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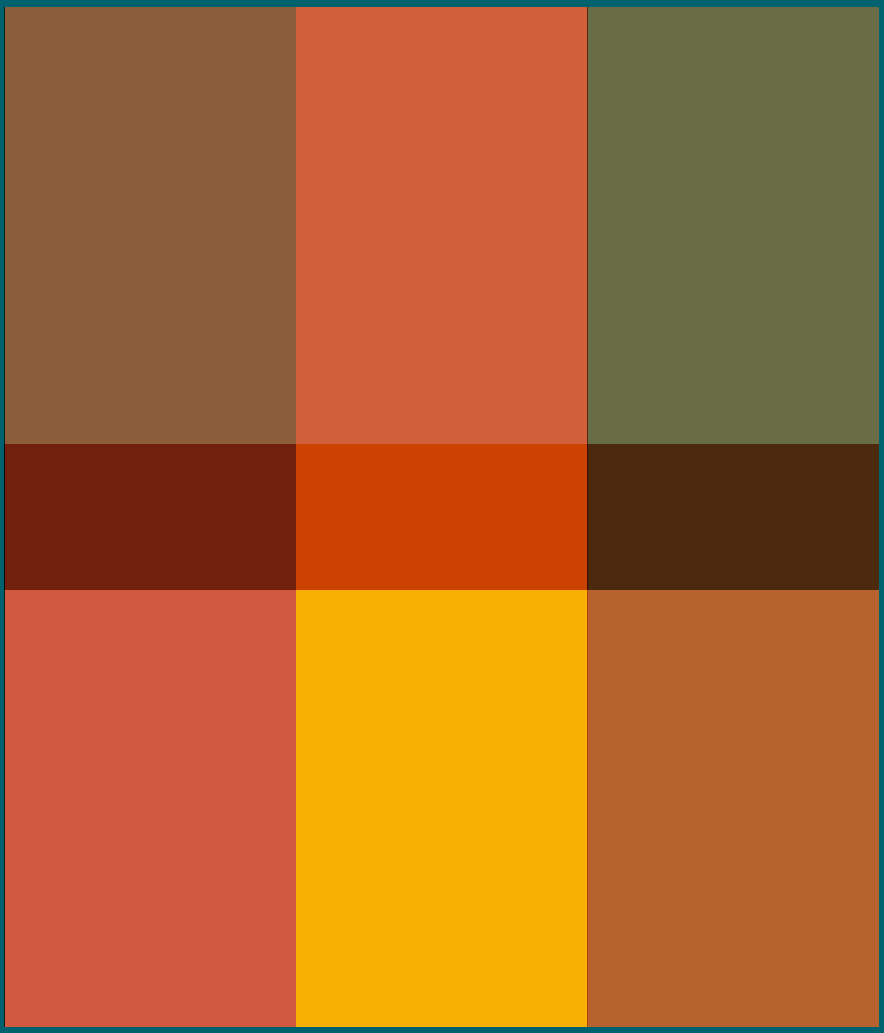

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C·E·P·S *Journal*

Center for Educational Policy Studies Journal
Revija Centra za študij edukacijskih strategij

The CEPS Journal is an open-access, peer-reviewed journal devoted to publishing research papers in different fields of education, including scientific.

Aims & Scope

The CEPS Journal is an international peer-reviewed journal with an international board. It publishes original empirical and theoretical studies from a wide variety of academic disciplines related to the field of Teacher Education and Educational Sciences; in particular, it will support comparative studies in the field. Regional context is stressed but the journal remains open to researchers and contributors across all European countries and worldwide. There are four issues per year. Issues are focused on specific areas but there is also space for non-focused articles and book reviews.

About the Publisher

The University of Ljubljana is one of the largest universities in the region (see www.uni-lj.si) and its Faculty of Education (see www.pef.uni-lj.si), established in 1947, has the leading role in teacher education and education sciences in Slovenia. It is well positioned in regional and European cooperation programmes in teaching and research. A publishing unit oversees the dissemination of research results and informs the interested public about new trends in the broad area of teacher education and education sciences; to date, numerous monographs and publications have been published, not just in Slovenian but also in English.

In 2001, the Centre for Educational Policy Studies (CEPS; see http://ceps.pef.uni-lj.si) was established within the Faculty of Education to build upon experience acquired in the broad reform of the national educational system during the period of social transition in the 1990s, to upgrade expertise and to strengthen international cooperation. CEPS has established a number of fruitful contacts, both in the region – particularly with similar institutions in the countries of the Western Balkans – and with interested partners in EU member states and worldwide.

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Revija Centra za študij edukacijskih strategij je mednarodno recenzirana revija z mednarodnim uredniškim odborom in s prostim dostopom. Namenjena je objavljanju člankov s področja izobraževanja učiteljev in edukacijskih ved.

Cilji in namen

Revija je namenjena obravnavanju naslednjih področij: poučevanje, učenje, vzgoja in izobraževanje, socialna pedagogika, specialna in rehabilitacijska pedagogika, predšolska pedagogika, edukacijske politike, supervizija, poučevanje slovenskega jezika in književnosti, poučevanje matematike, računalništva, naravoslovja in tehnike, poučevanje družboslovja in humanistike, poučevanje na področju umetnosti, visokošolsko izobraževanje in izobraževanje odraslih. Poseben poudarek bo namenjen izobraževanju učiteljev in spodbujanju njihovega profesionalnega razvoja.

V reviji so objavljeni znanstveni prispevki, in sicer teoretični prispevki in prispevki, v katerih so predstavljeni rezultati kvantitavnih in kvalitativnih empiričnih raziskav. Še posebej poudarjen je pomen komparativnih raziskav.

Revija izide štirikrat letno. Številke so tematsko opredeljene, v njih pa je prostor tudi za netematske prispevke in predstavitve ter recenzije novih publikacij.

The publication of the CEPS Journal in 2025 and 2026 is co-financed by the Slovenian Research and Innovation Agency within the framework of the Public Tender for the Co-Financing of the Publication of Domestic Scientific Periodicals.

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Contents

Review

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Editorial

The third issue of volume fifteen of the CEPS Journal is not a focus issue. It is devoted to thematically diverse papers by 31 authors from six different countries: Indonesia, the Philippines, Saudi Arabia, Ethiopia, Croatia and Slovenia. The papers discuss various educational areas, including science education, arts education, preschool teacher education, educational psychology, pedagogy and educational leadership practices, reflecting the broad scope of research in education. The CEPSj issue concludes with a book review.

Recent research in education emphasises the complexity of learning, development and leadership across different educational levels and disciplines. Studies examining student goals suggest that choices made in upper secondary education have a strong influence on higher education goals, highlighting the importance of timely and well-informed guidance during critical transitions. Research on science literacy and scientific creativity in primary school students indicates gaps in procedural knowledge but also shows that integrating the arts into STEM curricula can promote problem solving and creative thinking. In arts and music education, experiential learning is proving to be key, and activities such as remodelling artworks, providing inclusive opportunities for students with disabilities, and engaging students in distance learning – especially during a pandemic – have been shown to promote deeper understanding and motivation, with digital tools and the home environment playing an important role. Teachers' beliefs and professional practices are critical to promoting developmentally appropriate teaching, while targeted professional development can improve the implementation of adequate teaching approaches. In higher education, distance education in emergencies raises ethical and practical challenges related to equity, quality and assessment. Finally, research on academic leadership shows that personality traits, particularly conscientiousness and openness, significantly predict effective leadership practices. Taken together, these studies underscore the interplay of student competencies, teacher beliefs, instructional design, learning environments and leadership in shaping educational outcomes, providing important evidence for policy, curriculum development and teacher education.

The first paper in this issue, *Examining the Dynamic Nature of Pupils' Educational Aspirations: A Longitudinal Mixed-Model Study* by Boris Jokić and Zrinka Ristić Dedić, describes the results of a fully integrated longitudinal mixed-model study examining the nature of changes in, and interaction between, the upper secondary and higher education aspirations of Croatian pupils. The results indicate significant changes in upper secondary aspirations and stable higher education aspirations over time. Qualitative analyses indicate five patterns of

upper secondary education aspirations and three patterns of higher education aspirations. Analysis of the interaction between aspirations at different educational levels suggests that upper secondary aspiration mediates students' aspiration for higher education. These results suggest that special effort is necessary in order to inform students about their educational options at both the upper secondary and higher education levels.

Written by Matija Purkat and Iztok Devetak and entitled *Fifth-Grade Students' Science Competencies: An Opportunity to Rethink Further Education for Science Competence*, the second paper deals with the science competences of fifth-grade students (ages 10 and 11 years) in Slovenia. The science content researched in this study comprises chemical concepts, such as aqueous solutions, states of matter and nutrition. In addition, there is an examination of attitudes towards science and their role in the construction of science competence. The results reveal that procedural knowledge is the least developed aspect among students, while it is also confirmed that attitude components play an important role in interpreting overall science competency test achievements. The authors suggest emphasising a holistic view of the development of science competencies: knowledge, skills and attitude.

The third paper, *Secondary School Students' Response to Learning the Concept of the Destruction and Transformation of an Artwork into Another Artwork in the Visual Arts Class* by Daša Bojc and Robert Potočnik, introduces the concept of destruction and transformation into secondary school art education as a potential way of incorporating conceptual and contemporary artistic practices. Following this aim, secondary school students created an initial artwork (ready-made) as a prerequisite for its subsequent destruction and transformation into a new artwork. The results showed that in-depth discussions of conceptual foundations led to a predominantly positive student attitude towards contemporary artworks. The students did not only understand but also internalised the essence of these artworks, as was vividly reflected in their practical artistic expressions.

The next paper is by Shanaia Marie Fernandez, Pauline Kaye Madelo, Ray Anne Lu Suico, Jas Felicisimo Cane, Joy Magsayo, Mae Capuyan, Nyet Moi Siew and Dharel Acut and is entitled *Thinking What No One Else Has Thought: Investigating the Scientific Creativity of Primary School Students in a Science Class*. It addresses the scientific creativity level of 23 primary school students. The results show that the students have an evenly distributed range of scientific creativity levels: eight have a low scientific creativity level, eight have an intermediate scientific creativity level, and seven have a high scientific creativity level. The students were the most scientifically creative in creative science problem solving. The authors recommend integrating the arts into the STEM curriculum in order to help

develop students' scientific creativity, thus supporting conclusions presented in the second paper of this issue.

Entitled *Primary School Students' Attitudes Towards Distance Music Learning* and authored by Jasna Šulentić Begić, Amir Begić and Daria Kurtić, the fifth paper aimed to determine primary school students' attitudes towards distance music learning. A total of 503 seventh- and eighth-grade students from general education primary schools completed an online survey. The results show that the majority of the students feel that they found suitable conditions for distance music learning, that their parents and school were supportive, that they were satisfied with the digital tools, and that they saw themselves as successful learners. The overwhelming majority of the students believe that they acquire the same knowledge through distance learning as they do at school, and that distance music learning does not require a lot of effort or cause stress.

The sixth paper in this issue is by Misahun Shumetu Taye, Fituma Yadasa Kana and Tesema Regassa Jekil and entitled *Preschool Teachers' Role and Beliefs about Developmentally Appropriate Practice: A Systematic Literature Review*. This review paper examines a total of 14 studies that match the inclusion criteria. The results indicate that preschool teachers play various roles in promoting developmentally appropriate practice: creating a safe and supportive learning environment, providing diverse learning experiences customised to the specific needs and interests of each child, working in collaboration with families to ensure that children receive the necessary support at home, and advocating for the needs of young children and their families. The beliefs of preschool teachers regarding developmentally appropriate practice are attributed to various factors, including their personal experiences as learners, their professional development, the culture of the preschool or school where they work, and the availability of resources and support to implement developmentally appropriate practice. The findings highlight the importance of preschool teachers having a strong understanding of developmentally appropriate practice and being able to implement it effectively in their classrooms. Moreover, it is crucial to provide preschool teachers with professional development opportunities that can enhance their beliefs about developmentally appropriate practice and help them learn how to implement it effectively in preschool settings.

The main goal of next paper, which is entitled *Distance Learning and Teaching in Group Settings at Primary Music Schools in Slovenia* and authored by Jerneja Žnidaršič and Matic Trčko, was to determine music teachers' self-assessment of ICT competences and their use of teaching methods, strategies, techniques and assessment methods. The participants reported no problems using most ICT tools and resources during the Covid-19 pandemic. In general, they

were most confident with videoconferencing tools and least confident when recording explanatory videos unaccompanied by oral explanation. In the planning and implementation of the teaching process, they least frequently used activities of music creation and playing Orff instruments. More specifically, lessons in Music Preparatory most frequently included listening activities, while classes in Music Theory and Solfeggio focused on the transmission of theoretical musical and formal knowledge. Overall, the teachers mainly resorted to synchronous and frontal instruction. In terms of the evaluation and assessment of students' musical abilities, skills and knowledge, they most frequently employed oral assessment, as well as student-produced recordings of rhythmic and melodic exercises.

The eighth paper also deals with aspects of Covid-19 distant learning, focusing on the teaching process in university education studies. Written by Tatjana Hodnik, Janez Vogrinc and Janez Krek and entitled *Are the Benefits of Emergency Remote Education Truly Benefits? Ethical Dilemmas and Research Results on Emergency Remote Education from the Perspective of Prospective Teachers and the Foundations of Pedagogical Study Programmes*, the study presents an analysis of changes in the implementation of the pedagogical process during emergency remote education from the students' perspective, and an examination of the extent to which emergency remote education provided equal opportunities for students. The results show that the success of students in their studies depends on the technical conditions and the environment; that rapid transitions from one type of studying to another (from emergency remote education to hybrid or entirely at the faculty) are not recommended; that the teaching process was based on the concept of face-to-face teaching, partly adapting to different conditions on this basis; and finally, that the "desire for comfort" entered into the assessment of the quality and fairness of the educational process.

The goal of the study presented in the next review paper, entitled *Arts Education for Children with Disabilities: A Systematic Literature Review* by Lia Mareza, Mumpuniarti, Suwarjo, Ali Mustadi and Dinar Sari Eka Dewi, is to provide a knowledge map of the intellectual framework in the field of arts education for students with disabilities. The results of the review indicate the existence of three themes in the research of arts education for children with disabilities, all of which are presented in the paper.

The last paper in this issue of the CEPSj is by Mohammed Ali Assiri and entitled *The Big Five Factors of Personality Traits and Leadership Practices of Academic Department Chairs: A Predictive Study*. As the title suggests, it deals with the big five factors of personality traits that can predict academic department chairs' leadership practices. The results show that different factors (described in the paper) predict different aspects of department chairs' leadership competences.

The study concludes that academic leaders are required to consider personality traits as an important dimension in selecting and assigning academic department chairs and other academic leaders at all levels of higher education institutions.

The present issue concludes with a book review by Nevenka Maras, who discusses the book *Učenci s posebnimi potrebami in medvrstniško nasilje* [Special Needs Students and Peer Violence], written by Milena Košak Babuder, Vesna Bilić, Nika Obed, Tanja Virant and Milena Valenčič Zuljan, published in 2024 by the Faculty of Education, University of Ljubljana, (ISBN 978-961-253-322-9).

Iztok Devetak

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Examining the Dynamic Nature of Pupils' Educational Aspirations: A Longitudinal Mixed-Model Study

Boris Jokić*[1] and Zrinka Ristić Dedić[2]

This paper describes the results from a fully integrated longitudinal mixed model study examining the nature of, changes in, and interaction between the upper secondary and higher education aspirations of Croatian pupils. The research was carried out over two academic years in which pupils approached the transition from single-structure elementary (primary and lower secondary) education to differentiated upper secondary education. The qualitative part of the study centred on an in-depth exploration of the educational aspirations of 30 pupils from five schools using a series of 118 semi-structured interviews. The quantitative part consisted of repeated questionnaire administration (N = 823) while pupils progressed to the final year of elementary education. Generalised Estimating Equations for Repeated Measures Outcome and Latent Curve Growth Modelling procedures indicate significant changes in upper secondary aspirations and stable higher education aspirations over time. Qualitative analyses indicate five patterns of upper secondary education aspirations and three patterns of higher education aspirations. Analysis of the interaction between aspirations at different educational levels suggests that upper secondary aspiration mediates a pupil's aspiration for higher education. These results suggest that special effort is necessary in order to inform pupils about their educational options at both the upper secondary and higher education levels.

Keywords: upper secondary educational aspirations, higher education aspirations, mixed model design, longitudinal research

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Preučevanje dinamične narave izobraževalnih aspiracij učencev: longitudinalna študija z mešanim modelom

Boris Jokić in Zrinka Ristić Dedić

Ta članek opisuje rezultate popolnoma integrirane longitudinalne študije z mešanim modelom, ki je preučevala naravo, spremembe ter interakcijo med srednješolskimi in visokošolskimi aspiracijami hrvaških učencev. Raziskava je bila izvedena v dveh šolskih letih, v katerih so učenci prehajali iz enostrukturnega osnovnošolskega izobraževanja (razredna in predmetna stopnja) v diferencirano srednješolsko izobraževanje. Kvalitativni del raziskave se je osredinil na poglobljeno raziskovanje izobraževalnih aspiracij 30 učencev iz petih šol z uporabo niza 118 polstrukturiranih intervjujev. Kvantitativni del je obsegal ponavljajoče se izpolnjevanje vprašalnikov (N = 823), medtem ko so učenci napredovali v zadnje leto osnovnošolskega izobraževanja. Postopki posplošenih ocenjevalnih enačb za rezultate ponovljenih meritev in modeliranja latentne krivulje rasti kažejo na pomembne spremembe aspiracij v srednješolskem izobraževanju in stabilne aspiracije v visokošolskem izobraževanju skozi čas. Kvalitativne analize kažejo na pet vzorcev aspiracij za srednješolsko izobraževanje in tri vzorce aspiracij za visokošolsko izobraževanje. Analiza interakcije med aspiracijami na različnih izobraževalnih ravneh kaže, da imajo aspiracije na srednješolski ravni vpliv na učenčeve aspiracije za visokošolsko izobraževanje. Ti rezultati kažejo, da si je treba posebej prizadevati za obveščanje dijakov o njihovih izobraževalnih možnostih na ravni srednješolskega in visokošolskega izobraževanja.

Ključne besede: srednješolske izobraževalne aspiracije, visokošolske izobraževalne aspiracije, zasnova mešanega modela, longitudinalna raziskava

Introduction

For decades, research indicated that pupils' educational aspirations predict future educational and more general life selections and consequences. In general, those with advanced educational aspirations are more motivated and have better achievement, as do pupils for whom parents and educational workers have higher educational expectations and aspirations (Gorard et al., 2012; Gutman & Akerman, 2008). Research demonstrating the relationship between educational aspirations and identity formation, subjective well-being, and risk for social exclusion (Bynner, 2000; Kintrea et al., 2011) suggests that the importance of educational aspirations extends beyond the field of education. All of this may lead to the understanding that the educational policy should strongly focus on the raising of aspirations (Harrison & Waller, 2018). However, as Bowers-Brown et al. (2019) suggest, these policy efforts often ignore that the development of aspirations is influenced by the structural and material context of the individual pupil.

There are, however, several reasons for which caution should be exercised in accepting the notion that a positive correlation, or even causal relationship, exists between higher educational aspirations and positive educational and personal outcomes (e.g., Khattab, 2015). First, there are challenges in establishing the causation between aspirations and outcomes; as Gutman and Ackerman (2008) recognise, aspirations can be considered equally as a predictor and a product of a pupil's aptitudes, personal attributes, socialisation, and experiences. Second, and of particular importance to this paper, the relationship between educational aspirations and outcomes is particularly dynamic, shifting throughout the educational journey due to the interaction between individual development and the increasing complexity of educational and other social contexts (Gottfredson, 2002). The dynamic interaction between the individual and various contextual spheres in shaping educational aspirations becomes particularly relevant as pupils approach the transition points in education. During these important educational periods, pupils are being increasingly exposed to diverse information about their own prospects, achievements, and the relative strength of their abilities and talents within a wider group while also being faced with high levels of uncertainty in regard to placement in higher education levels. Under these conditions, it might be expected that educational transition prompts a (re)evaluation of pupils' outlooks regarding self-concept, abilities, ambitions, goals, and, in turn, both upper secondary and higher education aspirations.

This point becomes particularly relevant in educational systems, such as Croatian, Slovene, Serbian, and others in Southeastern Europe, where a single-structure elementary education is followed by a differentiated upper secondary

education system in which some programmes imply obligatory attendance of higher education, some offer optional attendance, and others do not allow for vertical mobility towards higher education (Lovšin, 2014; Pešikan & Ivić, 2016). In such systems, the link between upper secondary and higher education aspirations, rarely empirically examined, becomes of vital importance for capturing the complexity of the concept of educational aspirations.

To date, operationalisations of educational aspiration have not adequately captured the complexity of the relationship between educational aspirations and various factors stemming from the individual, peers, family, school, and wider society (e.g., Khattab, 2015; McCuloch, 2017). Typically, educational aspirations have been operationalised by considering the duration of formal education one aspires to complete, where attending or gaining a university degree is calibrated to higher levels of educational aspiration. For several reasons, such operationalisation of a complex concept seems simplistic. First, it implies a conceptualisation of educational aspiration that is exclusively focused on progression in formal education and the attainment of formal qualifications. An even more compelling argument for questioning such an operationalisation stems from the debatable notion that more years of schooling and academic titles from tertiary education institutions can be directly equated with qualitatively higher aspirations. Individuals and groups may hold qualitatively different perspectives about what education is, what it incorporates, and what its role in fulfilling more general life aspirations is. Furthermore, operationalisations examining individual aspirations to attend a higher education institution alone are becoming insufficiently discriminative in light of increasing access to higher education in the most developed countries (Schoon, 2010). Croatia is not an exception to this trend; data indicates that 67% of eligible pupils become higher education students immediately upon completion of upper secondary education (Jokić & Ristić Dedić, 2014).

Based on the conceptualisation proposed by Jokić & Ristić Dedić (2013), educational aspirations are defined as

> […] the ambitions and goals pupils hold with regard to both immediate and future educational experiences and outcomes. Educational aspirations are related to educational achievement, but they might also be tied to the pupils' cognitive and conative development or various other educational and personal elements. The educational aspirations of pupils are extremely diverse and constantly changing in interaction with the environment. (p. 27)

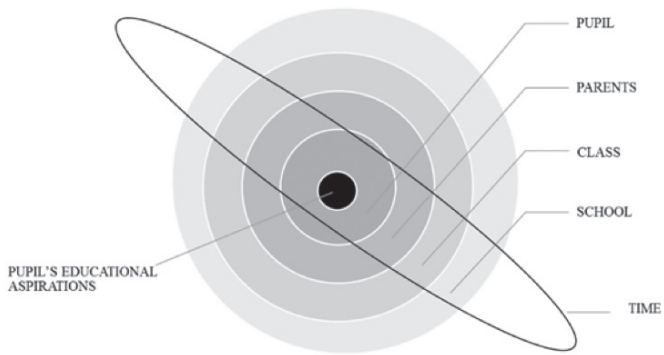
This definition is sufficiently broad to address the multidimensional, contextual, and developmental nature of pupils' educational aspirations and to

allow for a methodologically diverse examination of pupils' educational aspirations during the transitional period between elementary education and differentiated upper secondary education.

The literature strongly emphasises the contextual nature of pupils' educational aspirations (Berrington et al., 2016; Gutman & Akerman, 2008). Findings suggest that pupils' educational aspirations are shaped by the characteristics of the pupil and his/her educational experiences, as well as through pupils' interactions with parents, peers, schools, and communities and the influences of the current economic situation and wider socio-cultural and media forces. As such, the formation and development of pupils' educational aspirations might be envisaged inside a broader ecological system grounded largely on Bronfenbrenner's (1993) ecological paradigm and model. In Bronfenbrenner's model, the individual is positioned at the centre of the ecological system. In our research, the previously defined educational aspirations are located at the centre of the model. This system (Figure 1) is divided into four socially organised subsystems, representing a set of nested and interrelated structures that are potentially associated with pupils' educational aspirations. These structures vary from the immediate individual characteristics of the pupil to the more remote school environment and resemble Bronfenbrenner's dimensions, ranging from the microsystem to the macrosystem. The interaction of individual characteristics and those stemming from parental and school contexts gains complexity as pupils progress through their education. Consequently, the complexity of this interaction influences their educational aspirations in non-linear ways. Of particular importance to our work is the existence of a chronosystem as a time-based dimension influencing the entirety of the ecological system. As pupils approach educational transition points, the salience of aspirations increases at all levels.

Figure 1

Conceptual framework of pupil's educational aspirations



The literature offers extensive insight into the possible determinants of pupils' educational aspirations (e.g., Eccles & Wigfield, 2002; Gorard et al., 2012; Gutman & Akerman, 2008). In our paper, we focus on an exploration of the nature of pupils' educational aspirations and their determinants arising at the most proximal level (i.e., the pupil) that influence upper secondary and higher educational aspirations over time.

The simplistic nature of current operationalisations of educational aspirations has also been associated with the almost exclusive use of single-method research designs. Arguably, the dominance of quantitative over qualitative approaches and the lack of mixed method designs combining both quantitative and qualitative approaches has not allowed for an exploration of the complex nature of educational aspirations. Recently, there has been more frequent use of longitudinal research designs on large data sets, allowing for the exploration of aspirational change over the course of education (e.g., Baker et al., 2014; Berrington et al., 2016; Khattab, 2015; McCulloch, 2017). However, there is a need for more studies aimed specifically at educational aspirations that are longitudinal in character in both quantitative and qualitative components.

The context of the Croatian education system

The present study is conducted in the context of the Croatian education system as an example of the system in which single-structure elementary education is followed by a differentiated upper secondary education. Single-structure elementary education consists of eight years of compulsory schooling and encompasses both primary (4 years) and lower secondary (4 years) levels. It is almost completely state-funded, and enrolment is based on catchment area. The transition to upper secondary education, when pupils are 14–15 years of age, is based primarily on a selection process grounded on school achievement in grades 5–8. The Croatian upper secondary education consists of two major forms of vocational (VET) programmes (3- and 4/5-year programmes) and general secondary education programmes ('gymnasium'). Although not compulsory, nearly all pupils enrol in an upper secondary programme, and once enrolled, nearly all pupils successfully complete upper secondary education. Upon completion of a 3-year VET programme, pupils acquire a professional qualification but are not allowed to apply for higher education institution (HEI) programmes without completing a bridge programme. This group of pupils represents 22.9% of the cohort of all upper secondary school graduates. Pupils successfully completing 4-year or, in the case of a small number of health programmes, 5-year VET programmes acquire a professional qualification and are also eligible to apply to all HEI programmes. Graduates of these programmes

represent the largest proportion of the pupil cohort, attended by 46.4% of pupils. Completion of a gymnasium program, achieved by 30.7% of Croatian pupils, does not result in a professional qualification. Instead, pupils are expected to attend HEI programmes in order to gain such qualifications (Ministry of Science and Education of Croatia, 2021).

The present study

This paper presents the results of research that applied a fully integrated longitudinal mixed model design over the course of two academic years. Using both qualitative and quantitative data, it aims to probe the nature of and changes to the educational aspirations of Croatian pupils as they approach the transition from single-structure elementary (primary and lower secondary) to differentiated upper secondary education. The complex and dynamic nature of educational aspirations emphasises the need to consider the possibility that pupils' educational aspirations may qualitatively differ at diverse time points as pupils approach this transition. In this paper, we consider educational aspirations as they relate to both upper secondary and higher education, with particular focus on the crucial link between the two. Our examination of change in educational aspirations focuses on *intra-individual* change as pupils progress through the final two grades of elementary education. More specifically, this paper aims to answer the following research questions:

What is the nature of pupils' upper secondary and higher education aspirations at the end of elementary education?
How do pupils' upper secondary and higher education aspirations change as they approach transition to differentiated upper secondary education?
In what ways are the upper secondary and higher educational aspirations related as this transitional period approaches?

The proposed research aims to make an original contribution to existing knowledge by examining the educational aspirations of pupils still attending undifferentiated elementary education. By combining and integrating quantitative and qualitative methods in all research phases, the project also aims to offer new methodological perspectives for researching educational aspirations. Finally, the proposed project aims to offer more complex conceptualisations and operationalisations of educational aspirations by relating upper secondary and higher education aspirations.

Method

Participants

The quantitative part of the research was conducted in 23 elementary schools in Zagreb (of the 107 schools, this represented 21.9% of all elementary schools in Zagreb). This group of schools constituted a random sample stratified by school location (districts in the city of Zagreb). This sampling strategy ensured that districts differing in size and socioeconomic structure were represented in the school sample. A minimum of two 7th-grade classes in participating schools were randomly selected, and all pupils from these classes were invited to participate. Informed written consent was obtained from the pupils' parents. Pupils participated in the research at three time points over two academic years: at the end of 7th grade, at the midpoint of 8th grade, and at the end of 8th grade. Altogether, 1021 pupils participated in the first data collection point, 1012 in the second and 992 in the third data collection point at the end of the 8th grade. In total, 823 pupils participated in all three data collection points, and their responses were analysed. Attrition of participants over the course of the three data collection waves was not substantial, in which the proportion of those participating in all waves represented 80.6% of the total number of pupils participating in the 1st time-point. The data collection points were six months apart.

Qualitative data were collected over the course of two academic years with 30 pupils from five schools in Zagreb that were not a part of the quantitative research sample. To achieve maximum variation, schools were purposively selected for participation based on existing data collected during previous research efforts regarding various school-level socio-economic and educational indicators (e.g., educational status of parents and enrolment of pupils in different streams of upper secondary education). Of the five participating schools, one could be characterised as having 'higher parental educational status – higher gymnasium enrolment', two schools had 'diverse parental educational status of parents – diverse enrolment', and two had 'lower parental educational status – higher VET enrolment'. In each school, six 7th-grade pupils participated in the study. Teachers and researchers selected participants using pre-established selection criteria based on gender and previous school attainment (3 categories – above average, average, and below average).[3] Data were collected at four equidistant time points: at the midpoint and at the end of 7th grade and at the midpoint and end of the 8th grade. In total, 118 interviews were conducted, recorded, and transcribed. All data in both research phases were collected by the research team members.

3 Notation of the interview excerpts is based on gender (G=Girl; B=Boy) and the ordinal number of interview- one to four.

Instruments

Quantitative phase

In this paper, the analysis of two items examining educational aspirations that were included at all three time points is presented. These items were part of the tailor-made questionnaire examining pupils' well-being, competence and self-efficacy beliefs, subjective value of the school subjects, beliefs and expectations about future personal life and career.

Pupils' aspiration for higher education

Pupils were asked to specify the level of agreement with the item. *In the future, I want to pursue higher education.* Answers were recorded on a Likert-type scale: 1 – *I strongly disagree*; 2 – *I disagree*; 3 – *I neither agree nor disagree*; 4 – *I agree*; 5 – *I strongly agree*.

Pupils' aspiration for upper secondary education

Pupils were asked to provide a response to the question *What type of upper secondary education would you like to pursue?* Possible responses were: *3-year VET education, 4-year VET education, Gymnasium education (general upper secondary education); I still don't know*.

Quantitative data were analysed using various statistical procedures. Responses to the item probing aspirations for upper secondary education were treated as nominal and analysed with SPSS GEE (Generalised Estimating Equations for Repeated Measures Outcome) procedures (Heck et al., 2013; IBM SPSS, 2018). The patterns of individual changes in pupils' responses over time are also presented graphically with a lasagne plot. Responses to the item examining pupil aspirations for higher education were analysed with Latent Growth Curve Modelling in MPlus (Muthen & Muthen, 2020; Wang & Wang, 2019) with the aim of examining the change in participants' answers over time. In order to identify differences in higher education aspirations (measured at the final time-point) among groups of pupils with different upper secondary aspirations (also measured at the final time-point), a non-parametric Kruskal-Wallis test followed by post-hoc procedures were conducted, and effect sizes were reported.

Qualitative phase

The themes discussed in pupil interviews stemmed from the conceptual framework of the study, as well as from data analyses occurring in previous data collection time points. Over the course of four interviews, participants were repeatedly asked about their upper secondary and higher education aspirations, the

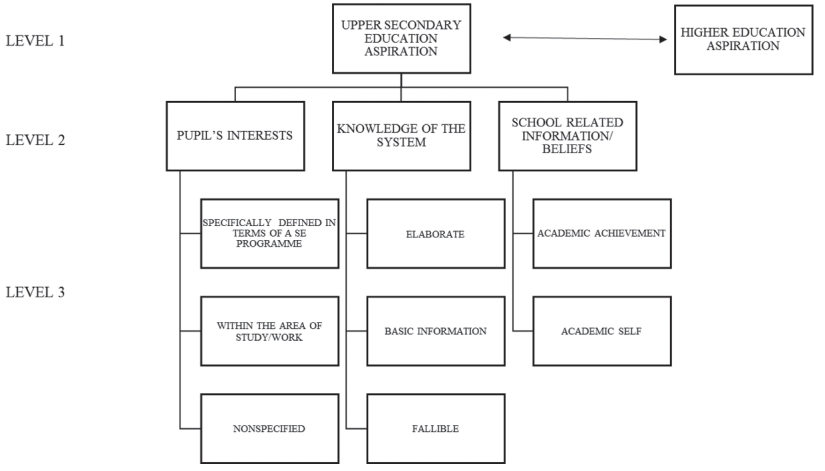
rationale behind their opinions, their views on the different streams of upper secondary education, the value of higher education, and the role of school, parents, peers, and significant others in forming and shaping their aspirations.

Interviews were transcribed and organised using NVivo software (QRC, 2018). Interview coding was conducted by research team members. The framework for analysis was grounded on the twelve tactics for generating meaning from interviews (Miles & Huberman, 1994) and a constant comparative approach, linking elements of inductive category coding with a simultaneous comparison of interview data with that collected from the quantitative phase of the study (Strauss & Corbin, 1998).

Analytical coding of interviews ensued in two stages. The first was grounded on theoretical and thematic coding of the data at higher levels of the coding scheme, while a more interpretative coding was embraced in the second stage. A hierarchical coding scheme consisting of three levels was developed and is presented in Figure 2.

Figure 2

Coding scheme used for the analysis of the qualitative data Research design



Research design

Within the longitudinal mixed model design, both qualitative and quantitative research phases were considered to be of equal importance. The longitudinal character allowed for an examination of change in educational aspirations over time. The first qualitative phase preceded the first quantitative phase and informed the initial questionnaire construction. From that point,

the qualitative and quantitative parts of the study ran concurrently and interactively influenced each subsequent phase as data analysis and inferences from previous time points proceeded. The quantitative phase consisted of the administration of a pupil questionnaire over three time points. All questionnaires were administered at schools during class time. At each time point the questionnaire consisted of items that were repeated at all three time points, while a number of additional items aimed at examining specific variables and concepts from the various spheres related to pupils' educational aspirations were added at certain time points. The qualitative part of the study centred on an in-depth exploration of the nature and formation of educational aspirations through a series of semi-structured interviews with pupils in their own schools; the interviews were, on average, 30 minutes in duration.

Results

Upper secondary education aspiration

Pupils' responses on questionnaire items inquiring about their aspirations for upper secondary education over the three data collection points are presented in Table 1.

Table 1

Distribution of pupils' responses about their upper secondary education aspirations

What type of upper secondary education would you like to pursue?	1st time-point	2nd time-point	3rd time-point
	%	%	%
I still don't know	24.5	13.9	4.5
3-year VET	5.7	5.7	7.9
4-year VET	25.9	33.0	40.3
Gymnasium	43.9	47.4	47.3

Overall, the results indicate high levels of aspiration for gymnasium education, with a relatively stable proportion of pupils aspiring for this type of upper secondary education in three research waves. This is followed by aspirations for 4-year VET education, where aspirations for this type of education (on a general level) increase over time. The proportion of pupils aspiring to pursue a 3-year VET education is relatively low. As expected, the number of those who are undecided about their preferred upper secondary educational path decreases significantly as the transition point approaches.

GEE modelling (Generalised Estimating Equations for Repeated Measures Outcome) using a repeated measure of upper secondary aspiration as categorical outcome (specifying multinomial distribution with cumulative logit link function) and time as a covariate show significant time effect (Wald Chi-Square = 9.40, $df = 1$, $p = .002$). Parameter estimates of the model are presented in Table 2.

Table 2

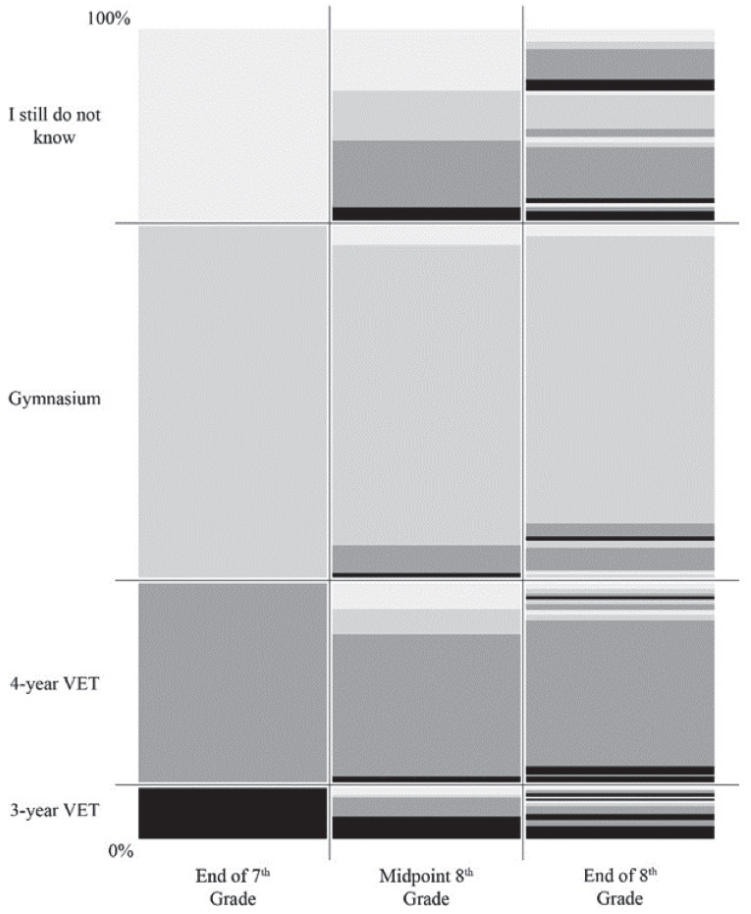
Parameter estimates for the model of pupils' upper secondary aspirations over time (aspirations are treated as a nominal variable, time-related variable as a covariate)

	Upper secondary aspiration	*B*	Std. Error	Wald Chi-Square	*df*	*p*	Exp (B)
Threshold	I still don't know.	-1.69	.075	507.18	1	<.001	.19
	3-year VET	-1.24	.071	301.81	1	<.001	.29
	4-year VET	.26	.069	14.27	1	<.001	1.30
Time		.08	.027	9.40	1	.002	1.09

Negative log odds coefficients suggest that over time, pupils were less likely to be in the categories 'I still don't know' and '3-year VET' education compared to the reference category of 'gymnasium'. A small but statistically significant positive coefficient comparing 4-year VET education to the gymnasium category indicates increased odds of being in the 4-year VET category over time.

The patterns of these changes in all 823 pupils' individual upper secondary education aspirations are also graphically represented in Figure 3. The first column represents individual responses in the first research wave. From there, the second and the third columns represent a choice of each pupil in the second and third research waves. The overall change in colours represents all 823 patterns.

Figure 3
Change in individual upper secondary education aspirations over time



As can be observed in Figure 3, the most frequent pattern of aspirations is one in which pupils aspire to pursue gymnasium education at all three time points (36.0% of the total sample), followed by a stable aspiration for pursuing 4-year VET education (16.9%). Smaller proportions of pupils exhibit a pattern in which they were undecided only at the first time-point (i.e., end of the 7th grade) but consequently formulated clear aspirations for 4-year VET education (7.3%) or gymnasium education (4.6%). In most cases, pupils who were undecided about their upper secondary education at the outset of the study opted for 4-year VET programmes at the end of the 8th grade. A change in aspirations over time is particularly present for those who reported an aspiration to pursue

3-year VET programmes in the 7th grade. Only 2.4% of pupils had stable aspirations for pursuing a 3-year VET education. At the end of the 8th grade, 1.5% of pupils in the sample were still undecided about the type of upper secondary education to which they aspired.

Our analyses of qualitative data over time allowed for triangulation and further exploration of the nature of changes in educational aspirations identified in the quantitative data. Specifically, this phase of the analysis enabled the identification of five patterns of upper secondary aspirations among pupils. These patterns will be discussed in the following sections.

1. *Firm gymnasium aspiration – pursuing defined academic interests*

This pattern is characterised by a firm aspiration for gymnasium education that is stable over the final two years of elementary education. Pupils exhibiting this pattern are all high achievers and frequently expressed specific interests in some discipline or school subject from the initial interview, as evidenced in the following interview excerpts:

> *'I was always great in Maths. I mean, at least everyone at home and here in school tells me so, and for me, mathematical gymnasium is a normal choice' (B, 1)*
>
> *'I am good in all subjects, but languages are something I really like, and I am not 100% sure, but 99% (laughs) I will go to a language gymnasium.' (G, 1)*

As interviews progressed, the aspirations of pupils in this category did not change, as evidenced in the words of one pupil from the third interview:

> *'As I told you twice already, it is only MIOC [prestigious mathematical gymnasium] for me. It's been like that from the 4th grade. My brother goes there, and my parents went there too.' (B, 3)*

Extremely high achievement that is characteristic for the pupils in this group allows them the privilege of choosing a gymnasium programme and even a particular school with no risk of failure at entry selection. In this case, high achievement is coupled with the identification and personal realisation of interest, specified through a particular area of study and specific gymnasium programme, and all information related to school is positive, thus reinforcing positive academic self-beliefs and aspirations. Interestingly, despite high levels of achievement and aspiration, most pupils in this group demonstrated comparatively low levels of knowledge about the upper secondary education system. As the realisation of these pupils' aspirations is certain, they do not feel the

need to explore other options. This is indicated in the words of one pupil from a more privileged school context:

> *'I know only of gymnasiums. I mean, there are schools for those not-so-good pupils, but I don't know about them.' (B, 1)*

2. *Firm gymnasium aspiration – delaying the choice*

From the first interview, a fifth of pupils expressed a general aspiration for gymnasium education but made no clear statement of their academic interests. These pupils, while consistently successful in school and holding a positive perception of their academic self, were unable to direct their aspirational choices towards specific academic domains:

> *'I would like to go to a general gymnasium. My parents tell me that I am good in foreign languages, but I am not sure.' (B, 2)*

In later interviews, this position became more clearly tied to the notion that general gymnasiums offered education with a wide academic reach. For these pupils, expressing a general aspiration to attend a gymnasium offered a means to delay making a more specific decision:

> *'I think I will go to a general gymnasium. These other types of gymnasiums I'm really not sure about. Why you need so many foreign languages and maths gymnasiums is the other extreme. For me, I think this choice is the best so I can see what to do with myself.' (B, 4)*

Also, in the words of another pupil from a different setting:

> *'I am not great at Maths. I mean, I have an A, but really…If I go to VET school, then I would be fixed to one work domain. And since I still don't know what to do, then it's a general gymnasium, and I still have four more years to decide' (G, 4)*

This excerpt also suggests a more refined understanding of the upper secondary system than that expressed by pupils in the previous group, which perhaps enables this pupil to make a more strategic decision regarding her educational pathway.

3. *Firm VET aspiration – pursuing clearly defined specific interest*

In contrast, a substantial number of pupils expressed an aspiration to pursue VET programmes from the very first interview. Pupils in this category varied in their educational achievement level and perception of their own abilities. For all pupils falling into this group, VET programmes were perceived to

be more aligned with their own attributes and interests, and more instrumental for achieving professional goals than gymnasiums:

> *'I don't aim for gymnasiums. I am more of a VET school type. More practical, if you get me.'(B, 1)*
>
> *'I feel it's better to go to these VET schools than to gymnasiums because you have a secure job when you're finished' (G, 3)*

In addition to the perceived instrumentality of VET education, pupils in this group also felt that VET education represented a better fit with their own interests:

> *'I am all into computers and things, and I am OK at school. But you know, why do I need to learn something like Latin or, I don't know, what if I want to learn about computers?' (B, 3)*

In this group, personal interests were more highly linked to a specific profession or area of work rather than an academic discipline such as maths or languages:

> *'I am very interested in aeroplanes, air traffic, and such. In fact, this is the only thing that I am interested in, so I would like to go to pilot and air traffic school' (B, 1)*

This stable aspiration for VET programmes is particularly evident among pupils who do not have the highest levels of educational achievement:

> *'In the end, I think I will go for a cook. Mom and I looked at the programmes, and that's it. I love to cook, and it's interesting for me. I mean I will have good pay, and it's in high demand on the market.' (B, 4)*

4. From undecided towards VET education

During the first interview (7th grade), a number of pupils expressed indecision regarding their upper secondary education aspirations. However, over subsequent interviews, this group arrived at a firmer position of aspiring towards either gymnasium or VET education programmes. In almost all cases, the latter group (those eventually expressing an aspiration to pursue VET education) demonstrated very limited knowledge of the upper secondary system in the initial interview:

> *'I don't know what types of high schools exist. There is this gymnasium close to our school. I know that. My mum always teases me that I will end up in a school for carpenters or garbagemen if I don't get good grades. This high school thing is really not my territory.' (B, 1)*

Apart from a relative lack of knowledge of future educational opportunities, this group of pupils was also characterised by generally lower levels of academic achievement. As such, the formation of their upper secondary aspiration was highly dependent on feedback received from the school in terms of academic performance during the final two years of elementary school. Eventually, these pupils align their aspirations to the level of expected and achieved academic outcomes:

> *'After all, it all depends on my grades. When it comes clear how I'll do, then we'll see.' (G, 3)*

For most of these pupils, the aspiration to pursue VET education was formulated in the 8th grade and was in tune with more general interests rather than an expressed interest in a specific subject included in elementary education:

> *'I was thinking about graphic school [school for graphic design] because I like to draw from I don't know when. You know sketches, little comics…' (B, 3)*

And in the words of another pupil from a different school during the fourth and final interview:

> *'Finally, I know. Technical school, computing programme. I mean, I knew in the 7th grade that I wanted to do something with ICT but I didn't know anything about high schools. So I talked with my mum, and she told me: "C'mon man, that's it. Go and search the Internet."' (B, 4)*

In addition to the insight these quotes provide in regard to the formulation of pupil aspirations, it is also important to note the influence of the familial sphere on aspiration formulation.

5. From undecided towards gymnasium education

This final profile included pupils who held an undecided position in the initial interview but eventually expressed an aspiration to attend a gymnasium. As was the case for those who later formulated aspirations for VET education, the aspiration expressed by this group seemed largely dependent on expectations regarding school achievement at the end of the final year of elementary education:

> *'I'm not sure. It depends on grades but, at the moment, I still don't know.' (G, 1)*

Over time, and as positive feedback regarding her own achievement accumulated, this pupil eventually arrived at the following position:

'I think I will go to the sports gymnasium because I'm good at karate. I think it's better because I will have more opportunities at university, or maybe I was thinking of the medical VET school for physiotherapists.' (G, 2)

By the end of the study, this pupil had eventually solidified her aspiration for attending a gymnasium. In her words, the important role of others in aspiration formulation among initially undecided pupils is again confirmed:

'I will go to the sports gymnasium. My friend goes there and tells me it's great.' (G, 4)

For pupils who initially express uncertainty about their educational aspirations, it seems that positive feedback in terms of their own academic performance received from school acts to reinforce their sense of academic self. Paired with the higher education aspirations held by these pupils, these self-perceptions played a vital role in the formation of their upper-secondary educational aspirations.

Higher education aspirations

Pupils' responses on questionnaire items inquiring about their aspirations for higher education over the three data collection points are presented in Table 3.

Table 3

Distribution of pupils' responses regarding their higher education aspirations

In the future, I want to pursue higher education.	1st time-point	2nd time-point	3rd time-point
	%	%	%
I strongly disagree	5.3	7.2	8.1
I disagree	5.6	4.4	3.6
I neither agree nor disagree	10.7	13.4	11.8
I agree	22.4	16.9	17.5
I strongly agree	56.0	58.2	58.9

Immediately evident in these results is the high level of higher education aspirations among all pupils, where 76.4% of the sample in the third time-point agreed that they wished to pursue higher education, and only 11.7% expressed disagreement with this statement.

Unconditional Longitudinal Growth Curve Modelling was applied to examine the change in pupils' higher education aspirations over time. The

observed values of pupils' aspirations over three data collection points were specified as a latent growth curve model with two latent variables: intercept (initial level) and slope (the rate of change over time). A description of the specified linear growth curve model of pupils' higher education aspirations is provided through the presentation of the means and variances of intercept and slope (Table 4).

Table 4

The means and variances of latent growth variables: Intercept and slope of pupils' higher education aspiration

Latent growth variables		Intercept	Slope
Mean	Estimate	4.15**	-.005
	S.E.	.035	.014
Variance	Estimate	1.14**	.09**
	S.E.	.072	.028
Correlation Intercept with Slope		-.12	

**$p < .01$

Goodness-of-fit indices suggested that the model fit the data adequately, as $\chi^2(1) = 1.183$, $p = .28$; RMSEA = .012; CFI = 1.0; TLI = 1.0; SRMR = .01.

The estimated mean value of the intercept at the end of the 7th grade was 4.15 ($p < .01$), indicating high initial levels of pupils' higher education aspirations. The variance of the intercept ($p < .01$) suggests significant variability in this score across pupils at the baseline level. The estimated mean of the slope was very close to zero ($p > .05$), indicating no change at the group level, specifically that the higher education aspirations of pupils did not significantly change as they progressed from the 7th to 8th grade of elementary education. However, the variance of the slope showed some variations between pupils in the rate of change over time ($p < .01$). The correlation between intercept and slope was -.12 and non-significant, indicating that the rate of change was not dependent on the initial level of pupils' higher education aspiration.

As expected, the higher education aspirations of pupils at the end of the 8th grade (3rd time-point) were significantly different between groups of pupils expressing different upper secondary aspirations ($H(3) = 348.47$, $p < .01$). In order to explore this finding in more detail, Mann-Whitney tests using Bonferroni correction were applied, indicating that all effects are reported at a $p = .008$ level of significance. All post hoc tests were significant with medium to large effect sizes. Pupils who aspire to gymnasium education have the highest level

of higher education aspiration, and pupils who aspire to 3-year VET education have the lowest.[4]

On the whole, these quantitative results were triangulated by data from the qualitative phase of the research, where a large majority of pupils also expressed an aspiration to attend higher education programmes in the future. Moreover, this analysis confirmed the stability of their position with regard to higher education aspirations. However, qualitative analyses also allowed for a more in-depth investigation of the specific nature of pupils' higher education aspirations and the varying ways in which upper secondary and higher education aspirations were interrelated. As a result of our analysis, these inter-relationships were categorised into three patterns, each of which will be discussed in turn in the following sections.

a. The Only Way Forward

This first pattern is characterised by views expressed by some pupils about the perceived inevitability of higher education. Many pupils spoke about higher education as 'the only way' to ensure positive life outcomes:

> *'I have to go to university, so I can have a job, make money and have something to live on.' (G, 1)'*
>
> *'It's, like, clear that you can't do anything in life without it [higher education].' (G, 2)*

As expressed by the pupils in these quotes, the aspirations of pupils to pursue higher education were often related to the instrumental and future-oriented goals of the individual pupil. For a considerable number of pupils, higher education was not only instrumental but also related to their own goal of self-realisation:

> *'I want to make something of myself and make some kind of career. If I study now, I will get into a better high school, and if I am good there, then I can enrol in a good university. And this is important for me because I have wanted to study medicine ever since I knew myself.' (G, 2)*

For the most part, the higher education aspirations expressed by this group are so deeply internalised that rarely do pupils express the sentiment

4 3-year VET – 4-year VET ($U = 1875.00$, $p < .001$, $r = -0.55$); 3-year VET – Gymnasium ($U = 282.50$, $p < .001$, $r = -0.77$); 3-year VET – Don't Know ($U = 228.50$, $p < .001$, $r = -0.71$); Gymnasium – 4-year VET ($U = 32554.00$, $p < .001$, $r = 0.51$); Gymnasium – Don't Know ($U = 3170.00$, $p < .001$, $r = -0.41$). The only exception was a post-hoc test comparing the responses of those opting for 4-year VET education and those who still did not know to which type of secondary education they aspired ($U = 5756.00$, $p > 0.05$).

that, in pursuing their aspirations, they are fulfilling familial expectations. Similarly, in only a few cases did pupils express the idea of pursuing higher education as a means for personal growth:

> *'I want to study because I want to have better knowledge and help people.' (G, 4)*

b. Looking Both Ways

For another group of pupils, aspiration to pursue higher education was linked to upper secondary aspirations for VET education. For these pupils, this combination was explained as the most satisfactory choice in that it offered both the possibility of attending higher education and entering the labour market:

> *'In my opinion, this is the best option [VET]. Some kids don't get it. You can work, but if you want, you can also go to university.' (B, 3)*

This open position is also one that was communicated to some pupils by their families:

> *'My parents told me that they [employers] are now looking more for people with higher education. And then we talked, and Dad told me I can still go to uni after VET school and at the end I think I will go.' (B, 4)*

c. Straight to Work

The third secondary-higher education aspirational pattern to become evident in our analysis is characterised by a lack of higher education aspiration, most often combined with firm aspirations for 3-year vocational education. In this group, pupils often expressed the perception that higher education represented a level of education incompatible with their personal characteristics:

> *'I don't see myself at uni. I'm not for that kind of thing. Now I just want to go to work.' (B, 1)*
>
> *'Oh no, uni. That's too much for me. Maybe high school is too much for me (laughs). I need something where I can work.' (B, 3)*

Strongly represented in the sentiments expressed by pupils holding this position is the aim to enter the labour market as soon as possible. Interestingly, however, the views expressed by this group also suggested a readiness, if necessary, to pursue higher education at a later stage:

> *'I don't know. Some people go to uni later, don't they? So if I need it, I will go.' (G, 3)*
>
> *'For me, this uni is just…I mean it's an opportunity, but you can work and pay for uni. You know, I work, and I pay for uni, but I also go out with*

friends, drinking and such. So, I could pay for that, but frankly, I don't want it because I want to work as soon as I can.' (B, 4)

Discussion

The findings of the present study revealed five underlying patterns in the educational aspirations expressed by Croatian pupils approaching the transition to upper secondary education. Both qualitative and quantitative results suggest that while, for some pupils, these aspirations are relatively stable during this period, the aspirations of other pupils are observed to evolve as they progress through the last two years of elementary education. Regardless of whether these aspirations were stable or changed over time, the findings indicate that the existence and development of pupils' specific interests, feedback about their academic performance and knowledge about educational options play a vital role in the formation of these aspirations. In general, pupils with clearly defined interests, regardless of their academic achievement, exhibited more specific upper-secondary education aspirations. For some, indecision in regard to upper secondary aspirations seems to be related to a lack of knowledge about the possibilities in upper secondary education or, in most cases, to the calibration of educational aspiration to one's own educational achievement. This is consistent with findings previously reported by Khattab (2015). The findings support the idea of the importance of the intrapersonal and interpersonal processes stemming from the pupils' microsystem and mesosystems on the formation and development of pupils' upper secondary aspirations (Bronfenbrenner, 1993; Grim et al., 2019).

Latent Curve Growth Modelling of the longitudinal data suggests that among Croatian pupils, higher education aspirations are high and stable over time. The difference in stability between upper secondary and higher education aspirations may be due to the time distance of the two. Perhaps one of the key findings stems from our analysis of the interaction between upper secondary and higher education aspirations, from which it might be argued that upper secondary aspiration mediates a pupil's aspirations for higher education. This would imply that the policy focus on raising higher education aspirations and ignoring upper-secondary ones may be fallible. Furthermore, thematic interview analysis revealed three patterns reflecting differing pupil perspectives in regard to higher education aspirations. In a context in which an aspiration to pursue higher education is becoming normative (Schoon, 2010), pupils nevertheless expressed differing views regarding the relative 'inevitability' of higher education. This confirms the argument that somewhat simplistic policy efforts

aimed at a generalised increase in educational aspirations are not likely to achieve their desired effects. In line with the suggestions of Bowers-Brown et al. (2019), the development of policy options should consider the context of both individual pupils and specific schools.

The results of the present study further suggest that current operationalisations used in quantitative research efforts are not sufficient nor adequate to fully capture the complexity of educational aspirations. Indeed, the use of mixed model designs, and those that entail a longitudinal element in particular, seem to be superior to single-method research for the examination of educational aspirations and should therefore be encouraged. The mixed model design employed in the present study enabled an in-depth exploration of the complex and multi-layered plethora of pathways and voices that lie behind the observed changes in upper secondary education aspirations and the overwhelming stability of higher education aspirations among Croatian pupils. As such, we would argue that the complexity of these voices should be considered in any consideration of educational aspirations by educational policy and failing to do so risks ignoring the valuable insight offered by these perspectives into the nature, determinants and evolution of aspirations as young people progress through their educational journey.

On a more practical level, the findings arising from the present study suggest that special effort is necessary in order to inform pupils about their educational options at both the upper secondary and higher education levels. This effort should incorporate more specific information, advice, and guidance, especially for those pupils who are not certain about their educational and career pathways (Robinson & Salvestrini, 2020). The diversity in both the patterns of pupils' aspirations and their development presented in the results suggest that these services should be tailored to the needs of individuals and groups of pupils, taking into consideration the expectations of youth and the ways they are influenced by their personal, social, economic, and cultural environments (Harrison, 2018). The results of the present study are relevant to the educational systems of many nation-states in southeastern Europe but also in those like Germany and Switzerland, which are characterised by strong differentiation and stratification (Gölz & Wohlkinger, 2019; Juttler et al., 2021).

The present study is characterised by several limitations. First, research was conducted in the Croatian capital where educational aspirations overall may be higher than in the rest of the country thus somewhat limiting the representativeness of its findings. Second, in its quantitative segment, the study uses traditional, and in this paper criticised, aspiration measures. Regardless of these limitations, by employing a longitudinal mixed model design, the study

addresses certain shortcomings of earlier studies and offers a meaningful contribution to this important field of research.

Conclusions

Overall, the research findings of this longitudinal mixed-model study of educational aspirations in the context of the Croatian education system demonstrated that pupils' upper secondary and higher education aspirations should be considered within a mutual interaction, where proximal aspirations regarding upper secondary education are clearly influenced by more distant higher education aspirations and vice versa. Over the two academic years during which pupils approach the transition from single-structure elementary education to differentiated upper secondary education, educational aspirations change at the intra-individual level and are under the influence of pupils' specific interests and the feedback they receive about their achievements but are also based on information pupils acquire about various educational programmes and streams from family, friends and the system. Together, this results in a large diversity of aspirational profiles that elude qualitative description of a 'single preferable educational pathway'. This diversity should be considered in the development of public policy regarding educational aspirations. Future research on aspirations should focus on the application of longitudinal designs to examine changes in aspirations in different educational systems and over longer periods, in particular during the transition to higher education and the labour market, when the interplay of factors stemming from various spheres of a broader ecological system might be even more complex.

Disclosure statement

The authors have no conflict of interest to declare.

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References

Baker, W., Sammons, P., Siraj-Blatchford, I., Sylva, K., Melhuish, E.C., & Taggart, B. (2014). Aspirations, education and inequality in England: insights from the effective provision of pre-school, primary and secondary education project. *Oxford Review of Education, 40*(5), 525–542. https://doi.org/10.1080/03054985.2014.953921

Berrington, A., Roberts, S., & Tammes, P. (2016). Educational aspirations among UK Young Teenagers: Exploring the role of gender, class and ethnicity. *British Educational Research Journal, 42*(5), 729–755. https://doi.org/10.1002/berj.3235

Bowers-Brown, T., Ingram, N., & Burke, C. (2019). Higher education and aspiration, *International Studies in Sociology of Education, 28*(3–4), 207–214. https://doi.org/10.1080/09620214.2019.1641307

Bronfenbrenner, U. (1993). The ecology of cognitive development: Research models and fugitive findings. In R. Wonziak & K. Fischer (Eds.), *Development in context: Acting and thinking in specific environments* (pp. 3–44). Erlbaum.

Bynner, J. (2000). *Risks and Outcomes of Social exclusion: Insights from Longitudinal Data.* Institute of Education, University of London. https://search.oecd.org/education/school/1855785.pdf

Eccles, J.S., & Wigfield, A. (2002). Motivational beliefs, values, and goals. *Annual review of psychology, 53*(1), 109–132. https://doi.org/10.1146/annurev.psych.53.100901.135153

Gölz, N., & Wohlkinger, F. (2019). Determinants of students' idealistic and realistic educational aspirations in elementary school. *Zeitschrift für Erziehungswissenschaft*, *22*(6), 1397–1431. https://doi.org/10.1007/s11618-019-00916-x

Gorard, S., See, B.H., & Davies, P. (2012). *The impact of attitudes and aspirations on educational attainment and participation*. Joseph Rowntree Foundation. https://www.jrf.org.uk/sites/default/files/jrf/migrated/files/education-young-people-parents-full.pdf

Gottfredson, L.S. (2002). Gottfredson's theory of circumscription, compromise, and self-creation. In D. Brown (Ed.), *Career choice and development* (4th ed., pp. 85–148). Jossey-Bass.

Grim, J., Moore-Vissing, Q., & Mountford-Zimdars, A. (2019). A comparative study of the factors shaping postsecondary aspirations for low-income students in greater Boston and greater London. *British Journal of Sociology of Education, 40*(6), 826–843. https://doi.org/10.1080/01425692.2019.1604208

Gutman, L., & Akerman, R. (2008). *Determinants of aspirations.* Centre for Research on the Wider Benefits of Learning, Institute of Education, University of London. https://discovery.ucl.ac.uk/id/eprint/1541614/1/Gutman2008 Determinants.pdf

Harrison, N. (2018). Using the lens of 'possible selves' to explore access to higher education: A new conceptual model for practice, policy, and research. *Social Sciences, 7*(10), 209, 1–21. https://doi.org/10.3390/socsci7100209

Harrison, N., & Waller, R. (2018). Challenging discourses of aspiration: The role of expectations and attainment in access to higher education. *British Educational Research Journal, 44*(5), 914–938. https://doi.org/10.1002/berj.3475

Heck, R.H., Thomas, S., & Tabata, L. (2013). *Multilevel modeling of categorical outcomes using IBM SPSS*. Routledge.

IBM SPSS. (2018). *SPSS Advanced Statistics* (Version 20). [Computer Software].

Jokić, B., & Ristić Dedić, Z. (2013). Conceptual Framework of the Decision Concerning the Use of Private Tutoring Services. In B. Jokić (Ed.), *Emerging from the Shadow – A Comparative Qualitative Exploration of Private Tutoring in Eurasia* (pp. 21–32). Network of Education Policy Centers.

Jokić, B., & Ristić Dedić, Z. (2014). *Postati student u Hrvatskoj [Becoming a student in Croatia]*. Agency for Science and Higher Education.

Jüttler, A., Schumann, S., Neuenschwander, M. P., & Hofmann, J. (2021). General or vocational education? The role of vocational interests in educational decisions at the end of compulsory school in Switzerland. *Vocations and Learning*, *14*(1), 115–145. https://doi.org/10.1007/s12186-020-09256-y

Khattab, N. (2015). Students' aspirations, expectations and school achievement: What really matters? *British Educational Research Journal, 41*(5), 731–748. https://doi.org/10.1002/berj.3171

Kintrea, K., St Clair, R., & Houston, M. (2011). *The influence of parents, places and poverty on educational attitudes and aspirations.* Joseph Rowntree Foundation. https://www.jrf.org.uk/sites/default/files/jrf/migrated/files/young-people-education-attitudes-full.pdf

Lovšin, M. (2014). The (Un) Attractiveness of Vocational and Technical Education: Theoretical Background. *Center for Educational Policy Studies Journal*, *4*(1), 101–120. https://doi.org/10.26529/cepsj.216

McCulloch, A. (2017). Educational Aspirations Trajectories in England. *British Journal of Educational Studies, 65*(1), 69–85. https://doi.org/10.1080/00071005.2016.1197883

Miles, M.B., & Huberman, A.M. (1994). *Qualitative Data Analysis (2nd Edition)*. Sage Publications Inc.

Ministry of Science and Education of Croatia. (2021). *Broj učenika. Školski e-Rudnik. [Number of pupils. Educational Database]*. https://mzo.gov.hr/istaknute-teme/ser-skolski-e-rudnik-3419/3419

Muthen, B., & Muthen, L. (2020). *Mplus* (Version 8.7). [Computer Software].

QRC International Pty Ltd. (2018). *NVivo* (Version 12). [Computer Software].

Pešikan, A., & Ivić, I. (2016). The sources of inequity in the education system of Serbia and how to combat them. *Center for Educational Policy Studies Journal*, *6*(2), 101–124. https://doi.org/10.26529/cepsj.90

Robinson, D., & Salvestrini, V. (2020). *The impact of interventions for widening access to higher education: A review of the evidence. TASO report*. Education Policy Institute. https://epi.org.uk/wp-content/uploads/2020/01/Widening participation review_EPI-TASO_2020.pdf

Schoon, I. (2010). Planning for the future: Changing education expectations for three British cohorts. *Historical Social Research/ Historische Sozialforschung, 35*(2(132)), 99–119. https://doi.org/10.12759/hsr.35.2010.2.99-119

Sparkes, J. (1999). *Schools, education and social exclusion.* LSE STICERD Research Paper No. CASE029. https://ssrn.com/abstract=1158920

Strauss, A., & Corbin, J. (1998). *Basics of Qualitative Research* (2nd Edition). Sage Publications Inc.

Wang, J., & Wang, X. (2019). *Structural equation modeling: Applications using Mplus*. John Wiley & Sons.

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Fifth-Grade Students' Science Competencies: An Opportunity to Rethink Further Education for Science Competence

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This paper deals with the science competences of fifth-grade students (ages 10 and 11 years) in Slovenia. The science content researched in this study comprises chemical concepts, such as aqueous solutions, states of matter, and nutrition. The science competence and science competencies that elementary school students are supposed to develop are defined. In the following, the concept of attitude towards science and its role in the construct of science competence is explained. The three components of science competencies of the 10- and 11-year-old students were measured using a knowledge test to cover content and procedural knowledge and a questionnaire to measure the attitude of students towards science. The findings reveal that procedural knowledge is the least developed among students. It is also confirmed that attitude components have an important role in interpreting overall science competency test achievements. In the conclusion, the holistic view of the development of science competencies (knowledge, skills, and attitude) is emphasised. Further study of the attitudes towards science in relation to science competence development in a broader way is suggested.

Keywords: elementary school students, science competence, competencies, content knowledge, procedural knowledge, attitudes towards science

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Naravoslovne kompetence učencev petega razreda: priložnost za ponovni razmislek o nadaljnjem izobraževanju za razvoj naravoslovnih kompetenc

Matija Purkat in Iztok Devetak

Ta prispevek obravnava naravoslovne kompetence učencev petega razreda (starosti 10 in 11 let) v Sloveniji. Naravoslovne vsebine, vključene v preizkusih znanja v raziskavi, se navezujejo na kemijske pojme, kot so: vodne raztopine, agregatna stanja snovi in prehrana. Opredeljene so naravoslovne kompetence, ki naj bi jih razvijali osnovnošolci. V nadaljevanju sta pojasnjena odnos do naravoslovja in njegov vpliv na konstrukt naravoslovne kompetence. Tri komponente naravoslovnih kompetenc 10- in 11-letnih učencev so bile merjene z uporabo preizkusa znanja, ki je zajemal vsebinsko in proceduralno znanje, ter anketnega vprašalnika za merjenje odnosa učencev do naravoslovja. Ugotovitve kažejo, da je pri omenjeni skupini učencev proceduralno naravoslovno znanje najmanj razvita komponenta naravoslovnih kompetenc. Potrjeno je tudi, da imajo komponente odnosa do naravoslovja pomembno vlogo pri interpretaciji skupnih dosežkov na preizkusu znanja naravoslovnih kompetenc. V zaključku je poudarjen celostni pogled na razvoj naravoslovnih kompetenc (znanje, spretnosti in odnos). Predlagano je nadaljnje raziskovanje odnosa do naravoslovja v povezavi z razvojem naravoslovnih kompetenc na širši ravni.

Ključne besede: osnovnošolci, naravoslovna kompetenca, kompetenca, vsebinsko znanje, proceduralno naravoslovno znanje, odnos do naravoslovja

Introduction

Competences are a construct that is difficult to define in an epistemological sense. The definitions of competences in the existing literature (among others, from the Directorate for Education, Employment, Labour and Social Affairs Education Committee (DeSeCo), 2002; European Commission, Directorate-General for Education, Youth, Sport and Culture, 2019; Illeris, 2009; Mausethagen, 2013; OECD, 2018) define it as an important ability to see and respond in accordance with a situation from the future, which is still unknown from the perspective of the present and cannot be recognised in advance, when competences are developed in the individual. That, in addition to the fact that recommendations are not clear on how competence development should be done on the national level, is why it is challenging to incorporate them into education (Halász & Michel, 2011).

Literature provides a distinction between qualifications and competencies, competences, and literacy. Qualification is the specific knowledge that enables the performance of an individual work (i.e., the profession). Definitions of competencies are centred on functionality, with a focus on the profession and specific knowledge and represent a practical orientation of competences by including all the individual's basic knowledge, skills, abilities, and attitudes (Brownie et al., 2011; Guthrie, 2009). Competences, unlike the first, should represent a set of skills, knowledge, and relationships with sufficient levels of development of critical thinking that enables an individual to succeed in new, previously unknown circumstances or contributes a good starting point and basic knowledge regarding the varied issues of present-day society (DeSeCo, 2002; European Commission, Directorate-General for Education, Youth, Sport and Culture, 2019; Radulović & Stančić, 2017). Comparison between scientific competence and science literacy is difficult and depends on the viewpoint of its use and epistemological background (Holbrook & Rannikmae, 2009; Laugksch, 1998; Miller, 1998; OECD, 2018, 2019a). However, both terms distinguish themselves from a focus on mere content acquisition and instead include the concept of significance, an understanding of the nature of science, the cultivation of individual traits, and the attainment of socio-scientific skills and values (Devetak, 2017; Holbrook & Rannikmae, 2009; Laugksch, 1998; OECD, 2018; OECD, 2019a). In addition, as indicated in both PISA Analytical Frameworks (OECD, 2018, 2019a), specific scientific competencies comprise science literacy in specific contexts requiring a certain grasp of science and technology. For that reason, scientific literacy can also be considered one of the key competences (Rychen & Salganik, 2003).

The Council of the European Union published eight key competences in its recommendation (European Commission, Directorate-General for Education, Youth, Sport and Culture, 2019). Simultaneously, all these key competences share the attributes of transferability and versatility.

For our research purposes, the competence in science, technology, and engineering (European Commission, Directorate-General for Education, Youth, Sport and Culture, 2019) represents the basis for the development of the competencies model used for measuring students' knowledge, skills, and attitudes. According to the adapted model of competences (European Commission, Directorate-General for Education, Youth, Sport and Culture, 2019; DeSeCo, 2002; OECD, 2018, 2019a), every competence predicts a developed database of content knowledge in the field of science, basic skills (procedural knowledge) and of course the attitude component of subject area to which each competence relates.

According to Krnel (2004a, 2004b), scientific skills constitute a crucial and foundational component of all competencies within the realm of science. The author here uses the term 'process skills', but these fall under the segment of procedural knowledge, as opposed to factual knowledge, according to Miller (1998). In the early stages of elementary school education, as described by Krnel (2004a, 2004b), students begin to acquire fundamental cognitive skills. These skills include activities such as sorting, arranging, attributing, scheduling in space and time, and using symbolic systems. As they progress, students further develop abilities related to systematic observation and experimentation, with a focus on conducting impartial and objective experiments. They also gain proficiency in handling information and formulating questions relevant to natural science procedures. By the end of the second three-year period in Slovenian elementary education, students should be prepared to engage in research activities, which involve the skills of prediction, hypothesis formulation, data presentation, and data integration, among others. This set of procedural knowledge is also acknowledged by other authors, including Smart (2017) and van Uum et al. (2016), who collectively highlight key competencies, such as questioning, observing, predicting, sorting, measuring, exchanging ideas, and interpreting gathered data.

The holistic view, indicated by the concept of competences, assumes that functionality, sensitivity, and sociality must be developed in an appropriate proportion in relation to the field of competence development (Illeris, 2007).

Motivation holds a significant position in the decision-making processes concerning specific learning behaviours (*inter alia* Illeris, 2007; Juriševič, 2005; Ryan & Deci, 2000; Schiefele & Rheinberg, 1997). The components of

motivation are, therefore, a motivational construct, which can be analysed from the student's learning behaviour or from what the student says.

The often accompanying term 'attitude towards science' is a component that is difficult to measure (Reid, 2006) although important in the observed relationship with both procedural and content knowledge (e.g., Lee & Kim, 2018; OECD, 2018; Zulirfan et al., 2018). One of the fundamental documents in its updated version defines attitude as what it describes as a starting point and mindset when acting and responding to ideas, persons, or situations (European Commission, Directorate-General for Education, Youth, Sport and Culture, 2019). A systematic review of research on interest, motivation, and attitude conducted by Potvin and Hasni (2014) recognises attitude as a construct consisting of three components: cognitive, affective, and behavioural, encompassing inclinations, either positive or negative, towards an object. Juriševič et al. (2010), in their questionnaire of students' attitudes towards Chemistry, suggest two main components to measure: interest and self-concept. The latter is supported by Pintrich and Schrauben's (1992) Social Cognitive model of Student Motivation, in which the student's engagement in learning in school is conditioned by motivational and cognitive components. Student's learning self-concept and interest in learning fall under the motivational components (right there).

Previous research has identified a favourable relationship between students' attitudes towards science learning and their academic achievements in secondary school (Narmadha & Chamundeswari, 2013) and that self-concept was a more reliable predictor of achievement (Guo et al., 2016). A meta-analysis of research on the correlation between science knowledge and attitude towards science (Allum et al., 2008) revealed a modest positive correlation between general attitudes towards science and general knowledge of scientific concepts. This correlation exhibits variability depending on cultural factors and the specific domains of science and technology (*inter alia,* Allum et al., 2008; Guenther & Weingart, 2016; Lee & Kim, 2018).

As mentioned earlier, content knowledge (Miller, 1998) represents the third component of the construct of competences (DeSeCo, 2002; Key Competences, 2002; OECD, 2018). Contents that are discussed in the school environment (and represent the focus of our research on the content knowledge part) are determined by curricula. The Slovenian Curricula for Science and Technology (Vodopivec et al., 2011) provides a wide range of topics to be taught in school. Our research focused on the three basic groups of content: environmental issues, nutrition, and chemical substances and aqueous solutions.

Environmental issues represent an important content in the school subject Science and Technology in Slovenian elementary schools. As some

research suggests (*inter alia* Alaydin et al., 2013; Treagust et al., 2016). students need constant reminders that environmental issues are important for them to understand the environment in which they are living. The lower the level of this topic coverage, the lower students' knowledge, leading to adequate levels of concern that can steer their behaviour in the future. A Slovenian study reveals a decline in students' environmental attitudes from the fourth to the seventh grade, whereas altruistic environmental concerns exhibited a notable increase with advancing grade levels (Torkar et al., 2021).

Students' concern about the environment is also related to their personal environment (home situations, parents' and other caregivers' behaviours, parents' education level, family's income, school environmental education experiences, etc.) (Alaydin et al., 2013). According to Salleh et al. (2016), older students than those participating in this research exhibit a considerable degree of knowledge regarding environmental issues and maintain a moderate level of awareness concerning environmental issues.

Similar to the knowledge and attitudes towards environmental issues, nutrition knowledge can be improved through intervention (Lakshman et al., 2010; Wall et al., 2011). Some studies based in schools with low socioeconomic settings indicated that behaviour can be improved with nutrition education (Shen et al., 2015), while others proved the opposite (de Villiers et al., 2016). While the primary aim of the study was not to measure the environmental awareness or nutrition concerns of students, our intention here is to emphasise the significance of these contents, their current integration within the educational process, and the reasons behind the inclusion of these in the science knowledge test.

A cross-age study on the students' (13- to 17-year-olds) understanding of the basics of aqueous solutions and their components conducted by Çalık and Ayas (2005) suggests that students have difficulties describing and using the concepts of solution, solvent, and solute. Additionally, students experience difficulties in bridging the gap between their understanding of matter and everyday life experiences (Blanco & Prieto, 1997; Çalık & Ayas, 2005). Furthermore, some studies in Slovenia have indicated that even among older students (14-year-olds), misconceptions about certain fundamental concepts in chemistry are observed (e.g., Slapničar et al., 2018). Krnel et al. (2003 & 2005) similarly contend that children should acquire an understanding of matter and objects. The process of discerning various substances through actions assists them in uncovering distinct properties. Their research affirmed that children progressively construct more sophisticated schemas, enabling them to differentiate between extensive and intensive properties and, consequently, between objects

and matter. As they accumulate more experiences, they become proficient in identifying properties of matter that remain consistent regardless of the matter's form and classifying it accordingly. In addition, according to Urbančič and Glažar (2012), older students can provide accurate descriptions and explanations of experiments after a certain period, provided they possess a genuine comprehension of the fundamental scientific concepts involved. The students' descriptions of their experiments can serve as a means to pinpoint particular misconceptions.

According to Chang and Hsin (2021), self-explanation triggers inferences that students generate independently to comprehend the information, thus stimulating independent thinking and prompting them to delve deeper into the provided information. This technique can be employed to address students' knowledge gaps in a particular science domain (Chang & Hsin, 2021). Self-confidence assessment and self-explanation require that the student do similar; in the first case, the assessment of how strongly he/she believes in the solution proposed, while in the second case, he/she must also be able to explain it. Therefore, it is important for a study with a focus on measuring knowledge achievement to check the self-confidence and self-explanation abilities of students.

Research problem and research questions

Science competences represent the centre of our research problem. No research with a direct focus on the array of science competencies (with the focus on specific chemical concepts) of 10- and 11-year-old students has been done in Slovenia or, as far as the accessible literature is regarded internationally. In contrast, research has been conducted concerning scientific literacy and accompanying attitude components (e.g., OECD, 2019a, 2019b), correlations between attitudes towards science learning and procedural knowledge (e.g., Zulirfan et al., 2018), correlations between attitudes towards science learning and level of scientific knowledge (e.g., Lee & Kim, 2018), and attitudes toward science and perceptions of the nature of science among elementary school students (e.g., Toma et al., 2019). Additionally, a systematic review has been conducted focusing on interest, motivation, and attitudes towards science and technology at the K-12 level (Potvin & Hasni, 2014). We should also highlight another study from Slovenia, which focused on a more specific subset of science competence. The primary objective of this study was to investigate whether project-based learning offers more favourable conditions for enhancing students' skills when compared to conventional instructional methods (Pešakovič et al., 2014). Most

of these studies focused on the competences of students older than those of our participants. Therefore, no specific suggestions were yet articulated on 1) which science competencies should be developed with students at age ten or eleven and 2) what is the most appropriate way of identifying them. Hence, the primary objective of this paper is to assess the science competencies of a specific group of students. Following the fundamental theoretical construct of competences being comprised of three components: knowledge, skills, and attitudes (DeSeCo, 2002; European Commission, Directorate-General for Education, Youth, Sport and Culture, 2019; OECD, 2018, 2019a); these are recognised as dimensions within which we should measure science competences of 10- and 11-year-old students. The common set of factual knowledge of specifically selected chemical concepts in a science context, science skills achievement and a component of attitude towards science is what is assumed to constitute science competencies of 10- and 11-year-old students.

Following the research problem, the main research questions are:

1. What is the overall level of fifth-grade (10- or 11-year-old) students' science competence, and are there statistically significant differences in science competence between male and female students?
2. What is the nature of students' attitudes towards learning science when they are grouped according to their overall achievements in science tests?
3. Is there a statistically significant correlation between students' confidence level in correctly solving the specific task and their science knowledge test measuring content and procedural knowledge achievements?

Method

Participants

The research was conducted in two schools in the Central Slovenian region. The sample consists of four mixed-gender classes of fifth-grade students. A different teacher has been teaching every class. Altogether, 77 fifth-grade elementary school students participated in the study. Of these, 34 (44.2%) were female, and 40 (51.9%) were male students. Three students did not give information on their gender. Most participants were between the ages of 10 (48.1%) and 11 (48.1%). There were two (2.6%) students aged 12. It should be noted that the older students were repeating the fifth-grade programme. One student did not give information on his age. Students were invited to voluntarily take part in the study, and written consent from their parents or caregivers was obtained for their child's involvement in the research.

The elementary school programme in fifth grade requires three school hours (45 min) per week in the subject of Science and Technology. Lower-grade students (from first to third grade) have three school hours in the subject Learning about the Environment. In fourth grade, students also have three hours of Science and Technology per week. Therefore, students have already attained a certain level of experience with experiments, observing and discussing different natural phenomena, and similar skills. At this age, students should be familiar with basic concepts in environmental issues, nutrition, and chemical substances and aqueous solutions. For comparison, students in fifth grade have four hours of Math, three hours of Sports and five hours of Slovene Language per week.

Instruments

In this research, five sets of variables were measured: the student's individual interest in the subject-specific learning field, the student's self-concept for the subject-specific learning field, the student's science content knowledge, the student's procedural knowledge, the student's confidence level in solving the specific task in the achievement test, and the gender. The latter acts as an independent variable.

Independent variables questionnaire was incorporated into the science knowledge test (SKT). It measured students' content knowledge and their scientific skills. The second instrument was the Student's Attitude towards Science Questionnaire (SASQ), which measured students' individual interest in science and their self-concepts in science.

Science knowledge test (SKT)

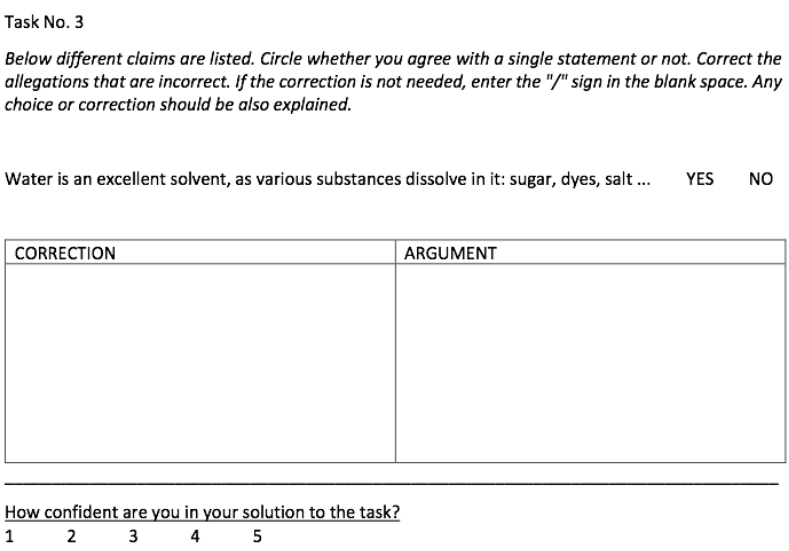
The assessment, which assesses both content knowledge (CK) and procedural knowledge (PK), consists of ten tasks. Each of these tasks is broken down into smaller subtasks to facilitate evaluation. In this context, each subtask corresponds to one of Bloom's taxonomy levels, as outlined by Anderson et al. (2001=. These levels can be categorised into three groups: the first level involves remembering, the second level encompasses understanding and applying, and the third level encompasses analysing, evaluating, and creating. As mentioned earlier, our research focused on the three basic contents. An example of the task covering aqueous solutions is shown in Figure 1. An example of the task covering nutrition is in Figure 2, and an example of the task covering environmental issues is in Figure 3.

The knowledge test had a total of 42 points as the maximum achievable score. Out of this total, students could earn 14 points in tasks at the first

level, which corresponds to 33.3% of the total score. In the second-level tasks, students could achieve 25 points, making up 59.5% of the total score. Lastly, in the third-level tasks, students had the opportunity to earn 3 points, constituting 7.1% of the overall score. Shares of different taxonomy levels are based on the model suggested by Razdevšek–Pučko (2002). In the self-evaluation tasks, students needed to evaluate their confidence in their answers for every task and potential subtask (i.e., twenty-two times during solving the knowledge test). All items consist of a five-point scale about their confidence level. The scale ranges from not confident at all (1) to completely confident (5).

Figure 1

Example of Task No. 3: content on aqueous solutions.


Task No. 3

Below different claims are listed. Circle whether you agree with a single statement or not. Correct the allegations that are incorrect. If the correction is not needed, enter the "/" sign in the blank space. Any choice or correction should be also explained.

Water is an excellent solvent, as various substances dissolve in it: sugar, dyes, salt ... YES NO

CORRECTION	ARGUMENT

How confident are you in your solution to the task?

1 2 3 4 5

Figure 2

Example of Task No. 6: content on nutrition.

Task No. 6

Read the text. Answer the question by circling the letter before the correct choice of menu. Write a short justification of your choice on lines.

Josh is a fifth-grader who has a very busy schedule. After his school, he has regular basketball training at the basketball club three times a week, and he has music school lessons twice a week. With all the responsibilities, of course, he must also do his regular homework, study, and spend some free time with peers.

Below you have his afternoon schedule for Wednesday. What meal do you recommend for lunch that day?

First, circle the correct choice of the menu offered and then justify it.

WEDNESDAY		LUNCH
end of lessons: 13.45 lunch: 14.10 (at home) basketball training: 15.00-17.00 homework: 17.40-18.40 revision of school lessons: 18.45-19.30 dinner: 19.30 free time: 20.00-20.30 preparing for bed: 20.30 bedtime: 21.00	**A**	**MENU 1** beef soup salad with pieces of roast chicken fruit and cereal bar
	B	**MENU 2** pizza four seasons ice-cream
	C	**MENU 3** broccoli soup potato with flat meatballs pancakes with chocolate spread

Justification of your choice:

_____

_____

_____

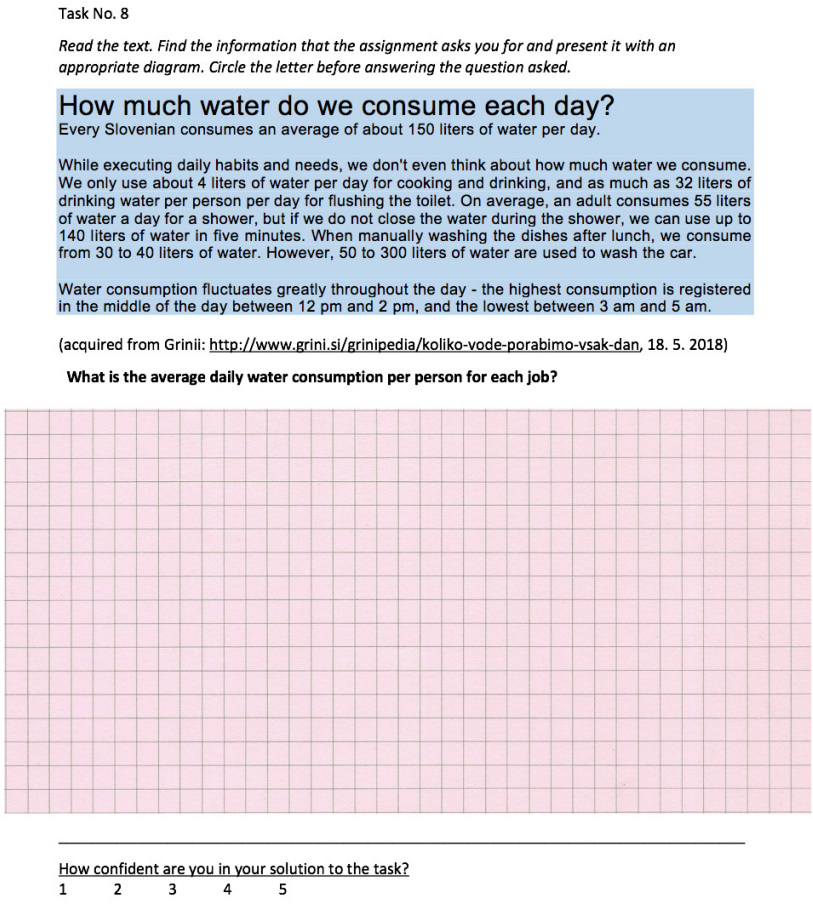
_____

How confident are you in your solution to the task?

1 2 3 4 5

Figure 3

Example of Task No. 8: content on environmental issues.



Task No. 8

Read the text. Find the information that the assignment asks you for and present it with an appropriate diagram. Circle the letter before answering the question asked.

How much water do we consume each day?

Every Slovenian consumes an average of about 150 liters of water per day.

While executing daily habits and needs, we don't even think about how much water we consume. We only use about 4 liters of water per day for cooking and drinking, and as much as 32 liters of drinking water per person per day for flushing the toilet. On average, an adult consumes 55 liters of water a day for a shower, but if we do not close the water during the shower, we can use up to 140 liters of water in five minutes. When manually washing the dishes after lunch, we consume from 30 to 40 liters of water. However, 50 to 300 liters of water are used to wash the car.

Water consumption fluctuates greatly throughout the day - the highest consumption is registered in the middle of the day between 12 pm and 2 pm, and the lowest between 3 am and 5 am.

(acquired from Grinii: http://www.grini.si/grinipedia/koliko-vode-porabimo-vsak-dan, 18. 5. 2018)

What is the average daily water consumption per person for each job?

How confident are you in your solution to the task?

1 2 3 4 5

The validation of the SKT was assured via the examination of the instrument by a researcher in the field of science education and two science teachers (content validity and criterion validity). The instrument was checked for internal consistency (Taber, 2017). In the study, the Cronbach alpha coefficient for the knowledge test scale (10 items) was .85. The Cronbach alpha coefficient for the six-item scale for content knowledge was .81, and it had a mean inter-item correlation of .99. The Cronbach alpha coefficient for the four-item scale for procedural knowledge was .82, and it had the mean inter-item correlation of .93. For the confidence level scale (10 items), the Cronbach alpha coefficient was .95.

As mentioned, SKT was comprised of tasks measuring PK and CK. There were four tasks measuring students' PK. Task No. 2 required students' skill in sorting; Task No. 8 required students' skill in handling information, presenting and interpreting data. Task No. 9 required students' skill in handling information and drawing conclusions. Task No. 10 required students' skill of experimentation. There were six tasks measuring students' content knowledge. The structure of the SKT from the content point of view is presented in Table 1. The classification of tasks, as shown in Table 1, allowed for an even representation of content sections as well as the distribution of various types of tasks throughout the knowledge assessment. Due to the practical nature of the content, environmental issues were examined in tasks assessing PK. The remaining content sections facilitated a more reliable assessment at the first taxonomy level. Similarly, such a knowledge assessment structure allowed for a gradual increase in complexity in the last two tasks.

Table 1

The structure overview of the SKT

Task No.	Type of knowledge tested in the item	Topic	Taxonomy level of the task
1	CK	properties of substances	2
2	PK	properties of substances, classification	2
3	CK	aqueous solutions	1 & 2
4	CK	aqueous solutions	2
5	CK	states of matter	2
6	CK	nutrition	2
7	CK	properties of substances	1 & 2
8	PK	environmental issues, interpreting the obtained data	2
9	PK	environmental issues, interpreting the obtained data	2 & 3
10	PK	environmental issues, planning an experiment	3

Student's Attitude towards Science Questionnaire (SASQ)

The adapted 15-item Attitude towards Science Questionnaire (Juriševič et al., 2010) was applied to measuring attitudes, which comprised two sets of items: one for students' individual interest (see Fig. 4) and another for their self-concept (see Fig. 5) towards science. All items consist of a five-point scale about individual interests or self-concept. Both scales range from strongly agree (5) to

strongly disagree (1). The Questionnaire's Cronbach's Alpha is .93 for individual interest and .90 for the self-concept scale.

Figure 4
Example of an item measuring students' self-concept.

8	In Science and technology, I learn the content very quickly.	5	4	3	2	1

Figure 5
Example of an item measuring students' individual interest.

13	Everything associated with science is drawing my attention.	5	4	3	2	1

Research design

The research followed a non-experimental and descriptive design, taking place in May 2018. All instruments were applied anonymously in classes in both elementary schools. Before the application of the instruments, signed parental or caregiver consents for participation in the research were collected. Those students whose parents or caregivers did not agree for their child to participate in the study were excluded from the final sample.

Participating students had the same conditions for completing the SASQ and the SKT. SKT was the first instrument applied, followed by the SASQ. Participants were informed that the data would be used for research purposes only, and the main objective of the study was explained. The students completed the SKT in 60 minutes. They had 15 minutes available for the SASQ.

The collected data underwent analysis using SPSS Version 22. Descriptive statistics were applied to reveal the level of science competences (knowledge, skills, and attitude towards science). To determine the differences in mean scores between groups based on gender (distribution of scores did not significantly differ from a normal distribution, as determined by the Kolmogorov-Smirnov test; female students $D(34) = .13$, $p = .16$, and male students, $D(40) = .09$, $p = .20$) the paired-sample t-test was used. To determine differences between CK and PK achievements (distribution of scores for PK did significantly differ from a normal distribution, according to the Kolmogorov-Smirnov test; CK achievements $D(77) = .08$, $p = .20$, and PK achievements $D(77) = .11$, $p < .05$), the Mann-Whitney test was used. Potential differences between average confidence level in CK tasks and average confidence level in

PK tasks (distribution of scores for both groups were significantly different from normal distribution, according to the Kolmogorov-Smirnov test; confidence level in CK tasks $D(77) = .16$, $p < .001$, and confidence level in PK tasks $D(77) = .12$, $p < .05$) were determined using the Mann-Whitney test. Potential differences between average self-concept and individual interest in science (distribution of expressed levels of specific attitude component were significantly different from a normal distribution, according to the Kolmogorov-Smirnov test, self-concept level $D(64) = .18$, $p < .001$, and individual interest level $D(64) = .12$, $p < .05$) were also determined using the Mann-Whitney test.

For determining the correlation between students' self-confidence and their SKT achievements, Pearson's coefficients were calculated. The same was done to determine the correlation between students' attitudes towards science and their SKT achievements.

Participating students were then grouped based on their SKT achievements. Students' categorisation into three groups based on their overall performance in the knowledge test was determined using statistical formulas. Group 1 comprised students with lower than $M - 1\ SD$ points, indicating poor overall science knowledge. Group 2 included students who scored between $M - 1\ SD$ and $M + 1\ SD$ points, representing average overall science knowledge. Group 3 consisted of students who scored above $M + 1\ SD$ points on the SKT, signifying superior overall science knowledge. An assumption of normality for some subsamples of data was violated using the Kolmogorov-Smirnov test. The level of reported individual interest in learning science in the group with poor overall science knowledge, $D(13) = .33$, $p < .001$, and the level of reported self-concept in the groups with poor overall science knowledge, $D(13) = .31$, $p < .05$, and with average overall science knowledge, $D(35) = .19$, $p < .05$, were significantly non-normal. An assumption of homogeneity of variance was also violated. For self-concept levels, the variances were significantly different in the three groups, $F(2, 55) = 7.31$, $p < .01$. Therefore, the Kruskal-Wallis test as a non-parametric alternative for One-Way ANOVA was conducted to explore the influence of these groups on attitude towards science. Statistical significance was defined as a minimum criterion for all computed mean differences, with a significance level set at $p \leq .05$. The findings are also presented with corresponding effect sizes. T-test results are reported with Cohen's d, results of Kruskal-Wallis test are reported with η^2.

Results

The results are listed according to the research questions. Every subtitle refers to one research question in the same order as listed in the Research Problem and Research Question parts of this study.

The overall level of fifth-grade students' science competence and differences in science competence between male and female students

The overall SKT score was compared according to gender differences to determine if science competence is significantly different between male and female fifth-grade students. The results show that there are no significantly different levels of developed overall science knowledge (expressed in %) between males and females, but female students are higher than male students on average score. There are also no significant differences in achievements in CK tasks between males and females nor in PK tasks between males and females. For more information, see Table 2. Nevertheless, it seems noteworthy to mention the slightly superior achievement of male students in PK tasks, unlike the otherwise predominant female students in CK task achievements. There are no significant differences between male ($M = 7.85$; $SD = 2.90$) and female students ($M = 9.21$; $SD = 3.12$) [$t(72) = 1.94$; $p = .06$] when comparing individual knowledge test results from tasks on Level 1. As before, it should be noted that in the group with superior overall science knowledge, male students performed slightly better in the third-level tasks (see Table 3).

Table 2

Differences between male and female students' achievements in SKT (overall, CK and PK)

SKT achievements	Gender	*M*	*SD*	*t*(72)	*p*
overall	Female	37.86	14.94	1.24	.220
	Male	42.33	16.15		
CK	Female	43.86	19.77	1.07	.287
	Male	48.75	19.22		
PK	Female	25.96	19.41	1.03	.309
	Male	21.60	16.76		

Table 3

Differences between male and female students' achievements in individual group comparisons

Group	Gender	*N*		Students' achievements in relation to the level of the task in SKT (expressed in %)		
				1	2	3
Poor overall science knowledge	Female	8	Mdn	35.7	14.0	.0
			IQR	30.4–42.9	12.0–15.5	.0–.0
	Male	9	Mdn	28.6	12.0	.0
			IQR	28.6–39.3	4.0–20.0	.0–.0
Average overall science knowledge	Female	19	Mdn	71.4	36.0	16.7
			IQR	64.3–85.7	28.0–38.0	.0–16.7
	Male	26	Mdn	57.1	34.0	16.7
			IQR	50.0–73.2	26.0–38.0	.0–33.3
Superior overall science knowledge	Female	7	Mdn	85.7	56.0	16.7
			IQR	85.7–100.0	48.0–60.0	.0–33.3
	Male	5	Mdn	71.4	56.0	33.3
			IQR	64.3–92.9	53.0–61.0	16.7–33.3

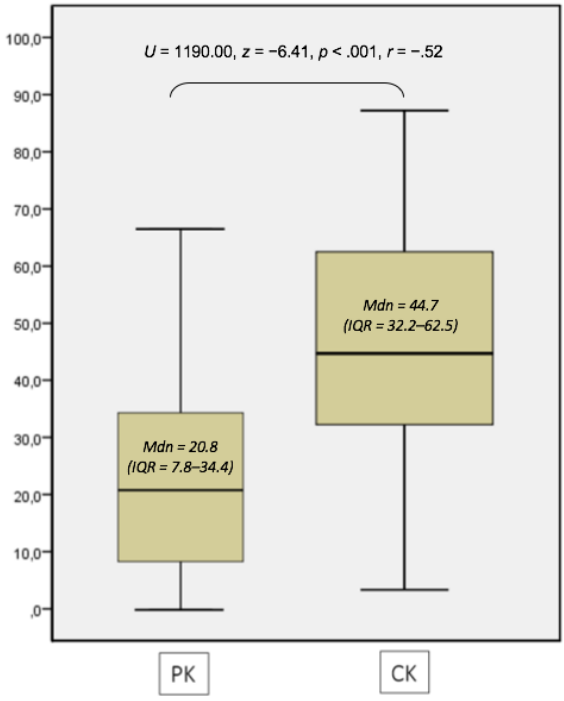
Note. The numbers in the column heading represent Bloom's taxonomy level: number 1 signifies the first level, encompassing remembering; number 2 signifies the second level, encompassing understanding and application; number 3 signifies the third level, encompassing analysis, evaluation, and creation.

Similar results also occurred in the attitude dimension of students' competence. There are no significant differences in self-concept between male (M = 4.02; SD = 1.12) and female (M = 3.67; SD = 1.40) students [$t(61)$ = -1.08; p = .29;] nor in individual interest in learning science between male (M = 3.85; SD = 1.16) and female (M = 3.34; SD = 1.19) students [$t(61)$ = -1.73; p = .09;]. Nonetheless, male students also expressed slightly higher self-concept and interest in learning science.

Students' results revealed that there is a large gap in students' achievements (in % of points achieved) between CK and PK tasks.

Figure 6

Students' achievements (in % of points achieved) in procedural knowledge (PK) tasks and content knowledge (CK) tasks.



In the CK tasks, the average percentage of achieved points was higher than in the PK tasks. A large interquartile range suggests there were major differences in achievements in PK tasks with a tendency towards lower values. Students' CK level was significantly higher than students' PK level.

Among tasks that measured CK, students achieved the highest score (in % of points achieved) in Task 4, by which their knowledge of solution chemistry was measured (M = 60.17, SD = 35.47). The task required recognition of the basic concepts that make up a solution and their attribution to substances in a given case. Students' lowest score (among CK tasks) was achieved in Task 6, which required knowledge of health and nutrition (M = 28.25, SD = 26.70).

Among tasks that primarily measured PK, students achieved the highest score (in % of points achieved) in Task 2, by which their process skills of sorting were measured (M = 40.26, SD = 49.36). Students' lowest score among PK tasks was achieved in Task 10, which required designing an experiment to compare the quality of air in different everyday spaces (M = 1.95, SD = 9.74). For more

information on individual tasks, see Table 4. Values are presented in percentages to facilitate a comparison of achievements across tasks.

Table 4

Individual results in tasks (in % of points achieved) with means, SD, and short descriptions.

Task No.	CK/PK	Content	*M*	*SD*
1	CK	properties of substances	51.6	31.2
2	PK	properties of substances, classification	40.3	49.4
3	CK	aqueous solutions	45.5	18.4
4	CK	aqueous solutions	60.2	35.5
5	CK	states of matter	39.0	49.1
6	CK	nutrition	28.3	26.7
7	CK	properties of substances	50.3	31.4
8	PK	environmental issues, interpreting the obtained data	21.6	22.6
9	PK	environmental issues, interpreting the obtained data	30.5	27.9
10	PK	environmental issues, planning of an experiment	2.0	9.7

Data comparison of the levels of expressed students' self-concept and students' individual interest in science has shown a slightly higher self-concept. Further analysis revealed that students did not express a significantly higher level of self-concept in science (Mdn = 4.00; IQR = 3.00–4.75) compared to individual interest in science (Mdn = 3.82; IQR = 2.98–4.48), U = 1699.00, z = -1.67, $p > .05$, r = -.15.

Students' attitude towards learning science when they are grouped according to their overall achievements in science test

First, a correlation was calculated to answer the research question that refers to the level of the correlation between students' attitudes towards science and SKT achievements. The data reveals that knowledge test achievements are strongly and positively correlated to the student's self-concept (r = .542, $p < .001$). Test performance is also positively related to the student's individual interest, with a coefficient of r = .828, $p < .001$.

As all the data suggested, there is a certain statistically significant correlation between SKT achievements, self-confidence, and dimensions of attitude, so further research had to be performed. According to the data, a high correlation exists between students' PK levels and both attitude components. The correlation coefficient is r = .334, $p < .05$ for individual interest and r = .523,

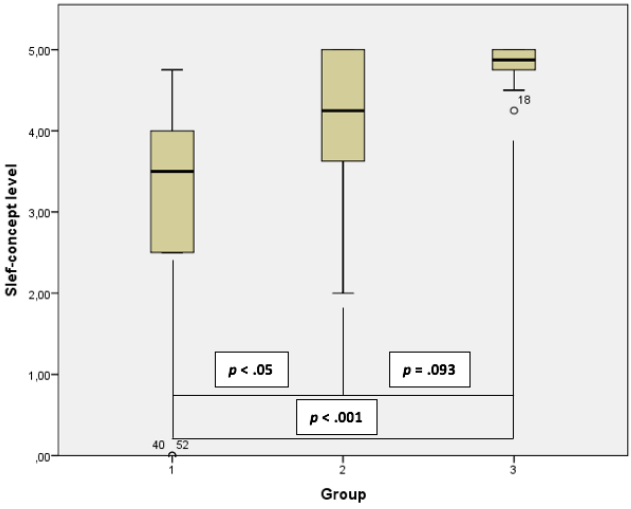
$p < .001$ for self-concept. A high correlation also exists between students' CK levels and both attitude components. The correlation coefficient is $r = .302$, $p < .05$ for individual interest and $r = .419$, $p < .01$ for self-concept.

There are significant differences in the attitude scores between students from groups with different science knowledge. Students with poor overall science knowledge were assigned to Group 1, students with average overall science knowledge to Group 2 and those with superior overall knowledge were assigned to Group 3 (Gp1, $n = 13$: poor overall science knowledge, Gp2, $n = 35$: average overall science knowledge, Gp3, $n = 10$: superior overall science knowledge).

Students' self-concept was significantly different between the groups of students with different overall knowledge test achievements, $\chi^2(2) = 15.740$, $p < 0.001$; $\eta^2 = .25$. Pairwise comparisons using Dunn-Bonferroni tests revealed that there is a statistically significant difference between the group with poor overall science knowledge (Gp1: *Mdn* = 3.50; *IQR* = 2.50–4.00) and the group with superior overall science knowledge (Gp3: *Mdn* = 4.88; *IQR* = 4.69–5.00) and between the group with poor overall science knowledge (Gp1: *Mdn* = 3.50; *IQR* = 2.50–4.00) and average overall science knowledge (Gp2: *Mdn* = 4.25; *IQR* = 3.50–5.00), but the group with average overall science knowledge (Gp2: *Mdn* = 4.25; *IQR* = 3.50–5.00) and the group with superior overall science knowledge (Gp3: *Mdn* = 4.88; *IQR* = 4.69–5.00) are not significantly different from one another (see Figure 7).

Figure 7

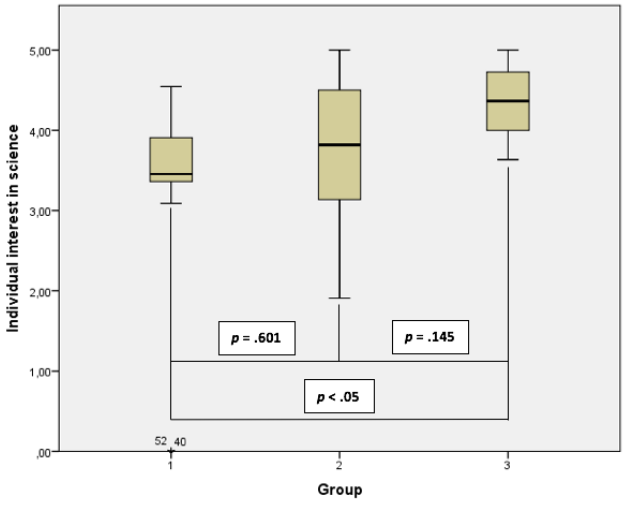
Comparison of self-concept level between groups (1 – poor overall science knowledge, 2 – average overall science knowledge, 3 – superior overall science knowledge)



Similar results can be determined for students' interest in science. It was affected by the groups, $\chi^2(2) = 7.212$, $p < 0.05$; $\eta^2 = .095$, although the effect size is fairly low. Pairwise comparisons using Dunn-Bonferroni tests revealed that a statistically significant difference is only between the group with poor overall science knowledge (Gp1: *Mdn* = 3.45; IQR = 3.23–3.95) and the group with superior overall science knowledge (Gp3: *Mdn* = 4.36; IQR = 3.98–4.80). The group with average overall science knowledge (Gp2: *Mdn* = 3.82; IQR = 3.09–4.64) is not significantly different from the other two groups. For more information, see Figure 8.

Figure 8

Comparison of individual interest in science level between groups (1 – poor overall science knowledge, 2 – average overall science knowledge, 3 – superior overall science knowledge)



Correlation between students' confidence level and their science knowledge test achievements

The results show that SKT achievement scores are statistically significantly correlated with the confidence level expressed by students while solving specific tasks ($r = .668$, $p < .001$). This means that the confidence level accounted for approximately 45% of the variation in science knowledge test scores. The average confidence level in CK tasks was significantly higher (*Mdn* = 4.15; *IQR* = 3.42–4.62) than in tasks that required mostly students' PK (*Mdn* = 3.56; *IQR* = 2.78–4.33), $U = 2160.50$, $z = -2.91$, $p < .05$, $r = -.23$. Comparing this with overall achievements in CK and PK tasks, it seems that students are sensitive

enough to doubt the correctness of their solutions for which their knowledge is relatively low.

A high correlation also exists between confidence level and both attitude components. The confidence level is, therefore, statistically significantly correlated with self-concept (r =.474, p < .001) and interest in learning science (r = .694, p < .001). This means that self-concept shares around 22.5%, and individual interest shares 48.2% of the attitude variability in expressed confidence.

Discussion

This research had two primary objectives: 1) initially, to establish the concept of science competence and the specific competencies that should be developed by fifth-grade students attending Slovenian public elementary schools, and 2) secondly, to measure the level of it among fifth-graders. The first research question refers to the level of fifth-grade students' developed science competences. According to the results, students have a deficit in PK rather than in CK. Students expressed that they are less convinced in their answers when the task requires their PK as opposed to their CK. However, they do signify the important fact that, among competencies, skills are not as developed as students' CK. According to the PISA 2018 results with a sample of students older than those in our research (OECD, 2019b), academic performance on their science literacy test was not induced by gender differences. The same finding was confirmed in this study. The results of the present study also do not confirm gender differences in attitudes towards science, but, as mentioned, there are small differences in favour of male students. The PISA 2018 (OECD, 2019b) results also confirm that small difference. Furthermore, the PISA results show that female students were more likely than male students to report positive attitudes towards mastering tasks. In the study by Toma et al. (2019), male students of the same age had better attitudes towards science than female students did.

Comparison between the understandings of concepts revealed that students understand specific concepts differently. These differences can be caused because of various experiences with science learning, different teachers, and different textbooks. As Krnel et al. (2003, 2005) suggest, students at this age do not have equally developed concepts of matter and object, and they do not completely differentiate between different properties. This can be seen from a comparison of achievements in Task No. 2 and No. 5 (Table 4), as the latter requires previously developed concepts. Nevertheless, students achieved the highest scores in tasks that covered aqueous solutions, properties of substances, and states of matter in SKT. The task that covers health and nutrition is among CK tasks, where students'

achievements were the lowest. It should be added that the task was relatively demanding. It required the student to analyse a menu; then, it was necessary to conclude the correct answer according to the food composition data of which the student should be aware. Regardless of the viewpoint that nutrition education improves behaviour (Shen et al., 2015) or not (de Villiers et al., 2016), the results suggest that these topics need better coverage. These topics also offer important background for understanding important issues today, such as informed buying decisions, genetically modified organisms, sustainable development, and similar. Results from PK tasks reveal greater differences between task achievements among participating students. Scientific skills are more abstract for this age group of students and seem to be less developed. Additionally, the performance in Task No. 10 prompts reflection on the depth of students' understanding of fundamental concepts in science. As indicated by the study of Urbančič and Glažar (2012), students are unable to provide satisfactory descriptions and explanations of scientific experiments without a sound grasp of these concepts. Of course, this reflection should also consider potential factors such as the lack of practical experience with experimentation in the classroom, the clarity of experiment execution instructions, and other relevant considerations. All these data suggest that certain dimensions of competencies are not as developed (skills) and not as exploited in the process of learning (attitude towards science) as, for example, content knowledge.

The second research question examines the nature of the correlation between science attitude and SKT achievements. In the first step, the overall correlation of knowledge and attitude was measured, but the following tests of correlation were focused on the nature of the observed relationship. The data suggest a high positive correlation exists between the level of PK and students' attitude towards science and between the level of CK and students' attitude towards science. This is in accordance with the work of Allum et al. (2008).

Furthermore, the potentially statistically significant differences in students' attitude dimension of science competence among students from different groups, formed according to students' overall science knowledge test achievements, were checked. As indicated by the findings, there are significant differences between students with different science knowledge.

It can be inferred from the results that competences are better developed within the group with average overall science knowledge and the group with superior overall science knowledge. The results are comparable with the study by Pešakovič et al. (2014). Focusing on the attitude component, these students show higher levels of self-concept compared to the group with poor overall science knowledge. This seems plausible because their knowledge test

achievements were higher, and students from Group 1 seem to be aware of their lack of knowledge (according to the results). Nevertheless, the average interest in science learning score is lower than the average self-concept score. Results suggest that self-concept plays an important role in evaluating successful learning (Guo et al., 2016). No conclusion can be made according to the current literature, as different research from various contexts gives different results. Lee and Kim (2018), for example, exposed their finding that, among adults, an important link exists between knowledge and attitude towards science. Of particular interest is the observation from their findings that knowledge, encompassing both content and procedural aspects, exhibits an overall negative association with attitudes toward science. The relationships depend on mediators (predictors of attitude) and the knowledge involved. These differences in results can be attributed to the different ages and cultural backgrounds of participants. Different results are mentioned in other research: with more similar sample characteristics to ours from PISA (OECD, 2019b) and from East Asia (e.g., Hu et al., 2018), with a high level of interest in science but low levels of process skills and academic achievement from Southeast Asia (e.g., Zulirfan et al., 2018) and uniquely correlated variables from South Africa by Guenther and Weingart (2016). All the mentioned research agrees that post-industrial societies increase the negative correlation between the science knowledge level and attitude towards science, whereas, in industrially developing countries, science is seen to be more trustworthy and interesting.

The results support the idea of attitude being a construct of self-concept and interest in the subject-specific field (Juriševič et al., 2010) and support the concept of subject-specific competence being comprised of knowledge, skills, and attitude towards the subject-specific field (*inter alia* OECD, 2018, 2019a; Illeris, 2009).

The third research question inquires about the presence of a statistically significant correlation between students' self-assessments and their level of PK and CK. A high correlation between students' confidence level and their level of science competences implies that students at this age are conscious of their academic success. They seem to be interested in the subject when they feel they have mastered the task given. The last fits the theory of competence motivation by which students, especially at this age, are more motivated in the subjects where they feel competent, with individual interest being one of the intrinsic motivation components. (Urdan & Turner, 2005).

Conclusions

Throughout this paper, the holistic view of the development of science competences is presented. Findings from the research reveal that the overall level of 10- and 11-year-old students' science competences is inadequate and unequally developed. This can be concluded from overall achievements in science competences and the statistically significant differences in students' attitudes towards science from different groups that were formed according to their SKT achievements. An interesting correlation between the level of PK and components of attitude has been observed. It can be summarised that there are no statistically significant correlations between the level of CK and both components of attitude (self-concept and individual interest). Concerning the self-concept, there are differences between low and medium and low and high achievers, but no statistically significant differences between medium and high achievers at the SKT. Statistically significant differences in individual interest in science learning were detected only between low and high achievers.

It can be concluded that students' confidence level and their level of procedural knowledge and content knowledge are strongly and significantly correlated. This suggests that students are conscious about science and that this is reflected positively in their level of science knowledge, and these factors also wield significant influence on students' attitudes toward science learning.

Limitations of this study

It is obvious that this research also has some limitations, which would be sensible to eliminate when planning further research. A qualitative review of our data revealed certain deficiencies in our instruments. The self-evaluation form for students to determine their level of confidence in solving the specific task, as was used in this research, is not appropriate for 10- and 11-year-olds, especially the requirement for justification. Participating students rarely gave useful responses, so these data were omitted from the analysis. Consequently, an important amount of data was potentially lost.

Another limitation can be found on the level of the theoretical basis. Van Uum et al. (2016) and Duschl (2007) define the concepts of scientific literacy and scientific knowledge more precisely and consider the epistemological component of natural science alongside content and procedural knowledge within the realm of natural science knowledge. We did not capture this in our research in any instrument, and we did not check this component. It is also exempt from interpretation.

Another important limitation of our study concerns the number of participating students. Because the knowledge and attitude were measured

quantitatively, a larger sample of participating students should be included. Therefore, the small number of participants has had an important impact on the statistical analysis of our data. For that reason, the results may have some limitations in interpreting them as representative, although some important aspects of statistical significance and especially the effect size of this analysis offer further discussion.

Implications for teaching

It is suggested to include well-considered activities in the science lessons instruction that would develop science skills. As data from our research suggest, students are aware (to a certain degree) of their strengths and weaknesses in the construct of their science competences. The component of students' attitudes towards science learning and their level of scientific knowledge are correlated. Therefore, it is important to help students raise the bar of their procedural knowledge via the attitude component and their motivation. This relationship seems to be important, as suggested by the high correlation between the two. In the developmental level at which the students from the sample were, motivation for learning is easier to cause and encourage (compared to older students). Therefore, the learning process should exploit that fact and help them to build competences at all three levels, from knowledge to skills and attitude towards science.

Guidelines for further research

With the attitude component being a key factor in the concept of competence development, it should be reasonable to further research and define its role in this so-called construct of competence. Data from this research show the important role of a student's self-concept in knowledge test achievements. It is strongly suggested that we focus on this component. One of the arguments for that is the fact that self-concept does not change as quickly as individual interest in learning science and is, therefore, more persistent.

Disclosure statement

The authors have no conflict of interest to declare.

References

Alaydin, E., Demirel, G., Altin, S., & Altin, A. (2013). Environmental knowledge of primary school students: Zonguldak (Turkey) example. *Procedia - Social and Behavioral Sciences*, *141*(2014), 1150–1155. https://doi.org/10.1016/j.sbspro.2014.05.195

Allum, N., Sturgis, P., Tabourazi, D., and Brunton-Smith, I. (2008). Science knowledge and attitudes across cultures: a meta-analysis. *Public Understanding of Science, 17*(1), 35–45. https://doi.org/10.1177/0963662506070159

Anderson, L. W., Krathwohl, D. R., Airasian, P. W., Cruikshank, K. A., Mayer, R. E., Pintrich, P. R., Raths, J., & Wittrock, M. C. (2001). *A taxonomy for learning, teaching, and assessing: a revision of Bloom's taxonomy of educational objectives.* Addison Wesley Longman.

Blanco, A., & Prieto, T. (1997). Pupils' views on how stirring and temperature affect the dissolution of a solid in a liquid: a cross-age study (12 to 18). *International Journal of Science Education*, *19*(3), 303–315. https://doi.org/10.1080/0950069970190304

Brownie, S., Thomas, J., & Bahnisch, M. (2011). *Exploring the literature: Competency-based education and competency-based career frameworks*. Australian Health Workforce Institute in partnership with Health Workforce Australia.

Çalık, M., & Ayas, A. (2005). A cross-age study on the understanding of chemical solutions and their components. *International Education Journal*, *6*(1), 30–41. https://files.eric.ed.gov/fulltext/EJ854953.pdf

Chang, T. L., & Hsin, H. T. (2020). The effect of the Self-explain–Discuss–Re-explain (SDR) learning strategy on high- and low-achieving fifth-grade students' achievement in science. *Research in Science & Technological Education, 39*(4), 461–488. https://doi.org/10.1080/02635143.2020.1772223

de Villiers, A., Steyn, N. P., Draper, C. E., Hill, J., Gwebushe, N., Lambert, E. V., & Lombard, C. (2016). Primary school children's nutrition knowledge, self-efficacy, and behavior, after a three-year healthy lifestyle intervention (HealthKick). *Ethnicity & Disease*, *26*(2), 171–180. https://doi.org/10.18865/ed.26.2.171

Devetak, I. (2017). Context-based teaching material and learning chemistry. In L. Leite, L. Dourado, A. S. Afonso, & S. Morgado (Ed.), *Contextualizing teaching to improve learning: the case of science and geography* (pp. 261–282). Nova science publishers.

Directorate for Education, Employment, Labour and Social Affairs Education Committee (DeSeCo). (2002). *Definition and Selection of Competences: Theoretical and Conceptual Foundations*. DEELSA/ED/CERI/CD(2002) 9. OECD. http://www.oecd.org/education/skills-beyond-school/41529556.pdf

Duschl, R. (2007). Science education in three-part harmony: Balancing conceptual, epistemic and social learning goals. *Review of Research in Education*, *32*, 268–291. https://doi.org/10.3102/0091732X07309371

European Commission, Directorate-General for Education, Youth, Sport and Culture. (2019). *Key competences for lifelong learning*. Publications Office. https://data.europa.eu/doi/10.2766/569540

Guenther, L., & Weingart, P. (2016). A unique fingerprint? Factors influencing attitudes towards science and technology in South Africa. *South African Journal of Science*, *112*(7/8), 1–4.

https://doi.org/10.17159/sajs.2016/20160093

Guo, J., Nagengast, B., Marsh, H. W., Kelava, A., Gaspard, H., Brandt, H., Cambria, J., Flunger, B., Dicke, A.-L., Häfner, I., Brisson, B., & Trautwein, U. (2016). Probing the unique contributions of self-concept, task values, and their interactions using multiple value facets and multiple academic outcomes. *AERA Open*, *2*(1). https://doi.org/10.1177/2332858415626884

Guthrie, H. (2009). *Competence and competency-based training: What the literature says*. National Centre for Vocational Education Research (NCVER).

Halász, G. and Michel, A. (2011), Key Competences in Europe: interpretation, policy formulation and implementation. *European Journal of Education*, *46*(3), 289–306. https://doi.org/10.1111/j.1465-3435.2011.01491.x

Holbrook, J. & Rannikmae, M. (2009). The meaning of scientific literacy. *International Journal of Environmental & Science Education*, *4*(3), 275–288. https://files.eric.ed.gov/fulltext/EJ884397.pdf

Hu, X., Leung, F. K., & Chen, G. (2018). School, family, and student factors behind student attitudes towards science: The case of Hong Kong fourth-graders. *International Journal of Educational Research*, *92*, 135–144. https://doi.org/10.1016/j.ijer.2018.09.014

Illeris, K. (2007). *How we learn: Learning and non-learning in schools and beyond*. Routledge.

Illeris, K. (Ed.). (2009). *International perspectives on competence development: Developing skills and capabilities*. Routledge.

Juriševič, M. (2005). *Učna motivacija v odnosu do učenja in učne uspešnosti učencev [Role of learning motivation in learning and academic achievement of primary school pupils].* [Doctoral dissertation, University of Ljubljana, Faculty of Arts]. DLIB. http://www.dlib.si/details/URN:NBN:SI:doc-CFT9G29K

Juriševič, M., Vogrinc, J., & Glažar, S. A. (2010). Attitude towards Science [Odnos do naravoslovja]. In S. A. Glažar (Ed.), *Analiza dejavnikov, ki vplivajo na trajnejše znanje z razumevanjem naravoslovno-tehniških vsebin : ciljno raziskovalni projekt* [*Analysis of factors that influence more permanent knowledge through the understanding of natural science and technical content: Targeted research project*] (pp. 40–41). University of Ljubljana, Faculty of Education. http://www.dlib.si/?URN=URN:NBN:SI:DOC-VNUVCMHA

Krnel, D. (2004a). *Pojmi in postopki pri naravoslovju in tehniki* [*Terms and procedures in Science and Technology*]. Modrijan.

Krnel, D. (2004b). *Pojmi in postopki pri spoznavanju okolja* [*Terms and procedures in Learning about the Environment*]. Modrijan.

Krnel, D., Glažar, S. & Watson, R. (2003). The Development of the concept of "matter": A cross-age study of how children classify materials. *Science Education, 87*(5), 621–639. https://doi.org/10.1002/sce.10080

Krnel, D., Watson, R., & Glažar, S. (2005). The development of the concept of 'matter': a cross-age study of how children describe materials. *International Journal of Science Education*, *27*(3), 367–83. https://doi.org/10.1080/0950069041233131444l

Lakshman, R. R., Sharp, S., J., Ong, K., K., & Forouhi, N., G. (2010). A novel school-based

intervention to improve nutrition knowledge in children: cluster randomised controlled trial. *BMC Public Health*, *10*(2010), 1–9. https://doi.org/10.1186/1471-2458-10-123

Laugksch, R. C. (2000). Scientific literacy: A conceptual overview. *Science Education*, *84*(1), 71–94. https://doi.org/10.1002/(SICI)1098-237X(200001)84:1<71::AID-SCE6>3.0.CO;2-C

Lee, S., & Kim, S.-H. (2018). Scientific knowledge and attitudes toward science in South Korea: Does knowledge lead to favorable attitudes? *Science Communication*, *40*(2), 147–172. https://doi.org/10.1177/1075547017753189

Mausethagen, S. (2013). Governance through concepts: The OECD and the construction of "competence" in Norwegian education policy. *Berkeley Review of Education*, *4*(1), 161–181. https://doi.org/10.5070/B84110058

Miller, J. D. (1998). The measurement of civic scientific literacy. *Public Understanding of Science*, *7*(3), 203–223. https://doi.org/10.1088/0963-6625/7/3/001

Narmadha, U., & S. Chamundeswari. (2013). attitude towards learning of science and academic achievement in science among students at the secondary level. *Journal of Sociological Research*, *4*(2), 114–124. https://doi.org/10.5296/JSR.V4I2.3910

OECD. (2018). *PISA for development assessment and analytical framework: Reading, mathematics and science*. PISA, OECD Publishing. https://doi.org/10.1787/9789264305274-en

OECD. (2019a). *PISA 2018 assessment and analytical framework.* PISA, OECD Publishing. https://doi.org/10.1787/b25efab8-en

OECD. (2019b). *PISA 2018 results (volume I): What students know and can do.* PISA, OECD Publishing. https://doi.org/10.1787/5f07c754-en

Pešakovič, D., Flogie, A. & Aberšek, B. (2014). Development and evaluation of a competence-based teaching process for science and technology education. *Journal of Baltic Science Education, 13*(5), 740–755. https://doi.org/10.33225/jbse/14.13.740

Potvin, P. & Hasni, A. (2014). Interest, motivation and attitude towards science and technology at K-12 levels: a systematic review of 12 years of educational research. *Studies in Science Education, 5*(1). https://doi.org/10.1080/03057267.2014.881626

Radulović, L. & Stančić, M. (2017). What is needed to develop critical thinking in schools? *Center for Educational Policy Studies Journal, 7*(3), 9–25. https://doi.org/10.26529/cepsj.28

Razdevšek–Pučko, C. (2002). Nacionalni preizkusi znanja in sodobna pojmovanja preverjanja in ocenjevanja znanja [National knowledge assessments and contemporary perspectives on the evaluation and grading of knowledge]. *Vzgoja in izobraževanje*, *32*(2), 4–10.

Reid, N. (2006). Thoughts on attitude measurement. *Research in Science & Technological Education*, *24*(1), 3–27. https://doi.org/10.1080/02635140500485332

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, *55*(1), 68–78. https://doi.org/10.1037110003-066X.55.1.68

Rychen, D.S., & Salganik, L.H. (Eds.). (2003). *Definition and Selection of Key Competencies: Executive Summary*. Hogrefe.

Salleh, M. F. M., Zuki, N. H. M., Ismail, M. H., & Abdullah, N. (2016). Secondary School Students' Knowledge and Awareness on Environmental Issues. In C. Y. Fook, G. K. Sidhu, S. Narasuman, L. L. Fong & S. B. Abdul Rahman (Eds.), *7th International Conference on University Learning and Teaching (InCULT 2014) Proceedings* (pp. 563–577). Springer. https://doi.org/10.1007/978-981-287-664-5_44

Schiefele, U., & Rheinberg, F. (1997). Motivation and knowledge acquisition: Searching for mediating processes. In M. L. Maehr, and P. R. Pintrich (Eds.), *Advances in motivation and achievement* (pp. 251–301). JAI Press.

Shen, M., Hu, M., & Sun, Z. (2015). Assessment of school-based quasi-experimental nutrition and food safety health education for primary school students in two poverty-stricken counties of West China. *PLoS ONE*, *10*(12), 1–16. https://doi.org/10.1371/journal.pone.0145090

Slapničar, M., Tompa, M., Glažar, S. A. & Devetak, I. (2018). Fourteen-year-old students' misconceptions regarding the sub-micro and symbolic levels of specific chemical concepts. *Journal of Baltic Science Education, 17*(4), 620–632. https://doi.org/10.33225/jbse/18.17.620

Smart, J. (2017). *Inspiring young minds: Scientific inquiry in the early years*. Redleaf Press.

Taber, K. S. (2017). The use of Cronbach's alpha when developing and reporting research instruments in science education. *Research in Science Education*, *48*(6), 1273–1296. https://doi.org/10.1007/s11165-016-9602-2

Toma, R. B., Greca, I. M., & M. L. Orozco Gómez. (2019). Attitudes towards science and views of nature of science among elementary school students in terms of gender, cultural background and grade level variables. *Research in Science & Technological Education*, *37*(4), 492–515. https://doi.org/10.1080/02635143.2018.1561433

Torkar, G., Debevec, V., Johnson, B. & Manoli, C. C. (2021). Assessing children's environmental worldviews and concerns. *Center for Educational Policy Studies Journal, 11*(1), 49–65. https://doi.org/10.26529/cepsj.793

Treagust, D. F., Amaranta, A., Chandrasegarana A. L., & Wona, M. (2016). A case for enhancing environmental education programs in schools: Reflecting on primary school students' knowledge and attitudes. *International Journal of Environmental & Science Education*, *11*(12), 5591–5612. https://files.eric.ed.gov/fulltext/EJ1115645.pdf

Urbančič, M. & Glažar, S. A. (2012). Impact of experiments on 13-year-old pupils' understanding of selected science concepts. *Eurasia Journal of Mathematics, Science & Technology Education*, *8*(3), 207–218. https://doi.org/10.12973/eurasia.2012.836a

Urdan, T., & Turner, J. C. (2005). Competence motivation in the classroom. In A. J. Elliot and C. Dweck (Eds.), *Handbook of competence and motivation* (pp. 297–317). Guilford.

van Uum, M. S., Verhoeff, R. P., & Peeters, M. (2016). Inquiry-based science education: Towards a pedagogical framework for primary school teachers. *International Journal of Science Education*, *38*(3), 450–469. https://doi.org/10.1080/09500693.2016.1147660

Vodopivec, I., A. Papotnik, A. Gostinčar Blagotinšek, D. Skribe Dimec, & A. Balon. 2011. *Učni načrt: Program osnovna šola, Naravoslovje in tehnika* [*Curriculum: Elementary school programma, science and technology*]. Ministry of Higher Education, Science and Innovation Slovenia, National Education

Institute Slovenia.
https://www.gov.si/assets/ministrstva/MIZS/Dokumenti/Osnovna-sola/Ucni-nacrti/obvezni/UN_naravoslovje_in_tehnika.pdf

Wall, D. E., Least, C., Gromis, J., & Lohse, B. (2011). Nutrition education intervention improves vegetable-related attitude, self-efficacy, preference, and knowledge of fourth-grade students. *Journal of School Health*, *82*(1), 37–43. https://doi.org/10.1111/j.1746-1561.2011.00665.x.

Zulirfan, Z., Rahmad, M., Yennita, Y., Kurnia, N., & Hadi, M. S. (2018). Science process skills and attitudes toward science of lower secondary students of Merbau Island: A preliminary study on the development of maritime based contextual science learning media. *Journal of Educational Sciences*, *2*(2), 90–99. https://doi.org/10.31258/jes.2.2.p.90-99

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Secondary School Students' Response to Learning the Concept of the Destruction and Transformation of an Artwork into Another Artwork in the Visual Arts Class

Daša Bojc*[1] and Robert Potočnik[2]

This empirical study aimed to introduce the concept of destruction and transformation into secondary school art education as a potential way of incorporating conceptual and contemporary artistic practices. Experts have highlighted the absence of such content in art education, emphasising the responsibility of teachers to integrate it into the learning process thoughtfully. To encourage students to engage in profound thinking about destruction and internalise the essence of conceptual art through practical experiences, we conducted a study at a Ljubljana secondary school. Here, students created their initial artwork (ready-made), a prerequisite for its subsequent destruction and transformation into a new artwork. We included two first-year classes, exploring 1) their response to the presented artworks aligned with the researched concept, 2) their attitude towards destroying and transforming their initial artwork, and 3) their response to the concept of destruction and transformation through their creative practice. Over four school hours, we gathered data through both qualitative and quantitative research techniques. The results showed that in-depth discussions of conceptual foundations led to a predominantly positive student attitude towards contemporary artworks. They not only understood but also internalised the essence of these artworks, which was vividly reflected in their practical artistic expressions. In conclusion, the study effectively introduced the concept of destruction and transformation into secondary school art education, promoting a deeper understanding of contemporary art among students while cultivating their creative and critical thinking skills.

Keywords: art education, conceptual art, contemporary art practices, destruction, secondary school, transformation

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Odziv dijakov na spoznavanje koncepta destrukcije in transformacije dela v drugo delo pri pouku likovne umetnosti

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Cilj empirične raziskave je bil vpeljati koncept destrukcije in transformacije v pouk likovne umetnosti kot mogoč način vključevanja konceptualnih in sodobnih umetniških praks na srednješolski ravni izobraževanja. Strokovnjaki namreč opozarjajo na pomanjkanje tovrstnih vsebin v likovnopedagoški praksi in poudarjajo odgovornost učiteljev, da skozi premišljen pristop te vpeljujejo v učni proces. Da bi pri dijakih spodbudili poglobljeno razmišljanje o destrukciji in da bi prek likovne izkušnje ponotranjili bistvo konceptualne umetnosti, smo na srednji šoli v Ljubljani izvedli empirično raziskavo. V okviru te so dijaki ustvarili prvi likovni izdelek (angl. ready-made), ki je bil predpogoj za nadaljnje uničenje in preobrazbo v drugi likovni izdelek. V raziskavo smo vključili dva razreda dijakov prvih letnikov, pri čemer so nas zanimali: 1) njihov odziv na prikazana umetniška dela, ki sovpadajo z raziskovanim konceptom; 2) njihov odnos do uničenja in preobrazbe prvega likovnega izdelka; 3) njihov odziv na koncept destrukcije in transformacije skozi lastno ustvarjalno prakso. V obeh razredih smo izvedli štiri šolske ure, znotraj katerih smo zbirali podatke s pomočjo tehnik kvalitativnega in kvantitativnega raziskovanja. Ugotovili smo, da se je poglobljena obravnava konceptualnih izhodišč skozi diskusijo odražala v večinsko pozitivnem odnosu dijakov do sodobnih umetniških del. Prikazanih del niso le razumeli, ampak so njihovo bistvo tudi ponotranjili, kar se je jasno odražalo v praktičnem likovnem izražanju dijakov. Sklenemo lahko, da je raziskava učinkovito vpeljala koncept destrukcije in transformacije v pouk likovne umetnosti na srednješolski ravni izobraževanja, saj je pri dijakih spodbudila globlje razumevanje sodobne umetnosti ter hkrati razvijala njihove sposobnosti ustvarjalnega in kritičnega mišljenja.

Ključne besede: pouk likovne umetnosti, konceptualna umetnost, sodobne umetniške prakse, destrukcija, srednja šola, transformacija

Introduction

Regarding the significance of implementing contemporary artistic practices in art education, Zupančič (2006) writes within the framework of the art-pedagogical concept, stating that art is taught to broaden and deepen our understanding of the cultural environment we inhabit. Due to their distinctiveness, heterogeneous nature, and connection to current social issues, contemporary art practices are attractive to students and serve as a source of motivation for them (Zupančič, 2006). An empirical study conducted by Zupančič and Velikonja (2017) also highlights the role of contemporary art in motivating students toward visual arts, finding that products stemming from contemporary artistic practices are complex and imaginative, engaging students in deep thinking, mental activity, and imaginative ideation. The curriculum for art education in secondary schools emphasises the artistic creativity and activity of students, deriving from their participatory role, along with an emphasis on independent and experimental work, through which students explore their own thoughts and feelings and express their ideas (Učni načrt. Gimnazija. Likovna umetnost, 2008).

The role of an art educator and conceptualism strategies in art education

Motivated students are a prerequisite for successful art education (Tacol, 1999). Numerous authors (Cencič, 2014; Gorjanc & Črčinovič Rozman, 2015; Tacol, 1999) argue that flexibility is the key attribute of a teacher that can greatly motivate students. To encourage maximum motivation, the teacher must select topics that interest the students and offer various materials and techniques that arouse curiosity, interest, and imagination. In the context of architectural design in art education, Batič (2011) highlights the importance of students' direct experience with space, making them critical users and co-creators. The art classroom itself should also be an inspiring creative space where the art educator, in synergy with the students, transforms the subject of visual arts into an exciting adventure (Pataky, 2020). Contemporary culture has transformed the traditional relationship between teachers and students into a collaborative one, in which the teacher and students form a community that co-creates new knowledge (Tomšič Amon, 2020). Glogovec and Žagar (1992) add that in a warm, democratic, and relaxed environment, students become more curious and motivated, closely related to creativity. Tacol (2003) highlights that it is the teacher's task to provide each student with the opportunity to express

themselves in the most suitable way for them and allow for individual artistic expression. Duh (2004) and Marentič-Požarnik (2019) emphasise that during lessons, the teacher should present students with new challenges, dilemmas, and problems through open discussions. Sullivan (2002) also points out the importance of encouraging students' creative ideas, arguing that the complexity of art in today's visual culture world highlights the need for education based on a critically aware mind. The responsibility of the art educator is to shape the content of the lessons that reflect the broadness of contemporary cultural practices and encompass the depth of students' creative and critical abilities.

In this context, the concept of a teacher as a conceptual artist was also conceived and explored in a qualitative study by Bremmer et al. (2020). The essence of this construct is that the teacher's actions should directly stem from conceptual artistic approaches. The idea is based on the fundamental conceptual assumption that the primary function of art is to engage the mind rather than evoke aesthetic responses, emphasising the process rather than the final visual products. It is also important to blur the boundaries between art and everyday life, allowing art to manifest in any discipline and form (even a dematerialised one). Leuthold (1999) adds that students should not be required to create objects and master traditional artistic skills; traditional artistic concepts such as style, beauty, unity, skill, durability, expression, and conventionality should be replaced with an emphasis on ideas, which are the essence of conceptual art. Twardzik Ching (2015) highlights that doubt, which is also essential to conceptualism, has much in common with children's natural curiosity. By introducing conceptual artistic practices, students come to understand that their own rebellious or unconventional thinking is not necessarily negative, and if directed towards creation, it can result in an exceptionally powerful and self-reflective experience. The use of conceptualism strategies in art education is also discussed by Marshall (2008), who suggests two common approaches of expression in contemporary artistic practices: metaphor and conceptual collage. These two approaches offer coherent steps for developing concepts, meanings, and new ways of thinking by creating complex connections and enabling students to develop technical and conceptual skills simultaneously.

Incorporating contemporary artistic practices into art education can contribute to the complete artistic development of students (in cognitive, affective, and psychomotor fields). Experts emphasise the responsibility of art educators to thoughtfully integrate these practices into the learning process (Kemperl, 2013; Kozjek Varl & Duh, 2017; Vrlič & Čagran, 2003; Zupančič, 2006, 2011; Zupančič & Velikonja, 2017). The concept of contemporary art pedagogy is said to be founded on problem-based teaching, striving to establish a

balance among all three aforementioned fields, encouraging students towards lateral thinking, emotional learning, and creative expression (Pivec, 2022). Pivec (2022) highlights that solving artistic problems requires both emotional engagement and intellectual processing. This is particularly important when integrating contemporary artistic practices into art education, as they often rely on conceptual foundations and address current issues individuals encounter in personal and societal spaces (Kemperl, 2013). To foster students' sensitivity and active citizenship, encouraging critical and creative responses to current issues (Kemperl, 2013; Zupančič, 2006, 2011), experts suggest a systematic exploration and application of the principles of contemporary artistic practices in art education. This involves helping students understand and internalise the essence of these practices through explanation, discussion, and their own experiences (Kemperl, 2013; Kozjek Varl & Duh, 2017; Zupančič, 2006; Zupančič & Velikonja, 2017).

The implementation of the concept of destruction and transformation in art education is a potential way to incorporate contemporary art practices in secondary school

In the concept of destruction and transformation of an artwork into another artwork, we have recognised the potential for innovative incorporation of conceptual or contemporary artistic practices at the secondary school level.

Destruction is present in all areas of art and encompasses numerous elements that are key components of contemporary artistic practices, even though it is not explicitly defined as an art concept within the secondary school art curriculum (Učni načrt. Gimnazija. Likovna umetnost, 2008). Therefore, students are not familiarising themselves with it directly. It appears only indirectly in the context of other art concepts that students are expected to grasp (such as land art, installation, performance, photography, and conceptual art).

In the concept of destruction and transformation of an artwork into another artwork, the main art concepts that come together are destruction and conceptual art. The subject of our research was destruction as a consequence of a deliberate artistic strategy or concept incorporating transformation. The premise of this conceptual construct is that destruction enables liberation, inspiring new boundaries of creativity through the process of transformation. In the art world, this would entail the destruction of existing artwork, a necessary condition for its transformation into a new masterpiece. This process of destruction and transformation can take various forms, from physically altering an existing artwork to its complete disintegration and using fragments to create

something new. One key element of this concept is the idea of change. By destroying one artwork and transforming it into another, the artist creates something new and different. This can represent a change in the author's artistic path or comment on larger societal changes. The destruction of the original artwork can also be understood as a commentary on the transience of all things and the constant cycle of creation and destruction. Another aspect of this concept is the idea of preservation. By destroying one artwork and transforming it into another entity, the artist preserves the original artwork in a new materialised or dematerialised form (in an installation, performance, photograph, video, story, or idea). This preserves the legacy of the original artwork while allowing it to evolve and change over time. It also allows the artist to keep the original idea alive in a new form or replace the original idea with a new one as a commentary on the first. The researched concept is complex and multi-layered, and it can be used to comment on a wide range of themes and ideas. It encompasses both the symbolism of change, impermanence and the preservation of heritage. Furthermore, it can stimulate thinking and inspire new ways of understanding art and its role in our lives.

Research problem and research questions

Destruction and transformation are inherent aspects of all perishable objects and are part of our life experiences. Likewise, as conceptual tools, they appear through heterogeneous manifestations in contemporary artistic practices, for which experts warn that they are often insufficiently included in art education (Kemperl, 2013; Vrlič & Čagran, 2003; Zupančič, 2006, 2011). We conducted an empirical study to encourage students to engage in the in-depth contemplation of destruction and to internalise the essence of conceptual art through artistic experiences. This study aimed to introduce the idea of transforming artwork through destruction into another artwork to integrate contemporary art practices into secondary school education. We formulated three research questions to explore the diverse responses of students to the explored concept:

1. What is the students' response to the presented artworks that align with the concept of destruction and transformation?
2. How do students perceive the future destruction and transformation of their initial artwork?
3. What is the students' response to the concept of destruction and transformation through their creative practice?

Method

Participants

In the empirical study, we included two classes of first-year students (aged 15 and 16) from a secondary school in Ljubljana, Slovenia, in the 2022/23 academic year. The sample was purposive, and its selection resulted from the alignment of our research problem with the art curriculum in secondary school, which includes content related to contemporary art practices (ready-made, conceptual art). As the implementation took place in two separate sessions, differences arose in the number of students present at the first and second meetings. In one class, twenty-four students participated throughout the entire research process, while in the other class, there were seventeen.

Instruments

The study was conducted within the framework of classroom sessions with students from both classes (two sessions of two hours in each class, with one week between the first and second sessions), and the articulation of the lessons was carefully planned before each instructional process. The first meeting was dedicated to introducing the concept of the ready-made, which transformed the artist from a 'creator' into a 'chooser', laying the foundation for conceptual art. This was also connected to the first art assignment, for which the artwork was a prerequisite for the creation of the second artwork. The second meeting initially involved a discussion with the students about destruction and included a presentation of selected artworks that align with the researched concept (Robert Rauschenberg, *Erased de Kooning Drawing*, 1953; John Baldessari, *Cremation Project*, 1970; Heather Benning, *Death of a Dollhouse*, 2013; David Datuna, *Hungry*, 2019). These artworks served as a starting point for the students' subsequent practical work.

We collected data during the meetings with the students using qualitative techniques (participant observation, unstructured interviews, documents) and quantitative research (questionnaires). During observation, we paid attention to the immediate responses of the students to new content and their attitude toward the creative process. Throughout the frontal lessons and individual consultations during the creative process, unstructured interviews were conducted in the form of relaxed dialogues with the students, focusing on their opinions, thoughts, and justifications. Documents (photographs of the students' artworks) provided insight into how the students embraced the concept

of destruction and transformation and how they responded to it artistically, as their thoughts and creative processes were manifested in their artworks. The questionnaires aimed to capture concise records of ideas from all the resulting artworks and obtain direct responses regarding how the students perceived the implementation of the concept of destruction and transformation.

Research design

We used observation sheets to provide detailed descriptions of each session. These reports included data obtained through participant observation and unstructured interviews with all students. We made an arbitrary selection of artworks, which we analysed based on the criteria we provided for each phase of the creative process, while the additional results are derived from examining all the artworks created. We processed the questionnaires at the level of frequency distribution (f, f%). Responses to open-ended questions were transcribed, categorised, and ranked in order by frequency. The synthesis was conducted at the level of understanding and explaining the characteristics of the studied phenomenon without generalising the findings to the entire population, but rather, they were related to our research questions.

In the interpretation, we integrated data obtained through various techniques within each research question, related the findings to those of other authors, and contextualised them within the framework of theoretical foundations.

Results

1. Students' response to artworks aligned with the concept of destruction and transformation

Participant observation and unstructured interviews

Based on discussions with the students, we found that the presented artworks were unfamiliar to them but captured their attention, as they actively engaged in dialogue and expressed their opinions without reservation. Most of the students showed a positive surprise toward presented artworks (they found them interesting, innovative, and different), while a few expressed a lack of understanding or their disapproval (they found them trivial and controversial). Further explanations of the conceptual backgrounds triggered heated discussions about the destruction of artworks and the boundaries of art.

Questionnaire

Within the questionnaire, students expressed their opinions on the presented artworks. We categorised students' responses based on their opinions and sorted them by frequency (Table 1).

Table 1

The number (f) and structural percentages (f %) of students' responses based on categories of opinions about the presented artworks that align with the concept of destruction and transformation

Rank	Category	Students responses	
		f	***f*** **%**
1	Positive opinion	35	67
2	Negative opinion	4	8
3	Lack of understanding	3	6
4	No response	3	6
5	Other	7	13
	Total	**52**	**100**

Students collectively provided fifty-two responses, the majority of which (67%) expressed a positive opinion about the presented artworks. Within this category, students most commonly wrote that they found them interesting, innovative, original, and different; individual students stated that they expressed good ideas that were fascinating, resourceful, beautiful, likeable, great, fine, or satisfactory. There were a few negative associations (8%), among which some students wrote that the artworks were strange, meaningless, unnecessary, and unlikable. A couple of students (6%) wrote that they needed help understanding the destruction of artworks; an equal percentage of students (6%) did not respond to the question. Other responses (13%) included associations such as destruction, release, assembly, design, and art.

2. Students' attitude towards future destruction and transformation of their initial artwork

Questionnaire

We collected data on students' attitudes toward the future destruction and transformation of their initial artwork using a questionnaire. The table below (Table 2) illustrates the percentage distribution based on their responses.

Table 2

Number (f) and structural percentages (f %) of students based on their attitude toward the future destruction and transformation of their initial artwork

Attitude toward the future destruction and transformation	Students	
	f	*f* %
They felt it would be a shame to destroy the initial artwork.	15	35
They were not satisfied with the initial artwork, so they were glad to be able to destroy and transform it.	12	28
They were surprised that they could destroy the first artwork, and they eagerly looked forward to future destruction and transformation.	11	26
They saw the first artwork as a starting point for the second artwork, so the process of destruction and transformation represented a new challenge to them.	3	7
Other	2	4
Total	**43**	**100**

The table shows that about a third (35%) of the students regretted destroying the first artwork. Meanwhile, over half of the students (54%) looked forward to future destruction and transformation, either because they were dissatisfied with the first artwork (28%) or because this possibility surprised them (26%). Very few students (7%) saw the process of destroying and transforming the first artwork as a new challenge. One student wrote under 'Other' that the destruction seemed unexpected and questionable, while another stated that he had wanted to destroy the first artwork.

3. Students' response to the concept of destruction and transformation through their creative practice

Documents

The first assignment required students to create a ready-made, expressing a certain idea by choosing everyday objects,[3] and juxtaposing and combining them. These objects reflected their interests, issues, or critical views on the chosen topic. The resulting ready-mades and ideas served as the basis for the second assignment, which required students to destroy and transform their first artwork into another. Through destruction and transformation, they replaced the original idea with a new one, which could either comment on the first idea or completely alter the concept.

3 The initial selection included around 200 everyday objects, among which were objects commonly found in the kitchen, bathroom, office, living room, fashion-related items, personal belongings, decorative objects, board games and toys, electronic devices, etc.

We evaluated the success of the first artworks based on the following criteria: 1) creating a ready-made (juxtaposition/combination of approximately three selected everyday objects), 2) the idea reflects the student's interests/problems/critique and is clearly expressed in the artwork, 3) presentation of the creative process, and 4) originality.

We assessed the success of the second artworks using the following criteria: 1) creating a conceptual artwork (concept and the process of destruction and transformation, transformation of the idea), 2) presentation of the creative process, and 3) originality.

In the following sections, selected artworks are presented and analysed, while further findings are based on the analysis of all the created artworks.

Selected artworks:

The first ready-made, titled 'Time Machine' (Figure 1), combines a glass, a wristwatch, a keychain, and a paper label. When creating the first artwork, the author slightly altered some objects (cut the label and keychain). The work addresses time travel, as the time machine allows us to return to the past or glimpse the future. The unusual combination and juxtaposition of objects that seemingly do not belong together testify to the author's imagination, who, through visual means, contemplated and expressed complex questions regarding the relativity of time.

In the second artwork, 'Flood of Time' (Figure 2), the author transformed the first artwork by removing the label, turning the glass, placing the keychain and watch inside, and filling it with water. With minimal means, they effectively commented on the initial idea by turning everything into water. The author aimed to convey through this transformation that all things change. The work is highly original, as it was the only one that incorporated the element of water, which, through the slow transformation of things, leads to their decay, degradation, and, ultimately, death. The previously dynamic visual image disappears in the serene act of submersion, where the countdown to its end begins.

Figure 1
Time Machine

Figure 2
Flood of Time

The title of the second ready-made (Figure 3) is 'Frying in Information', by which the author aimed to draw attention to the problem of the information society, which is constantly bombarded with abundant data. To express this idea, the author juxtaposed a frying rack and a brown string. The string alludes to complex and massive information and the chaos and preoccupation of people drowning in excessive information, just like food in a deep fryer. The innovative combination of these two disparate objects carries a critical commentary on current events. In the second creative phase (Figure 4), the author retained the initially selected items and twisted the rack, while the strings within simultaneously became entangled. The second message (people are burnt out from too much information) represents a continuation of the first message, evident in the destructive final state.

Figure 3
Frying in Information

Figure 4
Untitled

The third selected ready-made (Figure 5) includes a wooden cutting board, a dining knife, and a rubber band. With a hammer, the author drove the knife into the cutting board and attached a red rubber band near the incision. The title of the artwork ('Beef') references a colloquially used term for when two people are in conflict ('they have beef'). In contrast, the phrase 'burying the hatchet' means that two people reconcile. The work creatively combines two phrases reflected in the aesthetically refined artwork. The rubber band and the knife incision allude to a wound. You can hurt someone with words, actions, or a knife, and even if you later apologise, the scar always remains. The author's second artwork is 'Life' (Figure 6). From the original ready-made, the author removed the knife and, in its place, glued a string to the board. Upon closer examination of the artwork, we can see that the beginning of the string is burned. The author's new idea was that life is slowly slipping away, so reconciliation is necessary, while this represents a commentary on the initial idea. What seems particularly innovative is the depiction of life with a string, which announces its complexity and transience with its twists and a burned end.

Figure 5
Beef

Figure 6
Life

The fourth ready-made, titled 'Grave - The Home of the Dead' (Figure 7), incorporates everyday objects such as a picture frame, a dishwashing sponge, rulers, cables, and strings. The author made slight alterations to the objects (broken rulers thrust into the sponge, connected by strings, cables piercing the sponge) whilst all being placed on a sterile white picture frame. The author noted that the softness of the sponge represents a grave from which the souls of the dead crawl into hell, linked by the bad thoughts that race through their heads. The artwork is exceptionally innovative and imaginative, both in concept and execution. The

complementary contrast of red and green stands out, intensifying and supporting the theatricality of the artwork. In the second creative phase, the author created an artwork titled 'Evidence of Soul Slaughter' (Figure 8) by transforming the three-dimensional ready-made into a two-dimensional artwork. They inserted pieces of rulers and shredded parts of the sponge into the picture frame and attached brown strips around it. The concept continues the original story. The author explained that the substance in the middle represents evidence found in the house of the murdered soul. The second artwork serves as a hint that the dead souls climbing into hell (depicted in the first artwork) have killed their victims. Interestingly, the student transformed the visual appearance of the artwork almost beyond recognition while maintaining the narrative. The work indicates the author's exceptional artistic sensitivity and imagination.

Figure 7
Grave – The Home of the Dead

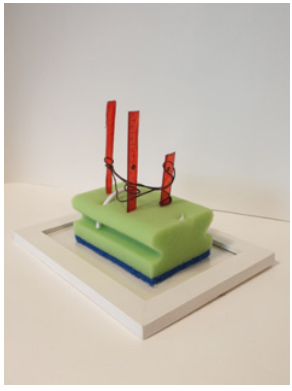

Figure 8
Evidence of Soul Slaughter

As seen in all the first artworks created, we can observe that students chose approximately the same number of everyday objects (two to five objects). Additionally, almost every student juxtaposed and combined objects that are not functionally compatible and are not typically found together in daily life. This approach allowed them to detach the objects from any preconceived meaning and express their ideas through innovative compositions and altered appearances of objects, titles, and stories. Most students connected objects with cables, strings, adhesive tape, or glue, while a few juxtaposed the chosen objects. Likewise, the majority did not significantly alter the objects, while the most common alterations were cuts that allowed students to join individual elements. Their messages were diverse, unusual, and interesting. The ideas fell into three main categories: contemplative and personal (45%), critical and current

(35%), and banal and ironic (20%). In general, the first creative phase produced aesthetically considered, visually clean, and conceptually original artworks that provided a quality starting point for the next creative phase.

Based on the analysis of all the second artworks, we find that the majority included all the initially selected objects, while a few students removed or added certain elements of the ready-made. The degree of destruction and transformation varied from high to low, with the couple transforming the first artworks to near unrecognisability. Students also employed similar methods, with common actions, such as objects being smashed, cut, twisted, or minimally altered. Some destruction methods were specific to the objects contained in the ready-made, such as burning a cigarette, submerging objects in a glass of water, sharpening a pencil, and bursting a balloon. Regarding the transformation of ideas, the majority (68%) commented on the first idea with their second idea, while approximately one-third of students (32%) opted for a complete transformation of the concept.

Participant observation and unstructured interviews

Within the first creative phase, we found that the students mostly chose objects from the selection based on personal preference or whichever objects intuitively caught their attention. Students who were initially indecisive about their object choices or needed help conceptualising ideas were encouraged to include objects that they found interesting or unusual. We suggested they first experiment with combining these objects and that the idea would develop during the creative process. We pointed out that their ideas could be banal, humorous, topical, critical, thoughtful, or personal. This encouragement helped the students approach the assignment more freely and spontaneously. During the creative process, the students showed interest in making ready-made objects, experimented, played, contemplated, and enthusiastically articulated their ideas.

A similar attitude was observed in the second creative phase, where the students were evidently more relaxed. It seemed that destruction excited them, provided satisfaction, served as a release, and for some, even presented a challenge to see how thoroughly they could destroy the objects. Conversely, some students approached the process of destruction and transformation more gently, making minimal interventions in the objects that aligned with their newly conceived ideas. Throughout the entire creative process, students assisted each other, creating a dynamic and productive atmosphere. It appeared that the unconventional art assignment had captivated the students, and during the evaluation phase, they enthusiastically explained their creative thought process.

Discussion

The first research question related to the students' response to the presented artworks that align with the concept of destruction and transformation. Based on participant observation and conversations with the students, we found that the presented works were unfamiliar to them, but their conceptual foundations captured their attention. They actively participated in dialogue and expressed their varied opinions without hesitation. The majority showed a positive surprise toward the works (finding them interesting, innovative, original, and different), while some students expressed a lack of understanding or disapproval (finding them banal, meaningless, and controversial), which was also confirmed by data obtained from questionnaires. The initial negative attitude toward contemporary art was already noted in previous research reports (Kozjek Varl & Duh, 2017; Zupančič & Velikonja, 2017). The authors found that students are often unfamiliar with contemporary artworks and that these do not align with students' preconceptions of art. In this context, destruction, as the opposite of creation, stands out even more, as it may *a priori* seem controversial, especially without an understanding of the meaning and purpose of destructive artistic acts. Zupančič (2011) emphasises that the exclusion of controversial works from art education is not the ultimate solution; instead, there is a need for an in-depth examination of these works, focusing on illuminating their conceptual backgrounds through discussions with students.

In the context of the second research question, we were interested in the students' attitudes toward the forthcoming destruction and transformation of their first artwork. Based on the obtained data, we found that their attitudes were quite diverse. The majority looked forward to the future transformation of their ready-made, either because they were dissatisfied with their first creation or because the prospect of destruction surprised and excited them. However, a considerable number of students initially were not inclined toward destroying their artworks. While the majority recognised destruction as a starting point for creating something new in the previously presented artworks, very few students perceived the process of destruction and transformation of their first artwork as a new challenge. In general, we observed that the students' attitude towards the second creative phase was mostly based on either satisfaction or dissatisfaction with their first artwork, rather than enthusiasm or resistance to the process of destruction itself, which could have brought them a new artistic experience. Based on this, it can be concluded that there is a need to emphasise to students more persistently the importance of direct and emotional engagement in the artistic creation process (Bremmer et al., 2020) to achieve

a comprehensive understanding of the role of art in personal and societal contexts (Učni načrt. Gimnazija. Likovna umetnost, 2008).

Within the framework of the third research question, we were interested in the students' response to the concept of destruction and transformation through their creative practice. Based on participant observation, we found that in the first creative phase, students needed some encouragement to identify with the contemporary way of creating. Through dialogue, we discovered that conceptualising the initial ideas was the most challenging aspect for students. However, with persistent emphasis that ideas could be diverse, as seen in the examples of presented artworks, students created visually engaging, aesthetically thoughtful, and conceptually original ready-mades, which provided a high-quality starting point for the second creative phase. In the latter, students were more relaxed from the beginning, and reshaping ideas was no longer an issue but rather a challenge and an opportunity to embody newly formed concepts in the process of destruction and transformation. While creating their second artwork, students showed no reluctance towards the destruction of their first artwork. They enthusiastically experimented with the transformative potential of objects, and the various levels and methods of destruction were aligned with the altered concepts. The resulting artworks demonstrated creative content both in formal solutions and ideas, indicating that students understood the presented artworks and the assignments. Their motivation was evident, as the atmosphere was dynamic, industrious, and collaborative. From this, we conclude that the unconventional artistic assignments engaged the students, as they enthusiastically explained their creative and thought processes. Similar conclusions have been reached by other authors (Kemperl, 2013; Kozjek Varl & Duh, 2017; Zupančič, 2006; Zupančič & Velikonja, 2017), indicating that artistic assignments stemming from contemporary art practices appeal to students due to their distinctiveness. Students understand the essence of the concepts and can express them in their creations (Kozjek Varl & Duh, 2017), their products are complex, students immerse themselves in the work, and they express their worldview with enthusiasm (Zupančič & Velikonja, 2017), thus actively and critically engaging with the social environment (Kemperl, 2013; Zupančič, 2006). Results from foreign empirical studies also point out that incorporating contemporary artistic practices in the classroom develops cognitive skills (Twardzik Ching, 2015, 2017), broadens understanding of art (Downing & Watson, 2004), enables the construction of students' own identities and the verbalisation of them to others (Herne, 2015), nurtures empathy and self-esteem (Herne, 2015; Twardzik Ching, 2015), promotes risk-taking in creative endeavours and encourages the expression of creativity (Twardzik Ching, 2015). Therefore, experts emphasise the need to allow students to establish a positive

attitude towards contemporary art through their own experience, enriching them in terms of sensitivity, critical thinking, and individual expression (Downing & Watson, 2004; Herne, 2015; Kemperl, 2013; Kozjek Varl & Duh, 2017; Twardzik Ching, 2015, 2017; Zupančič, 2006; Zupančič & Velikonja, 2017).

Conclusions

This study aimed to introduce students to the concepts of destruction and transformation within the realm of conceptual art, encouraging deep thinking about destruction, and highlighting the importance of the creative and cognitive processes. The research findings demonstrated that familiarising students with artworks aligned with the explored concept sparked their interest, enhanced their critical thinking abilities, and encouraged them to express their opinions (Kemperl, 2013; Zupančič, 2011). In-depth discussions about conceptual foundations resulted in a predominantly positive attitude among students towards the presented contemporary artworks (Vrlič & Čagran, 2003; Zupančič, 2006). Furthermore, the understanding and internalisation of the essence of these artworks manifested comprehensively in the practical artistic expressions of the students (Kozjek Varl & Duh, 2017; Zupančič & Velikonja, 2017).

The direct experience of destroying their artwork emotionally and intellectually engaged the students (Pivec, 2020), consequently altering their perception of destruction itself. While some students expressed reluctance towards destruction at the beginning of the second creative phase, they later found excitement in the act of destruction during the creative process. It provided them with a sense of release and simultaneously posed a challenge of imbuing the act of destruction with meaning through their ideas. As numerous theorists have pointed out (Bremmer et al., 2020; Leuthold, 1999; Marshall, 2008; Sullivan, 2002; Zupančič, 2006), this is particularly important because it allows students to simultaneously develop conceptual and technical skills, enabling them to express themselves creatively and individually. In general, the implementation of the concept of destruction and transformation in art education motivated students, encouraged their experimentation with contemporary modes of expression and fostered a deep and diverse approach to creation. Moreover, it promoted the development of key future skills such as creativity, imagination, divergent thinking, and innovative ideas, as noted by other authors regarding art assignments derived from contemporary art practices (Kozjek Varl & Duh, 2017; Marshall, 2008; Zupančič, 2006; Zupančič & Velikonja, 2017).

In conclusion, we find that we can gain much through an approach directly derived from the creative process of contemporary artists (Sullivan,

2002), provided we illuminate the complex nature of contemporary artworks to students (Kemperl, 2013; Zupančič, 2006, 2011), strategically confront them with dilemmas and challenges (Duh, 2004; Marentič-Požarnik, 2019), and continuously operate within a democratic and relaxed environment (Bremmer et al., 2020; Glogovec & Žagar, 1992; Tacol, 2003), where art education becomes an exciting experience (Pataky, 2020).

We recognise the potential for further research in connecting destruction with themes related to the preservation of cultural heritage, which, as Potočnik (2020) notes, are also often insufficiently integrated into art education. Potočnik (2020) suggests that informed art educators should 'guide students to become active and responsible citizens capable of understanding the issues and expressing their sensitivity and respect for cultural heritage and caring for it' (p. 50). Destruction can thus emphasise the fragility and temporality of cultural heritage, while preservation concerns its sustainability and the preservation of memory of the past. The connection between destruction and the preservation of cultural heritage is complex and enables students to explore different interpretations and understand how opposites can unite and complement each other in the context of art.

The duality of opposites (destruction and creation) was also highlighted in this research, in which we aimed to contribute to the development of contemporary art education practices through a specific thematic activity. The research also has practical value in the field of art education, as it contributes to the development of new approaches and methods while encouraging art educators to explore and recognise possible ways to incorporate conceptual artistic practices into the learning process. We suggest that more thematic activities in art education should stem from existential human problems and experiences, which can also be observed in contemporary art practices. Above all, we must be mindful and attentive to how we can open the eyes of young learners to see and recognise the power that conceptual art can hold. To do this, we need to be willing to find a way out of Plato's cave, in other words, be philosophically courageous and pedagogically responsible (Gaarder, 1997).

Regarding the research limitations, we would highlight the small sample of participating students, preventing the generalisation of results to a broader population. Additionally, the monitoring of students' attitudes towards destruction and transformation occurred within the scope of two sessions, a consequence of the limited time allocated to the visual arts subject in secondary school. This limitation in the number of hours poses a challenge for conducting research over an extended period, impacting the scope and depth of the analysis.

Potential extensions of the study could involve a larger number of students from various Slovenian secondary schools and investigating alternative approaches to destruction and transformation (e.g., students working in pairs; they would destroy and transform each other's artistic creations). This would deepen the understanding of their attitudes towards destruction, providing fresh insights into the psychological, emotional, and societal aspects of this process.

Disclosure statement

The authors have no conflict of interest to declare.

References

Batič, J. (2011). The field trip as part of spatial (architectural) design art classes. *Center for Educational Policy Studies Journal, 1*(2), 73–86. https://doi.org/10.26529/cepsj.429

Bremmer, M., Heijnen, E., & Kersten, S. (2020). Teacher as conceptual artist. *International Journal of Art & Design Education, 40*(1), 82–98. https://doi.org/10.1111/jade.12318

Cencič, M. (2014). Učne metode kot spodbuda k ustvarjalnosti [Teaching methods as a stimulus to creativity]. *Didakta, 24*(171), 5–7.

Downing, D. & Watson, R. (2004). *School art: What's in it? Exploring visual arts in secondary schools.* National Foundation for Educational Research.

Duh, M. (2004). *Vrednotenje kot didaktični problem pri likovni vzgoji* [Assessment as a didactic issue in art education]. Pedagoška fakulteta.

Gaarder, J. (1997). *Zofijin svet* [Sophie's world]. Obzorja.

Glogovec, V., & Žagar, D. (1992). *Ustvarjalnost. Projektno vzgojno delo* [Creativity. Project educational work]. National Education Institute Slovenia.

Gorjanc, T., & Črčinovič Rozman, J. (2015). Pomembnost prepoznavanja in spodbujanja otrokove ustvarjalnosti v učnem procesu [The importance of recognising and nurturing children's creativity in the learning process]. *Educa, 24*(1/2), 42–46.

Herne, S. (2005). Download: Postcards Home Contemporary Art and New Technology in the Primary School. *International Journal of Art and Design Education*, *24*(1), 5–19. https://doi.org/10.1111/j.1476-8070.2005.00419.x

Kemperl, M. (2013). Contemporary art and citizenship education: The possibilities of cross-curricular links on the level of content. *Center for Educational Policy Studies Journal, 3*(1), 97–117. https://doi.org/10.26529/cepsj.253

Kozjek Varl, K., & Duh, M. (2017). Prikaz medpredmetnega povezovanja na primeru implementacije sodobne umetnosti v osmi razred osnovne šole [Cross-curricular integration in the case of contemporary arts implementation in the eighth grade of primary school]. *Revija za elementarno izobraževanje, 10*(4), 377–397. https://doi.org/10.18690/1855-4431.10.4.377-397(2017)

Leuthold, S. (1999). Conceptual art, conceptualism, and aesthetic education. *The Journal of Aesthetic Education, 33*(1), 37–47. https://doi.org/10.2307/3333734

Marentič-Požarnik, B. (2019). *Psihologija učenja in pouka: od poučevanja k učenju* [Psychology of learning and teaching: from teaching to learning]. DZS.

Marshall, J. (2008). Visible thinking: Using contemporary art to teach conceptual skills. *Art Education, 61*(2), 38–45. https://doi.org/10.1080/00043125.2008.11651141

Pataky, G. (2020). "Do not touch it!" Today's children's visual competencies in comparison with the pre-digital era in light of their art educational environment. *Center for Educational Policy Studies Journal, 10*(4), 75–96. https://doi.org/10.26529/cepsj.925

Pivac, D. (2022). Problem-based learning and teaching in the process of experiencing and creating an artwork. In R. Potočnik (Ed.), *Innovative learning and teaching for quality careers of graduates and excellent higher education: Arts didactics in higher education* (pp. 107–122). University of Ljubljana Press. https://doi.org/10.51746/97896171283 14

Potočnik, R. (2020). Heritage preservation education: teachers' preconceptions and teachers implementation in visual arts classes. *Center for Educational Policy Studies Journal, 10*(2), 49–76. https://doi.org/10.26529/cepsj.792

Sullivan, G. (2002). Ideas and teaching: Making meaning from contemporary art. In Y. Gaudelius, & P. Speirs (Eds.), *Contemporary issues in art education* (pp. 23–35). Prentice Hall.

Tacol, T. (1999). *Didaktični pristop k načrtovanju likovnih nalog: izbrana poglavja iz likovne didaktike* [Didactic approach to planning art tasks: selected chapters from art didactics]. Debora.

Tacol, T. (2003). *Likovno izražanje. Didaktična izhodišča za problemski pouk likovne vzgoje v devetletni osnovni šoli* [Artistic expression. Didactic foundations for problem-based art education in nine-year elementary school]. Debora.

Tomšič Amon, B. (2020). Interdisciplinary connections through transmedia narratives in art education. *Center for Educational Policy Studies Journal, 10*(4), 55–74. https://doi.org/10.26529/cepsj.916

Twardzik Ching, C. L. (2015). Teaching contemporary art in primary schools. *Athens Journal of Humanities & Arts, 2*(2), 95–110. https://doi.org/10.30958/ajha.2-2-3

Twardzik Ching, C. L. (2017). Changing perspectives: Contemporary art practices in primary and secondary art classrooms. In *Educating for change: The European conference on education 2017* (pp. 181–196). The International Academic Forum. https://papers.iafor.org/wp-content/uploads/conference-proceedings/ECE/ECE2017_proceedings.pdf

Učni načrt. Gimnazija. Likovna umetnost [Curriculum. High School. Fine Arts]. (2008). Ministry of Education of the Republic of Slovenia, National Education Institute Slovenia.

Vrlič, T., & Čagran, B. (2003). Empirično uvajanje sodobnih vsebin v likovno vzgojo v osnovni šoli [Empirical introduction of contemporary content in elementary school art education]. *Sodobna pedagogika, 54*(4), 126–142.

Zupančič, T. (2006). *Metoda likovnopedagoškega koncepta: priročnik za učitelje* [The method of art-pedagogical concept: a handbook for teachers]. National Education Institute Slovenia.

Zupančič, T. (2011). "Prepovedane teme" v sodobni umetnostni vzgoji ["Forbidden topics" in contemporary visual arts education]? *Revija za elementarno izobraževanje, 4*(1–2), 47–60.

Zupančič, T., & Velikonja A. (2017). Beneški bienale sodobne umetnosti in pouk likovne umetnosti v osnovni šoli [The Venice biennale of contemporary art and arts in primary school]. *Revija za elementarno izobraževanje, 10*(2/3), 289–311.

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Thinking What No One Else Has Thought: Investigating the Scientific Creativity of Primary School Students in a Science Class

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For the advancement of humanity, scientific creativity is a crucial skill for coming up with innovations, addressing existing issues and interpreting particular scientific phenomena. The present study aimed to determine the scientific creativity level of 23 primary school students.

In a single cross-sectional study, a descriptive survey questionnaire modelled on the Scientific Structure Creativity Model (SSCM) incorporated a seven-item scientific creativity test specifically designed to align with the backgrounds of primary school students. The results show that the students have a balance between a low or intermediate scientific creativity level. Of the 23 respondents, 8 have a low scientific creativity level, 8 have an intermediate scientific creativity level and 7 have a high scientific creativity level. The respondents are the most scientifically creative in creative science problem solving. The researchers recommend an intervention such as integrating the arts into the STEM curriculum to help develop students' scientific creativity.

Keywords: primary school students, problem solving, scientific creativity, STEM education, scientific structure creativity model (SSCM)

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Misliti, česar ni mislil še nihče drug: raziskovanje znanstvene ustvarjalnosti osnovnošolcev pri pouku naravoslovja

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Znanstvena ustvarjalnost je za napredek človeštva ključna spretnost pri snovanju inovacij, reševanju obstoječih vprašanj in razlagi določenih znanstvenih pojavov. Namen te študije je bil ugotoviti raven znanstvene ustvarjalnosti pri 23 osnovnošolskih učencih. V enkratni presečni študiji je opisni anketni vprašalnik, oblikovan po vzoru t. i. modela strukture znanstvene ustvarjalnosti (Scientific Structure Creativity Model ali SSCM), vključeval sedemdelni test znanstvene ustvarjalnosti, ki je bil posebej oblikovan tako, da je ustrezal predznanju osnovnošolcev. Rezultati so pokazali, da so učenci uravnoteženi med nizko in srednjo stopnjo znanstvene ustvarjalnosti. Od 23 anketirancev jih ima osem nizko raven znanstvene ustvarjalnosti, osem jih je pokazalo srednjo raven znanstvene ustvarjalnosti in sedem anketirancev visoko raven znanstvene ustvarjalnosti. Anketiranci so najbolj znanstveno ustvarjalni pri ustvarjalnem reševanju naravoslovnih problemov. Raziskovalci priporočajo uvedbo ukrepa, kot je vključevanje umetnosti v učne načrte pri predmetih s področij naravoslovja, tehnologije, inženirstva in matematike (angl. STEM), ki bi pomagala razvijati znanstveno ustvarjalnost učencev.

Ključne besede: osnovnošolci, reševanje problemov, znanstvena ustvarjalnost, izobraževanje STEM, model strukture znanstvene ustvarjalnosti (SSCM)

Introduction

Creativity is a vital phenomenon that puts its imprint on every activity (Borowiecki & Mauri, 2023). In today's fast-paced and modern world, dealing with any scenario requiring complex thinking and solutions is essential. People are constantly searching for fresh ideas for beneficial reasons and to solve difficulties in their daily lives (Marx, 2006; Acut & Antonio, 2023). As a result, every country's education system places a high value on children's cognitive abilities and growth (Darling-Hammond et al., 2019).

Scientific creativity is a specific domain of creativity. It is defined as an ability or a cognitive trait that leads to producing original and practical products that have a designated use from a given set of conditions (Hu & Adey, 2002), and it is one of the most critical factors in the development of humankind (Hu et al., 2010). Hu and Adey (2002) have developed a theoretical model called the Scientific Structure Creativity Model (SSCM), which covers three dimensions of scientific creativity: product, trait and process. The product dimension includes the technical product, science knowledge, the science phenomenon and the science problem. The process dimension contains imagination and thinking, while the trait dimension comprises fluency, flexibility and originality, based on Torrance's (1990) main aspects of creativity. Fluency refers to the quantity of original ideas produced, flexibility is the ability to adapt to volatile situations and not be bound by traditional approaches if they are no longer applicable, and originality depends on the frequency or rarity of the answers given.

Accordingly, various interventions have been developed to cultivate the individual's scientific creativity. Bi et al. (2020) categorised the interventions into four types: problem solving, collaborative learning, conceptual construction and scientific reasoning. Problem-solving interventions improve the product dimension; collaborative learning and conceptual construction interventions cultivate the process dimension; and scientific reasoning interventions develop the trait dimension of scientific creativity. The present study focuses on scientific reasoning interventions. Scientific reasoning trains the traits of scientific creativity (fluency, flexibility and originality) and the production of the individual's hypotheses and predictions (Bi et al., 2020).

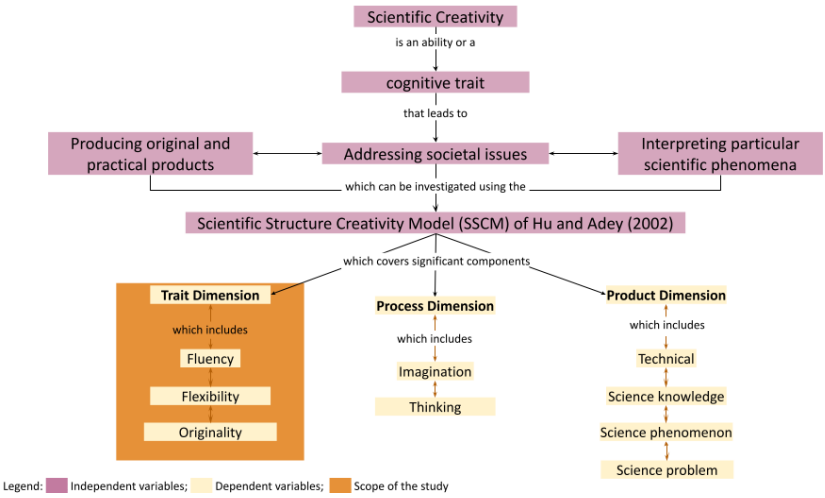
Creativity is a widely known and extensively researched topic, but the same could not be said for scientific creativity. A total of only 2,566 English-language articles were found that included the words 'scientific creativity' and were published between 2001 and 2019 (Wiyanto et al., 2020). Learning institutions should encourage and advocate enhancing creative thinking for

problem-solving situations or open-ended questions. Although scientific creativity is one of the most critical factors in the development of humankind (Hu et al., 2010), the skill of scientific creativity has yet to be acknowledged or deeply considered in primary schools (Siew et al., 2015).

In order to broaden the existing knowledge and research about scientific creativity, the present study investigates primary school students' scientific creativity. Abd-el and Lederman (2000) claim that creativity plays an essential role in science learning and discoveries. There is so much that science can disclose, and every step in the discovery process requires creativity before achieving an outcome. Many people still fail to realise the significance of creativity in science and problem solving, primarily due to the lack of articles and research explaining and emphasising its value. The present research aims to further the understanding of scientific creativity and explore the scientific creativity of primary school students in order to develop their comprehension of science, which is essential in enabling them to develop a fundamental understanding of science (Meador, 2003).

The scientific creativity assessment tool developed by Hu and Adey (2002) based on the Torrance Test of Creative Thinking (Torrance, 1990) has been utilised in many research studies as a basis for analysis and interpretation of students' scientific creativity. The Torrance Test of Creative Thinking (TTCT) evaluates the individual's creativity regarding the traits of fluency, flexibility and originality. However, the test only caters to general creativity. Several researchers have created their own scientific creativity tests, such as Friedlander (1983), Majumdar (1975) and Sinha and Singh (1987), but these tests rely on the student's science knowledge and are therefore unsuitable for junior high students with less scientific knowledge (Hu & Adey, 2002). Hu and Adey's (2002) Scientific Structure Creativity Model (SSCM) is designed to produce more reliable and accurate results by taking into account the students' limited knowledge. In the present research, the test created by Hu & Adey (2002) will be applied to evaluate the scientific creativity of primary school students by scoring the associated traits (Figure 1). Although the items are localised or contextualised, the main idea of the items remains the same.

Figure 1
Graphical concept map of the study



As reported, scientific creativity has yet to be widely acknowledged and studied in primary schools. The present study aimed to explore whether and how the SSCM could be used to investigate scientific creativity, particularly the trait dimension, in young students. Hence, the findings of the research may be used to improve scientific creativity so that students can learn how to apply it themselves and develop their creative thinking when doing scientific activities, such as research, thus expanding their understanding of science and helping them to discover new things more efficiently. Specifically, the study aimed to answer the following research questions:

RQ1: How scientifically creative are the respondents' answers regarding:
- 1.1 scientific uses of a piece of glass;
- 1.2 scientific questions when discovering a new animal species;
- 1.3 possible improvements to a jeepney (a public utility vehicle resembling a minibus);
- 1.4 hypothetical scenarios in the case of having no sun;
- 1.5 possible equations that are equal to 10;
- 1.6 testing which napkin is better; and
- 1.7 designing a coconut picking machine?

RQ2: What is the level of the respondents' scientific creativity in terms of:
- 2.1 originality;
- 2.2 fluency; and

2.3 flexibility?

RQ3: What implications and recommendations can be drawn from the findings of the study?

Method

Participants

The participants of the study were 23 sixth-grade students (57% female, 43% male) in a Department of Education-recognised private institution in Metro Cebu, Philippines. The respondents were briefed on the purpose of this study and were given a letter of consent enabling them to choose whether or not to voluntarily take part in the survey. The completed questionnaire forms were considered as given consent. The respondents' identities remained anonymous and the results of the surveys were treated with the utmost confidentiality. School guidelines regarding data privacy were strictly adhered to, as is evident in the FORUM Research Committee Certification (0001/2021-STEM Fernandez).

Instruments

In order to obtain the required data, the researchers utilised a questionnaire from Hu and Adey's (2002) research entitled "A Scientific Creativity Test for Secondary School Students", which is based on the Scientific Structure Creativity Model (SSCM). The questionnaire had seven items and was altered to localise the test. These items were provided to help students understand what was required. The test also assessed the students' sensitivity to science problems, their ability to improve a technical product, their scientific imagination, their creative science problem-solving ability, their creative experimental ability, and their creative science product design ability. Each item evaluated the students' flexibility, fluency and originality, all of which significantly influence a person's scientific creativity. Specifically, items 1, 2, 3 and 4 evaluated the students' flexibility, fluency and originality, while items 5, 6 and 7 only appraised their originality and flexibility. The researchers made use of Google Docs as a platform to distribute the questionnaires. The instruments used in the study underwent pilot testing to ensure validity and reliability.

Table 1

Sample questions from the scientific creativity questionnaires

Area	No. of Items	Sample Item
Flexibility	7	You are given the freedom to do anything you want with the piece of glass you were given. Write down as many possible scientific uses as you can for that piece of glass. For example, it can be used to make a test tube.
Fluency	4	Suppose you live on Mars, what do you think life would be like? For example, our houses would be specially designed to withstand the harsh conditions of the planet.
Originality	7	Design a coconut picking machine. Draw a picture on a piece of paper, and point out the name and function of each part. Take a picture of the drawing and attach it below.

The researchers utilised Hu and Adey's (2002) scoring guide for all of the items. They also adopted Genek and Doğança Küçük's (2020) scoring guide for the item that measures students' creative science product design ability.

Table 2

Scoring guide for the scientific creativity test

Item Number (Question)	Targeted Creative Ability	Dimension Covered	Scoring
1. You are given the freedom to do anything you want with the piece of glass you were given. Write down as many possible scientific uses as you can for that piece of glass. For example, it can be used to make a test tube.	Using an object for a scientific purpose	Fluency	1 point for each response
		Flexibility	1 point for each approach or area
		Originality	<5%: 2 points 5-10%: 1 points >10%: 0 points
2. If you came across an island with an animal species that you had never seen or read about before, what scientific questions would you want to research? Please list as many as you can. For example, what animal classification do they belong to?	Sensitivity to science problems	Fluency	1 point for each response
		Flexibility	1 point for each approach or area
		Originality	<5%: 2 points 5-10%: 1 points >10%: 0 points
3. You are a jeepney driver wanting to attract as many customers as you can. Think of as many possible improvements as you can to a regular jeepney, making it more interesting, more useful and more beautiful. If needed, explain why. For example, make the tires reflective, so they can be seen in the dark.	Ability to improve a technical product	Fluency	1 point for each response
		Flexibility	1 point for each approach or area
		Originality	<5%: 2 points 5-10%: 1 points >10%: 0 points

Item Number (Question)	Targeted Creative Ability	Dimension Covered	Scoring
4. If our planet had no sun, what do you think would happen? If needed, explain why. For example, the process of photosynthesis would not occur.	Scientific imagination	Fluency	1 point for each response
		Flexibility	1 point for each approach or area
		Originality	<5%: 2 points 5-10%: 1 points >10%: 0 points
5. Using the four basic operations, write as many possible equations as you can that would give a result of 10. The equation must only have two whole numbers and one operation. For example, -1+11=10.	Creative science problem solving ability	Flexibility	1 point for each approach or area
		Originality	<5%: 3 points 5-10%: 2 points >10%: 1 point
6. A company is conducting a survey on their product and you have been chosen as one of the product testers. You are given two kinds of tissue paper from different companies, both without labels. How can you test which is better? Please list as many possible methods as you can, as well as the instruments, principles and a simple procedure.	Creative experimental ability	Flexibility	3: Procedures 3: Instruments 3: Purpose
		Originality	<5%: 4 points 5-10%: 2 points >10%: 0 points
7. Design a coconut picking machine. Draw a picture on a piece of paper, and point out the name and function of each part. Take a picture of the drawing and attach it below.	Creative science product design ability	Flexibility	3 points for each function
		Originality	0: Machine does not collect coconuts 1: Collecting with a machine hand or collecting the coconuts that have fallen 2: Collecting coconuts with a vacuum 3: One distinctive original function 4: More than one distinctive original function 5: Original collection method

Research Design

This cross-sectional study utilised a descriptive survey questionnaire design to investigate and measure the scientific creativity of primary school students. The scoring guide was based on Hu and Adey's (2002) grading criteria, along with a few modifications adapted from Genek and Doğança Küçük's (2020) investigatory study of scientific creativity.

The respondents were asked to answer the given questionnaire, which

required basic scientific knowledge, only once. The questions were answered through Google Docs distributed through Google Classroom, providing a more convenient method of answering and recording the answers. The students were given 90 minutes to answer the survey.

The researchers started by giving a brief background about the study and relaying the instructions for the test. Due to time constraints, the students were given only 3-4 items from the questionnaire per meeting. The test was completed over a period of two days. The researchers collected the questionnaire data, tallied it and calculated the class's general mean. The results were analysed through the SSCM to determine how scientifically creative the students were, focusing on their flexibility, originality and fluency. The research conclusions were then constructed based on the study's findings.

Data Analysis

Descriptive statistics were used for this study, especially the class's general mean. The minimum and maximum test scores of the students were also presented and analysed. The class's general mean was used to analyse the overall scientific creativity level of the students by comparing it to the means of other studies, thereby establishing a basis for judgment and conclusion. A general mean higher than the general mean of other studies would imply that the students in the study are more scientifically creative.

The students were also categorised according to their level of scientific creativity, thus determining whether they have a low, medium or high level of scientific creativity. All of the calculations were done in Google Sheets.

Results

This section presents the test results, including the respondents' scores, the frequency of the answers for the originality trait, the frequency of students whose scores fall in a specific range, and the comparison of the present study's general mean with other studies.

Fluency, flexibility and originality traits of the respondents

The students' answers primarily contribute to their overall score and results in the scientific creativity test. Their scientific creativity score will differ depending on the quality, variety and number of answers in the completed test. The scores for the originality trait of each item were based on their percentage, as per Hu and Adey's (2002) scoring guide. The only exception is Item 7, which follows Genek and Doğança Küçük's (2020) scoring guide. The tables below

present the answers of the class as well as their percentage of originality. The fluency and flexibility means of each item are also briefly discussed.

It should be noted that these results have been arrived at after careful consideration and inspection of the answers, so responses that fail to answer the question or do not make sense have been disregarded. For Item 1, there is a total of 36 answers. The summary of the answers is presented in Table 3.

Table 3

Responses and originality percentage for Item 1 (i.e., scientific uses of a piece of glass)

Student Responses	Frequency	Percentage	Scores	Sources*
Weapon (broken shard as a dagger)	1	2.78%	2	R1
Openings (windows, sliding doors, etc.)	2	5.56%	1	R1, R4
Kitchen utensils (bowl, measuring cup, etc.)	6	16.67%	0	R1, R2, R5, R16, R17, R21
Bells	1	2.78%	2	R1
Household items (pencil holder, vases, etc.)	3	8.33%	1	R2, R16, R22
Storage	10	27.78%	0	R2, R5, R10, R11, R13, R15, R18, R19, R20, R23
Experiment on it/with the glass	5	13.89%	0	R3, R7, R8, R18, R20
Laboratory equipment (test tube, beaker, etc.)	4	11.11%	0	R5, R9, R19, R22
Repurpose the glass	1	2.78%	2	R12
Magnifying instruments (magnifying glass, eyeglasses, etc.)	2	5.56%	1	R14, R22
Glass aquarium	1	2.78%	2	R4
Overall	36	100%		

* R – Respondent

The most notable answers from this item are "turning the glass into a pot to house seedlings", "make bells with the glass", and "make a weapon out of the glass". Only one respondent had the bright notion of turning a piece of glass into a weapon. The answer "storage" was the most frequent for this item, with "kitchen utensils" coming second.

The students may have been influenced by or reminded of the common glass storage containers or kitchen items that can be easily found in their own homes, such as glass jars and bowls. This finding is in line with Genek and Doğança Küçük's (2020) study, in which "kitchen stuff" is also one of the most frequent answers for this item. Respondent 1 had the most answers based on their fluency trait, as well as providing the most original answers. This may have been because R1's answers included turning the glass into a weapon, one of the

most unique answers for this item. Respondent 6 scored lowest for Item 1, as no answers were given: this item was left blank on the paper. The mean score of the respondents for this item is 1.42.

For Item 2, there is a total of 86 answers, considerably more than the previous item. The answers and their originality are shown in Table 4.

Table 4

Responses and originality percentage for Item 2 (i.e., scientific questions when discovering a new animal species)

Student Responses	Frequency	Percentage	Scores	Sources*
Place of Origin	5	5.81%	1	R1, R17, R18, R20, R21
Breed/kind/classification/family	7	8.14%	1	R1, R10, R13, R15, R16, R17, R22
Body inspection (sex, limbs, organs, etc.)	6	6.98%	1	R1, R4, R5, R6, R9, R15
Animal's diet	13	15.12%	0	R1, R2, R5, R6, R7, R8, R9, R13, R15, R18, R19, R20, R22
Maximum size the animal can grow to	1	1.16%	2	R1
Strength of the animal	1	1.16%	2	R1
Limbs the animal can regrow	1	1.16%	2	R1
Wildness	2	2.33%	2	R2, R20
Friendliness	1	1.16%	2	R3
Ability to domesticate the animal	2	2.33%	2	R3, R15
Behaviour	4	4.65%	2	R5, R13, R15, R19
Biome/habitat	2	2.33%	2	R5, R22
Taste of the animal	1	1.16%	2	R6
Special abilities (night vision, jump high, etc.)	6	6.98%	0	R1, R4, R7, R10, R16, R17
Defensive abilities (claws, hard scales, etc.)	1	1.16%	2	R7
Name of the animal	4	4.65%	2	R8, R18, R19, R20
Edibility	1	1.16%	2	R8
Prey/predator	2	2.33%	2	R8, R15
Breeding habits	1	1.16%	2	R9
Locomotion (swim, flight, etc.)	3	3.49%	2	R9, R10, R16
Ability to lay or hatch from eggs	2	2.33%	2	R10, R12
Speed of locomotion (fast, slow, etc.)	2	2.33%	2	R1, R10
Weakness	1	1.16%	2	R12
Sleeping habits	1	1.16%	2	R12
Things they dislike	1	1.16%	2	R12
Level of danger to humans	4	4.65%	2	R13, R15, R19, R21
Endangered	3	3.49%	2	R14, R16, R20
Survival techniques (camouflage, etc.)	1	1.16%	2	R15
Animal it is similar to	2	1.16%	2	R15, R17

Student Responses	Frequency	Percentage	Scores	Sources*
Date of discovery	1	1.16%	2	R18
Method of approaching the animal	1	1.16%	2	R18
Lifespan	1	1.16%	2	R20
Contribution to the environment	1	1.16%	2	R21
Common ancestor	1	1.16%	2	R22
Overall	86	100%		

* R – Respondent

The most notable answers from this item are "Is it a cannibal?" and "How do they taste?" There was a great deal of variety in the answers from the respondents. However, these answers stood out the most because none of the other responses tackled the possibility of the animal being a cannibal or the question of how it tastes. The response "animal's diet" had the highest frequency, with a rather large gap to the response with the second highest frequency, "breed/kind/classification/family of animal". Many of the students would want to know whether the unknown animal is a herbivore, carnivore, omnivore or cannibal.

Respondent 15 had the highest score for this item, with the highest originality trait. This finding implies that R15 had unique answers, such as "survival techniques" and "animal it is similar to". The latter category has been separated rather than including it within the category "breed/kind/classification/family of animal", as it asks for a specific animal. The respondents with the lowest score for this item are R11 and R23, both of whom provided answers that were unrelated to the question and were therefore disregarded. The mean score for this item is 4.58, which indicates a sign of creativity. The present study therefore demonstrates a sign of creativity for this item.

There are 54 answers in total for Item 3. The summary of the responses for this item is presented in Table 5.

Table 5

Responses and originality percentage for Item 3 (i.e., possible improvements on a jeepney)

Student Responses	Frequency	Percentage	Scores	Sources*
Make the design better	18	33.33%	0	R1, R2, R3, R5, R6, R7, R8, R9, R10, R11, R13, R15, R16, R17, R18, R19, R20, R22
Increase seat capacity	3	5.56%	1	R1, R16, R17
Have good customer service	5	9.26%	1	R1, R2, R4, R16, R22
Add air conditioner/improve air conditioner	3	5.56%	1	R2, R5, R22
Comfort of jeepney (cleanliness, lights for visibility, etc.)	13	24.07%	0	R2, R4, R5, R9, R10, R11, R12, R14, R15, R17, R21, R22, R23
Put on music/avoid using loud music	7	12.96%	0	R2, R8, R10, R11, R13, R15, R20
Make jeepney sound attractive	1	1.85%	2	R7
Increase jeepney's speed	1	1.85%	2	R8
Put curtains	1	1.85%	2	R10
Increase jeep's distance for travel	1	1.85%	2	R11
Put windows/open windows	1	1.85%	2	R21
Overall	54	100%		

* R – Respondent

The most notable answer from this item is "putting barriers between each seat for the comfort of the passenger and the sake of social distancing". This response was the only answer in which the current situation was considered, and the change applied to the jeepney is most appropriate for people these days. The category "make design better" had the highest frequency for this item, with most of the students (18 out of 23) who included this category in their answers believing that a better design could attract more customers.

This finding implies that targeting their sense of sight is more effective for attracting customers. Respondent 2 had the highest total score for this item, with the fluency trait being the highest. Although R2 does not have unique answers, this is compensated for by the number of answers (for the fluency trait). The respondents with the lowest score for this item had only 1 point for fluency, 1 point for flexibility and 0 for originality, which means that their single answer for this item was not original. The mean total for this item is 2.04, indicating a sign of creativity.

Item 4 has 61 answers, which are presented in Table 6.

Table 6

Responses and originality percentage for Item 4 (i.e., hypothetical scenarios in a case of having no sun)

Student Responses	Frequency	Percentage	Scores	Sources*
Temperature drops (includes the collateral damage that comes with it, i.e., freeze to death, planet turns cold, etc.)	10	16.39%	0	R1, R8, R10, R11, R13, R15, R18, R19, R21, R23
No light	9	14.75%	0	R1, R5, R11, R12, R13, R14, R15, R16, R18
Change of weather/climate	2	3.28%	2	R1, R20
Plants' growth and life can be affected	12	19.67%	0	R1, R2, R7, R8, R9, R11, R12, R14, R15, R17, R20, R22
No oxygen	2	3.28%	2	R1, R2
Humans and animals will die	10	16.39%	0	R6, R7, R8, R13, R14, R15, R17, R21, R22, R23
Daytime and night time will be affected	4	6.56%	1	R3, R11, R12, R17
Solar energy can't be used	4	6.56%	1	R3, R4, R5, R15
No orbit	4	6.56%	1	R5, R8, R13, R17
Mass hysteria	1	1.64%	2	R8
Usage of an alternative technology for survival	1	1.64%	2	R8
Civilisation will move underground for warmth	1	1.64%	2	R8
Lack of Vitamin D	1	1.64%	2	R15
Overall	61	100%		

* R – Respondent

For this item, almost all of the respondents only mentioned how having no sun would affect the organisms living on the planet. The most notable answer for this item is "people will move underground for warmth utilising heat-inducing technology". This was the only response that addressed how humans could live or survive without the sun on our planet. The category "plants' growth and life can be affected" has the highest frequency count, followed by "humans and animals will die" and "temperature drops" by a small margin.

As mentioned above, the categories are the effects of a sunless situation at the surface level or the primary effects if such an event were to occur. The categories with the lowest frequency are "mass hysteria", "civilization will move underground for warmth", "usage of alternative technology for survival", and "lack of vitamin D". On close examination, it is clear that the categories with the lowest frequency are secondary effects or the reaction to primary effects: mass hysteria occurs in response to the sudden changes in the environment;

civilisation moving underground occurs in response to the drop in temperature and the death of vegetation on the surface; the use of alternative technology for survival is a response to the changing living conditions such as no light, death of animals and plants, and so on; and the lack of Vitamin D is the body's response to having no sun. The respondents who answered these categories demonstrated good critical thinking skills.

Respondent 8 has the highest score for this item and, as is evident from the table above, R8 also has the most original answers. Similar to the previous item, the respondents with the lowest score for this item have 1 point for fluency and 1 point for flexibility, which means that they gave a single answer, and that the answer is not original or unique.

Of all seven items, Item 5 had the greatest response, with 153 answers. This result dramatically demonstrates the students' fluency level. The answers are shown in Table 7.

Table 7

Responses and originality percentage for Item 5 (i.e., possible equations that are equal to 10)

Student Responses	Frequency	Percentage	Score	Sources*
1+9	10	6.54%	2	R10, R3, R1, R11, R8, R2, R5, R14, R16, R23
5+5	15	9.80%	2	R10, R20, R22, R13, R3, R1, R7, R11, R8, R2, R4, R14, R16, R19, R23
5x2	14	9.15%	2	R10, R20, R12, R9, R1, R7, R11, R8, R2, R4, R16, R17, R19, R21
-5+15	4	2.61%	3	R22, R1, R4, R5
-20+30	2	1.31%	3	R22, R1
8+2	10	6.54%	2	R10, R11, R8, R2, R14, R16, R17, R19, R21, R23
7+3	8	5.23%	2	R10, R22, R11, R8, R2, R18, R19, R23
4+6	8	5.23%	2	R10, R22, R8, R2, R14, R16, R19, R23
-30+40	2	1.31%	3	R22, R2
20-10	6	3.92%	3	R10, R20, R11, R8, R2, R19
-5x-2	1	0.65%	3	R2
10x1	7	4.58%	3	R10, R9, R11, R8, R2, R5, R18
10/1	3	1.96%	3	R7, R2, R8
20/2	6	3.92%	3	R11, R8, R2, R4, R17, R18
30/3	4	2.61%	3	R11, R8, R2, R19
40/4	2	1.31%	3	R8, R2
50/5	3	1.96%	3	R11, R8, R2
60/6	2	1.31%	3	R8, R2
70/7	2	1.31%	3	R8, R2
80/8	2	1.31%	3	R8, R2

Student Responses	Frequency	Percentage	Score	Sources*
90/9	2	1.31%	3	R8, R2
100/10	5	3.27%	3	R10, R20, R8, R2, R21
200/20	1	0.65%	3	R2
1000/100	1	0.65%	3	R2
0+10	1	0.65%	3	R3
12-2	3	1.96%	3	R3, R11, R8
11-1	6	3.92%	3	R7, R8, R5, R15, R16, R19
19-9	1	0.65%	3	R8
18-8	2	1.31%	3	R8, R18
17-7	1	0.65%	3	R8
16-6	1	0.65%	3	R8
15-5	3	1.96%	3	R11, R8, R17
14-4	1	0.65%	3	R8
13-3	2	1.31%	3	R8, R21
40-30	1	0.65%	3	R10
100-90	2	1.31%	3	R10, R19
1000-990	1	0.65%	3	R10
60-50	1	0.65%	3	R11
25-15	1	0.65%	3	R11
95-85	1	0.65%	3	R12
50-40	1	0.65%	3	R19
-7+17	1	0.65%	3	R22
-32+42	1	0.65%	3	R22
-22+32	1	0.65%	3	R22
-25+35	1	0.65%	3	R22
Overall	153	100%		

* R – Respondent

The most notable answer for this item is "-5x-2". Although 5x2 is an ordinary equation given by the respondents, only one respondent in the group considered or addressed the use of negative signs in the equation. The equations with the highest frequency are "5+5" and "5x2". The relationship between addition and multiplication (incorporating addition into the solution) might have been more straightforward for students to remember and perform. For this item, 18 of the 153 responses are considered unique and original. The mean total for this item is 11.89, which indicates a vital sign of creativity.

For Item 6, there are 39 answers for the reasoning of the experiments. The procedures and the materials in the answers are often specified, but in this case there is a slight difference in the answers. The reasonings for the experiments are presented in Table 8.

Table 8

Responses and originality percentage for Item 6 (i.e., testing which napkin is better)

Student Responses	Frequency	Percentage	Score	Sources*
Rippability of perforation lines in the tissue	1	2.56%	4	R1
Which has more rolls (in the packaging)	1	2.56%	4	R1
Durability	10	25.64%	0	R10, R9, R1, R7, R4, R14, R18, R17, R21, R5
Texture (softer, more comfortable, etc.)	4	10.26%	0	R1, R7, R4, R16
Width of tissue	6	15.38%	0	R20, R11, R2, R15, R18, R22
Scent	2	5.13%	2	R11, R8
Efficiency in cleaning	5	12.82%	0	R22, R12, R13, R11, R21
Absorbency	7	17.95%	0	R22, R15, R8, R2, R4, R13, R23
Flexibility	1	2.56%	4	R17
Eco-friendliness	2	5.13%	2	R8, R23
Overall	39	100%		

* R – Respondent

The notable answers for this item were "using heavy makeup to see which tissue can clean more", "using a worker's runny nose to test the tissue's durability", and "using a digital calliper to measure the tissue's thickness". The first and second answers were the only answers giving a specific situation, while the last answer was the only one that included a specific tool to measure the tissue.

If a tool or material is specified (e.g., use water), the answer receives 3 points. If procedures are specified (e.g., wipe the tissue paper on the table), the answer again receives 3 points. If a purpose is specified (e.g., wipe the tissue paper on a wet table to test its absorbency), the answer receives another 3 points for flexibility. As always, the originality depends on the percentage and frequency of each purpose of the experiment. The total mean of this item is 5.57, which indicates a vital sign of creativity.

For Item 7, each student is required to come up with a coconut picking robot. There needs to be more variety among the answers, with only three different responses being given, as shown in Table 9.

Table 9

Responses and originality percentage for Item 7 (i.e., coconut picking machine)

Student Responses	Frequency	Percentage	Scores	Sources*
Collecting with a machine hand	21	91.67%	1	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15, R16, R17, R18, R19, R20, R23
More than one distinctive original function	1	4.17%	4	R22
Original collection method	1	4.17%	5	R21
Overall	38	100%		

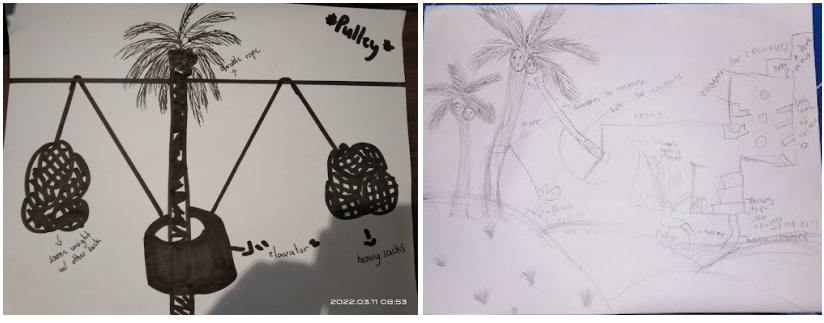
* R – Respondent

Interestingly, almost all of the respondents included a mechanical arm in their respective machines. Only 1 of the 23 respondents opted for a unique method of harvesting coconuts. Although many of the respondents added unique functions to their machines, the method of harvesting is not at all unorthodox.

Out of all of the responses, two machines were nevertheless considered unique by the researchers. The mean total for this item is 2.48, indicating a sign of creativity. The most notable responses (see Figure 2) were from R21 (left) and R22 (right), who were the only respondents with a unique machine. Respondents 21 and 22 gained 5 and 4 points respectively for originality in this item. Respondent 21 showed an original method of collecting, using simple devices such as a pulley. Although the solution provided by Respondent 22 uses a mechanical arm, many other elements were added to the drawing, thus making it unique. The drawing included the processes the coconuts have to go through, but it fails to reach a high level of detail.

Figure 2

Details from the most unique coconut picking machines



Analysis of the respondents' scientific creativity

A total of 23 respondents answered the survey. The table below presents a breakdown of their scores in each item and trait, along with the total score for each respondent.

The class overall mean for originality is 3.99, while they achieved 4.40 for flexibility and 3.14 for fluency. This result indicates that the class covered many areas in their answers, regardless of whether or not they were original. Although there are few answers in their questionnaires, at least the answers are original or unique. On the other hand, items 5 to 7 do not cover the trait of fluency, which may explain why fluency is the trait with the lowest mean. For further context and understanding of the data gathered, the descriptive statistics are presented in Table 10.

Table 10

Descriptive statistics of the scores and cut-off scores for each tercile for data interpretation

	N	**Mean**	***SD****	**Lowest Score**	**Highest Score**
Test Results	23	71.26	36.70	14	168
Range	**Frequency (*n* = 23)**	**Percentage**	**Interpretation**		
X ≤ 55	8	34.78	Low scientific creativity		
55 < X < 86	8	34.78	Intermediate scientific creativity		
86 ≤ X	7	30.43	High scientific creativity		

* *SD* – Standard Deviation

There is a wide gap between the lowest and highest scores, indicating that the results of the study have a wide range. Hu and Adey's (2002) study yielded similar results: for their respondents aged 12 years (which is close to the age of the present study's respondents), the mean was 45.36 with a standard deviation of 20.18; for their respondents aged 13 years, the mean was 56.92 with a standard deviation of 21.25.

Unfortunately, Hu and Adey (2002) did not specify whether the respondents in their study were scientifically creative or otherwise. However, it is clear that the set of respondents in the present study are more scientifically creative than those of Hu and Adey's (2002) study. Certain factors may have affected the overall result of the present study. Since the researchers adopted the scoring from both Hu and Adey (2002) and Genek & Doğanca (2020), the scoring method may have affected the

results. Environmental factors and the respondents' previous experiences (considering cultural and other differences) are also expected to affect adolescents' scientific creativity or creativity in general (Runco, 2017).

Lastly, it should be noted that scientific creativity is assessed based on the results of the study, as there are no other scales the researchers could base their results on (Table 10). In relation to the data presented (see Appendix A), it has been concluded that 8 of the 23 respondents (34.78%) have a relatively low level of scientific creativity, with the lowest score being 14. Of the 23 respondents, 8 (34.78%) are assessed with an intermediate level of scientific creativity, while 7 (30.43%) have a high level of scientific creativity, with the highest score being 168. The scientific creativity level of this class is therefore balanced between low and intermediate. This finding aligns with the results from Akkanat and Usta (2015), which also demonstrate a low or intermediate level of scientific creativity among seventh-grade students, with a general mean of 72.9 (the highest score possible is 142). Guingguing et al. (2016) revealed that 15% of the respondents from one school in their study were not creative, while 77.50% were slightly creative and 7.50%were creative, whereas in a second school the study revealed that 18.75% of the respondents were not creative, 51.25% were slightly creative and 30% were creative. Thus, most of the respondents from the two schools were slightly creative. This corresponds to an intermediate level of scientific creativity in the current study, indicating that the two schools from Guingguing et al.'s (2016) study have moderate scientific creativity levels. This finding implies that the students from the present study are slightly less scientifically creative than those from Guingguing et al.'s (2016) study. However, Guingguing et. al.'s (2016) study was conducted on ninth-grade students, whereas the present study was conducted on sixth-grade students. The studies by Hu and Adey (2002) and Genek and Doğanca (2020) show that scientific creativity increases with age.

The almost equal distribution of the present study's results may have been due to external factors, such as the willingness and motivation of the students to answer the questionnaire. Some of the students responded more attentively than others. Other factors, such as the environment in which the student took the survey – including the online setting in conducting the test, which may have served as a distraction – may also have affected these results.

Discussion

The present investigation demonstrates that primary school students' creativity relies mainly on flexibility. According to a number of researchers, such as Bott et al. (2014), Nusbaum and Silvia (2011) and Baas et al. (2008), cognitive flexibility is essential for performing creatively. However, considering the low to moderate levels of the class's scientific creativity in the present research, it is clear that the students' trait of flexibility is yet to be developed. The implication of relatively low to moderate scientific creativity among primary school students should be of concern for the school and for educators. Since scientific creativity serves as a tool for producing new ideas, educators must develop students' scientific creativity to ensure their success in the world of work (Prahani et al., 2021). Researchers like Plucker and McWilliams (2013), Meyer and Lederman (2013), Chesiment, Githua and Ng'eno (2016), De Bruin and Harris (2017) and Vidergor (2018) have suggested that teachers should entertain and encourage ideas and suggestions from the students as a foundation for the development of adolescent creativity (van der Zanden et al., 2020).

The depth of understanding of the questions also dramatically impacts the students' creativity (by the traits), as evidenced by the number of answers in the first item. It is presumed that the students could not show their scientific creativity in the first item due to their limited knowledge of the properties of glass and its constituents. In other words, this lack of understanding hindered their ability to demonstrate their scientific creativity in the particular context. This implies that a foundational understanding of the subject matter is essential for students to express their creativity and problem-solving skills effectively in scientific tasks or assignments. The implication aligns with Okere and Ndeke's (2012) study, which showed that scientific creativity is knowledge dependent.

The answers from each item will vary depending on what is asked for in each question, as each item covers a different aspect of scientific creativity. Nevertheless, the results show that some items have a higher scientific creativity than others. A thorough analysis of Table 10 shows that Item 5, the item with the highest mean, also has the highest originality scores. This item covers creative science problem-solving ability. Creative thinkers often devise alternative methods to solve mathematical problems. They may develop shortcuts, unconventional algorithms or unique problem-solving techniques that are efficient and effective, such as coming up with a novel way to calculate a tricky multiplication problem (Haavold & Sriraman, 2022). On the other hand, Item 1 has the lowest mean and, as shown in Table 10, it also has the lowest originality scores compared to the other items. Originality is strongly linked to creativity and

innovation (Acar et al., 2017). The fluency scores were more significant than the flexibility scores, except in Items 5, 6 and 7. Research and the development of different scoring techniques for divergent skills has led to the conclusion that fluency (quantity of generated ideas) is highly related to originality (quality of ideas) (Forthmann et al., 2020). Thus, the answers to each item greatly depend on the student's fluency to generate originality. Nijstad et al.'s (2010) study contradicted Forthmann et al.'s (2020) findings by suggesting that the correlation between flexibility and originality is stronger than the correlation between fluency within a specific context and originality. This indication is, however, not applicable to the present study, as the flexibility scores of Items 6 and 7 are the highest of all of the items, whereas their originality scores are among the lowest.

The varying answers to the different items could be attributed to the students' level of understanding of the question or topic. A study by Okere and Ndeke (2012) showed that scientific creativity is knowledge based. Hu and Adey (2002) also found that that scientific creativity may increase as knowledge, skills and experience increase, which could be a factor in why the fifth item garnered the highest number of answers. The four basic operations are something that the respondents have learned from a young age and are continuously exposed to, making the students more well-versed and familiar with the concept. On the other hand, the question involving the utilisation of glass had the fewest answers, as the students might have limited experience with it, so they can only reflect on it a little. The students' lack of knowledge regarding the topic hindered their scientific creativity from manifesting.

Given that the country's future rests on the ability of individuals to be innovative and creative, creativity is one of the most critical aspects of human capital development and is often used in the context of science education (Mukhopadhyay & Sen, 2013). According to Sak and Ayas (2013), producing novel ideas or products requires a combination of general creativity abilities, scientifically linked abilities and scientific knowledge. Since students are considered to be "future citizens and the potential of this vital resource affects the advancement of the nation greatly", it is crucial, in the words of Mukhopadhyay and Sen (2013), to foster scientific creativity in them specifically in the context of science instruction. Flexibility and divergence in thought are necessary for "creativity", which involves new approaches to thinking or expressing oneself and pursuing issues without a definitive solution. This suggests stretching and expanding the students' thoughts and ideas and developing unique insights, which consequently frequently calls for promoting confidence and overcoming fear.

The scientific community has shown an increased interest in creativity over the last few years, although the topic is not yet fully understood. Whether

creativity is a skill that everyone possesses, regardless of the field of study or expertise, has been one of the main concerns of many scholars (Baer et al ., 2012). Nowadays, people are interested in creativity, especially at work. Being knowledgeable is no longer sufficient in today's world; creativity and other core skills are needed to develop, adapt and push the limits of what is conventional (Concepción, 2017). Concepción (2017) also stated that economic crises have ignited a boom of creative ideas as a way to survive. In this sense, the absence of jobs and the need to think of new ways to earn money has a positive side: people's inner creativity capabilities are brought to the surface. According to Torrance (1965), creativity is primarily a process that enables us to be more perceptive to problems, to a lack of components, or to "blind spots" in our knowledge. Once we identify these challenges, we can develop solutions, assumptions or hypotheses, test them repeatedly, change them, retest them once more, and finally communicate the results. Through creativity, we can start to operationally define the skills, mental processes and personality traits that help or hinder the process. It offers a method for describing the products produced during the process, the types of people who can participate most successfully and the circumstances that make it possible.

Conclusion

Taken as a whole, the class that forms the sample in the present study has a relatively low to moderate level of scientific creativity. However, it has a higher overall mean than the sample in other studies, such as that of Hu and Adey (2002). External factors such as scoring, experience or environmental differences may have affected the results. The respondents are most scientifically creative regarding creative science problem solving ability, or Item 5, with a high mean of 11.89. Considering that 16 of the 23 respondents have a low or intermediate scientific creativity level, an intervention is recommended for the students to develop their scientific creativity.

The importance of scientific creativity increases over time as humankind continues to advance. Thus, it is crucial to profoundly integrate creativity in education, specifically in science curricula, and promote innovation and problem-solving skills to compete with the ever-changing world. For instance, educators throughout the United States have been developing STEAM curricula that include the arts and STEM disciplines. This operates with the idea that students analyse problems by convergent thinking, which will then be translated to creative solutions through divergent thinking (Land, 2013). Teachers from the arts and STEM departments must collaborate in planning concepts

for so-called STEAM units, in which both dimensions have equal amounts of learning (Land, 2013). An example would be a science teacher introducing the concept of primary machines while an art teacher introduces skills in visual art, such as product design. Other STEAM teaching methods may include kinetic art, circuit building and experimentation (Land, 2013). Projects of this programme emphasise the relationship between science and illustrations to make STEM appealing to the general public. Art is essential for learning and effectively communicating these ideas and discoveries to others, as has always been done (Segarra et al., 2018). The arts portion of STEAM leads to the creation of new ideas and offers a new perspective on existing scientific problems. Exposure to the arts is an essential step towards developing creative thinking, presenting unique ideas, problem solving and new scientific discoveries, all of which are the core skills of scientific creativity.

The importance of fostering students' creative abilities has recently increased due to the numerous economic, societal and individual advantages linked with it (Beghetto, 2010). The topic of scientific creativity is relatively new in the field of research. With this, it is suggested that future research topics on scientific creativity cover a wide range of respondents, specifically STEM students from different schools of all backgrounds. It is also suggested that future researchers correlate innovations or productive work, such as the publication of research papers from various learning institutions, with the scientific creativity level of its employees, students or researchers. Lastly, implementing research findings on students' scientific creativity into pedagogical practice is an ongoing process that requires dedication, collaboration and a commitment to fostering a creative learning environment. It can improve student engagement and critical thinking skills, and promote a deeper understanding of scientific concepts.

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The authors have no conflict of interest to declare.

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References

Abd-El-Khalick, F., & Lederman, N. G. (2000). Improving science teachers' conceptions of nature of science: A critical review of the literature. *International Journal of Science Education, 22*(7), 665–701. https://doi.org/10.1080/09500690050044044

Acar, S., Burnett, C., & Cabra, J. F. (2017). Ingredients of creativity: Originality and more. *Creativity Research Journal, 29*(2), 133–144. https://doi.org/10.1080/10400419.2017.1302776

Acut, D., & Antonio, R. (2023). Effectiveness of Science-Technology-Society (STS) approach on students' learning outcomes in science education: Evidence from a meta-analysis. *Journal of Technology and Science Education, 13*(3), 718–739. https://doi.org/10.3926/jotse.2151

Akanat, C., & Usta, E. (2015). Investigating scientific creativity level of seventh grade students. *Procedia – Social and Behavioral Sciences, 191*, 1408–1415. https://doi.org/10.1016/j.sbspro.2015.04.643

Anderson, R. C., & Graham, M. (2021). Creative potential in flux: The leading role of originality during early adolescent development. *Thinking Skills and Creativity, 40*. https://doi.org/10.1016/j.tsc.2021.100816

Aschauer, W., Haim, K., & Weber, C. (2021). A contribution to scientific creativity: A validation study measuring divergent problem solving ability. *Creativity Research Journal, 43*(2), 195–212. https://doi.org/10.1080/10400419.2021.1968656

Baas, M., Roskes, M., Sligte, D., Nijstad, B. A., & De Dreu, C. K. W. (2013). Personality and creativity: The dual pathway to creativity model and a research agenda. *Social and Personality Psychology Compass, 7*(10), 732–748. https://doi.org/10.1111/spc3.12062

Beghetto, R. A . (2010). Creativity in the classroom. In J. C. Kaufman & R. J. Sternberg (Eds.), *The Cambridge handbook of creativity* (pp. 447–463). Cambridge University Press. https://doi.org/10.1017/CBO9780511763205.027

Bi, H., Mi, S., Lu, S., & Hu, X. (2020). Meta-analysis of interventions and their effectiveness in students' scientific creativity. *Thinking Skills and Creativity*, *38*. https://doi.org/10.1016/j.tsc.2020.100750

Borowiecki, K. J., & Mauri, C. A. Originality, influence, and success: A model of creative style. *Journal of Cultural Economics*. https://doi.org/10.1007/s10824-023-09481-y

Concepción, A. (2018). Creativity in science domains: A reflection. *Universidad de Concepción*, *517*.

Darling-Hammond, L., Flook, L., Cook-Harvey, C., Barron, B., & Osher, D. (2019). Implications for educational practice of the science of learning and development. *Applied Developmental Science, 24*(2), 97–140. https://doi.org/10.1080/10888691.2018.1537791

Diedrich, J., Benedek, M., Jauk, E., & Neubauer, A. C. (2015). Are creative ideas novel and useful? *Psychology of Aesthetics, Creativity, and the Arts, 9*(1), 35–40. https://doi.org/10.1037/a0038688

Erwin, A. K., Tran, A., & Koutstaal, W. (2022). Evaluating the predictive validity of four divergent thinking tasks for the originality of design product ideation. *PLOS ONE, 17*(3), Article e0265116. https://doi.org/10.1371/journal.pone.0265116

Genek, S. E., & Doğança Küçük, Z. (2020). Investigation of scientific creativity levels of elementary

school students who enrolled in a STEM program. *İlköğretim Online, 19*(3), 1715–1728. https://doi.org/10.17051/ilkonline.2020.734849

Guingguing, B. J. O., Yway, D. A. A., Magsayo, J. R., Caparoso, J. K. V., & Lahoylahoy, M. E. (2016). Scientific creativity among selected high school students. In C. Yuenyong, P. Pongsophan, D. Treagust, G. P. Thomas, F. Ying Yang, M. B. Barquilla, C. Dahsah, C. Faikhamta, P. C. Taylor, M. Sumida, L. Halim, & K. C. D. Tan (Eds.), *International Conference of Science Educators and Teachers (ISET) 2016* (pp. 254–260). KhonKaen University, Thailand.

Haavold, P.Ø., & Sriraman, B. (2022). Creativity in problem solving: Integrating two different views of insight. *ZDM Mathematics Education*, *54*, 83–96. https://doi.org/10.1007/s11858-021-01304-8

Hu, W., & Adey, P. (2002). A scientific creativity test for secondary school students. *International Journal of Science Education, 24*(4), 389–403. https://doi.org/10.1080/09500690110098912

Hu, W., Shi, Q.Z., Han, Q., & Wang, X. (2010). Creative scientific problem finding and its developmental trend. *Creativity Research Journal, 22*(1), 46–52. https://doi.org/10.1080/10400410903579551

Hu, W., Wu, B., Jia, X., Yi, X., Duan, C., Meyer, W., & Kaufman, J. (2013). Increasing students' scientific creativity: The "Learn to Think" intervention program. *The Journal of creative behavior, 47*(1), 3–21. https://doi.org/10.1002/jocb.20

Kambeyo, L. (2017). Scientific reasoning skills: A theoretical background on science education. *NERA Journal, 14*, 40–64.

Kang, D., Park, J., & Hong, H. (2015). Changes in the number of ideas depending on time when conducting scientific creativity activities. *Journal of Baltic Science Education, 14*(4), 448–459. http://dx.doi.org/10.33225/jbse/15.14.448

Kenett, Y. N., Levy, O., Kenett, D. Y., Stanley, H. E., Faust, M., & Havlin, S. (2018). Flexibility of thought in high creative individuals represented by percolation analysis. *Proceedings of the National Academy of Sciences USA, 115*(5), 867–872. https://doi.org/10.1073/pnas.1717362115

Lamb, R. L., Annetta, L. A., & Vallett, D. B. (2015). The interface of creativity, fluency, lateral thinking, and technology while designing Serious Educational Games in a science classroom. *Electronic Journal of Research in Educational Psychology, 13*(2), 219–242. https://doi.org/10.14204/ejrep.36.14110

Land, M. (2013). Full STEAM ahead: The benefits of integrating the arts into STEM. *Procedia Computer Science, 20*, 547–552. https://doi.org/10.1016/j.procs.2013.09.317

Meador, K. S. (2003). Thinking creatively about science: Suggestions for primary teachers. *Gifted Child Today, 26*(1), 25–29. https://doi.org/10.4219/gct-2003-93

Mukhopadhyay, R., & Sen, M. K. (2013). Scientific creativity – a new emerging field of research: Some considerations. *International Journal of Education and Psychological Research (IJEPR), 2*(1), 1–9.

Okere, M. I. O., & Ndeke, G. C. W. (2012). Influence of gender and knowledge on secondary school students' scientific creativity skills in Nakuru District, Kenya. *European Journal of Educational Research, 1*(4), 353–366. https://doi.org/10.12973/eu-jer.1.4.353

Prahani, B. K., Suprapto, N., Rachmadiarti, F., Sholahuddin, A., Mahtari, S., Suyidno, & Siswanto, J. (2021). Online Scientific Creativity Learning (OSCL) in science education to improve students'

scientific creativity in Covid-19 pandemic. *Journal of Turkish Science Education, 18*, 77–90. https://doi.org/10.36681/tused.2021.73

Richter, A. W., Hirst, G., van Knippenberg, D., & Baer, M. (2012). Creative self-efficacy and individual creativity in team contexts: Cross-level interactions with team informational resources. *Journal of Applied Psychology, 97*(6), 1282–1290. https://doi.org/10.1037/a0029359

Runco, M. A. (2017). Comments on where the creativity research has been and where is it going. *The Journal of Creative Behavior, 51*(4), 308–313. https://doi.org/10.1002/jocb.189

Runco, M. A., & Charles, R. E. (1993). Judgments of originality and appropriateness as predictors of creativity. *Personality and Individual Differences, 15*(5), 537–546. https://doi.org/10.1016/0191-8869(93)90337-3

Sak, U., & Ayas, M. B. (2013). Creative Scientific Ability Test (C-SAT): A new measure of scientific creativity. *Dept. of Special Education, Faculty of Education, Anadolu University, 55*(3), 316–329.

Segarra, V. A., Natalizio, B., Falkenberg, C. V., Pulford, S., & Holmes, R. M. (2018). STEAM: Using the arts to train well-rounded and creative scientists. *Journal of Microbiology & Biology Education, 19*(1). https://doi.org/10.1128/jmbe.v19i1.1360

Siew, N. M, Chong, C. L, & Lee, B. N. (2015). Fostering fifth graders' scientific creativity through problem-based learning. *Journal of Baltic Science Education, 14*(5), 655–669. https://doi.org/10.33225/jbse/15.14.655

Smyrnaiou, Z., Georgakopoulou, E., & Sotiriou, S. (2020). Promoting a mixed-design model of scientific creativity through digital storytelling – the CCQ model for creativity. *International Journal of STEM Education, 7*(25). https://doi.org/10.1186/s40594-020-00223-6

Stevenson, C. E., Kleibeuker, S.W., de Dreu, C. K. W., & Crone, E. A. (2014). Training creative cognition: Adolescence as a flexible period for improving creativity. *Frontiers in Human Neuroscience, 8*, Article 827. https://doi.org/10.3389/fnhum.2014.00827

Van der Zanden, P. J. A. C., Meijer, P. C., & Beghetto, R. A. (2020). A review study about creativity in adolescence: Where is the social context? *Thinking Skills and Creativity, 38*. https://doi.org/10.1016/j.tsc.2020.100702

Wiyanto, Saptono S., & Hidayah, I. (2020). Scientific creativity: A literature review. *Journal of Physics: Conference Series*, 1567. https://doi.org/10.1088/1742-6596/1567/2/022044

Wu, Y., & Koutstaal, W. (2020). Charting the contributions of cognitive flexibility to creativity: Self-guided transitions as a process-based index of creativity-related adaptivity. *PLoS ONE, 15*(6), Article e0234473. https://doi.org/10.1371/journal.pone.0234473

Appendix A

Respondents' Scores for Each Item and Trait in the Scientific Creativity Test

	Item 1			Item 2			Item 3			Item 4			Item 5		Item 6		Item 7		SUM
	O	FLU	FLE	O	FLU	FLE	O	FLU	FLE	O	FLU	FLE	O	FLE	O	FLE	O	FLE	
R1	5	4	4	14	10	9	2	3	3	2	5	5	12	5	8	18	1	15	125
R2	1	4	3	2	4	2	2	7	5	2	2	2	60	22	0	15	1	0	134
R3	0	1	1	4	2	2	0	1	1	2	2	2	10	4	0	0	1	0	33
R4	3	3	2	2	3	2	2	3	2	1	1	1	10	4	0	9	1	0	49
R5	0	3	3	4	4	4	1	3	3	2	3	3	11	4	0	9	1	0	58
R6	0	0	0	2	4	3	0	1	1	0	1	1	0	0	0	0	1	0	14
R7	0	1	1	2	3	3	2	2	2	0	3	2	10	4	0	6	1	6	48
R8	0	2	1	6	4	4	2	4	3	9	8	7	75	27	4	8	1	3	168
R9	0	1	1	5	4	4	0	4	2	0	3	1	5	2	0	6	1	0	39
R10	0	1	1	11	8	5	2	4	4	0	3	1	30	12	0	3	1	6	92
R11	0	2	1	0	0	0	2	4	4	1	7	4	37	14	2	15	1	6	100
R12	2	1	1	8	4	4	0	1	1	1	3	2	7	3	0	15	1	6	60
R13	0	3	1	7	5	4	0	2	2	1	4	4	0	0	0	24	1	0	58
R14	1	1	1	4	2	1	0	1	1	0	4	3	8	4	0	6	1	3	41
R15	0	2	1	16	13	8	0	6	3	4	6	5	3	1	0	15	1	6	90
R16	1	3	2	5	4	4	2	3	3	0	1	1	13	6	0	9	1	0	58
R17	0	1	1	4	4	4	1	3	3	2	5	4	10	4	4	9	1	0	60
R18	0	2	2	7	5	5	0	1	1	0	2	2	11	4	0	3	1	6	52
R19	0	2	2	6	4	4	0	1	1	0	1	1	25	10	0	9	1	3	70
R20	0	2	2	9	6	6	0	2	2	4	4	2	10	4	0	9	1	12	75
R21	0	1	1	5	3	3	2	2	2	0	3	2	10	4	0	15	5	0	58
R22	2	5	4	7	5	4	2	5	4	0	4	2	27	10	0	18	4	12	115
R23	0	1	1	0	0	0	0	2	1	0	2	2	10	5	2	15	1	0	42

Note. O – Originality; FLU – Fluency; FLE – Flexibility

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Primary School Students' Attitudes Towards Distance Music Learning

Jasna Šulentić Begić[1], Amir Begić*[2] and Daria Kurtić[3]

Music education underwent significant adjustments during the Covid-19 pandemic, reflecting broader changes in education as a whole. Distance learning was the only way to organise learning to avoid the consequences of the pandemic. As part of this project, research was carried out in the 2021–2022 school year to determine primary school students' attitudes towards distance music learning. A total of 503 seventh- and eighth-grade students from general education primary schools completed an online survey to collect the data. The results show that the majority of the students feel that they found suitable conditions for distance music learning, that their parents and school were supportive, that they were satisfied with the digital tools, and that they saw themselves as successful learners. The overwhelming majority of the students believe that they acquire the same knowledge through distance learning as they do at school, and that distance music learning does not require a lot of effort or cause stress. However, the majority of the students feel that there were not enough workshops and courses organised by the school and the local community in order to make distance music learning easier for them. Of the sociodemographic factors studied, only the variable related to home conditions for distance music learning proved to be partially predictive.

Keywords: Covid-19 pandemic, primary school, distance music learning, students

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Odnos osnovnošolcev do učenja glasbe na daljavo

Jasna Šulentić Begić, Amir Begić in Daria Kurtić

Izobraževanje na področju glasbe se je med pandemijo covida-19 precej spremenilo, pri čemer so se odražale širše spremembe v izobraževanju na splošno. Učenje na daljavo je bil edini način organizacije učenja, da bi se izognili posledicam pandemije. V okviru tega prispevka je bila v šolskem letu 2021/22 izvedena raziskava, katere namen je bil ugotoviti odnos osnovnošolcev do učenja glasbe na daljavo. Za zbiranje podatkov so spletno anketo izpolnili 503 učenci sedmega in osmega razreda splošnih osnovnih šol. Rezultati kažejo, da večina učencev meni, da so našli primerne pogoje za učenje glasbe na daljavo, da so jih starši in šola podpirali, da so bili zadovoljni z digitalnimi orodji ter da se vidijo kot uspešne učence. Velika večina učencev meni, da z učenjem na daljavo pridobijo enako znanje kot v šoli in da učenje glasbe na daljavo ne zahteva veliko truda in ne povzroča stresa. Večina učencev pa meni, da šola in lokalna skupnost nista organizirali dovolj delavnic in tečajev, da bi jim olajšali učenje glasbe na daljavo. Od preučevanih socialno-demografskih dejavnikov se je kot delno napovedna izkazala le spremenljivka, povezana z domačimi pogoji za učenje glasbe na daljavo.

Ključne besede: pandemija covida-19, osnovna šola, učenje glasbe na daljavo, učenci

Introduction

In response to the Covid-19 pandemic, the implementation of distance learning became prevalent globally in 2020, including within the Republic of Croatia. Distance learning is a form of learning in which the physical presence of students and teachers is not realised, with the learning and teaching process instead taking place in a virtual environment with the support of digital technologies. Distance learning uses systems, tools and content that can support learning and teaching in a virtual environment. The Croatian Academic and Research Network (CARNET), the University Computing Centre, the Agency for Education, the Agency for Vocational and Adult Education, and the Agency for Mobility and EU Programs were all partners in the organisation of distance learning in Croatia (Šulentić Begić et al., 2022). The Action Plan for the Implementation of Distance Learning (Ministry of Science and Education, 2020a), which is a document containing a list of the most significant stages and procedures required for setting up distance learning in schools and universities, was released by the Ministry of Science and Education. These guidelines were supplemented by the Croatian Academic and Research Network in a report titled "Online Systems for the Organisation and Implementation of Distance Learning" (Croatian Academic and Research Network, 2020), which offered guidance on the choice and application of technological solutions for distance learning. During the Covid-19 pandemic in the Republic of Croatia, learning was organised via national television for students in the lower grades of primary school, while distance learning was organised through various online platforms for students in the upper grades of primary school and for students in secondary schools and colleges, with schools and colleges having the option of independently choosing platforms for conducting distance learning. As an aid to distance learning in primary and secondary schools, the Ministry of Science and Education of the Republic of Croatia published the online publication *Framework Annual Performance Curriculum* (Ministry of Science and Education, 2022) and accompanying video lessons and teaching materials (Ministry of Science and Education, 2020b) created by teachers from practice. According to Miražić-Nemet and Surdučka (2020), distance learning represented a significant challenge for all participants in the educational process, including teachers, students and their parents. It can be concluded that the Ministry of Science and Education, in collaboration with the aforementioned institutions, significantly contributed to the organisation and implementation of distance learning.

Distance (music) learning

In the next sections of this paper, we present studies on students' and teachers' perceptions of distance music learning and distance learning in general. The first studies presented examined students' attitudes (Centre for Educational Initiatives Step by Step, 2020; Crnković & Galić, 2020; National Centre for External Evaluation of Education, 2020; Šnidarić et al., 2020). Crnković and Galić (2020) conducted an online survey among 285 students from the fourth to the eighth grade of a primary school in order to examine students' attitudes towards distance learning. Almost three-quarters of the students claimed that they were completely or to some extent satisfied with distance learning. More than half of the students (65.6%) stated that it was not difficult to follow the online lessons, while the rest of the students stated that their difficulties were caused by a lack of direct communication with the teacher, problems with technology and the quality of the Internet connection.

A total of 1,779 students participated in another survey conducted in the Republic of Bosnia and Herzegovina (Centre for Educational Initiatives Step by Step, 2020). The goal of the research was to examine the opinions of primary and secondary school students on distance learning during the Covid-19 pandemic. Some 53.5% of the students stated that they had made good progress in their knowledge and skills, and almost the same percentage of students felt that the teachers cared about how they felt and encouraged them. Three-quarters of the students thought that they worked harder during distance learning than in traditional classes, and slightly more than half said they occasionally needed adult assistance. Of the students surveyed, 55.9% believed that grades are a measure of their knowledge and 4/5 believed that grades are important to them. The National Centre for External Evaluation of Education conducted two research studies with secondary school graduates (National Centre for External Evaluation of Education, 2020). A total of 13,099 recent secondary school graduates answered the online survey's first round in April 2020. The results of the research show that 35% of the graduates did not have their own computer and almost two-thirds of them had difficulties with the Internet connection to a greater or lesser extent during distance learning. Approximately 80% of the secondary school students encountered difficulties in time planning throughout the period of distance learning, while nearly 90% experienced challenges in sustaining concentration. The second survey was completed by 5,186 secondary school students. The results of this survey showed that the most common ways used to teach and communicate with the teachers were email, WhatsApp, Zoom and MS Teams, while Loomen was fifth, with less than half of

the students reporting using it. Three-quarters of the secondary school students surveyed stated that distance learning required more effort than regular classes. Only 8% of the students stated that they were satisfied with the implementation of distance learning, although three-fifths of them nonetheless stated that they were satisfied with the grades. Šnidarić et al. (2020) conducted a study to investigate the implementation strategy, satisfaction and challenges, and time spent during distance learning. The results show that more than three-quarters of the secondary school students surveyed judged that it was moderately to extremely difficult to follow and participate in distance learning, and more than 60% of the students reported that they were overworked and spent too much time on schoolwork compared to live classes. The students highlighted the following difficulties in the implementation of distance learning as the most acute: too extensive teaching content, lack of direct communication with teachers, and short deadlines for completing tasks. The remaining components (e.g., poor Internet connection) only represented difficulties for a small number of students.

Distance learning was also organised in the subject of music during the Covid-19 pandemic. Due to its specificity, it represented a great challenge for students in both primary and secondary schools, as well as for students in music schools and higher education. The main issue was the inability of students and teachers to interact physically (Ambruš-Kiš, 2020), as body language, facial expressions and the teacher's voice are crucial teaching tools in music education (Riley, 2009). The fact that students acquire the majority of their musical knowledge and skills through the teacher's mediation because their development requires continuous feedback is another indication of the uniqueness of music teaching (Rojko, 2012). This mostly refers to developing musical literacy, but it also includes learning to sing songs, play instruments, compose music, and a variety of other musical knowledge and skills (Šulentić Begić et al., 2022). In their study, Moscardini and Rae (2020) found that a significant proportion of music teachers (62%) saw themselves as lacking the necessary competence to effectively conduct distance music learning. Biasutti (2017) also highlights the problem of organising distance music learning in the context of performance skills. In distance piano learning, for instance, the teacher is unable to adjust the student's posture or finger positioning. The lack of dynamism, expressiveness and involvement that results from converting group music learning, such as choirs and orchestras, to an online environment is another significant barrier to strengthening students' performance abilities. According to Kibici and Sarıkaya (2021), it has been suggested that music teachers in higher grades of primary and secondary schools possess the necessary competence to effectively conduct distance music learning. Specifically, the authors note that male teachers and younger teachers are more likely to possess

the requisite skills for this mode of instruction. In addition, the Internet setting restricts human interactions, which causes a sense of loss of social bonds, as there are fewer opportunities for people to interact and collaborate musically (Levstek et al., 2021). Furthermore, the lack of interpersonal communication causes desocialisation and a lack of university student feedback (Rucsanda et al., 2021). Listening to music is the fundamental activity of music learning in primary schools in Croatia (Ministry of Science and Education, 2019), which was somewhat of a mitigating circumstance for organising distance music learning, as teachers mainly focused classes on listening to music. The online environment also imposes limitations on human interactions, leading to a perceived decline in social connections due to reduced opportunities for musical interaction and collaboration (Grushka et al., 2021; Hash, 2021). According to Pešikan et al. (2021), the ongoing pandemic gave rise to numerous inquiries pertaining to distance learning.

The following section provides an exposition of the outcomes of research pertaining to distance music learning as perceived by primary school students. The discussion encompasses the factors that contribute to the efficacy of distance music learning, including the provision of support and conducive conditions. In additional, it investigates personal experiences of achievement, and the evaluation and acquisition of knowledge and skills, as well as the satisfaction derived from the tools employed in distance music learning.

Research goal, hypotheses and research question

The goal of the study was to determine primary school students' opinions on distance music learning. The research was based on the following research question and hypotheses:

RQ1: What are the students' opinions on the acquisition and evaluation of knowledge and skills during distance music learning?

H1: Students believe that they have adequate support from their parents, school and community for successful distance music learning.

H2: Students have appropriate home conditions for successful distance music learning.

H3: Students consider themselves successful in distance music learning.

H4: The selection of tools for distance learning, as well as the implementation of activities and content in distance music learning, match the wishes of the students.

H5: There is no statistically significant difference in students' opinions on distance music learning based on sociodemographic factors (gender, grade, location of school, home conditions for distance learning).

Method

Participants

During the 2021/2022 academic year, 503 seventh and eighth graders (13 and 14 years old) from 16 Croatian counties participated in the study. The data were collected through an online survey. The research was funded by the authors. The respondent sample is shown in Table 1.

Table 1
Description of the sample (N = 503)

Gender	Male	217 (43.1%)
	Female	286 (56.9%)
	Total	503 (100%)
Grade	Seventh	263 (52.3%)
	Eighth	240 (47.7%)
	Total	503 (100%)
School location	City	245 (48.7%)
	Outside the city	258 (51.3%)
	Total	503 (100%)

As shown in Table 1, 503 students participated in the study, slightly more than half of whom were female (56.9%). There were slightly more seventh graders (52.3%) than eighth graders, and slightly less than half of the participants (48.7%) were attending a city school. A sample of 503 students meets the sample size criterion according to a reliability level of 95% and the permissible error of 5%, because, according to the data of the Croatian Bureau of Statistics (2022), there were 39,107 students in the seventh grade of primary school and 37,871 students in the eighth grade at the end of the 2020/2021 school year. Thus, the total population is 76,978 students, with an equal ratio of male and female students.

Instruments

The research methodology adopted in this study was quantitative in nature. Likert-type rating scales specifically constructed for the purpose of this investigation were utilised as the primary data collection tool. The data were gathered from the students participating in the study. The anonymous online

questionnaire administered to the students comprised a series of inquiries and statements strategically formulated to ascertain their sociodemographic attributes, including gender, grade level, school location and conditions pertaining to distance learning.

A three-item instrument in the form of a Likert scale was used to determine the students' opinions on the acquisition and evaluation of knowledge and skills during distance music learning.

The students' opinions on the support they received from their parents, school and local community were measured using a five-item instrument, one of which was dichotomous and four of which were in the form of a Likert scale.

A five-item instrument in the form of dichotomous questions was used to determine the students' perceptions of their home conditions for distance learning.

A three-item instrument in the form of a Likert scale was used to investigate the students' self-evaluation of success in distance music learning.

A set of five items was employed to examine the alignment between the students' preferences and the tools, activities and content utilised in distance music learning. This instrument consisted of one dichotomous question, one multiple-choice question and three single-choice questions.

To test hypothesis H5, a t-test was used to look for statistically significant differences in the students' attitudes towards distance music learning in relation to sociodemographic variables. The computer programme SPSS 25 was used to analyse the quantitative data.

Research design

The study was carried out in March 2022 with an anonymous survey questionnaire. An Internet link to the questionnaire was distributed to music teachers by the presidents of county councils responsible for music culture education. The teachers then sent the link to their students. Approximately 12 minutes were required to complete the questionnaire. The obtained results were then analysed. Parental agreement was sought in compliance with the ethical standards of research (Ajduković & Kolesarić, 2003).

Results and discussion

At the beginning of the questionnaire, we wanted to determine students' opinions on the acquisition and evaluation of their knowledge and skills (Table 2).

Table 2

Students' opinions on the acquisition and evaluation of their knowledge and skills

Claim/Answers	I don't agree at all	I disagree	I have no opinion	I agree	I completely agree
I acquire the same knowledge and skills during distance music learning as I would in a classroom.	66 (13.1%)	76 (15.1%)	101 (20.1%)	99 (19.7%)	161 (32.0%)
The grades I receive in distance music learning align with my level of knowledge.	39 (7.8%)	35 (7.0%)	88 (17.5%)	118 (23.5%)	223 (44.3%)
The music teacher demonstrates a higher degree of leniency in his/her grading practices compared to their typical approach.	91 (18.1%)	47 (9.3%)	139 (27.6%)	103 (20.5%)	123 (24.5%)

As can be seen in Table 2, slightly more than half of the students believe that during distance music learning they acquire the same knowledge and skills as during learning at school, and more than two-thirds think that the grades they receive in distance music learning are a reflection of their actual knowledge. These findings are consistent with the results of another study (Centre for Educational Initiatives Step by Step, 2020). While every fourth student has the opposite opinion, nearly half of the students think that the teacher is more lenient than usual while teaching via distance learning.

With the aim of answering research question RQ1 (*What are the students' opinions on the acquisition and evaluation of knowledge and skills during distance music learning?*), it may be concluded that, while the teachers grade more leniently than normal, more than half of the students believe that they are learning the same material and skills, and that their grades accurately reflect their knowledge.

In the next section of the questionnaire, the students were asked to estimate the support of the school and the local community for distance music learning (Tables 3 and 4).

Table 3
Students' opinions about school support

Question/answers	yes	no	in total
Do you believe your school provides you with enough support for distance music learning?	411 (81.7%)	92 (18.3%)	503 (100%)
Are you satisfied with the resources you use for distance music learning?	454 (90.3%)	49 (9.7%)	503 (100%)

As can be seen in Table 3, less than a fifth of the students believe that the school does not provide them sufficient support for distance music learning, and only one in ten students is not satisfied with the resources.

Table 4
Students' opinions about support from parents, school and the local community

Claim/Answers	I don't agree at all	I disagree	I have no opinion	I agree	I completely agree
I have the support of my parents for distance music learning.	60 (11.9%)	23 (4.6%)	65 (12.9%)	75 (14.9%)	280 (55.7%)
At school, I acquired the knowledge and skills for distance music learning.	27 (5.4%)	29 (5.8%)	62 (12.3%)	156 (31%)	229 (45.5%)
My school organises courses and workshops that help students with distance learning.	152 (32%)	62 (12.3%)	112 (22.3%)	82 (16.3%)	95 (18.9%)
There are enough classes and workshops in my area to help people use digital technologies.	112 (22.3%)	80 (15.9%)	110 (21.9%)	90 (17.9%)	111 (22.1%)

Slightly more than two-thirds of the students say that their parents support them in distance music learning, and more than two-thirds say that they learned the knowledge and skills they need for distance learning at school. However, only slightly more than a third of the students agreed with the statement that their school offers courses and workshops to help them with distance

learning (Table 4). The students are divided equally regarding the question of whether or not there is a sufficient number of such workshops and courses in the environment in which they live.

Considering the obtained results, hypothesis H1 (*Students believe that they have adequate support from their parents, school and community for successful distance music learning*) is partially accepted.

In the next part of the questionnaire, we wanted to find out from the research participants whether they had the necessary home conditions for distance learning (Table 5).

Table 5

Home conditions for distance learning

Question/answers	yes	no	in total
Do you use the Internet at home?	497 (98.8%)	6 (1.2%)	503 (100%)
Do you have a computer (desktop or laptop) at home?	469 (93.2%)	34 (6.8%)	503 (100%)
Do you have your own room?	414 (82.3%)	89 (17.7%)	503 (100%)
Do you have the tools (computer programmes, digital platforms) necessary for distance music learning?	490 (97.4%)	14 (2.6%)	503 (100%)
Do you have a quality Internet connection for distance music learning?	437 (86.9%)	66 (13.1%)	503 (100%)

From Table 5, it can be seen that almost all of the students use the Internet at home, have tools available for distance music learning and have a good Internet connection. Less than a fifth of the students do not have their own room, and only one in every sixteen students does not have a computer. The results obtained (having a room, Internet, necessary tools, etc.) are better than the results of previous research that included secondary school students (National Centre for External Evaluation of Education, 2020).

Considering the obtained results, hypothesis H2 (*Students have appropriate home conditions for successful distance music learning*) is accepted.

We also wanted to determine whether the research participants considered themselves sufficiently successful in distance music learning (Table 6).

Table 6

Students' self-assessment of success in distance music learning

Claim/Answers	I don't agree at all	I disagree	I have no opinion	I agree	I completely agree
I think I am successful in distance music learning.	10 (2.0%)	12 (2.4%)	63 (12.5%)	170 (33.8%)	248 (49.3%)
Independent work and study are useful in distance music learning.	22 (4.4%)	30 (6.0%)	78 (15.5%)	113 (22.5%)	260 (51.7%)
Distance music learning requires a lot of effort and is a source of stress for me.	149 (29.6%)	109 (21.7%)	111 (22.1%)	46 (9.1%)	88 (17.5%)

Only one in twenty students thinks they are not successful in distance music learning, while one in ten thinks that individual work and study are not helpful (Table 6). At the same time, only every fourth student thinks that distance music learning requires effort and is a source of stress. The results are consistent with the aforementioned study by Crnković and Galić (2020), in which the respondents were also primary school students. However, two other studies (National Centre for External Evaluation of Education, 2020; Šnidarić et al., 2020), in which the participants were secondary school students, found that students believe that distance learning requires a lot of effort. We hypothesise that this is because secondary school classes cover a substantially wider range of subject matter and because secondary school students are under significantly more stress due to having to take the state matriculation exam.

Considering the obtained results, hypothesis H3 (*Students considered themselves successful in distance music learning*) is accepted.

We also wanted to determine which tools and activities the research participants use in distance music learning, as well as which tools and activities are their favourites. In answer to the question *Which tool for distance learning do you prefer?* most of the students, 265 (52.7%), answered that they prefer MS Teams, 77 (15.3%) prefer videoconferencing tools such as Zoom and Google Meet, 60 (11.9%) prefer Google Classroom, 54 (10.7%) prefer Yammer, and 35 (7%) prefer digital textbooks, while none of the students mentioned Loomen. The next question was: *What resources do you use for distance learning*? One or more answers were available to the students. The majority of the respondents,

315 (62.6%), chose Microsoft Teams, followed by 144 (28.6%) who selected digital textbooks, while 143 (28.4%) of the students selected both Zoom and Google Meet. The next question was: *Are you satisfied with the resources you use for distance learning?*". The vast majority of the students, 454 (90.3%), expressed satisfaction with the tools they use.

When asked about the most common activity in distance music learning, the students indicated the acquisition of musicology content, 300 (59.6%), followed by listening to music, 165 (32.8%), while 11 (2.2%) of the students answered singing and 9 (1.8%) playing. Most of the students reported preferring the activity of listening, 306 (60.8%), while musicological content was preferred by 82 (16.3%) of the students and singing and playing by 47 (9.3%).

As we can see, the overwhelming majority of the students said that they prefer MS Teams, which is the tool most often used in distance music learning. When it comes to digital textbooks, however, more than a quarter of the students indicated that such textbooks are used, but only one in fourteen students prefers them. A significant gap between preferences and implementation was observed with regard to activities and content. Specifically, the students mostly prefer listening to music, while the acquisition of musicological content is in fact the most prevalent activity in distance learning. It is unusual that listening to music, which is the central activity in music teaching according to the current curriculum (Ministry of Science and Education, 2019) and is the students' favourite activity, is less represented than musicological content. In addition, as stated in the Curriculum (Ministry of Science and Education, 2019, 34), in a general education school, "musicological content is learned based on listening to music".

Considering the obtained results, hypothesis H4 (*The selection of tools for distance learning as well as the implementation of activities and content in distance music learning match the wishes of the students*) is partially accepted.

With the aim of testing hypothesis H5 (*There is no statistically significant difference in students' opinions on distance music learning based on sociodemographic factors (gender, grade, location of school, home conditions for distance learning)*), the obtained results were compared (Tables 7, 8, 9, 10, 11, 12 and 13).

With regard to gender, no statistically significant difference was found for any variable.

Table 7

T-test for independent samples with respect to grade

Variable	Grade	*N*	*M*	*SD*	*t*
Opinion on the representation of workshops in schools	seventh	263	3.02	1.46	**3.21** **
	eighth	240	2.59	1.49	
Opinion on the representation of workshops in the local community	seventh	263	3.18	1.41	**2.71** **
	eighth	240	2.83	1.48	
Opinion on parental support	seventh	263	3.79	1.50	**-3.25** **
	eighth	240	4.19	1.25	

$p < .05$*; $p < .01$**; $p < .001$***

A statistically significant difference was observed between the three parameters and the grade, as indicated in Table 7. Eighth-grade students believe to a lesser extent that distance learning workshops are organised sufficiently at school and in the local community. However, they perceive parental support to be significantly stronger. Considering that their children will imminently transition to secondary education, it is plausible that the heightened concern among parents of eighth-grade students pertains to scholastic advancement.

Table 8

T-test for independent samples with respect to school location

Variable	Location	*N*	*M*	*SD*	*t*
Acquiring knowledge and skills	city	245	3.29	1.39	**-2.02** *
	outside the city	258	3.55	1.42	
Grades as a reflection of knowledge	city	245	3.76	1.27	**-2.32** *
	outside the city	258	4.02	1.24	

$p < .05$*; $p < .01$**; $p < .001$***

The t-test for independent samples (Table 8) revealed a significant difference between the research participants regarding where the school was located in relation to the two variables that were examined. Greater numbers of students who attend school outside cities believe that they get the same knowledge and skills from distance music learning as they do from traditional classes, and that the grades they obtain are an accurate indication of their knowledge.

Below are the results of the t-test in relation to the students' home conditions for distance music learning (Tables 9, 10, 11, 12 and 13).

Table 9

T-test for independent samples in relation to home conditions

Variable	Home Internet	*N*	*M*	*SD*	*t*
Opinion on acquiring knowledge at school	yes	497	4.08	1.12	**3.78** ***
	no	6	2.33	1.51	
Opinion on successful participation in classes	yes	497	4.28	.88	**4.40** ***
	no	6	2.67	1.63	
Opinion on the benefits of independent work and study	yes	497	4.12	1.13	**2.05** *
	no	6	3.17	1.60	

$p < .05$*; $p < .01$**; $p < .001$***

Table 9 shows that, as would be expected, those students who do not have Internet access at home significantly less often agreed with the statements that they learn the skills necessary for distance music learning, that they do so successfully, and that they benefit from independent learning to follow classes. It is obvious that having a home Internet connection is a crucial factor for successful distance learning.

Table 10

T-test for independent samples in relation to computer ownership

Variable	Owning a computer	*N*	*M*	*SD*	*t*
Opinion on acquiring knowledge at school	yes	469	4.11	1.09	**4.27** ***
	no	34	3.26	1.48	
Opinion on parental support	yes	469	4.04	1.36	**3.63** ***
	no	34	3.15	1.58	
Opinion on successful participation in classes	yes	469	4.32	.84	**5.18** ***
	no	34	3.50	1.40	
Grades as a reflection of knowledge	yes	469	3.93	1.23	**2.33** *
	no	34	3.41	1.54	

$p < .05$*; $p < .01$**; $p < .001$***

Likewise, statistically significant differences were found in relation to four variables with regard to owning a computer (Table 10). As expected, students who own a computer agreed to a significantly greater extent with the statements that at school they acquire the knowledge needed for distance music learning, that they

have the support of their parents, that they successfully follow the lessons, and that the grades they receive are a reflection of their actual knowledge.

Table 11

T-test for independent samples in relation to having one's own room

Variable	Having one's own room	*N*	*M*	*SD*	*t*
Opinion on acquiring knowledge at school	yes	414	4,13	1.11	**3.32** **
	no	89	3.70	1.21	
Opinion on successful participation in classes	yes	414	4.31	.87	**2.61** **
	no	89	4.03	1.04	

$p < .05$*; $p < .01$**; $p < .001$***

Having one's own room was found to be a significant predictor for two variables, as indicated in Table 11. As anticipated, the students lacking access to private accommodations had lower levels of agreement regarding their ability to effectively engage in classes and acquire the requisite abilities within the educational setting.

Table 12

Independent sample t-test in relation to tool availability

Variable	Availability of tools	*N*	*M*	*SD*	*t*
Opinion on acquiring knowledge at school	yes	490	4.09	1.10	**4.20** ***
	no	13	2.77	1.74	
Opinion on successful participation in classes	yes	490	4.29	.86	**5.19** ***
	no	13	3.00	1.63	
The teacher's leniency in grading	yes	490	3.26	1.39	**2.04** *
	no	13	2.46	1.45	

$p < .05$*; $p < .01$**; $p < .001$***

Statistically significant differences were found in three variables regarding the availability of the necessary digital tools for distance music learning (Table 12). In particular, students who think they have the necessary tools report that they have gained the knowledge required to observe such classes in school, that they are successful in doing so, and that teachers are more lenient in grading than they are in school.

Table 13

T-test for independent samples in relation to the quality of the Internet connection

Variable	Quality Internet connections	*N*	*M*	*SD*	*t*
Opinion on acquiring knowledge at school	yes	437	4.18	1.05	**6.49** ***
	no	66	3.24	1.36	
Opinion on the representation of workshops in schools	yes	437	2.90	1.48	**3.46** **
	no	66	2.23	1.42	
Opinion on the representation of workshops in the local community	yes	437	3.13	1.42	**4.73** ***
	no	66	2.24	1.43	
Opinion on parental support	yes	437	4.05	1.35	**2.82** **
	no	66	3.53	1.59	
Opinion on successful participation in classes	yes	437	4.36	.81	**6.37** ***
	no	66	3.62	1.21	
Opinion on the benefits of independent work and study	yes	437	4.18	1.09	**3.44** **
	no	66	3.67	1.36	
Opinion on the demandingness and stress of learning	yes	437	2.58	1.42	**-2.15** *
	no	66	2.98	1.47	
Acquiring knowledge and skills	yes	437	3.49	1.38	**2.73** **
	no	66	2.98	1.53	
Grades as a reflection of knowledge	yes	437	3.98	1.20	**3.74** ***
	no	66	3.36	1.49	
The teacher's leniency in grading	yes	437	3.31	1.37	**2.93** **
	no	66	2.77	1.50	

$p < .05$*; $p < .01$**; $p < .001$***

There were statistically significant differences in all of the variables examined regarding the Internet connection for distance music learning. As can be seen in Table 13, students who judge that they have a sufficiently high-quality Internet connection agreed to a greater extent with all the statements except for the statement that distance learning is demanding and stressful. Considering the obtained results, hypothesis H5 (*There is no statistically significant difference in students' opinions on distance music learning based on sociodemographic factors (gender, grade, location of school, home conditions for distance learning))* is accepted.

Conclusion

As part of this work, research was conducted to determine the opinions of primary school students on distance music learning. The findings indicated that the majority of the students surveyed believe they have adequate conditions for distance music learning, that their parents and the school support them, that they are satisfied with the digital tools, and that they consider themselves successful in distance music learning. Furthermore, the overwhelming majority of the research participants estimate that they acquire the same knowledge during distance music learning as they do during learning at school, and that distance music learning does not require a lot of effort and does not cause stress. However, the majority of the students believe that the school and local community do not organise enough workshops and courses that would make distance music learning easier for them. In specific situations, such as a pandemic, the school and community should respond more quickly. Of all of the sociodemographic variables examined, only the variable related to home conditions for distance music learning proved to be partially predictive.

We believe that future research should include an examination of students' and teachers' attitudes towards the achievement of educational outcomes related to the activities of listening to music, performing music and creating music. This would provide a more complete insight into this topic, which is current not only from the perspective of pandemics and other emergency situations, but also from the perspective of the increasingly strong implementation of digital and distance learning in the very near future as an integral part of the progress of technology and civilisation.

Disclosure statement

The authors have no conflict of interest to declare.

References

Ajduković, M., & Kolesarić, V. (Eds.) (2003). *Etički kodeks istraživanja s djecom* [*The ethic codex for research with children*]. Vijeće za djecu Vlade Republike Hrvatske. Državni zavod za zaštitu obitelji, materinstva i mladeži.

Ambruš-Kiš, R. (2020, April 7). *Izazovi nastave glazbe na daljinu* [*Challenges of remote music teaching*]. Profil Klett. https://www.profil-klett.hr/izazovi-nastave-glazbe-na-daljinu

Biasutti, M. (2017). Strategies adopted during collaborative online music composition. *International Journal of Music Education*, *36*, 473–490.

Centre for Educational Initiatives Step by Step. (2020). *Procjena online nastave tokom pandemije COVID-19 od strane roditelja, učenika i nastavnika u BiH* [*Evaluation of online classes during the COVID-19 pandemic by parents, students and teachers in Bosnia and Herzegovina*]. COI Step by Step i proMENTE socijalna istraživanja.

Crnković, S., & Galić, A. (2020, April 1). *Online anketa OŠ Julija Kempfa – Stavovi učenika o održavanju nastave na daljinu i suočavanja s epidemijom koronavirusa* [*Online survey of the Primary School Julija Kempfa – Attitudes of students towards distance learning and dealing with the coronavirus epidemic*]. OŠ Julija Kempfa.

Croatian Academic and Research Network. (2020). *Online sustavi za organizaciju i provođenje nastave na daljinu* [*Online systems for organising and conducting distance learning*]. CARNET.

Croatian Bureau of Statistics. (2022). *Priopćenje.* [*Announcement*]. Državni zavod za statistiku.

Grushka, K., Lawry, M., Sutherland, K., & Fergusson, C. (2021). A virtual choir ecology and the Zoom-machinic: Visual technologies as a panacea for social isolation. *Video Journal of Education and Pedagogy*, *5*(1), 116.

Hash, P. M. (2021). Remote learning in school bands during the COVID-19 shutdown. *Journal of Research in Music Education*, *68*(4) 381–397.

Kibici, V. B., & Sarıkaya, M. (2021). Readiness levels of music teachers for online learning during the COVID 19 pandemic. *International Journal of Technology in Education* (IJTE), *4*(3), 501–515.

Levstek, M., Barnby, R. M., Pocock, K. L., & Banerjee, R. (2021). 'It all makes us feel together': Young people's experiences of virtual group music-making during the COVID-19 pandemic. *Frontiers in Psychology, 21*, 1–18.

Ministry of Science and Education. (2019). *Kurikulum nastavnog predmeta Glazbena kultura za osnovne škole i Glazbena umjetnost za gimnazije* [*Curriculum of the subjects Musical Culture for Primary Schools and Musical Art for Secondary Schools*]. Ministry of Science and Education of the Republic of Croatia.

Ministry of Science and Education. (2020a). *Akcijski plan za provedbu nastave na daljinu* [*Action plan for the implementation of distance learning*]. Ministry of Science and Education of the Republic of Croatia.

Ministry of Science and Education. (2020b). *Videolekcije i nastavni materijali* [*Video lessons and teaching materials*]. *Ministry of Science and Education of the Republic of Croatia.*

Ministry of Science and Education. (2022). *Okvirni godišnji izvedbeni kurikulumi* [*Framework annual performance curricula*]. Ministry of Science and Education of the Republic of Croatia.

Miražić-Nemet, D., & Surdučki, T. (2020). Učenje na daljinu iz ugla nastavnika, učenika i roditelja [Distance learning from the perspective of teachers, students and parents]. *Pedagoška stvarnost, 66*(2), 169–178.

Moscardini, L., & Rae, A. (2020). *We make music online: A report on online instrumental and vocal teaching during the COVID-19 lockdown.* The Scottish Government: Music Education Partnership Group.

National Centre for External Evaluation of Education. (2020). *Ispitivanja o iskustvima i zadovoljstvu nastavom na daljinu* [*Surveys on experiences and satisfaction with distance learning*]. National Centre for External Evaluation of Education, Croatia.

Pešikan, A., Niemi, H., & Devetak, I. (2021). Education in the Covid-19 era - "We will find a way or

we will make it": Facing the challenges of the pandemic in education. *Centre for Educational Policy Studies Journal, 11*(Special Issue), 7–16. https://doi.org/10.26529/cepsj.11.Sp.Issue

Riley, P. E. (2009). Video-conferenced music teaching: Challenges and progress. *Music Education Research, 11*, 365–375.

Rojko, P. (2012). *Metodika nastave glazbe. Teorijsko-tematski aspekti* (Drugo izmijenjeno i dopunjeno izdanje – elektroničko) [*Music teaching methodology. Theoretical and thematic aspects* (Second amended and supplemented edition - electronic)]. Sveučilište J. J. Strossmayera-Pedagoški fakultet Osijek.

Rucsanda, M. D., Belibou, A., & Cazan A-M. (2021). Students' attitudes toward online music education during the COVID 19 lockdown. *Frontiers in Psychology*, *12*, 1–10.

Šnidarić, N., Brekalo-Papac, R., & Mišetić, Ž. (2020). *Školsko istraživanje o provedbi nastave na daljinu* [*School research on the implementation of distance learning*]. Škola za medicinske sestre Mlinarska.

Šulentić Begić, J., Begić, A., & Pečić, J. (2022). Attitudes of music teachers towards organizing distance learning in the context of lifelong education. In I. Đurđević Babić, & V. Galzina (Eds.), *1st International Online Scientific Conference ICT in Life Conference proceedings. Contemporary society meeting ICT challenges and issues* (pp. 341–355). Faculty of Educational Sciences, Juraj Dobrila University of Pula.

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Preschool Teachers' Role and Beliefs about Developmentally Appropriate Practice: A Systematic Literature Review

Misahun Shumetu Taye*[1], Fituma Yadasa Kana[2] and
Tesema Regassa Jekil[3]

This systematic literature review has examined the various functions assumed by preschool educators in promoting developmentally appropriate practice, the differing beliefs held by preschool teachers concerning it, and the factors that influence the beliefs and perceptions of preschool teachers about it. To carry out this review, a comprehensive search strategy was employed across different databases to identify relevant studies published between 2010 and 2023. The inclusion criteria comprised studies that focused on the role and beliefs of preschool teachers in promoting developmentally appropriate practice. The review includes a total of 14 studies. The results indicate that preschool teachers play different roles in promoting developmentally appropriate practice, such as creating a safe and supportive learning environment, providing diverse learning experiences customised to the specific needs and interests of each child, working in collaboration with families to ensure that children receive the necessary support at home, and advocating for the needs of young children and their families. The beliefs of preschool teachers regarding developmentally appropriate practice are attributed to various factors, including their personal experiences as learners, their training and professional development, the culture of the preschool or school where they work, and the availability of resources and support to implement developmentally appropriate practice. The findings highlight the importance of preschool teachers having a strong comprehension of developmentally appropriate practice and being able to implement it effectively in their classrooms. Moreover, it is crucial to provide preschool teachers with professional development opportunities that can enhance their beliefs about developmentally appropriate practice and help them learn how to implement it effectively.

Keywords: developmentally appropriate practice, early childhood education, preschool teachers, teachers' beliefs, teachers' role

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Vloga in prepričanja vzgojiteljev o razvojno primerni praksi: sistematični pregled literature

Misahun Shumetu Taye, Fituma Yadasa Kana in Tesema Regassa Jekil

V tem sistematičnem pregledu literature so bili obravnavani: različne naloge, ki jih imajo vzgojitelji pri spodbujanju razvojno primerne prakse, različna prepričanja vzgojiteljev o njej ter dejavniki, ki vplivajo na prepričanja in zaznave vzgojiteljev o njej. Za izvedbo tega pregleda je bila uporabljena obsežna iskalna strategija v različnih podatkovnih zbirkah, da bi našli ustrezne študije, objavljene med letoma 2010 in 2023. Merila za vključitev so zajemala študije, ki so se osredinjale na vlogo in prepričanja vzgojiteljev pri spodbujanju razvojno primerne prakse. V pregled je bilo vključenih skupno 14 študij. Izsledki kažejo, da imajo vzgojitelji pri spodbujanju razvojno primerne prakse različne vloge, kot so: ustvarjanje varnega in spodbudnega učnega okolja, zagotavljanje raznolikih učnih izkušenj, prilagojenih specifičnim potrebam in interesom vsakega otroka, sodelovanje z družinami, da bi otrokom zagotovili potrebno podporo doma, ter zagovarjanje potreb majhnih otrok in njihovih družin. Prepričanja vzgojiteljev o razvojno primerni praksi pripisujemo različnim dejavnikom, vključno z njihovimi osebnimi izkušnjami kot učenci, njihovim usposabljanjem in s strokovnim razvojem, kulturo vrtca ali šole, v kateri delajo, ter z razpoložljivostjo virov in podpore za izvajanje razvojno primerne prakse. Ugotovitve poudarjajo, da je pomembno, da vzgojitelji dobro razumejo razvojno ustrezno prakso in jo lahko učinkovito izvajajo v svojih razredih. Poleg tega je ključnega pomena, da se vzgojiteljem zagotovijo možnosti strokovnega razvoja, ki lahko okrepijo njihova prepričanja o razvojno ustrezni praksi in jim pomagajo, da se naučijo, kako jo učinkovito izvajati.

Ključne besede: razvojno ustrezna praksa, predšolska vzgoja, vzgojitelji, prepričanja učiteljev, vloga učiteljev

Introduction

The importance of the early stages of a child's life in their development has gained increasing attention in recent years, leading to more research, policy changes, and programmes aimed at supporting early childhood development. Research has shown that the experiences and surroundings a child encounters during this period can have a profound impact on their cognitive, social, and emotional well-being, which can last a lifetime (Nold et al., 2021). This period is fundamental to a child's academic and social success in the future (Alzahrani et al., 2019; Kern & Friedman, 2009; Nold et al., 2021; Stacey, 2018, 2023). Therefore, it is imperative that this developmental phase adheres to all quality benchmarks, encompassing high-quality pedagogical practices that are founded on an interdisciplinary approach led by proficient experts and the active participation of all principal stakeholders within the child's proximate milieu (Majcen & Drvodelić, 2022). Additionally, the connection between pertinent policies and practices plays a pivotal role in ensuring the quality of early childhood education and care (Majcen & Drvodelić, 2022).

Studies have shown that it is vital to ensure that children are exposed to developmentally appropriate practices (DAP) (Li et al., 2019) to foster their best possible development and learning. DAP is a research-driven framework that outlines practices in the early childhood environment that offer the best educational opportunities for young children's growth and development or 'best practices' (Chan & Okamoto, 2006). As the National Association for the Education of Young Children (2018), elaborated by Alghamdi and Ernest (2019), DeGennaro (2012), Helm and Katz (2011), and Sanders and Farago (2018), the concept of DAP is described as educational instruction that draws on established knowledge about young children's development and learning, effective early education practices, and individualised understanding of each child (Copple & Bredekamp, 2009; Sanders & Farago, 2018; Thompson & Stanković-Ramirez, 2021). It is methods that promote each child's optimal development and learning through age-appropriate, individual-appropriate, and culturally appropriate practices. Hence, DAP is founded upon extensive investigation into the growth and education of children, thereby encouraging the highest level of learning and development in young individuals (Grantham-McGregor et al., 2007). Additionally, this framework is deeply rooted in the study of developmental science and theory (National Association for the Education of Young Children, 2018; Gestwicki, 2016; Helm & Katz, 2011; Sanders & Farago, 2018; Stacey, 2018).

Although DAP overlaps with older concepts and theories such as Vygotsky's proximity zone and scaffolding (Vygotsky & Cole, 1978),

Bronfenbrenner's socio-ecological contexts (Bronfenbrenner, 2000), and the importance of children's early life stages, DAP is unique in its focus on intentional educator practice and decision-making within an early childhood education setting, and early childhood educators who apply DAP base their practices and decisions on research evidence (Kim, 2011). It is a child-centred approach that recognises the uniqueness of each child and their individual developmental trajectory (Stacey, 2023). It highlights the significance of play, exploration, and inquiry, which support the overall development of the child (Hutapea et al., 2021; Stacey, 2018). Moreover, DAP is responsive to evolving pedagogical challenges, emerging research on explicit teaching practices with young children, and the needs of preschool educators and the children they serve in a continual effort to provide high-quality early childhood education (Gestwicki, 2016).

DAP mandates that preschool teachers possess a comprehensive understanding of children's developmental stages, tailor their teaching methods to suit each individual's needs, and possess knowledge about the diverse social and cultural environments that each child inhabits (Chan & Okamoto, 2006). Thus, the role of preschool teachers in promoting DAP is crucial (Thompson & Stanković-Ramirez, 2021), as they are responsible for creating a learning environment that supports each child's optimal development and learning. Preschool teachers' beliefs and perceptions about DAP can have a significant impact on the quality of early childhood education that young children receive. However, despite the importance of DAP, research has shown that preschool teachers' beliefs about DAP and their understanding of what it constitutes can vary widely (Laleye, 2019; Raftery, 2016). This lack of consensus on what constitutes DAP and how to implement it effectively poses a significant challenge for preschool teachers. Without a clear understanding of DAP principles, preschool teachers may struggle to create a learning environment that is developmentally appropriate for young children. This can have negative consequences for children's learning and development, as they may not receive the support they need to reach their full potential (Raftery, 2016).

Therefore, it is important to understand preschool teachers' roles and beliefs about DAP and how they define and interpret it (Kim, 2011). This systematic literature review aims to examine the existing research on preschool teachers' roles and beliefs about DAP. The review explored the various functions assumed by preschool educators in promoting DAP, the different beliefs that preschool teachers hold about DAP, and the factors that influence preschool teachers' beliefs and perceptions about DAP. The review also examined the impact of preschool teachers' beliefs about DAP on their classroom practices and the quality of early childhood education that young children receive.

To this end, the systematic review was guided by the following basic research questions:

1. What are the roles assumed by preschool educators in promoting DAP?
2. What are the different beliefs that preschool teachers hold about DAP?
3. What are the factors that influence preschool teachers' beliefs and perceptions about DAP?

Method

Database selection

The methodology employed for this literature review involved a systematic search of internet resources, abstracts, and databases, including ERIC, Web of Science, and Google Scholar, to identify appropriate materials to ensure that the review was comprehensive and included all relevant studies on the topic. The current review considered studies in the form of journal articles published between 2010 and 2023 from all over the world, using descriptors such as the role of preschool teachers, the role of early childhood teachers, beliefs of preschool/early childhood teachers, and developmentally appropriate practice. Findings and research from 2010 onward were considered, with a few exceptions when the research was deemed particularly significant. This criterion was chosen to ensure that the review included the most recent and relevant studies on the topic. Moreover, the evidence sourced for the review was derived from peer-reviewed journals to ensure that the studies included in the review were of high quality and had undergone rigorous scrutiny by experts in the field.

Evaluation of the studies and data extraction

The authors identified relevant studies using a thorough search strategy that was then screened using strict inclusion criteria. Each study's data was extracted using a clear method, ensuring consistency throughout the review. As a result, studies that focus on the role and beliefs of preschool teachers in promoting DAP, which examined the impact of preschool teachers on child development and explored effective teaching practices in early childhood education, were published in a peer-reviewed academic journal, were published in English, used primary sources of data in their study, were published between 2010 and 2023, etc., were included. Table 1 depicts the inclusion and exclusion criteria employed in the current review of the literature.

Table 1

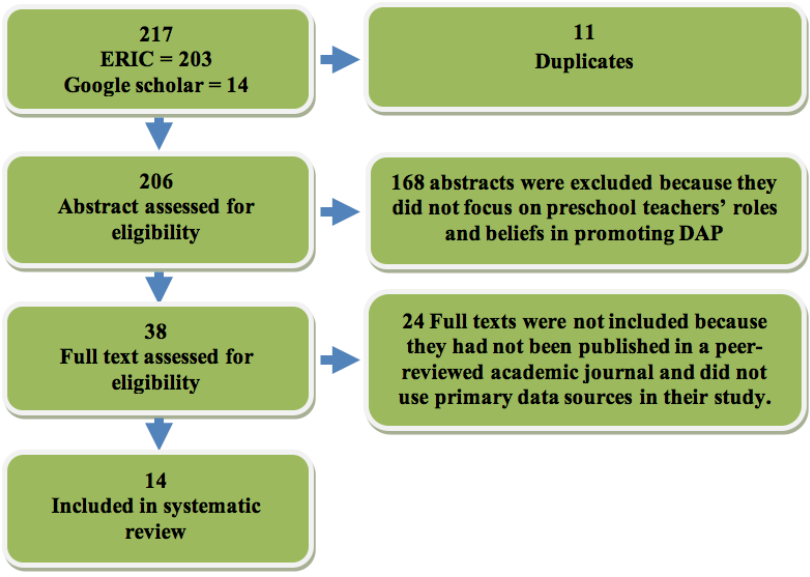
The Inclusion and Exclusion Criteria

Inclusion criteria	Exclusion criteria
– Studies that focus on the role and beliefs of preschool teachers in promoting DAP.	– Studies that did not focus on the role and beliefs of preschool teachers in promoting DAP.
– Studies that were published in a peer-reviewed academic journal.	– Studies that were not published in a peer-reviewed academic journal.
– Studies that were published in English.	– Studies that were not published in English
– Studies that used primary sources of data in their study.	– Studies that did not use primary sources of data in their study.
– Studies that were published between 2010 and 2023.	– Studies that were published before 2010.

Procedures

The systematic literature review that examines the role and beliefs of preschool teachers in promoting DAP follows a series of steps. Initially, the researchers establish the research question and the review's scope. In this particular case, the question focused on the role and beliefs of preschool teachers in promoting DAP. Secondly, the researchers conducted an exhaustive search of pertinent literature through various databases and search engines. The search is grounded in specific keywords and inclusion criteria. Thirdly, the researchers evaluate the identified studies based on their relevance to the research question and the inclusion criteria in which systematic analysis of data was conducted from a total of 217 journal articles. Figure 1 displays the search's methodology. Fourteen publications were included in the final data collection after the evaluation of the titles, abstracts, keywords, and full-text reads in certain cases (Table 3). Fourthly, the researchers extrapolate applicable data from the chosen studies and integrate the findings. Finally, the researchers interpret the results and draw conclusions based on the evidence outlined in the literature.

Figure 1
Operational steps



Results

The current review included studies from nine different countries: Ethiopia, Greece, Hong Kong, Jordan, Japan, Oman, Turkey, Saudi Arabia, and the United States. In terms of the research approach used in the studies, 11 were quantitative, two were qualitative, and the remaining one used a mixed research approach. The review included 14 studies published between 2010 and 2023. The review found various functions assumed by preschool educators in promoting DAP, including creating a positive and nurturing environment where children feel safe and respected; providing a variety of learning experiences that are tailored to the individual needs and interests of each child; collaborating with families to ensure that children are receiving the support they need at home; and advocating for the needs of young children and their families. The review also found the beliefs that preschool teachers hold about DAP and the factors that influence preschool teachers' beliefs and perceptions about DAP, including the preschool teacher's training and experience, the culture of the preschool or school where the teacher works, and the availability of resources and support for implementing DAP.

Generally, the analysis revealed three major themes: various functions assumed by preschool teachers in promoting DAP, beliefs that preschool teachers hold about DAP, and factors that influence preschool teachers' beliefs and perceptions about DAP. Table 2 depicts the major themes and subthemes that emerged from the current review of the literature.

Table 2

The Main Theme and its Subthemes

Main theme	Subthemes
Various functions assumed by preschool teachers in promoting DAP	– Creating a positive and nurturing environment where children feel safe and respected – Providing a variety of learning experiences that are tailored to the individual needs and interests of each child – Collaborating with families to ensure that children are receiving the support they need at home – Advocating for the needs of young children and their families
Beliefs that preschool teachers hold about DAP	
Factors that influence preschool teachers' beliefs and perceptions about DAP	– The teacher's training and experience. – The culture of the preschool or school where the teacher works. – The availability of resources and support for implementing DAP.

Table 3

The Studies' Characteristics and Main Findings

No	Author(s) (publication year and country)	Participants	Research Approach of the study	Major findings
1	Abu-Jaber et al. (2010) Jordan	285 teachers	Quantitative	Preschool teachers have firm beliefs toward DAP, except for establishing reciprocal relationships with families. No noteworthy variations in the convictions of teachers exist with regard to the instruction of children based on their educational level, duration of experience, or age.
2	Alford et al. (2016) USA	450 students and 91 teachers	Quantitative	Students taught by preschool teachers with higher developmentally appropriate instructional practices (DAIP) scores were more engaged and less distracted; Students taught by preschool teachers with lower DAIP scores were less engaged and more distracted.
3	Alghamdi and Ernest (2019) Saudi Arabia	37 teachers	Mixed Method	The study yielded four primary perspectives that exhibit a prevailing consensus within the DAP framework regarding the optimal approach to early childhood education. The findings furnish substantiation that numerous facets of DAP can be suitable in diverse cultural and national contexts.
4	Cheung et al. (2022) Hong-Kong	717 teachers	Quantitative	This research validates the significance of executing a comprehensive curriculum that is suited to a child's developmentally appropriate in the initial years of their growth and development.

No	Author(s) (publication year and country)	Participants	Research Approach of the study	Major findings
5	Cobanoglu et al. (2019)Turkey	251 teachers	Quantitative	The efficacy of teaching, in general, was found to be a significant predictor of preschool teacher beliefs regarding Developmentally Appropriate (DA) and Developmentally Inappropriate Practice (DIP). Furthermore, preschool teacher self-efficacy with regard to parental involvement was observed to be a significant predictor of preschool teacher beliefs about DAP, although not for DIP.
6	Donegan-Ritter and Kohler (2017) USA	1 students and 1 teachers	Qualitative (case study)	Preparing preschool teachers of young children for inclusion necessitates a harmonious amalgamation of superior DAPs, tailored environmental adjustments, and personalised instructional approaches.
7	Hegde and Hewett (2021) Japan	85 preservice teachers	Quantitative (online survey)	The paper examines the effectiveness of online teaching modules (DAP) for guiding young children's behaviour from the perspectives of both students and instructors. The results showed that both students and preschool teachers were satisfied with the implementation of these modules, and they found them helpful in learning and teaching strategies.
8	Hegde et al. (2014) Japan	10 teachers	Qualitative	Japanese day nursery and kindergarten teachers believe in play-based learning, social-emotional development, and the importance of teacher observation and facilitation.
9	Jumiaan et al. (2019) Jordan	180 teachers	Qualitative	Preschool teachers have a high knowledge of DAP, but those with early childhood education specialisation and high academic qualifications have more knowledge.
10	Li et al. (2019) USA	107 teachers	Qualitative	The maths lesson was evaluated by the preschool teacher participants to be of superior quality and developmentally fitting. Nonetheless, they observed certain inadequacies, such as insufficient peer interactions and inadequate differentiation of the lesson.
11	Mages et al. (2018) USA	28 teachers	Qualitative	Application-focused workshops were more valuable to participants than content-focused workshops. Professional development initiatives should focus on both student learning outcomes and teacher knowledge and skills.
12	Mengstie (2022) Ethiopia	6 teachers	Qualitative	The findings revealed a discernible disparity between the convictions of preschool teachers and their tangible classroom applications of DAP. The respondents expressed unwavering beliefs regarding the criticality of DAP in nurturing children's growth and knowledge acquisition. Nevertheless, the participants did not adhere to the DAP recommendations whilst imparting knowledge to the children.
13	Mohamed and Al-Qaryouti (2016) Oman	264 teachers	Qualitative	Most of the preschool teachers espoused convictions regarding child-initiated learning and integrated socio-cultural curriculum. As for self-reported practices, the majority of preschool teachers embraced extensive integrated activities.
14	Rentzou and Sakellariou (2011) Greek	55 teacher candidates	Qualitative	The preschool teacher participants exhibit a preference for developmentally appropriate beliefs in terms of both their beliefs and the instructional activities that they carry out. Despite the analysis indicating correlations between DAP and Developmentally Inappropriate Practice (DIP) beliefs and practices, it has been observed that beliefs do not serve as a predictor of practices.

Discussion

Various Functions Assumed by Preschool Teachers in Promoting DAP

Creating a Positive and Nurturing Environment

The creation of a positive and nurturing environment is a crucial function of preschool teachers in promoting DAPs. According to Alford et al. (2016), the optimal learning experience for preschool children occurs when they have positive and caring relationships with adults and peers. To cultivate these relationships, preschool teachers must exhibit warmth, responsiveness, and support. Additionally, they can foster a sense of community by encouraging cooperation, idea-sharing, and the acceptance of differences (Donegan-Ritter & Kohler, 2017). Preschool teachers can establish positive relationships with children by extending a warm greeting upon arrival, attentively listening to their stories, and responding to their needs and interests. Further, they can provide positive feedback and encouragement to enhance feelings of value and respect (Li et al., 2019; Mages et al., 2018).

Preschool teachers can also advance a sense of community by promoting collaboration, interest-sharing, and mutual learning opportunities (Mages et al., 2018). They can create an inviting and inclusive classroom environment that welcomes all children (Marjanovič Umek, 2021). Additionally, preschool teachers can ensure a safe and respectful environment by establishing clear expectations and rules for behaviour (Alford et al., 2016). Modelling positive behaviour, providing guidance, and support for conflict resolution are also important. The creation of a classroom environment free from physical and emotional harm, which emphasises children's well-being, is a crucial objective (Hegde & Hewett, 2021).

In conclusion, creating a positive and nurturing environment is a vital function of preschool teachers in promoting DAPs. Building positive relationships with children, encouraging a sense of community, and providing a safe and respectful environment are crucial steps in facilitating DAP. Preschool teachers who fulfil these functions can help young children develop the skills, knowledge, and attitudes they need to be successful in school and life.

Providing Tailored Learning Experiences

Preschool teachers have the critical function of providing tailored learning experiences that meet the individual needs and interests of each child. According to Alford et al. (2016) and Donegan-Ritter and Kohler (2017), this is

achieved by adapting teaching strategies to meet the developmental needs of each child, observing their interests, strengths, and challenges, and planning activities that are engaging, challenging, and developmentally appropriate. Sakellariou and Rentzou (2011) suggest that preschool teachers should arrange firsthand, meaningful experiences that are both cognitively and creatively stimulating, invite exploration and investigation and engage children's active and sustained involvement. In order to promote DAP, Alford et al. (2016) emphasise the importance of preschool teachers recognising the unique qualities and assets that each young child brings to the early learning programme as an individual, as well as a member of families and communities. Preschool teachers should, therefore, build on each child's strengths and design and implement learning environments that help all children achieve their full potential across all domains of development and content areas. Additionally, Li et al. (2019) underscore the significance of promoting DAP by being mindful not to compromise any aspect of each child's physical, cognitive, social, or emotional well-being.

Preschool teachers can use assessment to inform instruction by observing and documenting each child's progress and development, as stated by Alford et al. (2016). This information can be used to create individualised learning plans that address each child's unique needs and to adjust teaching practices accordingly. The provision of developmentally appropriate materials and activities that are engaging, challenging, and culturally and linguistically diverse is also crucial, according to Donegan-Ritter and Kohler (2017). These materials and activities should reflect each child's interests, strengths, and needs. In summary, to provide tailored learning experiences that help young children develop the skills, knowledge, and attitudes they need to succeed in school and in life, preschool teachers must use assessment to inform instruction, provide developmentally appropriate materials and activities, and foster positive relationships with children.

Collaborating with Families

Collaboration with families is an essential task of preschool teachers in promoting DAPs, as evidenced by Donegan-Ritter and Kohler (2017) and Mages et al. (2018) studies. Preschool teachers are mandated to work alongside families to ensure that children receive adequate support at home. Furthermore, they are required to involve families in the learning process by sharing curriculum information, providing opportunities for family involvement, and encouraging families to share their insights and experiences. According to Mages et al. (2018), preschool teachers should establish robust partnerships

with families by being respectful, responsive, and supportive of their needs and interests. Therefore, in order to align with the principles of DAP, it is imperative for educational practices to encompass a wide range of cultural, linguistic, and ability diversity. This is because DAP recognises and values each individual as an esteemed member of the learning community. To accomplish this, preschool teachers should establish a collaborative relationship with families to design a learning environment that is inclusive of cultural, linguistic, and ability diversity (Hegde & Hewett, 2021).

To collaborate with families effectively, preschool teachers must build positive relationships with families by being warm, responsive, and supportive. They must also communicate regularly with families to share information on the progress and development of each child. Additionally, they should involve families in decision-making that impacts their child's education (Mages et al., 2018). Moreover, preschool teachers should respect families' cultural and linguistic diversity by comprehending each child's cultural and linguistic background, providing materials and activities that reflect each child's cultural and linguistic background, and involving families in creating a culturally and linguistically responsive learning environment (Mages et al., 2018). Similarly, preschool teachers ought to involve families in the learning process by providing opportunities for families to participate in classroom events and activities and counselling parents (Skočić Mihić et al., 2019). Lastly, they should provide families with information on how to support their child's learning at home.

Advocating for the Needs of Young Children and Their Families

Preschool teachers have a crucial responsibility in advocating for the requirements of young children and their families, as indicated by Alford et al. (2016). To achieve this, they must remain abreast with current research and best practices in early childhood education, engage in professional development opportunities, and support policies that promote the welfare of young children and their families. As posited by Mages et al. (2018), preschool teachers can be effective advocates by fostering positive relationships with policymakers, sharing their proficiency and insights, and working collectively with other stakeholders.

Beliefs that preschool teachers hold about DAP

Preschool teachers hold varying beliefs regarding DAP. Some preschool teachers posit that DAP is of utmost importance and that they must strive to cultivate a learning environment that caters to the developmental needs of all

children (Hegde et al., 2014; Jumiaan et al., 2019; Mohamed & Al-Qaryouti, 2016). These preschool teachers maintain judicious expectations and furnish each child with an optimal blend of challenge, support, sensitivity, and stimulation (Cobanoglu et al., 2019). They espouse the notion that DAP embodies a comprehensive educational outlook that fosters optimal healthy advancement for every child. In addition, DAP enables preschool teachers to perceive children as unique individuals and to gauge their growth and progress at their own pace. It also facilitates the matching of activities and lessons to a child's specific interests and developmental requirements. Moreover, the experience of preschool teachers and the size of their classrooms were significant predictors of their views on DAP. Preschool teachers who implement DAPs aid children in acquiring the essential skills, knowledge, and attitudes necessary for success in both academic and non-academic domains (Mohamed & Al-Qaryouti, 2016). The conclusions of the study by Alghamdi and Ernest (2019) provide proof that several aspects of DAP can be suitable for diverse cultures and nations.

In contrast, some preschool teachers of early childhood education may lack familiarity with DAP or may not recognise its significance. The study undertaken by Abu-Jaber et al. (2010) examined the beliefs of Jordanian preschool teachers with respect to the utilisation of DAP and ascertained that they failed to fully comprehend the significance of tailoring pedagogical methodologies to cater to each child's unique developmental needs. Furthermore, the preschool teachers exhibited limited recognition of the distinct strengths that young children possess as individual entities and members of their families and communities. Similarly, Mengstie's (2022) investigation examined the beliefs of Ethiopian preschool teachers concerning DAP, which uncovered a positive correlation between the teachers' educational background, classroom quality, and the academic abilities of young children with DAP practices. Despite acknowledging the crucial roles that DAP plays in children's learning and development, the preschool teachers did not strictly adhere to DAP guidelines while teaching. The educators pointed to external factors such as resource shortages, large class sizes, lack of parental support, and administrative issues as the cause of this discrepancy. Furthermore, the practices of teachers in regard to DAP were found to be influenced by both their prior teaching experiences and individual dispositions, highlighting the significant role that a combination of personality and work experience plays in the adoption of DAP (Rentzou & Sakellariou, 2011; Sakellariou & Rentzou, 2011). Therefore, it is imperative for educational leaders to offer teachers opportunities for professional development in order to facilitate their understanding and implementation of DAPs in early childhood education (Mengstie, 2022).

In summary, varying perspectives exist among preschool teachers with regard to DAP. There are those who hold that DAP is a crucial consideration in fostering a learning environment that is appropriate for all children and, thus, strive towards this goal. These preschool teachers opine that DAP aids in their ability to view children as individuals and track their progress and growth at their own pace. Conversely, others may lack familiarity with DAP or do not regard it as significant. It is incumbent on school administrators to provide opportunities for professional development that would aid in enhancing teachers' comprehension and implementation of DAPs in preschool settings. By accomplishing these objectives, preschool teachers would be better positioned to equip young children with the requisite skills, knowledge, and attitudes that would enable them to excel academically and in their personal lives.

Factors that Influence Preschool Teachers' Beliefs and Perceptions about DAP

The teacher's training and experience

Studies have shown that multiple factors can have an impact on preschool teachers' beliefs and perceptions regarding DAP. These factors encompass several aspects, such as the teacher's training, expertise, and experience. For instance, Mohamed and Al-Qaryouti (2016) reveal that teachers who have received training in DAP tend to be more aware of its significance and are more likely to implement it in their teaching practices. Likewise, Abu-Jaber et al. (2010) ascertain that a positive correlation exists between the educational background of teachers and their implementation of DAP. Moreover, preschool teachers who possess prior experience working with young children are more likely to possess a more profound comprehension of child growth and development, which, in turn, empowers them to create optimal learning experiences that are developmentally appropriate. Likewise, Skočić Mihić et al. (2019) affirm that participation in in-service training is positively associated with greater self-efficacy in counselling parents. While it is apparent that they have obtained the necessary skills for counselling parents through both personal and professional development, the provision of in-service training serves as a pivotal factor in attaining such competence (Skočić Mihić et al., 2019).

DAP is an all-encompassing and overarching concept that pertains to a wide range of developmental domains for children aged 0 to 8 years. Preschool teachers who receive training in DAP understand that it is a research-based framework that outlines best practices in early childhood education that can facilitate optimal learning and development for young children (Jumiaan et al.,

2019). Moreover, they recognise that DAP necessitates awareness of each child's developmental stage, individualisation of learning experiences, and sound understanding of the social and cultural contexts in which each child resides. These three guiding principles constitute the foundation of DAP.

Preschool teachers who have experience working with young children may also have a better understanding of child development and how to create developmentally appropriate learning experiences (Mohamed & Al-Qaryouti, 2016). The awareness among educators is that DAP is grounded in knowledge, rather than presumptions, pertaining to the growth and development of children. As a result of this knowledge, teachers are empowered to design activities that sufficiently challenge children, thereby facilitating their advancement and engagement (Jumiaan et al., 2019). Furthermore, it is understood that educators acknowledge the fact that DAP enables them to obtain personal insight into each child's characteristics by means of observations and building connections with their families, as indicated by Hegde et al. (2014). This, in turn, empowers teachers to actively involve children in purposeful and gratifying activities and impart knowledge based on their inclinations and proficiencies. Consequently, through a thorough understanding of the impact of teacher training and experience on their beliefs and perceptions about DAP, school administrators can offer professional development and support to facilitate the implementation of DAP in teaching practices. Thereby, preschool teachers can create developmentally appropriate learning experiences that assist young children in acquiring the skills, knowledge, and attitudes essential for success both in school and in life.

The culture of the preschool or school where the teacher works

The influence of the preschool or school's culture on a preschool teacher's beliefs and perceptions about DAP is highlighted by Mohamed and Al-Qaryouti (2016). When a school culture prioritises academic achievement over play and exploration, teachers may feel compelled to focus on academic skills instead of creating developmentally appropriate learning experiences. Conversely, if the school culture values play and exploration, preschool teachers may feel more encouraged to implement DAP in their teaching practices, as noted by Cheung et al. (2022). It is crucial that the culture of the preschool or school where the preschool teacher works acknowledges each child's unique strengths, interests, and needs, as emphasised by Mohamed and Al-Qaryouti (2016). Preschool teachers in a culture that values play and exploration are likely to feel more supported in creating developmentally appropriate learning experiences that are engaging, challenging, and developmentally appropriate for each child. However, in a culture that prioritises academic achievement over

play and exploration, teachers may feel pressured to emphasise academic skills rather than creating developmentally appropriate learning experiences, as noted by Sakellariou and Rentzou (2011). This mismatch can lead to a difference between the teacher's beliefs and perceptions about DAP and their actual teaching practices.

The availability of resources and support for implementing DAP

Cheung et al. (2022) posited that the underlying principle of DAP is centred on the acknowledgement and endorsement of each person as a respected component of the educational community. In order to be considered developmentally appropriate, approaches and methodologies must display a range of cultural, linguistic, and aptitude diversity. Mohamed and Al-Qaryouti (2016) suggested that teachers with access to resources supporting cultural, linguistic, and ability diversity are more likely to implement DAP in their teaching practices. Such resources may include books, toys, and other materials reflecting the cultural and linguistic diversity of their students, which can create developmentally appropriate learning experiences that are engaging, challenging, and suitable for each child.

Furthermore, preschool teachers who receive support from school administrators and colleagues may feel more confident in their ability to implement DAP (Cobanoglu et al., 2019). School administrators can provide professional development opportunities to help preschool teachers understand the significance of DAP and its implementation in teaching practices. Colleagues, in contrast, can offer support and feedback to help preschool teachers refine their instructional strategies and create developmentally appropriate learning experiences. It follows that the availability of resources and support for implementing DAPs can significantly influence teachers' beliefs and perceptions about the practice. Preschool teachers who have access to developmentally appropriate materials and curriculum may be more likely to implement DAP in their teaching practices. Additionally, preschool teachers who receive support from school administrators and colleagues may feel more confident in their ability to implement DAP. Given the impact of the availability of resources and support on preschool teachers' beliefs and perceptions about DAP, school administrators should provide resources and support that help preschool teachers create developmentally appropriate learning experiences that promote the acquisition of skills, knowledge, and attitudes necessary for success in school and beyond.

Conclusion

This systematic literature review endeavoured to address three research inquiries pertaining to DAP within the context of early childhood education. The first question was about the various functions assumed by preschool educators in promoting DAP. The second inquiry pertained to the varying beliefs held by preschool teachers regarding DAP. The focus of the third inquiry was on the elements that have an impact on the beliefs and perspectives of preschool teachers regarding DAP. The results of the search yielded valuable insights into the significance of DAP in early childhood education, the pivotal role played by professional development in promoting DAP, and the beliefs and perceptions of preschool teachers regarding DAP. The diverse responsibilities of preschool educators in promoting DAP encompass creating an environment that is both secure and conducive to learning, offering varied learning opportunities that are tailored to the individual needs and interests of each child, collaborating with families to ensure that children receive requisite support at home, and advocating for the needs of young children and their families. The beliefs of preschool teachers regarding DAP are attributed to various factors, including their personal experiences as learners, their training and professional development, the culture of the preschool or school where they work, and the availability of resources and support to implement DAP. To ensure the successful implementation of DAPs, it is essential for educators, families, and policymakers to work together to advocate for and support DAP in early childhood settings. This includes providing professional development opportunities, ongoing reflection and assessment of curriculum, activities, and environments, and embracing continuous learning and growth.

Implications

The present review offers a comprehensive and rigorous analysis of the literature concerning preschool teachers' beliefs and practices with regard to DAP. The results of this review offer substantial implications for developing teacher training programmes and professional development opportunities that can effectively support the implementation of DAP in early childhood education. Additionally, the findings of this review can contribute to policy decisions pertaining to early childhood education and the creation of guidelines for DAP.

Limitations

The review is limited by the scope of the literature included. While the review is systematic, it is only as comprehensive as the literature that is available and included in the analysis. The review is also limited by the quality of the studies included. The quality of the studies can impact the validity and reliability of the findings. The review is limited by the generalisability of the findings. The studies included in the review may not be representative of all preschool teachers or early childhood education programmes. The authors only used peer-reviewed articles, which may have excluded relevant studies that were not published in peer-reviewed journals. This could have resulted in a biased sample of studies that may not have fully represented the range of beliefs and roles of preschool teachers regarding DAP. Hence, while the systematic review offers valuable insights into preschool teachers' beliefs and practices regarding DAP, it is imperative to consider the limitations of the review when interpreting its findings.

Ethical statement

The research did not involve human and animal subjects. The reviews on which it was based aggregated studies that had already received ethical approval. Consequently, no additional ethical approval was necessary.

Disclosure statement

The authors have no conflict of interest to declare.

References

Abu-Jaber, M., Al-Shawareb, A., & Gheith, E. (2010). Kindergarten teachers' beliefs toward developmentally appropriate practice in Jordan. *Early Childhood Education Journal*, *38*(1), 65–74. https://doi.org/10.1007/s10643-010-0379-z

Alford, B. L., Rollins, K. B., Padrón, Y. N., & Waxman, H. C. (2016). Using systematic classroom observation to explore student engagement as a function of teachers' developmentally appropriate instructional practices (DAIP) in ethnically diverse pre-kindergarten through second-grade classrooms. *Early Childhood Education Journal*, *44*(6), 623–635. https://doi.org/10.1007/s10643-015-0748-8

Alghamdi, A. A., & Ernest, J. M. (2019). Teachers' beliefs about developmentally appropriate practices in Saudi Arabia. *International Journal Of Child Care And Education Policy*, *13*(1), 1–16. https://doi.org/10.1186/s40723-019-0064-7

Alzahrani, M., Alharbi, M., & Alodwani, A. (2019). The effect of social-emotional competence on children academic achievement and behavioral development. *International Education Studies*, *12*(12), 141–149. https://doi.org/10.5539/ies.v12n12p141

Bronfenbrenner, U. (2000). *Ecological systems theory*. Oxford University Press.

Chan, L., & Okamoto, Y. (2006). Resisting suggestive questions: Can theory of mind help? *Journal Of Research In Childhood Education*, *20*(3), 159–174. https://doi.org/10.1080/02568540609594559

Cheung, A. C. K., Keung, C., & Tam, W. (2022). Understanding Hong Kong pre-primary school teachers' curriculum beliefs: A modified version of the curriculum orientation inventory. *Early Childhood Education Journal*, *50*(6), 959–968. https://doi.org/10.1007/s10643-021-01211-3

Cobanoglu, R., Capa-Aydin, Y., & Yildirim, A. (2019). Sources of teacher beliefs about developmentally appropriate practice: A structural equation model of the role of teacher efficacy beliefs. *European Early Childhood Education Research Journal*, *27*(2), 195–207. https://doi.org/10.1080/1350293x.2019.1579547

Copple, C., & Bredekamp, S. (2009). *Developmentally appropriate practice in early childhood programs serving children from birth through age 8*. Eric.

DeGennaro, A. K. (2012). Young investigators: The project approach in the early years. *The Journal of Experiential Education*, *35*(1), 305–306.

Donegan-Ritter, M., & Kohler, F. W. (2017). Preparing early childhood educators for blending practices in inclusive classrooms. *Jaasep Spring*, *117*(1), 104–117.

Gestwicki, C. (2016). *Developmentally appropriate practice: Curriculum and development in early education*. Cengage Learning.

Grantham-Mcgregor, S., Cheung, Y. B., Cueto, S., Glewwe, P., Richter, L., & Strupp, B. (2007). Developmental potential in the first 5 years for children in developing countries. *The Lancet*, *369*(9555), 60–70. https://doi.org/10.1016/s0140-6736(07)60032-4

Hegde, A. V., & Hewett, B. S. (2021). Examining effectiveness of online teaching modules on developmentally appropriate practices (DAP) for guiding young children's behavior: student and instructor perspectives. *Journal Of Early Childhood Teacher Education*, *42*(1), 93–109. https://doi.org/10.1080/10901027.2020.1781714

Hegde, A. V., Sugita, C., Crane-Mitchell, L., & Averett, P. (2014). Japanese nursery and kindergarten teachers' beliefs and practices regarding developmentally appropriate practices. *International Journal Of Early Years Education*, *22*(3), 301–314. https://doi.org/10.1080/09669760.2014.948390

Helm, J. H., & Katz, L. G. (2011). *Young Investigators: The Project Approach in the Early Years* (2nd ed.). Teacher's College Press.

Hutapea, R. P., Simatupang, N., & Kasih, I. (2021). Game development is developmentally appropriate practice (developmentally appropriate) practice based education for elementary school children. *Journal Physical Education, Health And Recreation*, *5*(2), 179–185. https://doi.org/10.24114/pjkr.v5i2.27573

Jumiaan, I., Alelaimat, A., & Ihmeideh, F. (2019). Kindergarten teachers' knowledge level of developmentally appropriate practice in Jordan. *Education 3-13*, *48*(8), 1000–1011. https://doi.org/10.1080/03004279.2019.1699939

Kern, M. L., & Friedman, H. S. (2009). Early educational milestones as predictors of lifelong academic achievement, midlife adjustment, and longevity. *Journal Of Applied Developmental Psychology*, *30*(4), 419–430. https://doi.org/10.1016/j.appdev.2008.12.025

Kim, H. K. (2011). Developmentally appropriate practice (DAP) as defined and interpreted by early childhood preservice teachers: beliefs about DAP and influences of teacher education and field experience. *Srate Journal*, *20*(2), 12–22. https://files.eric.ed.gov/fulltext/EJ959525.pdf

Laleye, B. O. (2019). *Influence of Teachers' Awareness of Developmentally Appropriate Practices on Pre-primary School Children's Developmental Skills in Ilorin Metropolis, Kwara State* [Doctoral dissertation, Kwara State University, Nigeria].

Li, X., McFadden, K., & Debey, M. (2019). Is It DAP? American preschool teachers' views on the developmental appropriateness of a preschool math lesson from China. *Early Education And Development*, *30*(6), 765–787. https://doi.org/10.1080/10409289.2019.1599094

Mages, W. K., Nitecki, E., & Ohseki, A. (2018). A college-community collaboration: fostering developmentally appropriate practices in the age of accountability. *Journal Of The Scholarship Of Teaching And Learning*, *18*(3), 174–188. https://doi.org/10.14434/josotl.v18i3.21761

Majcen, S. A., & Drvodelić, M. (2022). Quality pedagogical practice in early childhood education institutions relating to children at risk of social exclusion. *Center for Educational Policy Studies Journal*, *12*(3), 81–10. https://doi.org/10.26529/cepsj.1086

Marjanovič Umek, L. (2021). A New image of preschool institutions in slovenia: conceptual, systemic and curricular backgrounds. *Center for Educational Policy Studies Journal*, *11*(2), 165–184. https://doi.org/10.26529/cepsj.1036

Mengstie, M. M. (2022). Preschool teachers' beliefs and practices of developmentally appropriate practice (DAP). *Journal Of Early Childhood Research*, *21*(2), 121–132. https://doi.org/10.1177/1476718x221145464

Mohamed, A. H. H., & Al-Qaryouti, I. A. (2016). The association between preschool teachers' beliefs and practices about developmentally appropriate practices. *Early Child Development And Care*, *186*(12), 1972–1982. https://doi.org/10.1080/03004430.2016.1146260

National Association for the Education of Young Children. (2018). *NAEYC early learning program accreditation standards and assessment items*. National Association for the Education of Young Children. https://www.naeyc.org/sites/default/files/globally-shared/ downloads/PDFs/accreditation/early-learning/2022elpstandardsandassessmentitems-compressed.pdf

Nold, J., De Jong, D., Moran, J., Robinson, D., & Aderhold, F. (2021). Early childhood education: academic and behavioral benefits of prekindergarten educational programming. *Sage Open*, *11*(2), 1–8. https://doi.org/10.1177/21582440211010154

Raftery, B. (2016). *Developmentally appropriate practice (DAP): An examination of preservice teachers.* [Doctoral dissertation, Middle Tennessee State University].

Rentzou, K., & Sakellariou, M. (2011). Greek pre-service kindergarten teachers' beliefs about and practices of developmentally appropriate practices in early childhood education. *Early Child Development And Care*, *181*(8), 1047–1061. https://doi.org/10.1080/03004430.2010.509796

Sakellariou, M., & Rentzou, K. (2011). Cypriot pre-service kindergarten teachers' beliefs about and practices of developmentally appropriate practices in early childhood education. *Early Child Development And Care*, *181*(10), 1381–1396. https://doi.org/10.1080/03004430.2010.531132

Sanders, K. & Farago, F. (2018). Developmentally appropriate practice in the 21st century. In M. Fleer & B. van Oers (Eds.), *International handbook of early childhood education* (pp. 1379–1400). Springer. https://doi.org/10.1007/978-94-024-0927-7_71

Skočić Mihić, S., Blanuša Trošelj, D., & Katić, V. (2019). Influence of in-service preschool teachers' education on their perceived competences for counselling parents. *Center for Educational Policy Studies Journal*, *9*(1), 27–43. https://doi.org/10.26529/cepsj.658

Stacey, S. (2018). *Emergent curriculum in early childhood settings: From theory to practice*. Redleaf Press.

Stacey, S. (2023). *Pedagogical Documentation in early childhood: Sharing children's learning and teachers' thinking*. Redleaf Press.

Thompson, J., & Stanković-Ramirez, Z. (2021). What early childhood educators know about developmentally appropriate practice. *Phi Delta Kappan*, *103*(2), 20–23. https://doi.org/10.1177/00317217211051138

Vygotsky, L. S., & Cole, M. (1978). *Mind in society: Development of higher psychological processes*. Harvard University Press.

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Distance Learning and Teaching in Group Settings at Primary Music Schools in Slovenia

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During the Covid-19 pandemic, all stakeholders in education, including music teachers, had to respond to new challenges, including the adjustment of the learning process to the requirements of distance learning and teaching. The main goal of the present research was to determine music teachers' self-assessment of ICT competences and their use of teaching methods, strategies, techniques and assessment methods. A survey questionnaire was designed and the collected data were processed using the Friedman test and the Kruskal-Wallis test. The sample consisted of teachers of subjects that are taught in groups (i.e., Music Preparatory, Music Theory and Solfeggio) at public primary music schools in Slovenia. The participants reported no problems using most ICT tools and resources during the pandemic. In general, they were most confident with videoconferencing tools and least confident when recording explanatory videos unaccompanied by oral explanation. In the planning and implementation of the teaching process, they least frequently used activities of music creation and playing Orff instruments. More specifically, lessons in Music Preparatory most frequently included listening activities, while classes in Music Theory and Solfeggio focused on the transmission of theoretical musical and formal knowledge. Overall, the teachers mainly resorted to synchronous and frontal instruction. In terms of evaluation and assessment of musical abilities, skills and knowledge, they most frequently employed oral consolidation, testing and assessment, as well as student-produced recordings of rhythmic and melodic exercises.

Keywords: distance learning and teaching, music schools, information and communication technology (ICT), music activities, teaching and learning methods

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Učenje in poučevanje na daljavo pri skupinskih predmetih v slovenskih glasbenih šolah

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Med epidemijo covida-19 so se morali vsi deležniki v izobraževanju, med njimi tudi učitelji glasbe, odzvati na izziv, ki je zahteval prilagoditev učnega procesa in izvajanje pouka na daljavo. Glavni namen raziskave je bil ugotoviti samoocene učiteljev glasbe glede IKT-kompetenc ter njihove uporabe metod poučevanja, strategij, tehnik in metod ocenjevanja. Oblikovan je bil vprašalnik, zbrani podatki pa so bili obdelani z uporabo Friedmanovega in Kruskal-Wallisovega testa. Vzorec je vključeval učitelje, ki poučujejo skupinske predmete (glasbena pripravnica, glasbena teorija in solfeggio) na javnih glasbenih šolah v Sloveniji. Udeleženci niso poročali o težavah pri uporabi večine orodij in virov IKT med pandemijo. Na splošno so bili najbolj samozavestni pri uporabi orodij za videokonference in najmanj pri izdelavi videoposnetkov brez razlage. Pri načrtovanju in izvajanju učnega procesa so v najmanjši meri uporabljali dejavnosti ustvarjanja glasbe in igranja na Orffova glasbila. Natančneje, učne ure glasbene pripravnice so najpogosteje vključevale dejavnost poslušanja, medtem ko so se pri nauku o glasbi in solfeggiu osredinjali na prenos teoretičnega glasbenega in formalnega znanja. Na splošno so se učitelji večinoma zanašali na sinhrono in frontalno poučevanje. Pri vrednotenju glasbenih sposobnosti, spretnosti in znanja so najpogosteje uporabljali ustno utrjevanje, preverjanje in ocenjevanje ter posnetke učencev (ritmično-melodične vaje).

Ključne besede: učenje in poučevanje na daljavo, glasbene šole, informacijsko- komunikacijska tehnologija (IKT), glasbene dejavnosti, metode poučevanja in učenja

Introduction

With the Covid-19 pandemic in 2020, education moved out of the classroom and into the homes of learners. Distance learning (also e-education, distance education, online learning and/or distance teaching) was a temporary solution adopted by the Slovenian government to ensure an uninterrupted teaching and learning process while simultaneously guaranteeing the safety of students and teachers at a time of crisis. The rapid adoption of decisions related to the Covid-19 situation forced schools to quickly organise and adapt to the new modality of delivery (Kustec et al., 2020). According to Hodges et al. (2020), such *emergency remote teaching* differs considerably from the "online learning" known and developed prior to 2020. Consequently, all education stakeholders faced unexpected challenges.

Although distance learning and teaching was not a solution that education stakeholders would implement without difficulty, research by Rupnik Vec et al. (2020) nevertheless shows high attainment of teaching objectives by Slovenian primary and secondary education institutions in this period. At the same time, teachers reported that distance learning and teaching had been more demanding and stressful. Moreover, school closure decreased the motivation for work among both teachers and pupils (Kustec et al., 2020; 2021) and increased problems in providing adequate equipment for individual pupils (Šef, 2020), as well as specialised teaching equipment and specialised classrooms for schools (ZASSS, 2020). Similar observations were made in various countries, namely a lack of IT devices, insufficient IT skills of students and teachers (Nedzinskaite-Maciuniene et al., 2022), a lack of children's interest in learning (Drvodelić & Domović, 2022), difficulties with following students' development especially in the area of assessment and evaluation (Özgür Karataş, et al., 2021), and heavy workload and poor performance of teachers (Zorkić, et al., 2021).

For teachers in the field of music education, the achievement of learning objectives linked to the performance and creation of music presented a particularly demanding challenge. As Begić et al. (2022) highlight in their research, most music teachers focused on active music listening during this period, as other activities (singing, playing, creating) were difficult or impossible to implement. The planning of distance learning and teaching further involved making decisions on the delivery method(s) that would best enable the achievement of the subject-specific objectives, e.g., synchronous communication (continuous interaction with participants in constant contact) through videoconferencing tools, not requiring the physical presence of participants in the same room. However, since the exclusive use of synchronous communication had earlier proven ineffective (Watts, 2016), a combination with asynchronous instruction was recommended when working

remotely. Asynchronous interaction is time-independent and allows participants to exchange information with a time delay (by email, text message or in an online classroom) and does not require a direct physical presence (Zmazek, 2022).

In addition to taking into account the teaching objectives, the age of the learners and the availability of technical aids, the choice of communication method(s) was also influenced by the choice of teaching method. Frontal instruction through a videoconferencing tool implemented in distance learning and teaching can negatively influence feedback and the accuracy of communication. Problems may also arise due to unresponsiveness of students, technology glitches and poor quality of audio and video transmission (Biasutti et al., 2021; Ververis & Apostolis, 2020; Svalina & Ristivojević, 2022), all of which can impede the teacher's ability to control the learning process. Indirect methods of instruction, on the other hand, have the potential to achieve greater learner involvement, which is their main advantage compared to frontal instruction (Kramar, 2009) and makes them particularly suitable for distance learning. Asynchronous individual activities (work done at home) can thus play a key role in the achievement of learning objectives. One downside of indirect methods of instruction is that they are more suitable for older pupils who can work independently and less appropriate for younger pupils, e.g., those attending Preschool Music Education (5-year-olds) and Music Preparatory (6-years-olds). Finally, indirect methods are also more demanding to organise and prepare.

Another sensitive issue in distance learning is the evaluation and assessment of knowledge. Some studies show that teachers feel that their assessment and feedback practices were implemented successfully (Mäkipää et al., 2021). According to Rupnik Vec et al. (2020), who looked at primary and secondary schools in Slovenia, the assessment and feedback practices closely resembled those of face-to-face teaching, following the guidelines set out in the curricula and relying mostly on oral examinations, via video conferences, and assessment of oral presentations and student-produced work, e.g., recordings. However, Klein and Lewandowski-Cox (2019) discovered that assessment has traditionally presented a significant challenge to working remotely. In a study by Biasutti et al. (2022), for example, music teachers highlighted the problem of maintaining equal criteria due to differing conditions and adjustment of content, as well as difficulty in evaluating the expressivity and interpretation of online performances. Reimers et al. (2020) further noted that school closure severely impacted both formative and summative assessment.

Despite these challenges, distance learning also had positive aspects, including the development of new practices by teachers and novel organisational methods for the teaching and learning processes. Among the advantages, authors

report the following: increased flexibility of working hours and innovative spatial arrangements, better adjustment of the pace and content of instruction, enhanced opportunities for individualisation, acquisition of new knowledge and skills (Bregar et al., 2020), creating innovative solutions new to teachers' practice (Korhonen, et al., 2021), improved organisation of teacher activities, more efficient sharing of good practices on platforms and keeping records of teaching and work (Biasutti et al., 2022; Petek, 2021; Thornton, 2020), and an increase in independence among students, including an enhanced ability to self-check and self-assess (Encarnação et al., 2021; Svalina & Ristojević, 2022). However, these aspects can be put into practice only if teachers attain a certain level of IT ability, skill and knowledge. In addition to in-depth interaction with digital technology, high-quality, effective and diversified distance learning also requires creativity, e.g., in the preparation of materials adapted to asynchronous delivery (i.e., interactive and explanatory videos with visual and/or interactive content, appealing and interesting worksheets) (Kustec et al., 2020).

In terms of IT competences, music teachers in Slovenia believe themselves to be skilled in working with information and communications technology (Bohak Adam & Metljak, 2021). Some international studies have also demonstrated music teachers' belief in their own average or above-average IT skills (Begić et al., 2022; Kibici & Sarıkaya, 2021). However, Moscardini and Rae (2020) disagree and consider two-thirds of music teachers insufficiently competent to teach music remotely and inadequately prepared for the distance learning process (Ayaz Töral & Albuz, 2021; Biasutti et al., 2021).

Group settings at music schools in Slovenia

Music education in Slovenia on the primary (school and preschool) level is provided by public and private music schools under the Preschool Music Education, Preparatory Music and Preparatory Dance programmes, as well as the Music (instrument and music theory/solfeggio) and Dance programmes. The aims and objectives of music education are defined by the Music Schools Act (ZGla, 2000), while the content of individual subjects and the learning objectives and standards are set out in the curricula (Ministrstvo za vzgojo in izobraževanje Republike Slovenije, 2022). The subjects Music Preparatory,[3] Music Theory and Solfeggio are taught in groups.

3 The Music Preparatory programme has a duration of one year. The Music programme, on the other hand, spans six years for pupils aged 7–9 years and four years for pupils who enrol at 10 years of age or later (ZGla, 2000). On a weekly basis, the lessons are taught with the following durations: Musical Preparatory classes – 60 minutes; Music Theory and Solfeggio – 90 minutes for a group of 16 to 20 pupils, and 60 minutes for a group of 12 to 15 pupils (Ministrstvo za vzgojo in izobraževanje Republike Slovenije, 2022).

The principal aim of music education is to develop musical literacy. (Functional) musical literacy encompasses a range of abilities, skills and knowledge that are essential for engaging with music. It involves the capacity to play music and read and write musical notation, to perform music based on written scores, to articulate thoughts and opinions about music as a listener, performer and/or creator, to transcribe or notate the music one hears, and to comprehend and interpret musical notation (Mills & McPherson, 2006). The general learning objectives of the subjects Music Theory and Solfeggio are the development and deepening of musical perception (rhythmic, melodic, harmonic), the promotion of musical creativity, aesthetic sensitivity, musical taste and the ability to evaluate music-artistic works, and an introduction to the use of modern music technology (Zadnik, 2019). Among other things, the general objectives of Music Preparatory include the development of a positive attitude towards artistic expression, the development of basic musical perception (rhythmic and melodic) and musical expression, participation in both individual and group music-making, creation of musical and other artistic (visual, verbal, movement-dance) content, becoming familiar with visual representations of musical content and learning fundamental musical concepts (*Curriculum. Music Preparatory*, 2022). It is crucial that the learning objectives are achieved through musical activities, such as performing, listening and creating, which are fundamental activities in the Music Preparatory programme. The subjects Music Theory and Solfeggio include solfeggio, performing and interpretation of examples from music literature, creating, listening, and musical theoretical and formal knowledge. Musical performance and solfeggio are fundamental music activities that allow pupils to develop various elementary musical skills. Through activities such as singing, playing instruments (including body percussion, and improvised and Orff instruments) and enunciation of rhythmical content, pupils develop a sense of rhythm and melody. Additionally, performing helps them to develop a harmonic ear, to acquire the ability to accurately reproduce rhythms and pitches, to cultivate their singing voice and to learn to work in a group context. Through active listening to music, pupils develop attentive listening abilities and emotional sensitivity, and refine their aesthetic musical taste. Attentive listening also deepens their ability to appreciate and evaluate the expressive and formal elements of music (Denac, 2002). Alongside experiential listening, which encourages pupils to express their inner experiences and emotions in response to music, an important role is assumed by experiential-analytical listening, which motivates pupils to actively identify and analyse various musical elements and performance techniques and to evaluate musical works. Music creation encourages the development of musical

thinking, along with emotional and critical attitudes towards music, while introducing pupils to its expressive and formative elements (Sicherl-Kafol, 2015). Pupils are given the opportunity to create their own musical content, as well as recreate or interpret examples from the vast body of music literature. Within curricula, creativity represents the most dynamic form of learning, allowing pupils to utilise and integrate their musical skills and knowledge (*Curriculum. Music Theory*, 2022; *Curriculum. Solfeggio*, 2022).

A fundamental education method in the development of functional musical literacy in music schools is solfège or solfeggio,[4] which bridges the gap to understanding musical concepts and the theoretical and formal principles of music. Solfeggio develops pupils' musical skills and abilities through rhythmic, melodic and harmonic exercises and activities that improve their musical memory (Zadnik, 2019). It is important that the planning and delivery of lessons include a variety of music activities. Musical literacy, which "is manifested by developed musical representations and skills within the musical-categorical system, which serve as the bridge that facilitates the transformation of internal auditory perception of written musical content into vocalized expression, and vice versa" (Zadnik, 2011, p. 141), is not the sole objective of music activities. Such activities also contribute to the development of creativity, problem-solving abilities, effective management of emotions and the prevention of aggression, depression and anxiety, while also bridging gaps in communication (Sicherl-Kafol, 2015).

The learning objectives of the group lessons taught at music schools (i.e., in the subjects Music Preparatory, Music Theory and Solfeggio) include the active engagement of pupils in various music activities. It was this specific feature that motivated us to study the didactic aspects of distance learning during the first wave of the pandemic. In our research, we focused on the ICT competences of teachers and the frequency of the integration of music activities, methods and techniques into the learning and teaching process, as well as on the assessment and grading practices for ability, skill and knowledge.

Aim and research questions

The main aim of our research was to investigate the use of distance learning and teaching in group settings, specifically in the subjects Music

4 In the programmes offered by primary music schools in Slovenia, solfeggio is included both as an activity and as an independent subject. Solfeggio as an activity comprises various elements, such as rhythmic dictation, melodic dictation, melodic-rhythmic dictation, exercises developing a steady metrical beat, exercises using the tonal alphabet with solmisation and/or neutral syllables, and sight-singing exercises (singing a vista) (*Curriculum. Music Theory*, 2022; *Curriculum. Solfeggio*, 2022). In the curriculum of the Preparatory Music programme, the specific definition of solfeggio as an activity is not provided.

Preparatory, Music Theory and Solfeggio, at primary music schools in Slovenia. We focused on the following research questions:

1. How do teachers assess their own competence(s) in the use of ICT tools and resources?
2. What music activities were most frequently included in the learning and teaching process during group synchronous lessons in individual subjects?
3. Is there a connection between the level of (self)assessed ICT competence(s) and the frequency of the inclusion of music activities in the learning and teaching process?
4. What teaching methods and strategies were most frequently integrated into the learning and teaching process in individual subjects?
5. What teaching and learning techniques did teachers most frequently integrate into their learning and teaching process in individual subjects?
6. What consolidation and testing methods did teachers most frequently include in the learning and teaching process in individual subjects?
7. What assessment methods did teachers most frequently integrate into their learning and teaching process in individual subjects?

Method

The study is based on the descriptive and causal-non-experimental method of empirical pedagogic research.

Participants

The study included 52 teachers from public Slovenian music schools, who taught the subjects Music Preparatory, Music Theory and Solfeggio during the period of distance learning in 2020 and 2021. The study was based on a non-randomised probability sample. With regard to the distribution of the research participants, our questionnaire was mostly answered by teachers aged 51–60 (50%), followed by teachers aged 41–50 (25%), with a minority of teachers being under 41 years of age. The sample did not include teachers under 26 years of age. The largest number of the sampled teachers taught Music Theory (f = 50), and the smallest number taught Music Preparatory (f = 25), with 16 of the teachers teaching one subject, 21 teaching two subjects, and 15 teaching all three subjects. The largest portion of the sample was comprised of teachers from the Osrednjeslovenska region (24.5%) and the smallest portion from Koroška (1.9%). The other regions represented in the sample were: Pomurska (3.8%), Podravska (13.2%), Savinjska (11.3%), Zasavska (9.4%), Dolenjska

(5.7%), Gorenjska (5.7%), Goriška (9.4%), Primorsko-notranjska (57%) and Obalno-kraška (9.4%).

Instrument

An online questionnaire was custom designed for the study. It included nine closed-ended and five semi-open-ended questions. The section dealing with teachers' self-assessed ICT competences was based on a list of statements proposed by Rupnik Vec et al. (2020). When identifying variations in didactic practices, teachers who taught multiple subjects provided separate answers for each subject. A 6-point Likert-type scale was used to determine the usage frequency of music activities, teaching strategies, teaching and learning methods, as well as consolidation and testing methods (1 – every lesson, 2 – every other lesson, 3 – two to three times a month, 4 – once a month, 5 – less than once a month, and 6 – never).

Research design

The questionnaire was sent to all public music schools in Slovenia ($N = 67$) and was active from February through April 2022.

The data were analysed with the IBM SPSS Statistics V26 statistical software package, using descriptive and inferential statistics, more specifically frequency statistics, the Friedman test and the Kruskal-Wallis test. To maintain clarity and conciseness, the tables present only the key data of interest, omitting unnecessary details.

Results

The results are presented according to the research questions addressed in the study.

Teachers' self-assessment of ICT competences

A four-level statement scale was used to assess the teachers' competence to use ICT tools and resources: 1 – I cannot do it, 2 – I can only do it with help, 3 – I can do it independently but with difficulty, and 4 – I can do it independently without difficulty. Table 1 shows the results of the Friedman test for all self-assessed competences. The results are ranked with the highest value indicating the level of competence at which the teachers feel most independent.

Table 1
Teachers' self-assessment of competences

Competence	$\bar{R}$
Use at least one videoconferencing tool for the purposes of distance learning and teaching	4.79
Prepare exercises and activities supporting independent learning of new content	4.53
Tailor distance learning and teaching activities to individuals and groups of pupils	4.11
Record and share a lesson (with oral explanation)	4.04
Prepare assessment and grading exercises for distance learning and teaching	3.79
Use at least one of the online learning environments (e.g., Moodle, Google Classroom, MS Teams)	3.72
Make an explanatory video (in an unconventional way – with no oral explanation)	3.01

$p = 0.000$; $\chi 2 = 42.910$

The results of the analysis showed that most ICT tools and resources were used by the teachers in distance learning and teaching independently and without problems. Statistically significant differences were found in individual ICT competences ($p = 0.000$; $\chi 2 = 42.910$), with the teachers being most confident in the use of videoconferencing tools (87.2%; $\bar{R} = 4.79$) and least skilled in the production of explanatory videos with no oral explanation (using visual representation only) (41.3%; $\bar{R} = 3.01$).

Music activities in the distance learning and teaching process

The next set of questions addressed the integration of individual music activities into distance learning in group music lessons at primary music schools. The Friedman test was used to compare music activities by subject. The frequency of music activities is ranked with the lowest value indicating the most frequently employed activity.

Table 2
Integration of music activities by subject – comparison

Music activities	Music Preparatory	Music Theory	Solfeggio
	$\bar{R}$	$\bar{R}$	$\bar{R}$
Teaching about music theory and form	2.35	2.11	1.98
Listening to music	2.03	2.75	2.91
Creating music	3.00	4.01	4.17
Performing and interpreting examples from musical literature	2.63	3.69	3.57
Solfeggio exercises		2.44	2.37
p	0.018	0.000	0.000
$\chi 2$	10.107	56.745	42.273

Listening to music was the most frequently used distance learning and teaching activity in Music Preparatory lessons ($\bar{R}$ = 2.03; p = 0.018), while in Music Theory and Solfeggio lessons, teachers mostly resorted to teaching about music theory and the transmission of formal knowledge ($\bar{R}$ = 2.11; p = 0.000 and $\bar{R}$ = 1.98; p = 0.000). Creating music was the least frequently used activity in all three subjects ($\bar{R}$ = 3.00; $\bar{R}$ = 4.01; $\bar{R}$ = 4.17). Next, we sought to establish whether there was a link between the self-assessed ICT competences and the frequency of using music activities. The results of the Kruskal-Wallis tests revealed no link between most ICT competences and the frequency of use. Thus, no statistically significant difference could be established between the frequency of using music activities among music teachers and their self-assessed ICT competences, i.e., *the use of at least one videoconferencing tool for the purposes of distance learning and teaching*; *the use of online learning environments such as Moodle, Google Classroom and MS Teams; the making of explanatory videos; the recording and sharing of lectures with an oral explanation; and the preparation of self-study exercises and activities.* A statistically significant difference was found only in the competence related to preparing remote evaluation and assessment activities (Table 3).

Table 3

Music activities vs. self-assessment of competence in preparing remote evaluation and assessment activities

Music activity	Competence – to prepare remote evaluation and assessment activities	*N*	$\bar{R}$	*p*	Kruskal-Wallis *H*
Creating music	I cannot do it.	6	31.08	0.025	9.346
	I can only do it with help.	3	38.17		
	I can do it independently, but with difficulty.	10	20.60		
	I can do it independently without difficulty.	25	19.32		
	Total	44			

As can be seen in Table 3, the teachers' competence in preparing remote evaluation and assessment activities shows statistical significance when connected with the frequency of use of music creation activities (p = 0.025; H = 9.346). Teachers who were more competent ($\bar{R}$ = 19.32) in this domain were more likely to undertake creative activities with pupils than those who felt less competent ($\bar{R}$ = 31.08).

Delivery methods and teaching strategies in distance learning and teaching

This set of questions was designed to identify similarities and disparities in the use of distance learning delivery methods and teaching strategies. Teachers could opt for a synchronous (simultaneous, live streaming) or asynchronous delivery method (time-independent, delayed feedback) or a combination of both. Table 4 presents the results of the Friedman test for the delivery methods by lesson. The lowest value indicates the method of delivery that was employed most frequently.

Table 4

Comparison of the frequency of delivery method by subject

Method of implementation	Music Preparatory	Music Theory	Solfeggio
	$\bar{R}$	$\bar{R}$	$\bar{R}$
Synchronous delivery	1.44	1.31	1.09
Asynchronous delivery	2.33	2.41	2.59
Combination of both methods	2.22	2.28	2.31
p	0.004	0.000	0.000
$\chi 2$	10.857	29.360	25.529

A statistically significant difference in the use of the delivery method (p = 0.004; p = 0.000; p = 0.000) was established for all three subjects taught in primary music schools, with synchronous delivery being the predominant mode of instruction in all of them ($\overline{R}$ = 1.44; $\overline{R}$ = 1.31; $\overline{R}$ = 1.09).

Furthermore, as presented in Table 5, we were interested in the usage frequency of distance learning teaching strategies in relation to the method of delivery.

Table 5

Comparison of the frequency of teaching strategies by subject

	Music Preparatory	Music Theory	Solfeggio
	$\overline{R}$	$\overline{R}$	$\overline{R}$
Frontal instruction (synchronous)	2.00	1.85	1.87
Individual work – synchronous	2.47	2.90	2.87
Individual work – asynchronous	4.25	4.07	4.50
Work in pairs – synchronous	5.11	5.37	5.00
Work in pairs – asynchronous	5.19	5.21	5.16
Group work – synchronous	3.97	3.56	3.71
Group work – asynchronous	5.00	5.04	4.89
p	0.000	0.000	0.000
$\chi 2$	57.343	106.266	61.129

Statistically significant differences emerged in the use of teaching strategies in all three lessons (p = 0.000; p = 0.000; p = 0.000), with teachers most frequently using frontal instruction (synchronous remote work) ($\overline{R}$ = 2.00; $\overline{R}$ = 1.85; $\overline{R}$ = 1.87). Asynchronous work in pairs and groups was the least used teaching strategy in all three subjects. In individual and group work, the synchronous type was preferred over asynchronous activities. In all three subjects, synchronous group work was more common than work in pairs.

Distance learning teaching and learning techniques

When selecting teaching and learning techniques, teachers had to give particular thought to the resources available to them and to their pupils at home. The results, calculated with the Friedman test and presented in Table 6, illustrate the frequency of using individual techniques across the three subjects under investigation.

Table 6

Comparison of the use of distance learning/teaching techniques across three subjects

Technique	Music Preparatory	Music Theory	Solfeggio
	$\bar{R}$	$\bar{R}$	$\bar{R}$
Explanation	6.53	5.24	4.53
Conversation	5.76	5.85	5.47
Presentation (PowerPoint, screen sharing)	6.09	6.65	6.31
Demonstration (playing instruments, singing songs, etc.)	5.82	5.76	7.38
Call-and-response/sing-along	5.35	8.17	11.13
Reinforcement of song	5.24	7.59	8.91
Musical notation	12.97	5.00	4.91
Graphic notation	7.24	12.14	11.41
Rhythmic speaking/recitation	7.44	6.41	8.91
Body percussion/playing on improvised instruments	8.12	13.08	12.75
Playing Orff instruments	15.06	16.29	15.09
Solfeggio techniques	14.79	6.92	6.28
Parlato readings	16.06	9.08	8.00
Phonomimic techniques	13.97	13.97	13.56
Experiential listening	8.65	10.76	11.31
Experiential-analytical listening	9.65	10.80	9.28
Musical creation techniques	11.94	13.42	12.03
Creation while listening to music	10.32	13.88	13.75
p	0.000	0.000	0.000
$\chi 2$	175.635	320.318	132.415

Comparison of the frequency of individual teaching techniques used in distance learning yields a statistically significant correlation across the three subjects under investigation (p = 0.000; p = 0.000; p = 0.000). The techniques most frequently used in Music Preparatory lessons were reinforcement of song ($\bar{R}$ = 5.24), call-and-response/sing-along ($\bar{R}$ = 5.35) and conversation ($\bar{R}$ = 5.76). In Music Theory and Solfeggio lessons, the most commonly used techniques were musical notation and explanation. The differences in using teaching techniques are conditioned by learning objectives. One of the learning objectives in Music Theory and Solfeggio that is not included in Music Preparatory is, for example, singing selected melodic exercises with solfège syllables, the musical alphabet and neutral syllables.

In all three subjects, the use of Orff instruments was the least frequent teaching technique. As expected, parlato reading and solfeggio techniques were the least frequently used teaching techniques in Music Preparatory lessons, as these are not yet part of the syllabus. Musical creation and creation while listening to music were also among the most infrequently used techniques across all three subjects. The demonstration technique was used rather frequently in Music Preparatory ($\overline{R}$ = 5.82) and Music Theory lessons ($\overline{R}$ = 5.76) and slightly less frequently in Solfeggio lessons ($\overline{R}$ = 7.38).

Consolidation and testing methods in distance learning

In our survey, the participating teachers also rated the frequency of the different consolidation and testing methods on a six-point scale (1 – every lesson; 2 – every other lesson; 3 – twice or three times a month; 4 – once a month; 5 – less than once a month; and 6 – never).

Table 7

Comparison of the frequency of consolidation and testing methods across lessons

Consolidation and testing method	Music Preparatory	Music Theory	Solfeggio
	$\overline{R}$	$\overline{R}$	$\overline{R}$
Oral assessment during video conferences	4.00	3.96	3.67
Completing textbook exercises during video conferences	5.39	4.69	2.75
Completing textbook exercises – asynchronously	6.61	3.69	5.17
Completing worksheets during video conferences	7.06	5.58	4.67
Completing worksheets – asynchronously	6.11	5.23	6.83
Online interactive tools, quizzes, etc. (e.g., Quizlet, Kahoot!, Liveworksheets)	7.22	8.35	7.67
Online classrooms (used for quizzes, uploading work, assessment, feedback, etc.)	6.06	6.65	7.08
Creating mind maps as a consolidation method	7.11	8.08	7.67
Recordings (of rhythmic and melodic exercises, of singing, etc.)	4.44	5.81	5.67
Oral poster and PowerPoint presentations and/or presentations with other aids	8.28	8.31	8.83
Various group work products	7.83	8.65	8.83
Other	7.89	9.00	9.17
p	0.037	0.000	0.000
$\chi 2$	20.628	53.205	34.320

The results of the Friedman test indicate statistically significant differences in the frequency of consolidation methods across all three subjects (p = 0.037; p = 0.000; p = 0.000). Oral consolidation and testing, as well as completing textbook exercises during video conferences, emerged as the methods most often employed across all three subjects. In Music Preparatory lessons, the most frequently used method involved pupils producing recordings ($\overline{R}$ = 4.44), in Solfeggio lessons, consolidation and testing was undertaken mostly by completing textbook exercises during video conferences ($\overline{R}$ = 2.75), and in Music Theory lessons it was accomplished by the asynchronous completion of textbook exercises ($\overline{R}$ = 3.69).

Assessment methods in distance learning

In Slovenian primary music schools, the assessment process starts in Music Theory lessons. It is thus important to note that the lessons in Music Preparatory, which students attend prior to commencing Music Theory, are not assessed and therefore cannot be evaluated and included in the results presented below.

Table 8 presents the results of the Friedman test for different assessment methods by subject.

Table 8

Comparison of assessment methods across subjects

Assessment method	Music Theory	Solfeggio
	$\overline{R}$	$\overline{R}$
Oral assessment during video conferences	3.79	3.98
By way of assessing student recordings (of rhythmic and melodic exercises, songs, etc.)	3,35	3,14
Written assignment via video conference	2.51	2.90
Submitted written assignments	3.03	2.90
Other	2.32	2.07
p	0.000	0.000
$\chi 2$	34.627	24.679

The usage frequency of assessment methods in distance learning shows statistically significant differences in the values for Music Theory (p = 0.000) and Solfeggio lessons (p = 0.000). The most frequent method in Music Theory ($\overline{R}$ = 3.79) and Solfeggio lessons ($\overline{R}$ = 3.98) was oral assessment via video conference. Finally, the method least used by teachers was assessment by way of written assignments via video conferences (f% = 2.51; f% = 2.90).

Discussion

The objective of this study was to investigate music teachers' self-assessment of ICT competence. In the sample studied, those teaching subjects that are taught in groups at primary music schools in Slovenia reported no difficulty using most of the tools and resources listed in our questionnaire. They were most proficient with videoconferencing tools and least skilled at making their own videos, although most reported no major problems. In their study of Slovenian primary and secondary school teachers (n = 7,328), Rupnik Vec et al. (2020) came to similar conclusions. Two-thirds of the teachers they surveyed reported that they could, albeit with difficulty, make independent use of all of the digital tools and resources suggested by the researchers. The teachers were most confident about creating exercises and activities for independent learning by pupils and about the use of videoconferencing tools, and least confident about preparing explanatory videos and recording and sharing video lectures. Moreover, a study of the distance learning experience of Slovenian primary music school teachers during the Covid-19 pandemic (Boham Adam & Metljak, 2021) revealed that half of the surveyed teachers experienced difficulties using ICT tools, mostly linked to the achievement of learning objectives, while a smaller proportion experienced technical problems with ICT use and difficulty communicating with pupils. A few of the teachers indicated other problems, such as pupil unresponsiveness and inexperience or lack of skills in the effective use of ICT (in particular, online classroom platforms, software, and video and audio recordings). In a study by Svalina and Ristivojević (2022), Croatian and Serbian music school teachers rated their work with electronic devices as successful, but pointed out the extra work and preparation that was needed when working remotely. Other research, e.g., Begić et al. (2022), has highlighted the very high self-assessment of teachers' competencies for teaching music at a distance and the great readiness in the dimension of self-efficacy in using computer and the internet (Kibici & Sarıkaya, 2021).

Given the specific features of music teaching, we also aimed to explore the extent to which teachers could integrate various music activities into their distance learning and teaching. In Music Preparatory lessons, these activities most often included listening, while in Music Theory and Solfeggio classes, teachers mostly resorted to music theory and form instruction. The least used activity in all three subjects was music creation. Given the pandemic situation, we assume that creative activities were the most challenging to implement in a remote learning and teaching environment. In this respect, we sought to establish whether the teachers who self-assessed their ICT competences highly

were more likely to use music creation in their distance teaching. In most cases, analysis of the integration of various music activities in distance learning and teaching yielded no differences. Of the seven competences investigated, a statistically significant difference was found only for competence in preparing remote evaluation and assessment activities. Similar research by Zadnik (2021) showed that teachers of Music Theory and Solfeggio, as well as students enrolled in an undergraduate programme in Music Pedagogy (i.e., future music teachers), used ICT tools and resources most frequently for listening to music and least frequently for music creation. The author concluded that the students were more likely than the teachers to use existing online videos. Moreover, the students more frequently created their own didactic recordings, which they posted online. The study also revealed an uneven distribution of music activities in lessons given by the teachers: creation was present significantly less than for other activities. The author suggests the reason for this may lie in the teachers' preference for musical notation as the top distance learning and teaching technique.

All of these findings align with the present research. The Music Theory and Solfeggio teachers in our research most often used musical notation, too, whereas the techniques most frequently used in Music Preparatory lessons were reinforcement of the song, call-and-response and conversation. Given the unavailability of didactic resources at home – most pupils did not have Orff instruments – and the challenges of music-making in groups, hardly any of the teachers surveyed used Orff instruments, which again aligns with previous research by Biasutti et al. (2022). However, we also found that teachers were able to adapt and that they used improvised instruments instead.

Research by Kisiel (2020), and Svalina and Ristojević (2022) established that, compared to classroom instruction, distance learning offered fewer opportunities for demonstration, which is indispensable for the correct handling of instruments, body posture while playing and playing technique. Bohak Adam and Metljak (2021) also discovered that, when instructing students in musical instruments, teachers found that difficulties emerged primarily during group lessons and performances. These difficulties were often attributable to unstable sound, which presented challenges in many other aspects as well. In the aforementioned study by Svalina and Ristojević (2022), Solfeggio teachers emphasised the absence of direct contact with students and low-grade audio and video transmission caused by unreliable internet connections, leading to untimely feedback, a loss of control over intonation in singing, and specific rhythm and melody issues. All of these challenges are associated with synchronous teaching, which was the delivery method most frequently used by our

respondents, and with frontal instruction, which was their most frequently employed teaching strategy.

The aforementioned study by Rupnik Vec et al. (2020) found that non-music primary and secondary schools in Slovenia more frequently adopted a blended approach of synchronous and asynchronous music teaching. In addition to instructing pupils via video conferences, teachers also provided written instruction for independent homework. In the US context, Shaw and Mayo (2022) similarly found that most of the music and non-music teachers in their study (n = 1,368) used a blended teaching approach during the pandemic. In this regard, we assume that asynchronous teaching may have been more challenging for younger pupils and their parents, whereas synchronous lessons merely required parents to connect through a computer application.

Since assessment is key to a quality learning process, we were also interested in how teachers consolidated, tested and assessed pupils' abilities, skills and knowledge during distance learning sessions. The responses to our questionnaire showed that, in all three surveyed subjects, teachers mostly used video conferences, during which pupils were evaluated orally or required to complete textbook exercises. In addition to consolidation and testing, teachers also had to assess their students' knowledge. In Music Theory and Solfeggio lessons (the lessons in Music Preparatory were not assessed), they mostly resorted to oral assessment, followed by recorded rhythmic and melodic exercises, songs and other activities. Our findings align with those from the study Rupnik Vec et al. (2020), which identified students' oral responses to questions via video conferences as the most frequently employed assessment method. Research has also revealed that assessing the learning process presented a significant challenge *per se*. Croatian and Serbian music school teachers of theoretical subjects in the Svalina and Ristojević (2022) study, for instance, highlighted the difficulty of conducting credible testing and assessment of knowledge and/or skills, which they identify as the greatest obstacle to distance learning, when considering all of the extra work required. Let us conclude with the Deloy (2022) survey of US music theory teachers, who experienced difficulty in evaluating pupil performance (singing songs, intervals and chords) during synchronous instruction. The issues were attributed to poor internet connection, questionable privacy and background distraction during assessment.

Conclusions

The Covid-19 pandemic presented unprecedented challenges across multiple aspects of our lives, impacting stakeholders in education both in Slovenia and around the world. While many music schools had been integrating online teaching methods even prior to the pandemic, primarily with the aim of broadening their appeal (Biasutti et al., 2022), the sudden school closure after the outbreak necessitated an urgent and immediate transition to remote learning. The present study examined teachers' pedagogic and didactic practices during this period and assessed teachers' competence in distance learning. The results are encouraging, especially in areas related to teachers' use of activities and methods. Despite the difficulty of integrating certain music activities, such as creation and performance, into online teaching and learning, teachers did not shy away from these, instead including them less often. Another interesting observation is that teachers managed to circumvent certain problems, such as the unavailability of Orff instruments, by including activities that utilised improvised instruments that students could make at home. Furthermore, the experience of remote work during the pandemic also contributed to the development of various other aspects, e.g., the exchange of good practice on platforms (e.g., razlagamo.si, 2023), and advances in the ability, knowledge and use of ICT tools and resources among music teachers (Bohak Adam & Metljak, 2021).

The limitations of the present study include the limited sample size, as only public music schools in Slovenia were included in the survey; adding respondents from private music institutions would have produced additional insight into remote learning and teaching approaches. Furthermore, the study focused on the use of a narrowly defined list of ICT tools and resources; this aspect could have been addressed in more detail by examining the music teachers' digital literacy in general. Since the study spanned only the period of distance learning, we cannot infer the extent to which certain music activities and methods were represented in the classroom in non-online settings. However, the research findings can contribute to a better understanding of the importance of activity-oriented music education. We firmly believe that the foundation of music teaching and learning lies in musical experience. Despite the constant advances in technology, bringing about improved sound quality, reduced time lags and ample opportunities for distance group music-making, interpersonal contact will remain indispensable to the full appreciation and enjoyment of, and engagement in music.

Disclosure statement

The authors have no conflict of interest to declare.

References

Ayaz Töral, D., & Albuz, A. (2021). Covid-19 pandemi sürecinde 4-13 yaş grubu öğrencilerine yönelik uzaktan çalgı öğretimine ilişkin öğretmen görüşleri. [Teachers' opinions on distance instrument teaching for students in the age group 4–13 during the Covid-19 pandemic process]. *Dumlupınar Üniversitesi Eğitim Bilimleri Enstitüsü Dergisi, 5*(1), 21–43.

Begić, J. Š., Begić, A., & Pečić, J. (2022). Attitudes of music teachers towards organizing distance learning in the context of lifelong education. In Đurđević Babić, I., & Galzina, V. (Eds.), *1st International Online Scientific Conference ICT in Life Conference proceedings. Contemporary society meeting ICT challenges and issues* (pp. 225–240). Fakultet za odgojne i obrazovne znanosti Sveučilišta Josipa Jurja Strossmayera u Osijeku, Hrvatska akademija znanosti i umjetnosti (HAZU).

Biasutti, M., Philippe, R. A., & Schiavio, A. (2021). Assessing teachers' perspectives on giving music lessons remotely during the COVID-19 lockdown period. *Musicae Scientiae, 26*(3), 585–603.

Bohak Adam, T., & Metljak, M. (2021). Poučevanje glasbene umetnosti na daljavo v osnovnošolskem izobraževanju med epidemijo COVID-19 [Distance teaching of musical arts in primary education during the COVID-19 epidemic]. *Muzikološki zbornik, 57*(1), 229–253.

Bregar, L., Zagmajster, M., & Radovan, M. (2020). *E-izobraževanje za digitalno družbo* [E-education for the digital society]. Andragoški center Slovenije.

Curriculum. Music Preparatory. (2022). Ministry of Education of the Republic of Slovenia, National Education Institute Slovenia.

Curriculum. Music Theory. (2022). Ministry of Education of the Republic of Slovenia, National Education Institute Slovenia.

Curriculum. Solfeggio. (2022). Ministry of Education of the Republic of Slovenia, National Education Institute Slovenia.

Deloy, D. (2022). *Teaching music theory through COVID-19.* [Master's thesis, University of Nebraska-Lincoln].

Denac, O. & Pšunder, M. (2002). *Glasba pri celostnem razvoju otrokove osebnosti* [Music in the holistic development of a child's personality]. National Education Institute Slovenia.

Drvodelić, M., & Domović, V. (2022). Parents' opinions about their children's distance learning during the first wave of the Covid-19 pandemic. *Center for Educational Policy Studies Journal, 12(3),* 221–241.

Encarnação, M., Vieira, M. H., & Brunner, G. (2021). The experience of music teachers from Portugal and Germany during the Covid-19 pandemic: Hard times and creative solutions. In M. Pabst-Krueger, & A. Ziegenmeyer (Eds.), *Perspectives for music education in schools after the pandemic. A joint publication by authors of the network of Music Teacher Associations in Europe (MTA)* (pp. 18–27). European Association of Music in Schools (EAS).

Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, A. (2020, March 27). The difference between emergency remote teaching and online learning. *Educause Review*. https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning

Jokić Zorkić, T., Mićić, K., & Kovács Cerović, T. (2021). Lost trust? The experiences of teachers and students during schooling disrupted by the Covid-19 pandemic. *Center for Educational Policy Studies Journal, 11*, 195–218.

Kibici, V. B., & Sarıkaya, M. (2021). Readiness levels of music teachers for online learning during the COVID 19 pandemic. *International Journal of Technology in Education (IJTE), 4*(3), 501–515.

Kisiel, M. W. (2020). Elementary music education in the era of remote teaching – Constraints and prospects for development. *International Journal of Research in E-learning, 6*(2), 1–14.

Klein, E., & Lewandowski-Cox, J. (2019). Music technology and Future Work Skills 2020: An employability mapping of Australian undergraduate music technology curriculum. *International Journal of Music Education, 37*(4).

Korhonen, T., Juurola, L., Salo, L., & Airaksinen, J. (2021). Digitisation or digitalisation: Diverse practices of the distance education period in Finland. *Center for Educational Policy Studies Journal*, *11*, 165–193.

Kramar, M. (2009). *Pouk.* Educa, Melior.

Kustec, S., Logaj, V., Krek, M., Flogie, A., Truden-Dobrin, P., & Ivanuš-Grmek, M. (2020). *Vzgoja in izobraževanje v Republiki Sloveniji v razmerah, povezanih s covid-19. priporočila* [Education in the Republic of Slovenia in conditions related to Covid-19]. Ministry of Education of the Republic of Slovenia, National Education Institute Slovenia.

Kustec, S., Logaj, V., Krek, M., Flogie, A., Truden-Dobrin, P., & Ivanuš-Grmek, M. (2021). *Šolsko leto 2021/22 v Republiki Sloveniji v razmerah, povezanih s covidom-19: modeli in priporočila* [The 2021/22 school year in the Republic of Slovenia in the context of Covid-19: Models and recommendations]. Ministry of Education of the Republic of Slovenia, National Education Institute Slovenia.

Mäkipää, T., Hahl, K., & Luodonpää-Manni, M. (2021). Teachers' perceptions of assessment and feedback practices in Finland's foreign language classes during the Covid-19 pandemic. *Center for Educational Policy Studies Journal*, *11*, 219–261.

Mills, J., & McPherson, G. E. (2006). Musical literacy. In G. E. McPherson (Ed.), *The child as musician. A handbook of musical development* (pp. 155–171). Oxford University Press.

Ministrstvo za vzgojo in izobraževanje Republike Slovenije. (2022). *Programmes in Music Education. Programi v glasbenem izobraževanju.* Ministry of Education of the Republic of Slovenia.

Moscardini, L., & Rae, A. (2020). *We make music online. A report on online instrumental and vocal teaching during the Covid-19 lockdown.* MEPG.

Nedzinskaite-Maciuniene, R., Stasiunaitiene, E., & Simiene, G. (2022). Through thick and thin: Lower secondary school students' barriers to learning under Covid-19 conditions. *Center for Educational Policy Studies Journal, 12*(3), 167–189.

Özgür Karataş, F., Akaygun, S., Çelik, S., Kokoç, M., & Nur Yılmaz, S. (2021). Challenge accepted: Experiences of Turkish faculty members at the time of emergency remote teaching. *Center for*

Educational Policy Studies Journal, 11, 141–163.

Petek, T. (2021). The opinion of Slovene (mother tongue) teachers on distance learning in primary schools. *Center for Educational Policy Studies Journal, 11,* 383–406.

Razlagamo.si. (2023). *Izobraževalna podporna točka Razlagamo.si*. https://www.razlagamo.si

Reimers, F., Schleicher, A., Saavedra, J., & Tuominen, S. (2020). *Supporting the continuation of teaching and learning during the COVID-19 Pandemic, Annotated resources for online learning.* OECD Publishing, Paris.

Rupnik Vec, T., Slivar, B., Zupanc Grom, R., Deutsch, T., Ivanuš-Grmek, M., Mithans, M., Kregar, S., Holcar Brunauer, A., Preskar, S., Bevc, V., Logaj, V., & Musek Lešnik, K. (2020). *Analiza izobraževanja na daljavo v času prvega vala epidemije covida-19 v Sloveniji* [Analysis of distance education during the first wave of the Covid-19 epidemic in Slovenia]. National Education Institute Slovenia.

Shaw, R., & Mayo, W. (2022). Music education and distance learning during COVID-19: A survey. *Arts Education Policy Review, 123(3),* 143–152.

Sicherl-Kafol, B. (2015). *Izbrana poglavja iz glasbene didaktike* [Selected chapters from music didactics]. University of Ljubljana, Faculty of Education Press.

Svalina, V., & Ristivojević, A. (2022). Distance learning in Croatian and Serbian music schools. *Open Learning: The Journal of Open, Distance and e-Learning, 40*(1), 29–49. https://doi.org/10.1080/02680513.2022.2108314

Šef, M. (2020). *Izvedba dela na daljavo* [Implementation of remote work]. Osnovna šola Litija.

Thornton, L. (2020). Music education at a distance. *National Association for Music Education, 29(3)*, 3–6.

Ververis A. & Apostolis, A. (2020). Online Music Education in the Era of COVID-19: Teaching Instruments in Public Music Secondary Schools of Greece During the 2020 Lockdown. In R. Thripp (Eds.), *Proceedings of ICSES 2020-- International Conference on Studies in Education and Social Sciences, Istanbul, Turkey* (pp. 1–9). ISTES Organization.

Watts, L. (2016). Synchronous and asynchronous communication in distance learning: A review of the literature. *Quarterly Review of Distance Education, 17*(1), 23–32.

Zadnik, K. (2011). Razvoj ritmičnega in melodičnega posluha pri 8-letnih učencih v glasbeni šoli [Development of rhythmic and melodic hearing in 8-year-old students in music school]. *Glasbeno-pedagoški zbornik Akademije za glasbo v Ljubljani, 16,* 19–41.

Zadnik, K. (2019). *Nauk o glasbi v slovenski glasbeni šoli: med preteklostjo, sedanjostjo in prihodnostjo* [Teaching about music in the Slovenian music school: Between the past, present and future]. Ljubljana University Press, Faculty of Arts.

Zadnik, K. (2021). Interactive learning materials for subjects Music Theory and Solfeggio in the Slovenian primary music school. *Metodički Ogledi, 29*(2), 281–301.

ZASSS. (2020). *»Izobraževanje na daljavo« in pogled naprej* ["Distance education" and looking ahead].

ZGla. (2000). *Zakon o glasbeni šoli* [*Music Schools Act*]. Uradni list RS, št. 81/06.

Zmazek, B. (2022). *Nagovor za izobraževalno podporno točko Razlagamo.si* [Opening speech for the educational support point Razlagamo.si]. https://www.razlagamo.si

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Are the Benefits of Emergency Remote Education Truly Benefits? Ethical Dilemmas and Research Results on Emergency Remote Education from the Perspective of Prospective Teachers and the Foundations of Pedagogical Study Programmes

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Commencing in March 2020 and continuing during the 2020/2021 academic year, all university education was forced to introduce emergency remote education due to restrictions imposed in countries affected by the Covid-19 pandemic. In the present empirical study, which includes a representative sample of students from one of the education faculties in Slovenia, data was obtained on the conditions and implementation of study programmes via emergency remote education. The areas of study were the material conditions for studying, the pedagogical process in emergency remote education, the ethics of the rules of performance and assessment, and the academic community. The study provides an analysis of the changes that took place in the implementation of the pedagogical process during emergency remote education from the students' perspective and an examination of the extent to which it provided equal opportunities for students. The results show that the success of students in their studies depends on technical conditions and the environment; that rapid transitions from one type of studying to another (from emergency remote education to hybrid or entirely at the faculty) are not recommended; that the teaching process was based on the concept of face-to-face teaching, partly adapting to different conditions on this basis; and finally, that the "desire for comfort" entered into the assessment of the quality and fairness of the educational process. Based on the values of our professional ethical judgement and the results of the study, we conclude that higher education teachers should be aware that providing comfort to some students who have the appropriate conditions for studying or simply preferring to teach from the comfort of home are not adequate reasons to maintain online delivery of courses compared to the criteria of justice and quality in education.

Keywords: pedagogical study programmes, emergency remote education, ethics, distance learning, justice, prospective teacher

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Ali so prednosti izobraževanja na daljavo v sili resnično prednosti? Etične dileme in izsledki raziskav o izobraževanju na daljavo v sili z vidika bodočih učiteljev in temeljev pedagoških študijskih programov

Tatjana Hodnik, Janez Vogrinc in Janez Krek

Z marcem 2020 in v študijskem letu 2020/21 je bilo vse univerzitetno izobraževanje zaradi omejitev, uvedenih v državah, ki jih je prizadela pandemija covida-19, prisiljeno uvesti izobraževanje na daljavo v sili. V tej empirični študiji, ki vključuje reprezentativni vzorec študentov ene izmed pedagoških fakultet v Sloveniji, so bili pridobljeni podatki o pogojih in izvajanju študijskih programov prek izobraževanja na daljavo v sili. Področja preučevanja so bila: materialni pogoji za študij, pedagoški proces v izobraževanju na daljavo v sili, etičnost pravil izvedbe in ocenjevanja ter akademska skupnost. Študija prinaša analizo sprememb, ki so se zgodile pri izvajanju pedagoškega procesa med izobraževanjem na daljavo v sili z vidika študentov, in preučitev, v kolikšni meri je ta študentom zagotavljal enake možnosti. Izsledki kažejo, da je uspešnost študentov pri študiju odvisna od tehničnih pogojev in okolja; da hitri prehodi iz ene vrste študija v drugo (iz izobraževanja na daljavo v sili v hibridno ali v celoti na fakulteti) niso priporočljivi; da je pedagoški proces temeljil na konceptu neposrednega poučevanja in da se je na tej podlagi deloma prilagajal različnim razmeram; in končno, da je v oceno kakovosti in pravičnosti izobraževalnega procesa vstopila »želja po udobju«.

Ključne besede: pedagoški študijski programi, izobraževanje na daljavo v sili, etika, učenje na daljavo, pravičnost, bodoči učitelj

Introduction

From March 2020, all university education institutions were forced to introduce "distance education" due to restrictions imposed in countries affected by the Covid-19 pandemic. This was an emergency in which degree programmes that were neither conceived nor formally accepted as distance education programmes had to be implemented at a distance due to the exceptional circumstances. In the present empirical study, we investigated the implementation of degree programmes in this situation, which, due to its specificity, raises fundamental ethical questions in the field of teaching at the university level.

Due to its exceptional nature, online teaching does not correspond to the concept of "distance learning" as it has been known in various forms for around 200 years (Harting & Erthal, 2005). Distance learning is when the teacher and the learner are physically separated, and the pedagogical approaches and the overall organisation of the processes are adapted to this form of learning. In modern times, distance learning programmes have the following specific features: planning, organisation, development and courses are designed according to distance learning; students have sufficient technological equipment for the courses they take; technical staff have enough time and experience to find ideal solutions to problems; and time management is under the initiative of the teacher (Unver & Sungur, 2022). The advantages of such programmes are claimed to be that students can study "from home", and the message of the slogan advertisements inviting students to enrol is "simplicity": "Earn a college degree in your pyjamas!", "Get your bachelor's without leaving the house!", "Study wherever and however you want!" (Loveless, 2023). Prospective students are therefore led to believe that distance learning programmes are convenient and easy. More realistically, the website Education Corner warns students: "While the flexibility is real, know that college isn't supposed to be easy, and it's rarely convenient" (Loveless, 2023).

During the Covid-19 pandemic, educational institutions had to convert non-distance education programmes into e-classes overnight and teachers had to modify their pedagogical approaches to adapt to the changing situations. Hodges et al. (2020) therefore define this process as "emergency remote teaching". As our study explores not only teaching, but also learning and the social aspects of the pedagogical process, we use the broader term "emergency remote education" (hereafter ERE). ERE is characterised by an attempt to adapt the existing curriculum, an unplanned and rapid transition, and students not having equal technological equipment for distance learning. It is a situation in which face-to-face courses are given online and teachers experience time

management problems due to working in the home environment (Unver & Sungur, 2022). One obvious similarity between distance learning and ERE is the absence of face-to-face teaching. The key differences are that distance learning programmes start from a predominantly self-directed learning perspective and that both the timetable and the teaching are structured differently for students than when delivered on the premises of a higher education institution. In ERE, the pedagogical process, which was originally designed differently, has "merely" been transferred to "distance learning".

The present research focuses on study programmes for the education of prospective teachers. In comparison with most non-pedagogical studies, the conditions of ERE in pedagogical studies raise specific questions derived from the fact that in addition to providing a range of disciplinary knowledge (languages, mathematics, science, social sciences, etc.), a fundamental goal of all pedagogical study programmes is the acquisition of pedagogical knowledge, attitudes and skills, which students develop primarily in direct contact with professors, assistants and other students, as well as in pre-service practice. The execution of the face-to-face pedagogical process itself therefore has important educational effects for prospective teachers. At the same time, higher education teachers and professionals, through their work and behaviour, indirectly communicate to students their attitude towards the ethical values and principles that should be followed by a quality pedagogical process.

The results of the research have been partially presented at three scientific conferences (Hodnik & Krek, 2023; Hodnik et al., 2021; Krek et al., 2021). Here, we present the study in the post-pandemic era, which has allowed us to review previously published research in this area. Karataş et al. (2021) analysed 20 surveys of students and teachers in the higher education sector in different countries, all published in 2020. The authors summarised the main and common findings of the different studies as follows. It was evident that the most common difficulties encountered in the process were technical problems, including insufficient equipment, the low speed of internet connection, disconnections experienced by many students, and the inability of students living in rural areas to access their course content due to their internet infrastructure. Differences in access to the study process due to differences in the technical conditions of working from home are probably largely the result of social differences. Therefore, a study process to which students do not have equal access constitutes an ethical problem from the point of view of the fundamental norm of justice, i.e., the provision of equal educational opportunities.

Regarding the process of teaching and learning, Karataş et al. (2021) summarised research findings demonstrating that many distracting factors in

the home environment affected students' performance in learning: students expressed the difficulties of working at home because their parents and siblings were also at home during ERE. Most students agreed with the view that distractions caused by their physical environment reduced their ability to participate in online classes and to perform optimally. Another significant problem pointed out by Karataş et al. (2021) in their summary of research is related to assessment and evaluation: students involved in different surveys were concerned about the reliability and safety of exams and the difficulties in measuring and evaluating practical skills, technical competencies and skills such as teaching practice. The results of the studies analysed by Karataş et al. (2021) indicate that the difficulties experienced during ERE affected learning in many ways. It was observed that students' class participation was reduced and communication between student-student and student-teacher was not conducted properly, while the rich interactions between students that are necessary for attendance, participation and learning were lost. On the other hand, strong communication established between students and faculty members before the pandemic increased the participation of students in courses.

It was reported that although students found online synchronous lessons especially useful in maintaining the learning process in a planned way, using synchronous and asynchronous environments together was more effective. Asynchronous environments were found to be useful, as they enabled students to learn by providing the flexibility to repeat course content whenever they wanted.

Regarding the implementation of ERE, it is clear that the analysis of surveys undertaken by Karataş et al. (2021) focused on the material conditions for studying as experienced by students in their home environment, access to appropriate ICT resources necessary for studying, and issues related to ensuring fairness in the assessment of knowledge, as well as on some other pedagogical aspects of the implementation of the study. While some of the issues are related to the effectiveness of studying, the key questions raised by ERE are from the perspective of justice. It is not surprising that journals now devote special issues to ethical perspectives on the social and economic consequences of Covid (see Studies in Philosophy and Education 2023, Volume 42, Issue 1). Research on Covid-19 in higher education in Slovenia has addressed the following issues, among others: developing pedagogical competences and exam delivery and stress (Gradišek & Polak, 2021), combining distance learning and practical training (Plevnik, 2021), anxiety in students and non-students (Podlesek & Kavčič, 2021), and students' learning self-regulation (Žerak et al., 2021).

Theoretical basis of the research

The premise of the present study was that there were changed conditions of studying in which the quality of the educational process was affected by the social circumstances of the student and other changed living conditions independent of the educational process itself. Ensuring equity is therefore a particular substantive issue highlighted in our study. The basic criterion of justice in the Slovenian school system is the principle of ensuring equal educational opportunities (cf. Kodelja, 2006). This is based on equality in the concept of human rights and is a universally valid norm of the education system. As a fundamental principle of justice in the school system, it is also valid in higher education and will therefore serve as our general criterion for judging the conditions for studying and the study process itself. Equality of conditions has two aspects within the framework of the concept of justice: firstly, equality of access (e.g., equality of conditions for enrolment in a programme, equality of access to an examination, etc., so that differences in the knowledge and skills acquired by students are the result of individual merit rather than the result of unequal conditions of access to study or to parts of the study process), and secondly, equality of starting points in terms of the material conditions that enable an individual to study.

Before addressing these questions, it is important to highlight the formal framework for interpreting research results in the context of ERE. Among the relevant published research, we have, for example, come across a study that presents the results as opportunities for improvements in teaching, which can be understood as meaning that it is "just" or "precisely" the circumstances of ERE that would allow the process to be carried out in accordance with certain desirable pedagogical principles. The authors stressed that "our exam questions enabled students to find practical implications and creative solutions to hypothetical problems (case studies) in the exam using higher taxonomical levels of knowledge" (Gradišek & Polak, 2021, p. 292). Since these principles should have been taken into account in exam preparation in any case, also before the pandemic, the result of their application can be interpreted in two ways: either (1) that they could have been taken into account during the pandemic, as in normal circumstances, but it does not follow that the circumstances of the pandemic made this possible; or (2) that they were only taken into account during the pandemic. In the second case, the conditions of the pandemic are presented as opportunities for improvements in teaching, implying that the educational process did not take these principles into account beforehand, when it should have done. In this case, the result would only reveal the weaknesses of teaching

before the crisis. However, since it is very likely that even before the pandemic, higher education teachers were preparing and delivering examinations in accordance with the principles mentioned in the quotation above, it follows that an interpretation that attributes teaching improvement to these "external circumstances" does not actually consider whether the reason for adherence to these principles was a change in the "external context" of the teaching process during the ERE period or something else. When researchers interpret the result as a "fact" without carefully considering the criteria required for interpretation, i.e., whether the result can be attributed to the specificity of the ERE context or to their own efforts as teachers despite the changed context, they arrive at a false correlation, thus giving rise to the seemingly "optimistic" (if true), yet "catastrophic" message that only the circumstances of the pandemic made it possible to put these fundamental pedagogical principles into practice.

Almost three centuries ago, the philosopher David Hume (2006 [1748]) pointed out that ethical implications cannot be directly deduced from any factual observation. A factual finding has to be placed into certain normative, professional or social frameworks, into the field of the ethical, which bring arguments and criteria of evaluation. This step only establishes the basis for interpretations of fact, the frameworks of possible arguments for conclusions. Statistically processed data on students' responses, obtained according to the principles of empirical quantitative social science research, can be understood as facts within the framework of statistics and facts about subjective opinions, and can only be properly interpreted based on professional, scientific and broader ethical premises. In the present study, the two starting points highlighted are the consideration of the broader social context of the pandemic and the fact that we are exploring and interpreting the delivery of pedagogical study programmes that were not designed as distance learning. The challenge for interpretation is to introduce relevant contexts and to consider whether or not, or how, these specific contexts contributed to the research findings.

In addition to the above, the pandemic brought a further context to consider, namely, that the attitudes of all those involved in the study processes may also have been shaped by individual values and skills regarding technology (Šimenc, 2021). Since ICT made teaching in crisis situations possible in the first place, a "positive" perception of what technology makes possible may have crept into the perception of the situation, leading to an uncritical evaluation of the actual processes. The search for the benefits of technology can neglect the fundamental starting points of study programmes, while resistance to or ignorance of ICT may have the effect of making individuals less engaged in these processes.

In our literature review, we found that an approach that overlooks this underlying context of events in the interpretations of results, and is largely enthusiastic about what technology makes possible, is very common, and that researchers point out in their conclusions, among other things, that teachers could be better trained to work with ICT (e.g., Anderson, 2021; Karataş et al., 2021; Korhonen et al., 2021; Mäkipää et al., 2021). These demonstrations turn technology, which is a means, into an end. As Šimenc (2021) points out: "New technologies in education are thus not only neutral aids for teachers, but can change the structure of the pedagogical space. They can foster the tendency for technology to replace teachers and contribute to narrowing the goals of education. Therefore, when new technologies are introduced, it would be useful to develop a reflection that recognises these tendencies and thematises them accordingly" (pp. 23–24, authors' transl.) A characteristic of the above research is a lack of such reflection. The authors draw conclusions that do not place the results in the context of the implementation of the pedagogical process in a pandemic situation in which the use of ICT was a condition of any implementation at all; ICT was not just a tool to be used when, in terms of educational objectives, it was assumed to be a more effective means of achieving these objectives than some other means. In research that assumes the views of participants without taking into account this specific pedagogical and social context, a serious question arises: To what extent can the findings be valid? To what extent are the findings relevant outside the context, i.e., in a normal social situation where study programmes can be implemented as they are designed? If we do not start from the objectives of the curriculum and consider the most appropriate means to achieve them, the necessity of using ICT in a specific context could become a thoughtless reason for changes in teaching in higher education in normal circumstances.

In the present paper, we therefore start from the assumption that the aim of the curriculum is not the use of ICT technology or any other method, form or didactic tool *per se*. When we judge these processes, the ethical and professional starting point for our understanding must therefore be the design and objectives of the study programmes, which includes the specificities of their particular content areas, the fundamental aims of the programme, and the fact that they were organisationally and pedagogically originally conceived in a face-to-face delivery mode.

Although objective data exist in the form of formally obtained assessments, we also wanted to obtain students' views on their attainment of knowledge in the context of ERE, as these subjective assessments can be one of the data from which to draw conclusions on the attainment of the fundamental

objectives of study programmes. We assume that it is difficult to draw any conclusions about the quality of delivery from data on the use of ICT technology and the use of different methods and forms of pedagogical work *per se*. These pedagogical processes are too complex to draw any conclusions about the pedagogical quality of implementation based on data on the use or non-use of a particular didactic or technological tool. Nevertheless, it is possible to draw a tentative conclusion from such data as to whether or not there were significant or even unprecedented changes in the didactic implementation of the pedagogical process in the context of ERE. Individual student responses concerning the conditions for studying (e.g., accommodation during the study period, possibilities to use various ICT resources, access to literature) can be understood as student assessments of factual conditions influenced by various factors that are difficult to identify. In interpreting these assessments, in addition to taking into account the broader social context of the research, it is necessary to consider criteria regarding what ensures the quality of studying in general.

Despite the differences between ERE and distance learning, they do share certain similarities. These are the presumed strengths of the distance learning concept that gave rise to it in the first place. For example, the socioeconomic situation of certain students may be relevant to the circumstances that led to the concept of distance learning, such as the difficulty of accessibility to the place of study for the student and the more demanding financial conditions of face-to-face study; other specificities may also be very important, such as the difficulty of the student's participation in the face-to-face teaching process due to specific special needs, and so on. We assume that such characteristics of distance learning, at least for the situation of certain students, can be perceived as advantages in the context of ERE as well. Like distance learning, ERE can facilitate the conditions of study for individual students and contribute to levelling the playing field in terms of access to studies. In such circumstances, both distance learning and ERE may be perceived by students as an important aspect of their studies, or as more important than other aspects. At the same time, of course, the student's situation may also be determined by the inequality of certain material conditions, potentially making it difficult, if not impossible, for the student to participate in ERE.

Each form of study therefore raises ethical issues related to the quality of studies and the fundamental right to equal educational opportunities. The starting criterion for assessing the results is the objectives of the study programmes and the possibilities for students to achieve these objectives in the specific circumstances. Even assuming the same specific circumstances of the pandemic, from the student's perspective, not all study programmes are in the

same situation, as the assumptions for their qualitative implementation are different. In our case, this means that the specificities of pedagogical study programmes have to be taken into account, such as the importance of face-to-face interactions in teacher training programmes, the necessity of practical training for teaching, and reflecting on one's own teaching practice.

The research problem

The research problem is to find out what changes occurred in the delivery of the teaching process from the students' perspective during the ERE and to determine the extent to which ERE provided equal opportunities for students. The research is based on two premises: that we are studying pedagogical study programmes that were not designed as distance learning and were delivered as ERE; and that the qualitative achievement of the objectives of the pedagogical programmes presupposes interactions of the participants in a face-to-face pedagogical process in conjunction with the student's independent study. The ethical issues of justice or the provision of equal educational opportunities are particularly highlighted in ERE due to the changed conditions of studying.

On the one hand, the objectives of the pedagogical study programmes derive from the general competences of these programmes, the provision of which has an important impact on the quality of the studies. These general competences are, for example, sensitivity/openness to people and social situations, mastery of communication and other social skills, diversity and the needs of the individual, understanding individual values and value systems, mastering professional-ethical issues, etc. On the other hand, in addition to the general competences, each pedagogical study programme also contains specific competences, the achievement of which is not only about acquiring knowledge at the cognitive level, but also about learning interpersonal interactions, values and attitudes, as well as social and pedagogical skills.

This means that, as in all non-teaching study programmes, the academic community is important. In teaching programmes, however, there are the additional crucial dimensions of learning social relationships and teaching in face-to-face interactions, learning how to manage the teaching process, and putting the values of the teaching process into practice in the teaching process. This includes the various dimensions of face-to-face study, which allows for live interaction between the learner and the instructor and enables learners to benefit from a greater level of direct interaction with their fellow students. In addition, face-to-face study ensures a better understanding and recollection of lesson content and gives class members a chance to bond with one another. It

allows eye contact, gestures and other forms of non-verbal communication, as well as the use of speech and actions in face-to-face interactions to achieve a variety of goals that influence the individual's thinking and feeling and elicit direct responses from those involved in the action itself.

Research aims

The aim of the study is to investigate the implementation of the study process in pedagogical study programmes in the form of ERE during the pandemic period in one of the pedagogical faculties in Slovenia in the areas of 1) the material conditions for studying, 2) the pedagogical process in ERE, 3) the ethics of the rules of implementation and assessment of knowledge, and 4) the academic community.

Method

In order to obtain answers to the research aims using quantitative research methodology, we designed a questionnaire that was offered to students at the Faculty of Education, University of Ljubljana, in an electronic format in March–April 2021.

Sample

The sample included 656 students of the Faculty of Education, University of Ljubljana, aged between 19 and 49 years (M = 22.4, SD = 4.7). The respondents included 467 female students and 31 male students; the remaining students in the sample did not respond to the question about gender. The average grade of the participating students in the previous academic year (2019/20) was 8.48 (SD = 0.66). The sample included 500 undergraduate students, 68 master's students, and 2 students undertaking an additional year; the remaining students did not respond to the question about level of study. At the undergraduate level, there were 268 students in the first year, 77 in the second year, 82 in the third year and 55 in the fourth year. At the master's level, there were 58 students in the first year and 10 in the second year. In terms of study programmes, there were 98 primary teacher students, 86 preschool education students, 75 special and rehabilitation pedagogy students, 26 speech and language therapy students, 84 social pedagogy students, 98 two-subject teacher students, 14 art pedagogy students, 6 cognitive science students, and 11 students who answered "other"; the remaining students did not provide answers to this question.

The study programme of art education is unique in comparison with other programmes because a large part of the programme is related to studio work at the faculty premises, so the data presented below on individual questions regarding this programme are not entirely comparable with the data related to other study programmes. As only six students of cognitive science and two students of the additional year completed the questionnaire, we present these data but do not include them in the interpretations.

Instrument

Including the open-ended questions, the questionnaire consisted of a total of 35 questions, as well as some questions on demographic data. Here we present the results of 18 questions, grouped into four sections: 1) the material conditions for studying, 2) the pedagogical process in ERE, 3) the ethics of the rules of performance and assessment, and 4) the academic community. In the questions presented, 12 used Likert scales, while 6 were multiple choice questions with 3 or 4 items.

Data analysis

Statistical calculations were performed using SPSS software. To ensure validity, the questionnaire was tested on a pilot sample of students and changes were made before actual use. To check the reliability of the results, internal consistency was measured with the Cronbach's alpha coefficient (Cohen et al., 2011). The calculations for the sections concerning the material conditions for studying and the pedagogical process in ERE yielded alpha coefficients of 0.697 and 0.680, respectively; for the sections on the ethics of the rules of performance and assessment and the academic community, the alpha coefficients were 0.770 and 0.760, respectively. This means that the internal consistency among the items was reliable. Descriptive statistics are presented either with percentages or mean and standard deviation parameters; the correlations in indexes were calculated using the non-parametric statistical Spearman's rank correlation coefficient.

Results

The material conditions for studying during the pandemic

In the first set of questions, the students were asked about their conditions for studying during the pandemic.

Table 1
Q1 *Please indicate where you were residing during the time of the pandemic.*

	f	%
1. Outside my permanent place of residence (in a student dormitory in Ljubljana, in a sublet apartment, etc.).	40	7.6
2. At home (in my permanent place of residence with my family or similar).	368	70.2
3. Due to the pandemic, I moved from my temporary place of residence (in a student dormitory in Ljubljana, in a sublet apartment, etc.) to my home (my permanent place of residence with my family or similar).	112	21.4
4. Other	4	0.8

The results show that 21.4% of the students moved from their temporary place of residence (e.g., dormitory, sublet apartment) back to their permanent place of residence due to the pandemic.

We further asked the participants how they rate the conditions for studying during the ERE compared to before the pandemic.

Table 2
Q2 *Please indicate the quality of your conditions for studying during the pandemic compared to the time before it.*

	f	%
Better	75	24.6
The same	151	49.5
Worse	79	25.9

The data show that most of the students (about half) rated the conditions for studying as the same, while the rest were split into two roughly equal groups: a quarter of the students rated the conditions during the pandemic as better and a quarter rated them as worse. The reasons that led half of the students to describe their conditions as better or worse during the pandemic remain a matter for further investigation.

As regards the claim (Q3) *fewer opportunities for student work during the period of the pandemic and less of my own income had a negative impact on the quality of my studies*, it turns out that the majority of the students (55.2%) disagree or completely disagree that the reduced opportunities for student work and the reduction in their own income negatively affected the quality of their studies. Some 35.5% agreed or completely agreed with this.

As regards the claim (Q4) *I wanted to undertake student work during the period of the pandemic, but it was not possible*, the responses were as follows: 10.9% of the students could not decide, 17.9% did not agree at all, 20.1% disagreed, 20.9% agreed and 30.2% strongly agreed. This means that more than half of the students wanted to undertake student work but were unable to do so.

Technical conditions were also crucial for studying during the ERE. We therefore asked the students how they felt these conditions were met during the ERE.

Table 3

Q5 *Please estimate the amount of time the following technical means or conditions were available to you during ERE* (the items in italics in Table 3 are later grouped into the index "technical conditions for studying").

	% Not at all	% A minority of the time	% About half the time	% The majority of the time	% All the time
1. computer		1.1	1.5	14.1	83.2
2. camera	0.2	2.7	4.8	22.3	70.0
3. microphone		2.3	3.4	21.9	72.3
4. good internet connection	0.4	5.0	17.6	58.0	19.1
5. an appropriate environment for the undisturbed following of the educational process at a distance	0.4	5.9	16.6	40.3	36.8
6. access to study literature	3.4	22.3	29.6	28.2	16.4

Some 83.2% of the students had a computer at their disposal all of the time. The rest of them had a computer available most of the time, and none stated that they did not have access to a computer at all. Over 70% had access to a camera and microphone all of the time, and a further 20% had access most of the time. Thus the basic technical conditions for ERE were ensured for the vast majority of the students. However, the situation regarding a good internet

connection is slightly different: one fifth of the students answered that they had a good internet connection all of the time, slightly less than three fifths had a good internet connection most of the time, and one fifth had a good internet connection half of the time or less. In Table 3, italics have been used to mark the statements for the index "technical conditions for studying", which will be used in further interpretations in certain correlations.

With regard to access to study literature (Statement 6 in Table 4), only exceptionally did the students not have access to study literature at all (3.4% of the students). Slightly more than a fifth of the students had access a minority of the time, 16.4 % had access about half of the time, and slightly less than 60 % had access the majority of the time. A total of 44.6% of the students, i.e., slightly less than half, had access to study literature either the majority of the time or all of the time. These results show that the students were in quite different positions regarding access to study literature. We would have expected the results to show a more positive picture given the fact that all students obtain remote access to the library on enrolment.

The students were further asked to self-assess their achieved knowledge during the period of ERE. For Q6 *Compared to studying at the faculty, the knowledge I acquired in the process of distance learning is lower quality, the same quality or higher quality*, they had to choose one of the answers provided. Some 46.6% of the students chose "the same quality", 43.1% chose "lower quality" and 10.3% chose "higher quality". The correlation between the students' self-assessment of their achieved knowledge and the index "technical conditions for studying" (Statements 1–4 in italics in Table 3) is statistically significant and positive: the better the technical conditions for studying, the better the student's assessment of their own knowledge (Spearman's rank correlation coefficient $r = 0.26$, $p < 0.001$).

The correlation for the statement "an appropriate environment for undisturbed following of the educational process at a distance" (Statement 5 in Table 3) with the students' self-assessment of their achieved knowledge also shows a positive and statistically significant relationship (Spearman's rank correlation coefficient $r = 0.22$, $p < 0.001$).

Based on both results, we can conclude that the success of students in their studies depends on the appropriate technical conditions and environment.

The educational process in ERE: Students' presentations of their work

We were interested in how students rated presentations of their products, reports, etc. during the ERE and whether they experienced any stress in doing so.

Table 4

Q7 *Please evaluate your agreement with the following statements about presenting your own products (seminars, projects, videos, etc.) in ERE to presentations at the faculty.* (1 – I completely disagree, 4 – I completely agree. The items in italics in Table 4 are later grouped into the index "stress" in ERE)

	M	*SD*
1. When preparing a presentation at a distance, I focused even more on activities that would encourage listeners to participate.	3.17	0.72
2. Presenting your own products at a distance (seminars, projects, etc.) is more stressful due to the unpredictability (or actual occurrence) of technical problems.	3.05	0.93
3. Presenting your own products at a distance (seminars, projects, etc.) is less stressful because there are fewer opportunities for interaction.	2.79	0.96
4. When presenting at a distance, it bothered me that I did not see the listeners and their responses.	2.71	1.05
5. Presenting your own products at a distance (seminars, projects, etc.) is less stressful because you do not have to pay attention to body language.	2.70	0.95
6. When presenting my own products at a distance, I missed interaction and discussions with the other students and the education professionals.	2.59	1.01
7. Presenting my own products at the faculty suits me more than presenting them at a distance.	2.51	1.03
8. Presenting your own products at a distance (seminars, projects, etc.) is more stressful because you do not know what others are doing with your image/picture (whether they are watching you, recording you, etc.).	2.32	1.04
9. I spent less time preparing a presentation at a distance than I would spend preparing a presentation at the faculty.	2.27	0.96
10. Presenting your own products at a distance (seminars, projects, etc.) is more stressful because there is no eye contact.	2.23	0.92
11. For the preparation of products, the education professionals expected us to have knowledge in the field of ICT for which we had not been trained.	1.91	0.80
12. When presenting products, the education professionals also included ICT skills in the assessment, which are not part of the course content.	1.83	0.79

On average, the students agree that when preparing a presentation at a distance, they focused even more on activities that would encourage the listeners to participate (M = 3.17, SD = 0.72), that they were bothered by not seeing the listeners and their responses (M = 2.71, SD = 1.05), and that they missed interaction and discussions with other students and education professionals (M = 2.59, SD = 1.01). The students also reported that they prefer to present their own products at the faculty (M = 2.51, SD = 1.03).

On average, the students disagree that for the preparation of products, their teachers expected them to have knowledge in the field of ICT for which they had not been trained (M = 1.91, SD = 0.79), nor do they agree that teachers

included ICT skills that are not part of the course content in the evaluation of products (M = 1.83, SD = 0.79). The latter may mean that the students are well trained in ICT, or at least that the teachers did not have high expectations in this respect.

Table 5
"Stress" index by years

	Stress Index	
	M	***SD***
1st cycle,1st year	2.36	0.68
1st cycle, 2nd year	2.33	0.69
1st cycle, 3rd year	2.47	0.71
1st cycle, 4th year	2.59	0.68
2nd cycle, 1st year	2.37	0.66
2nd cycle, 2nd year	3.07	0.51

In first-cycle study programmes, third- and fourth-year students reported that they were more stressed during ERE than first- and second-year students, while the stress index of students in the first year of the second cycle are approximately at the same level as those of first- and second-year students. This result could be explained by the fact that students of the third and fourth years of the first cycle have more practical training, which was the most difficult aspect of the programme to execute in distance education, required the most adjustment and was reduced in most cases. First-year students in the second cycle (M = 2.37) have less practical training than third- and fourth-year students in the first cycle. The results for the second year of the second cycle (M = 3.07) can be explained by the fact that there were fewer students in the sample, as well as by the differences between the three two-year master's programmes (cognitive science, preschool education and art therapy) compared to the one-year master's programmes.

The average "stress" index is M = 2.42, SD = 0.69, which means that the students estimated that they had experienced some level of stress while studying at a distance.

Correlations between the "technical conditions for studying" index, the "stress" index and the students' self-assessment of the quality of their achieved knowledge are not statistically significant.

The educational process in ERE: Teachers' execution of teaching

The implementation of the ERE required a lot of adaptation by teachers and staff. The following questions for students were designed to find out how students rated the implementation of the ERE. These topics concern their right to have access to teaching and their right to equal conditions of information (access to information).

First of all, we were interested in how well the students had been informed about the implementation of the distance teaching process in ERE. In response to Q8 *Please evaluate how well you were informed about remote access to the educational process at a distance*, the students' ratings were: very well 44.4%, well 47.9%, badly 5.9% and very badly 1.8%. The students therefore judge that they were very well or well informed (approx. 90%) about access to distance education, which applies to all study programmes.

We wanted to know the extent to which the students estimated that teachers had implemented the contact hours of the courses. In response to Q9 *Please estimate how many education professionals implemented all of the contact hours of the courses that were on the timetable via ZOOM, TEAMS, etc.*, the following answers were given: all 64.5%, the majority 33.5%, approximately half 0.9%, the minority 0.9% and none 0.2%. In all of the study programmes, the most common answer is that all of the education professionals executed all of the contact hours that were in the timetable. The second most common response is "the majority", with about a third of the students giving this estimation. We can conclude that contact hours of the courses were carried out in their entirety in all of the study programmes in most courses.

Teachers had a variety of options for delivering the ERE. Students were asked to rate the extent to which teachers used certain forms and methods of work. The results are shown in Table 6.

Table 6

Q10 *Please estimate how many education professionals used the following forms of work in the execution of the course at a distance (via ZOOM, TEAMS, etc.) – not necessarily every hour.*

		None	A minority	About half	The majority	All
The education professional lectured the content.	*f*	1	8	18	238	391
	%	0.2	1.2	2.7	36.3	59.6
The education professional shared slides on the screen.	*f*	3	18	53	326	256
	%	0.5	2.7	8.1	49.7	39.0
Work in groups (e.g., breakout rooms).	*f*	18	201	182	211	44
	%	2.7	30.6	27.7	32.2	6.7
During the lecture, the education professional constantly created a board image (white board).	*f*	205	340	58	46	7
	%	31.3	51.8	8.8	7.0	1.1
The education professional also offered students the possibility of writing on a white board while the course was being executed.	*f*	327	269	33	21	6
	%	49.8	41.0	5.0	3.2	0.9
The education professional also included videos, films, etc. in the distance execution.	*f*	14	202	215	196	29
	%	2.1	30.8	32.8	29.9	4.4
The education professional used surveys (polls application within ZOOM, TEAMS, etc.).	*f*	196	311	91	49	9
	%	29.9	47.4	13.9	7.5	1.4
The education professional used software applications, e.g., for drawing, 3D representations, geometry, etc.	*f*	451	171	24	7	3
	%	68.8	26.1	3.7	1.1	0.5
The education professional recorded and published recordings of lectures/exercises in an online classroom.	*f*	281	318	43	12	2
	%	42.8	48.5	6.6	1.8	0.3

The majority of the students (59.6%) report that all of the education professionals presented the content in lectures, while 36.3% report that the majority of the education professionals lectured (95.9% of the students in total). Similarly, 88.7% of the students report that all or most of the education professionals shared slides.

In two forms of work – working in groups and including videos – only a small percentage of the answers are at the extremes (none or all), while the responses falling into in each of the other three options (a minority, about half, the majority) are divided into approximately 30%.

A different pattern of answers is shown in the following items: 1) constantly creating a board image, 2) use of surveys, 3) software applications, and 4) recording and publishing recordings of lectures. In these items, 80–90% of

the students report that the education professionals did not use these forms, or that they used them to a lesser extent.

In the use of forms of work, we can nonetheless also point out items that, according to the students, were used by about half, the majority and all the education professionals, and which represent about a fifth of all of the answers. Such forms are the constant creation of a board image (16.9% of the students) and the use of surveys (22.8%).

The results show that, according to the students, most of the education professionals used "frontal work" in which they shared slides. At the same time, it can be observed that the education professionals used slightly more group work (breakout rooms) and surveys (polls), which, in our opinion, we tend to use less in lectures in lecture rooms. In these aspects, it is likely that the execution of ERE provided additional opportunities. We should point out that the education professionals started distance education in the spring of the 2019/20 academic year and were able to upgrade their execution of the educational process in the 2020/21 academic year. Differences in the use of specific forms and methods of teaching (those used to a lesser degree) are most likely also related to the content of courses in the various study programmes: some courses offer more opportunities to include a variety of forms of execution of the educational process, or even require such forms, while others demand fewer forms.

The students were further asked how they rate teachers' ERE and indicated their agreement with each statement on a five-point scale. The results are shown in Table 7.

Table 7

Q11 *Please evaluate your agreement with the statements below regarding teaching.* (The items in italics in Table 7 are later grouped in the index "students' evaluation of the quality of the implementation of teaching methods")

	% I can't decide	% Strongly disagree	% Disagree	% Agree	% Strongly agree
1. The work methods of the education professionals in ERE differed from the work methods at the faculty.	21.2	3.0	22.5	40.6	12.7
2. The education professionals adapted their work methods well to the conditions of ERE.	5.6	3.1	7.6	51.2	32.5
3. I had the impression that the education professionals simplified the content too much when executing courses at a distance.	3.0	37.3	52.2	5.6	2.0
4. The lack of computer skills of the education professionals hindered the fluency of the educational process.	6.8	22.4	51.0	15.6	4.3
5. The technical difficulties of work at a distance hindered the fluency of the educational process.	4.8	11.1	41.1	33.9	9.1
6. During ERE, the education professionals assigned us more independent work.	11.6	2.6	21.0	36.4	28.3
7. During ERE, the education professionals assigned us more independent study of literature.	13.6	4.3	29.8	30.3	22.0

More than half of the students (53.3%) agree or completely agree that the methods of work of the education professionals during ERE differed from the methods of work at the faculty. About a quarter of the students (25.5%) disagree or completely disagree with this.

The index "students' evaluation of the quality of the implementation of teaching methods" (the statements for this index are marked in italics in Table 8) shows that most of the students agree that the methods used were appropriate.

First-year students rate the execution of teaching methods better (M = 3.10, SD = 0.51) than students of other years (M = 2.93, SD = 0.58). The difference is statistically significant, $t(602) = 3.78$, $p < 0.001$, $d = 0.3$. The perception of first-year students may be influenced by the fact that they have not yet had an opportunity to experience face-to-face study at the faculty, whereas upper-year students have.

The students were then asked about their experience of attending teaching engagements during the ERE and how their independent study during the pandemic had been. The results are shown in Table 8.

Table 8

Q12 *Please assess the extent to which the following statements about studying from home are true for you.* (The items in italics in Table 8 are later grouped into the index "the circumstances of distance education are favourable for studying".)

	% I can't decide	% Strongly disagree	% Disagree	% Agree	% Strongly agree
1. The home environment (comfort of the space) in which I can follow the educational process suits me very well.	3.7	3.7	12.6	35.9	44.2
2. The home environment in which I can follow the educational process does not encourage me to study.	4.4	26.8	36.2	22.0	10.5
3. The home environment (comfort of the space) encourages me to engage with other things not related to my studies during the execution of the educational process at a distance.	5.0	9.2	26.6	41.8	17.4
4. Due to fewer discussions with other students and education professionals about the content of the course, I estimate that my knowledge is less in-depth.	5.9	16.9	28.8	29.1	19.4
5. I used timeslots in the timetable when there was no educational process ("holes in the timetable") more efficiently for studying than I would have at the faculty.	5.0	14.7	22.8	21.9	35.6
6. During the pandemic, I was able to arrange a remote consultation with education professionals faster than if we had been at the faculty.	18.4	7.5	18.4	32.5	23.1
7. The conditions during ERE reduced my interest in studying.	5.2	31.2	27.0	23.8	12.8
8. During ERE, I missed the opportunity to study in the library.	3.3	33.1	29.4	22.2	12.0
9. In the future (at a time when this would not otherwise be necessary), I would like part of the study to be carried out at a distance, as well.	7.4	18.5	13.5	23.1	37.5
10. The conditions of distance learning in virtual classrooms (via ZOOM, TEAMS, etc.) allowed me to follow the educational process more effectively than at the faculty.	9.4	16.6	24.1	25.3	24.7
11. Re-watching the recordings of previous lectures/ exercises gave me a better understanding of the content.	12.8	13.3	15.2	26.6	32.2
12. I compensated for my absences by watching recordings of previous lectures/exercises.	11.1	29.0	26.4	20.0	13.5
13. The conditions of ERE allowed me to put less effort into my studies.	7.4	38.3	39.4	10.4	4.6
14. When studying from home, I had problems with motivation to do study tasks and learn.	3.3	18.3	24.8	25.1	28.5
15. I estimate that I studied less intensively during ERE than at the faculty.	13.1	16.9	28.1	26.6	15.3

The items in italics in Table 8 are positive, i.e., favourable for studying. These items have been combined into the index "the circumstances of distance education are favourable for studying". The average value of this index is $M = 2.73$, $SD = 0.57$. The results can be interpreted as indicating that students tend to assess the circumstances of distance education more favourably.

A total of 80.1% of the students surveyed agree or completely agree that the home environment (comfort of the space) in which they can follow the educational process suits them very well. At the same time, the majority of the students (59.2%) agree or completely agree that their home environment (comfort of the space) encourages them to engage with other things not related to their studies during the execution of distance education. Some 57.5% of the students agree or completely agree that the timeslots in the timetable when there was no pedagogical process ("holes in the timetable") were used more efficiently for studying than they would have been at the faculty. This figure undoubtedly reflects the issue of "holes" in the timetable when students are at the faculty. A total of 55.6% of the students agree or completely agree that during the pandemic they were able to arrange consultation at a distance with education professionals faster than if they had been at the faculty. Short consultations with students in various timeslots are in fact significantly more feasible at a distance, as they require less adjustment than arranging meetings at the faculty. Compared to other items in Q12, however, this is the item with the largest share of students who cannot decide (18.4%). It is possible that they either did not seek contacts with education professionals at a distance, or that they did not have meetings with them at the faculty. Although 58.2% of the students disagree or completely disagree with the statement that the conditions of ERE reduced their interest in studying, more than a third of those (36.6%) who responded reported that ERE did in fact reduce their interest in studying. It could be said that the comfort of the home study space, which suits 80.1% of students, is not reflected in interest in studying in the case of one third of the students. Only about a third the students (34.2%) agree or completely agree that they missed the possibility of studying in the library during ERE. In a certain way, this corresponds with the finding that 60.6% of the students agree or completely agree that they would like part of studying to be executed remotely in the future (at a time when this would not otherwise be necessary), as well. The majority of the students (55.4%) disagree or completely disagree that they compensated for their absences by watching recordings of lectures/exercises, which is explained by the fact that as many as 91.3% of the students reported that only a small number, or none, of the education professionals recorded and published recordings of lectures/exercises in the online classroom.

The ethics of the rules of performance and assessment

We also sought the students' views and opinions on the issues of the ethics of the rules with regard to both ERE and assessment. Firstly, Table 9 shows the students' evaluations concerning the rules, behaviour and assessment of knowledge.

Table 9

Q13 *Based on your experience with the execution of distance learning, please evaluate your agreement with the following statements concerning the ethics and rules of distance education.*

	% I cannot decide	% I completely disagree	% I disagree	% I agree	% I completely agree
1. I think it would be useful if there were a book of rules for executing the pedagogical process at a distance.	16.7	3.7	9.7	41.2	28.7
2. When executing the pedagogical process at a distance, the education professionals provided sufficiently precise rules of behaviour.	7.4	3.7	17.3	49.3	22.3
3. In distance learning, I like the fact that education professionals can address students by name.	12.8	2.9	5.2	45.0	34.0
4. The rules for executing the pedagogical process at a distance varied greatly between education professionals, making it difficult to adapt to different requirements.	6.2	11.7	40.0	26.6	15.5
5. When executing the pedagogical process at a distance, education professionals were a good example to us with their behaviour.	8.7	2.7	6.4	59.6	22.5
6. When assessing our knowledge at a distance, education professionals followed the rules that they had provided for implementation.	8.0	0.8	7.2	49.3	34.8
7. Education professionals were objective when assessing knowledge at a distance.	12.4	1.7	6.4	52.0	27.4
8. When assessing knowledge at a distance, education professionals took into account possible technical difficulties.	9.7	3.5	12.0	46.8	28.0
9. When assessing knowledge at a distance, education professionals were able to detect and take into account differences in students' knowledge.	27.0	4.7	12.0	41.7	14.6
10. Taking exams at a distance allowed copying or other forms of cheating.	13.2	20.2	32.6	26.4	7.6

	% I cannot decide	% I completely disagree	% I disagree	% I agree	% I completely agree
11. Due to the conditions in conducting exams at a distance, which allowed copying or other forms of cheating, it was rational for students to make use of these possibilities.	17.9	22.5	32.2	21.6	5.8
12. I took exams at a distance where it was not possible to copy/cheat at all.	6.4	2.7	12.0	32.6	46.2
13. I had the impression that the education professionals used stricter criteria for assessing knowledge when conducting exams at a distance.	18.8	5.6	28.0	25.2	22.3
14 I studied less for exams at a distance because I anticipated that it would be possible to copy/cheat during the exam.	4.1	55.9	32.8	6.0	1.2
15. During certain exams, I was under stress due to the demanding technical conditions of implementation that were set in order to prevent copying/cheating during the exam.	4.3	9.7	17.5	27.4	41.2
16. The extensive control measures to prevent copying/cheating in exams were humiliating for me.	10.3	19.2	35.1	21.6	13.8
17. My principle is not to copy/cheat in exams, so I passed all of the exams at a distance honestly.	6.8	1.2	13.6	32.2	46.2
18. I estimate that I did as well in the exams at a distance as I would have if the exams had been held at the faculty.	12.8	3.9	15.0	37.1	31.3

About 70% of the students surveyed agree or completely agree that it would be useful if there were a book of rules for the execution of distance education, despite the fact that approximately the same percentage say that the education professionals provided sufficiently precise rules of conduct in the execution of distance education. Almost 80% of the students agree or completely agree with the statement that they liked the fact that the education professionals could address them by name during distance education. This is certainly a specific feature of the environment of working at a distance, as the individual enters the online environment with his/her name displayed next to his/her image.

Some 51.7% of the students disagree or completely disagree with the statement that the rules for the execution of distance education differed greatly between the education professionals, making it difficult to adapt to different requirements. This result is interesting given the fact that most of the students agreed that it would be useful if there were rules for the execution of distance education.

Between 80 and 85% of the students agree or completely agree with the statement that the education professionals were good role models in their

execution of distance education, and that they followed the rules they had provided for conducting assessment of knowledge at a distance.

It is interesting to note that 14.8% of the students disagree or completely disagree with the statement "My principle is not to copy/cheat in exams, so I passed all of the exams at a distance honestly", while 6.8% of students cannot decide regarding this statement.

With regard to the performance in examinations during the ERE, we were first interested in how the students rate their performance in distance examinations compared to their performance in pre-pandemic examinations. To question Q14 *Please indicate what kind of grades you received on average in exams conducted at a distance* (compared to exams not conducted at a distance), they answered: on average higher 13.0%, on average the same 70.1%, on average lower 16.9%.

Next, we wanted to find out in more detail the extent to which the students agree with each of the statements about taking exams during the ERE. The results are shown in Table 10.

Table 10

Q15 *Based on your experience with the execution of distance learning, please evaluate your agreement with the following statements concerning the assessment of knowledge.*

	% I cannot decide	% I completely disagree	% I disagree	% I agree	% I completely agree
1. In exams at a distance, essay-type questions were technically demanding because I had to photograph/scan the product and send it to the education professional on time.	14.4	14.4	27.0	25.3	18.9
2. In exams at a distance, multichoice questions required the demonstration of complex knowledge.	17.9	3.1	15.6	43.0	20.4
3. In exams at a distance, I had the impression that the education professionals had given a lot of thought to the organisation of the exam.	8.6	2.3	10.9	50.0	28.2
4. In exams at a distance, the education professionals clearly presented the criteria for assessing knowledge.	9.3	5.6	15.4	44.4	25.3
5. I had a lot of technical problems when taking exams at a distance.	4.1	23.7	54.3	14.6	3.3

Some 21% of the students disagree or completely disagree that the education professionals did not present the criteria for assessing knowledge clearly,

while 17.9% had a lot of technical problems when taking exams at a distance.

A total of 44.2% of the students reported that essay-type questions in the exam were technically demanding because they had to photograph/scan the product and send it to the education professional on time.

The correlation between the results of the statement "I had a lot of technical problems when taking exams at a distance" and the students' answers regarding the average grade achieved in distance exams (Q14) compared to non-distance exams is negative and statistically significant (r = -0.14, p = 0.02). Since the majority of the students (78%) did not have technical problems, this was not reflected in lower average grades.

The academic community

A university is an academic community that works in a cohesive way. As this was absent during the ERE, we were interested in the students' views on the circumstances of the pandemic in terms of the disrupted (or, for first-year students, difficult to establish) academic connectedness. The results are shown in Table 11.

Table 11

Q16 *Based on your experience of distance learning, please evaluate your agreement with the following statements.* (the statements are listed according to the students' degree of agreement, from 4 – I completely agree to 1 – I completely disagree)

	M	*SD*
1. During ERE, I missed informal socialising with students.	3.48	0.83
2. The teaching profession requires the development of knowledge and skills in direct interactions with others, which I missed during ERE.	3.19	0.86
3. During ERE, I missed live study-related cooperation with other students (talks, joint preparation of projects, seminars, etc.).	3.09	0.96
4. During ERE, I missed the kind of interactions with education professionals that can occur in direct contact while studying at the faculty.	2.85	0.94
5. During ERE, I had more contact with education professionals via the internet than I would have had at the faculty.	2.42	0.91
6. Because we can communicate and collaborate with other students through social networks, I did not miss contacts with students at the faculty during the pandemic.	2.09	1.00

The students agree or completely agree (M = 3.48, SD = 0.83) that they missed informal socialising with other students during ERE, and that the

teaching profession requires the development of knowledge and skills in direct interactions with others, which they missed during ERE (M = 3.19, SD = 0.86). Similarly, but with slightly lower values, they agree or completely agree that during ERE they missed live study-related cooperation with other students (talks, joint preparation of projects, seminars, etc.) (M = 3.09, SD = 0.96) and interactions with education professionals that can occur in direct contact while studying at the faculty (M = 2.85, SD = 0.94).

The results show that most of the students miss the academic community, despite the fact that about half of them state that they would like to have part of their studies via distance education in the future, as well.

In responding to the statement (Q17) *Compared to the cooperative relationship between students at the faculty, the cooperative relationship between students during the period of distance learning was (worse/unchanged/better)*, 34.8% of the students said they were worse, 43.6% said they were unchanged and 21.6% said they were better.

Unlike Q17, Q18 asked students to compare the relationships between teachers and students before and during ERE. Q18: *Compared to the cooperative relationship between students and education professionals at the faculty, the cooperative relationship between students and education professionals during the period of distance learning was (worse/unchanged/better*). Some 23.3% of the students state that the relationship during ERE was worse than before, while 51.0% believe it was unchanged and 25.7% claim it was better.

A slightly different picture is revealed by the data on the cooperative relationship between education professionals and students in comparison to the data on the cooperative relationship between students. Compared to Q17, in Q18 a higher percentage of the students judged that the cooperative relationship between students and education professionals was unchanged (in Q17 the percentage was 43.6%, while in Q18 it was 51.0%). The answers to Q18 indicate that the levels of perception of a better or worse relationship between students and teachers are almost the same (worse 23.3%, better 25.7%).

Discussion

In line with the analysis of the research mentioned above in the introduction, the present research confirms that one of the important aspects of educational justice for students is the provision of equal material conditions for their studies. The correlation between the material conditions for studying and the assessment of knowledge attainment shows that the success of students in their studies depends on the appropriate technical conditions and environment.

Students were in a rather unequal position regarding these conditions, which are beyond the control of the faculty. The living conditions of students during the pandemic were worse than before the pandemic for more than a quarter of the students surveyed, while just over a third of the students also agreed that the fact that they could not undertake student work had a negative impact on their studies.

The unequal study conditions for students, over which the faculty has no influence, were also represented by access to the internet during the ERE. Over one fifth of the students in the present study had good access to the internet for only half of the time or for less than half of the time during the ERE. This is not insignificant, as the index "technical conditions for studying" has been shown to be statistically significantly related to students' assessment of the knowledge acquired (the better the index for technical conditions, the better the students' self-assessment of the knowledge acquired). The association between adequate conditions for studying and students' self-assessment of the knowledge acquired is also statistically significant.

Around one fifth of the students who moved from their temporary place of residence (in a student dormitory in Ljubljana, in a sublet apartment, etc.) to their home during the ERE would later have problems both with renting space at the place of study and with partly used transport tickets in a hybrid model (partly on-campus, partly at a distance). From these results we can conclude that rapid transitions from one type of a study to another (from ERE to hybrid or entirely faculty-based education) is not recommended, as rapid changes put a large proportion of students in an unequal position, or even prevent them from following the study process.

In establishing equal starting material conditions that can be influenced by the faculty, we would highlight access to literature and rules for the implementation of the teaching process during ERE. Slightly less than half of the students surveyed stated that they had access to literature only half of the time or less than half of the time during the ERE. The reasons for this may be different. It is possible that teachers did not make extra arrangements for the materials to be available electronically, but the result may also suggest that a certain proportion of students were not adequately familiarised with the possibility of using library services remotely before the pandemic.

In order to ensure the quality of the teaching process, it would be useful to introduce a policy for the implementation of the teaching process during an ERE period at the faculty level. Around 70% of the students surveyed agree that it would be useful to have a book of rules for the implementation of ERE. Given the abruptness of the transition to ERE, the initial solution of leaving the

implementation to the autonomy of the teachers was justified. In the second year of the pandemic, however, it would probably have been possible to establish some uniform rules or to recommend that teachers establish minimum general rules that would set expectations and ensure consistency of action and equality of conditions for the students.

In general, the results of the ERE teaching programmes showed that the study process was continued during the pandemic and that students were adequately informed about the distance learning process. The results shown in Tables 7 and 8 generally confirm that the delivery of the pedagogical process was based on the concept of face-to-face delivery and was partly adapted to different conditions on this basis.

The students surveyed expressed the opinion that teachers used appropriate methods and forms of work. This would be expected from higher education professionals teaching prospective teachers. It can be assumed that "appropriateness" has an additional assumption. i.e., appropriate "under the given conditions". One limitation of the present research is that the data on students' satisfaction with the delivery of the process and the use of pedagogical approaches do not provide sufficiently complex insights to draw specific conclusions about quality or to argue that any of the possible approaches should be used either more or less. The use of a particular pedagogical approach depends on the content and other circumstances, individual courses and programmes are not in equal positions, and the delivery of material – including lectures – may be more or less intellectually demanding. For example, the conclusion reached by the authors of one study, "that the online lectures contributed the most to the students' competence development but were not perceived as very demanding" (Gradišek & Polak, 2021), suggests that the lectures were delivered in such a way that students perceived them as not demanding. It does not follow, however, that students generally find lectures undemanding due to the fact that they are supposed to be "passive" in their use of the lecture format, as the authors might be understood to suggest.

The results of the present survey show that the propaganda slogans used to advertise distance learning ("Earn a college degree in your pyjamas!", etc.), when viewed purely from the point of view of "selling" the programme to the student, do not unreasonably target the pleasure principle as a human characteristic, which also played an important role in the case of ERE. The results show that the desire for pleasure has a role in judging the quality and fairness of delivery. This was also reflected, for example, in the results concerning the remote administration of examinations. In the aforementioned study (Gradišek & Polak, 2021), the students surveyed mostly agreed with statements describing

situations that do not require extra effort on their part: comfortable clothes, wasting time driving to the college, repeating the exam content until the very beginning of the exam, no other people present in the room I have chosen. The least positive assessment (most students rated the impact as neutral) pertained to remote exams and the teacher's supervision during the exam via camera and microphone. From these results, it might be hastily concluded that students are comfortable with remote exams, but the present research reveals certain factors that caused students stress when taking exams remotely, i.e., the difficulties associated with accessing the internet, technical equipment, exam delivery and typing skills. It is possible that students are comfortable with the comforts of home and deciding on certain exam conditions, but not with all aspects of remote exams.

The comfort of the home study space suits 80.1% of the students surveyed, but the majority (59.2%) also agree or completely agree that their home environment (comfort of the space) encourages them to engage with other things not related to their studies during the execution of ERE, and more than a third of those who responded (36.6%) reported that ERE reduced their interest in studying. The comfort of the home study space is not reflected in interest in studying in the case of one third of the students. The majority of the students (55.4%) disagree or completely disagree that they compensated for their absences by watching recordings of lectures/exercises, which is explained by the fact that as many as 91.3% of the students reported that only a small number, or none, of the education professionals recorded and published recordings of lectures/exercises in the online classroom. However, 60.6% of the students agree or completely agree that they would like part of studying to be executed remotely in the future (at a time when this would not otherwise be necessary), as well.

The formation of an academic community is impeded in ERE and students missed informal socialising with other students. Moreover, the teaching profession requires the development of knowledge and skills in direct interactions with others, which students also missed during ERE. Similarly, but with slightly lower values, the students surveyed agree or completely agree that during ERE they missed live study-related cooperation with other students (talks, joint preparation of projects, seminars, etc.) and interactions with education professionals that can occur in direct contact while studying at the faculty.

Regarding access to literature, just under half of the students surveyed stated that they had access to literature half or less than half of the time during the ERE. This may indicate that a certain proportion of students neglected the possibility of using electronic resources or did not pay as much attention

to it before the ERE because the teaching process accustomed them to using non-electronic resources. The results in this regard would probably have been better if teachers had accustomed students more to using the electronic services offered by the library even under normal conditions. The faculty could take a step forward in this direction.

The pandemic period highlighted the difficulties encountered by students while studying under ERE conditions, as well as the wider problems of modern university study. One study (Žerak et al., 2021) found that "the most constructive of the learning strategies was found to be the goal-setting strategy. This finding points to the suggestion that higher education teachers and colleagues could further encourage students to set goals in distance learning by assigning more ongoing, shorter and appropriately challenging assignments or study activities" (p. 246). This finding can be understood in several ways. The first way of understanding the need for more online, shorter and appropriately challenging assignments or study activities is that, compared to the usual face-to-face delivery, studying from home is more demanding for students because they are left more to their own devices, discipline and organisation. It follows that during ERE, higher education teachers should adapt quickly and introduce a greater degree of supervision and step-by-step guidance into the study process. Another possible reason for a strategy of a higher degree of ongoing guidance (especially for students enrolled in the first year during the pandemic period) could be the high enrolment in university degree programmes and the consequent enrolment of students who are less qualified to study, which results in a need for more ongoing support and guidance. The first reason – that ERE requires students to have a greater degree of autonomy than undertaking their studies at university – may be compounded by a third reason, namely, that even potentially successful students are less prepared for autonomous study and learning by pre-university education. The ERE period revealed an issue for the post-pandemic era: since university studies are in any case characterised by greater student autonomy in the study process compared to secondary schools, this would imply that university studies should approach student management in ways that are typical of secondary schools. But how encouraging would this change in university study be for those students who expect and rightly want a greater degree of autonomy?

Conclusion

The present research has revealed certain opportunities for online teaching that were not available before ERE, or that are primarily made possible by ERE. Among them are the possibility of remote consultations (the students in our study stated that it was easier to contact teachers to resolve certain issues and that this could be done more frequently; this individual form of work could be further developed in individual cases); addressing students by their first names, which is enabled by the software environment (this was highlighted by students as an important and desirable factor, but it is much more difficult, if not impossible, in face-to-face lectures with a large number of students); and the usefulness of filling in time between "gaps in the timetable" (although this is really up to each individual student). It can be assumed that in online lectures we should always think about how to exploit the possibilities offered by software tools, since various distractions make it more difficult for students to follow the lecture than in face-to-face conditions. But how can we prevent or eliminate the distractions and obstacles caused by the conditions of studying from home in the face-to-face learning process?

The apparent paradoxes in the results of the present research (e.g., most of the students miss the academic community, but about half of them state that they would like to have part of their studies via distance education in the future, as well, etc.) can be explained by a clash of incompatible values. In the ERE era, there was a fundamental ethical conflict between the criteria of quality assurance and justice in the delivery of study programmes, on the one hand, and the desire for pleasure, on the other. Although students want to be comfortable in their studies, they also want to have direct social contact with other students, but it is not possible to have both at the same time. In this perspective, which is clearly present, the advantage of ERE is precisely the provision of comfort. But is this benefit really a benefit? From the point of view of a public higher education institution (HEI), the primary value must be the quality of the education it provides. Therefore, if an HEI had to choose between the students' (or teachers') desire for comfort, on the one hand, and the provision of an academic community and quality, on the other, the professional decision would be to facilitate the latter and face-to-face delivery, even at the cost of giving up the comforts of the home environment.

While the implementation of the teaching process in a faculty cannot erase all of the social differences that determine the lives of students (whether they support them or not), studying in faculty premises can take place on equal terms for all students. Irrespective of social differences, it can ensure equity

in the face-to-face study process, while also making face-to-face teaching between teachers and students of paramount importance for pedagogical study programmes.

For higher education teachers, a pressing and real question now, and a possible research question for future research, is what knowledge was attained by students in the pandemic period. However, based on the values of our professional ethical judgement and the results of the present study, we conclude that higher education teachers should be aware that providing comfort to some students who have the appropriate conditions for studying, or simply preferring to teach from the comfort of home, are not adequate reasons to maintain online delivery of courses compared to the criteria of justice and quality in education.

Disclosure statement

The authors have no conflict of interest to declare.

References

Anderson, L. W. (2021). Schooling interrupted: Educating children and youth in the Covid-19 era. *Center for Educational Policy Studies Journal, 11*(Special Issue), 17–38. https://doi.org/10.26529/cepsj.1128

Cohen, L., Manion, l., & Morrison, K. (2011). *Research methods in education* (7th ed). Routledge.

Gradišek, P., & Polak, A. (2021). Insights into learning and examination experience of higher education students during the Covid-19 pandemic. *Sodobna pedagogika*, *72*(138), 286–307.

Harting, K., & Erthal, M. (2005). History of distance learning. *Information Technology. Learning and Performance Journal*, *23*, 35–44.

Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, A. (2023, February 12). *The difference between emergency remote teaching and online learning*. Educause Review. https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning

Hodnik, T., & Krek, J. (2023). Emergency remote teaching during the Covid-19 pandemic: Ethical dilemmas and research results from the perspective of the foundations of teacher education study programmes. In G. Stoković, J. Lukić, & J. Stanivuković (Eds.), *International scientific conference Education During the Covid-19 Pandemic: Experience and Lessons Learned: Book of abstracts* (pp. 108–109). University of Belgrade Teacher Education Faculty, Beograd.

Hodnik, T., Krek, J., Podlogar, N., & Vogrinc, J. (2021). Quality and ethical dilemmas in the education of future teachers under the conditions of distance education. In *Challenges of distance teaching in teacher education and education: [Abstracts] and programme* (p. 2). University of Ljubljana, Faculty of Education.

Hume, D. (2006 [1748]). *An enquiry concerning human understanding: A critical edition*. Clarendon

Press.

Karataş, F. Ö, Akaygün, S., Çelik, S., Kokoç, M., & Nur Yılmaz, S. (2021). Challenge accepted: Experiences of Turkish faculty members at the time of emergency remote teaching. *Center for Educational Policy Studies Journal, 11*(Special Issue), 141–163. https://doi.org/10.26529/cepsj.11.Sp.Issue

Kodelja, Z. (2006). *O pravičnosti v izobraževanju* [*On justice in education*]. Krtina.

Korhonen, T., Juurola, L., Salo, L., & Airaksinen (2021). Digitisation or digitalisation: Diverse practices of the distance education period in Finland. *Center for Educational Policy Studies Journal, 11*(Special Issue), 165–193. https://doi.org/10.26529/cepsj.1125

Krek, J., Hodnik, T., Podlogar, N., & Vogrinc, J. (2021). Education of future teachers under the conditions of distance education. In A. Beka (Ed.), *Kosovo International Conference on Educational Research KICER: Book of abstracts* (p. 51). University of Pristhina, Faculty of Education.

Loveless, B. (2023, February 12). *Distance learning: The ultimate guide to online learning.* Education Corner. https://www.educationcorner.com/distance-learning/distance-online-learning-guide.html

Mäkipää, T., Hahl, K., & Luodonpää-Manni, M. (2021). Teachers' perceptions of assessment and feedback practices in Finland's foreign language classes during the Covid-19 Pandemic. *Center for Educational Policy Studies Journal, 11*(Special Issue), 219–240. https://doi.org/10.26529/cepsj.1108

Plevnik, M. (2021). The challenges of conducting practical exercises in the scope of an adapted educational process in higher education institutions during the Covid-19 epidemic. *Sodobna Pedagogika*, *72*(138), 308–320.

Podlesek, A., Kavčič, V. (2021). Generalised anxiety in Slovenian university students during the Covid-19 pandemic. *Sodobna pedagogika*, *72*(138), 322–341.

Šimenc, M. (2021). Vloga tehnologije v vzgoji in izobraževanju ter enake možnosti učencev v obdobju pandemije [The role of technology in education and equal opportunities for students in the Covid-19 crisis]. *Sodobna pedagogika, 72*(138), 12–26.

Unver, E., & Sungur, A. (2022) Distance learning under the Covid-19 conditions within architectural education. *Center for Educational Policy Studies Journal, 12*(3), 191–219.

Žerak, U., Podlogar, N., Lišić, A., Lavrih, L., Fricelj, N., & Juriševič, M. (2021). Značilnosti učne samoregulacije študentov pri študiju na daljavo med epidemijo covida-19 [Characteristics of students' learning self-regulation in distance learning during the Covid-19 epidemic]. *Sodobna pedagogika, 72*(138), 234–251.

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Arts Education for Children with Disabilities: A Systematic Literature Review

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Research, testimonies and descriptions of successful projects and initiatives have shown the benefits of well-planned inclusive arts education for students with disabilities. The group of students with disabilities is diverse. The only thing they have in common is a disability that prevents them from taking advantage of the general curriculum without specialised support. Teaching students with disabilities is a requirement for all teachers, regardless of their subject-matter expertise. The goal of this research is to provide a thorough knowledge map of the intellectual framework of the field of study of arts education for students with disabilities. Using the PRISMA method to analyse articles published between 2012 and 2022, a systematic literature review methodology was used. An overview of the study's articles, authors, top journals and research themes is given. The findings indicate the existence of three themes in the research of arts education for children with disabilities. In summary, this paper reviews key findings from the research analyses and suggests future research trajectories for the arts education area.

Keywords: arts education, PRISMA method, student with disabilities, systematic literature review

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Likovna vzgoja za otroke s posebnimi potrebami: sistematični pregled literature

Lia Mareza, Mumpuniarti, Suwarjo, Ali Mustadi in
Dinar Sari Eka Dewi

Raziskave, pričevanja in opisi uspešnih projektov in pobud so pokazali prednosti dobro načrtovane inkluzivne likovne vzgoje za učence s posebnimi potrebami. Skupina učencev s posebnimi potrebami je raznolika. Skupen jim je le status oseb s posebnimi potrebami, ki jim onemogoča, da bi brez specializirane podpore v polnosti odnesli vse koristi splošnega učnega načrta. Poučevanje učencev s posebnimi potrebami je obvezno za vse učitelje ne glede na njihovo strokovno znanje na področju predmeta. Cilj te raziskave je podati temeljit zemljevid znanja o intelektualnem okviru študijskega področja likovne vzgoje učencev s posebnimi potrebami. Za analizo člankov, objavljenih med letoma 2012 in 2022, je bila z uporabo metode PRISMA uporabljena metodologija sistematičnega pregleda literature. V študiji je podan pregled člankov, avtorjev, najpomembnejših revij in raziskovalnih tem. Ugotovitve kažejo na obstoj treh tem pri raziskovanju likovne vzgoje pri otrocih s posebnimi potrebami. V povzetku tega članka so pregledane ključne ugotovitve raziskovalnih analiz in predlagane prihodnje raziskovalne poti za področje likovne vzgoje.

Ključne besede: likovna vzgoja, metoda PRISMA, učenec s posebnimi potrebami, sistematični pregled literature

Introduction

Persons with disabilities are those who have "long-term physical, mental, intellectual or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society on an equal basis with others" (WHO, 2021). Around the world, an estimated 240 million children between the ages of 0 and 17 have disabilities. Second only to South Asia with 64.4 million disabled children, East Asia and the Pacific is home to 43.1 million (UNICEF Indonesia, 2023). In Indonesia, 3.3 percent of children (aged 5–17 years) have disabilities (Kementerian Kesehatan RI, 2018), and just under three out of ten of these children have never attended education.

The Indonesian government has devoted more serious attention to children with disabilities through inclusive education initiatives. Children with disabilities participate in mainstream educational settings at lower rates than non-disabled children, and their participation decreases at each level of education (UNICEF Indonesia, 2023). In 2019, there were 59,000 schools providing inclusive education and this figure increased to 99,000 in 2020. As for the number of students with disabilities, in 2019 there were 17,473 and in 2020 there were 17,558 (Puslapdik, 2021). The problem is that not all-inclusive schools can provide proper assistance or treatment at school. Mumpuniarti et al. (2021) identified that special schools and inclusive schools in Indonesia do not know the source of their programmes in the curriculum. The education system is very dependent on curriculum policies, but the reality on the ground is that there are many primary schools, especially inclusive schools, that do not meet the established standard due to the lack of a class guide, the student screening process, the characteristics of children with disabilities, the background of teachers' education, and even the development of teacher competencies according to inclusive school standards. The universal education policy has not been fully implemented. Many children with disabilities are still marginalised from participating and learning in class for various reasons, and there is still a great deal of discrimination, negative labelling, difficulties for instructors in planning acceptable and appropriate treatment, and ineffective teaching methods (Rasmitadila et al., 2021).

Indonesia needs more holistic education programmes for children with disabilities that combine home-based, school-based and arts education-based assistance. There is also a need for more research to ensure access to evidence-based services (Kiling et al., 2018). Creative activities could be relevant solutions to the problem of finding forms and methods of psychological-pedagogical work that encourage students to cultivate their creative thinking

and skills (Dmitriev et al., 2020). Arts education fosters creativity and possibly encourages other skills conducive to innovation, such as specialised abilities, thinking and imagination abilities, as well as conduct and interactive abilities (or character). Students enrolled in arts education courses display a more ambitious attitude to academic work as well as higher levels of commitment and motivation. Students who study the visual arts are stronger in geometrical reasoning than students who do not study the visual arts (Winner et al., 2013). Education in the arts promotes habits of mind and ways of thinking that enhance the student experience of school and the outcomes of schooling (Elpus, 2022). Art offers a uniquely profound tool for children and adolescents, one that is easily adaptable to different developmental stages. Choice of materials, ways of facilitating the process of art making, and utilising art products to augment the therapeutic experience also stand out (Metzl, 2022). Art is essential in developing children with disabilities, as every type of art provides opportunities for them to express themselves and develop creative skills. For example, through visual arts, children can explore their self-expression visually, while performing arts such as dance and music can improve their motor skills and interpersonal communication. By involving children with disabilities in various types of art, teachers support their creative development and help to improve their emotional and social well-being. Apart from serving as learning material, art is also important as a therapeutic medium for children with disabilities. Art can assist the bereaved due to its ability to promote exploration and expression of the feelings that occur in the grieving process. The use of art in therapy for children with disabilities therefore also depends on the goals (Green et al., 2021). Art can facilitate both positive and negative emotions, and the act of creating art can bring pleasure to the creator (Wadeson, H., 2010). Schwartz and Pace (2008) explain that making art with students with disabilities impacts the ability of these students to experience self-esteem and pride when their art is professionally framed and installed at the exhibition. For students with disabilities, art provides a means to contribute their ideas in positive and powerful ways. Fine art is one type of arts education that can provide or express images and feelings so that arts education can be a means to develop flexibility, self-esteem and visual communication. It can also express students' feelings and emotions in inclusive education programmes (Kencana et al., 2020).

In view of the above, a comprehensive strategy and learning model for arts education with adequate treatment and assistance is needed, taking into account the abilities associated with different student characteristics in terms of talent, interests and abilities. The treatment of arts education programmes for students with disabilities must be adjusted so as not to cause negative emotions

(stress, angry, sadness) or unachieved educational goals due to poor execution. Arts education underlines teaching and learning about art disciplines and processes. Children can learn the different languages, concepts and symbols through which artistic ideas are expressed. They can also develop their own interpretive skills, expertise and understandings, as well as the capacity to appreciate different representations of others (Ewing, 2010).

Research Problem

Based on the background outlined above, the research problem can be formulated as:

a) How is the existing literature review related to the strategies, models and methods used in practical arts education settings for children with disabilities?
b) What is the effectiveness of inclusive schools that use arts education as the primary approach, and what pathways are effective in implementing individual education programmes and classroom activities?
c) What are the research trends in 2012–2022 regarding arts education for students with disabilities?

Method

This research was conducted using the Systematic Literature Review (SLR) method, *which* is a process that aims to identify, review, evaluate and interpret all existing research. In the present study, the researchers identified articles in a structured manner following certain steps. First, Research Questions (RQs) were established. An RQ is devised according to the needs of the chosen topic. The RQs in this study are: (RQ1) How is the existing literature review related to the strategies, models and methods used in practical arts education settings for children with disabilities?; (RQ2) What is the effectiveness of inclusive schools that use arts education as the primary approach, and what pathways are effective in implementing arts education programmes and classroom activities?; and (RQ3) What are the research trends in 2012–2022 regarding arts education for students with disabilities? Second, the search process was determined. The search process is used to obtain relevant data to answer the research questions. In the present research, the process uses databases with the keywords arts education, art therapy, elementary school or primary school, and children with disabilities. Third, inclusion and exclusion criteria were defined. Inclusion and exclusion criteria are used to determine whether the data

obtained can be used in the SLR research. Fourth, Quality Assessment (QA) was undertaken. The data obtained were evaluated according to the following assessment QA criteria:

- (QA1) What kinds of arts education models, such as inclusive models, specialised programmes and community-based programmes, have been used with children with disabilities?
- (QA2) What specific strategies have been used to adapt arts education activities for children with different types of disabilities?
- (QA3) What kinds of improvements in cognitive, motor or social-emotional development are the outcomes of arts education programmes for children with disabilities?
- (QA4) What are the difficulties and constraints of various ways of dealing with arts education for children with disabilities, and how have these been addressed in the literature?
- (QA5) Does the article describe the effectiveness of inclusive schools that use arts education as the primary approach?
- (QA6) In terms of individual education programmes and class activities, which methods are most effective for incorporating arts education into inclusive education?

Each QA will obtain an answer. The fifth step was data collection. In this study, the data collected for review was secondary data, i.e., the data collected from databases is searched for relevant articles from Scopus. Then, data analysis was undertaken. The collected data were analysed according to the RQs. During the present research, there was then a deviation from the protocol to refine the equivalent words for search keywords in the database. A systematic literature review is a critical analysis of existing research on a particular topic. In the context of arts education for children with disabilities, a systematic literature review examines the different strategies, models and methods that have been used in practical settings and analyses the effectiveness of these approaches based on the available evidence. The first stage is a search for related research based on a query. The query in this study was TITLE-ABS-KEY (art AND education) AND (children AND with AND special AND needs), which obtained 1,165 papers. This query was then entered into the advanced search feature available on Scopus. By selecting the year option from 2012 to 2022, the number of papers was reduced to 851. The second stage is Review 1, which identifies and analyses the subject area. The research papers obtained in the paper search are selected at this stage. In the present study, the paper selection excluded papers that were not labelled Social Sciences, Psychology,

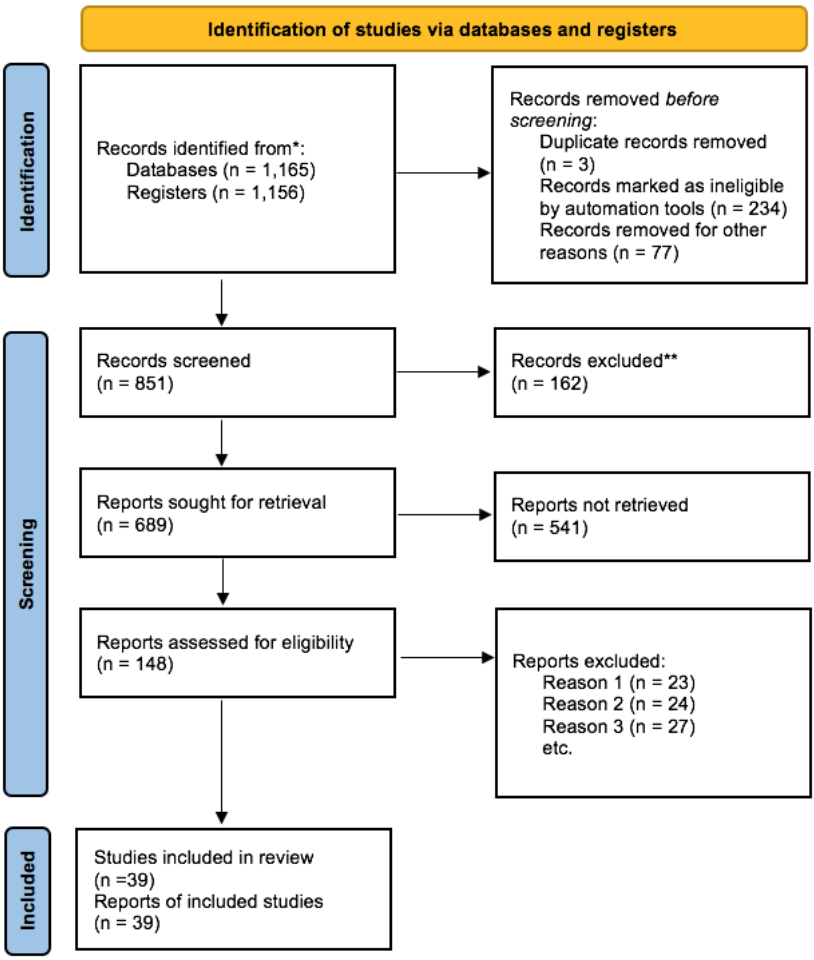
Arts and Humanity, and Multidisciplinary. This reduced the number of papers to 689. The number was further reduced by eliminating papers based on the type of article, the accessibility options (must be open access) and the language (must be English), resulting in 148 document papers. Subsequent paper elimination was based on a checklist of keywords, namely Education, Child, Inclusive Education, Art, Creativity, Learning, Art Education, Children, Disability, Music, Arts, Arts Education, Schools, Student, Teaching, Arts-Based Methods, Autism, Gifted Education, Inclusion, Music Therapy, Teacher, Art Therapy, Elementary Education, Elementary School, Imagination, Learning Disabilities, Play and Learn through The Arts, Teacher Education, Teaching and Learning, Therapy, ADHD, Aesthetic Experience, Antiretroviral Therapy, Highly Active. This reduced the selection to 74 papers.

The results of Review 1 were carried over to Review 2, in which the content of the papers was analysed. In the Review 2 stage, analysis was carried out through abstracts. Research methods were selected by eliminating papers with content and research subjects unrelated to arts education for children with disabilities, as well as papers with research methods such as literature reviews. After the Review 2 stage, 39 papers remained. These were further analysed in Review 3, which examined the content of the writing in the research. A selection was made by assessing the quality of the paper based on the aforementioned QA list, which was formed according to a list of problem formulations.

By synthesising and analysing existing research on these topics, the aim of the present SLR research on arts education for children with disabilities in the period 2012–2022 is to provide a comprehensive overview of the state of knowledge in the field, to identify gaps in the existing research, and to suggest directions for future research. It can also provide insights for art educators, special education teachers and other practitioners working with children with disabilities, thus helping them to develop effective strategies and programmes based on evidence-based practices. The results of each process are summarised briefly in Figure 1.

Figure 1

PRISMA Table



PRISMA Method (Page et al., 2021).

The initial stage was a search for papers based on the proposed query of 1,165 papers. A search based on year found 851 papers on arts education for children with disabilities. Further paper selection was based on Review 1, Review 2 and a Quality Assessment Review. Review 1 obtained 689 papers related to arts education for children with disabilities, Review 2 obtained 148 such papers and the Quality Assessment Review, which was based on six Quality Assessments, obtained 39 such papers.

Results and discussion

The results obtained from various viewpoints will be analysed and demonstrated. Figure 2 shows the number of papers published by year. As described above, each review stage involved a significant elimination process, with the final QA review reducing the 148 eligible papers to only 39, thus discarding 109 papers because they were deemed irrelevant to the selected variable. Figure 2 shows that the 39 papers included in the study comprised two papers published in 2013, two in 2015, two in 2016, three in 2017, six in 2019, seven in 2020, nine in 2021 and eight in 2022. Thus, more and more papers related to arts education for children with disabilities were published over the period studied, although the size of the increase is not particularly significant.

Figure 2
Number of articles published by year

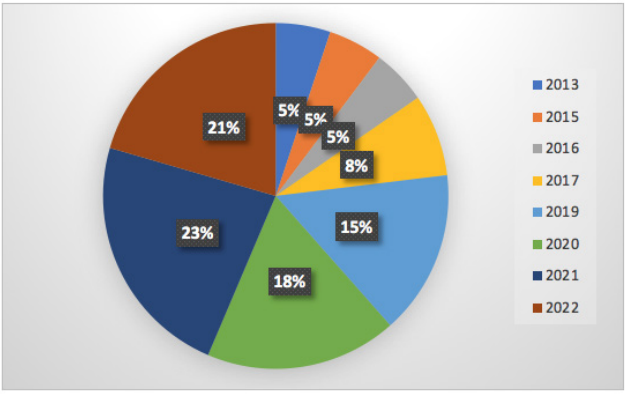


Figure 3
Graph of author's country of origin

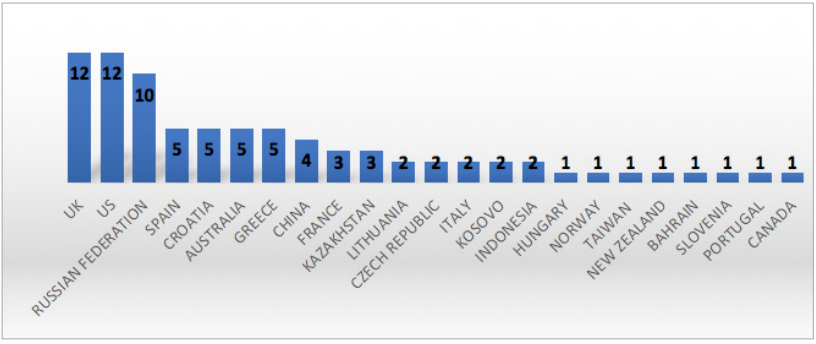
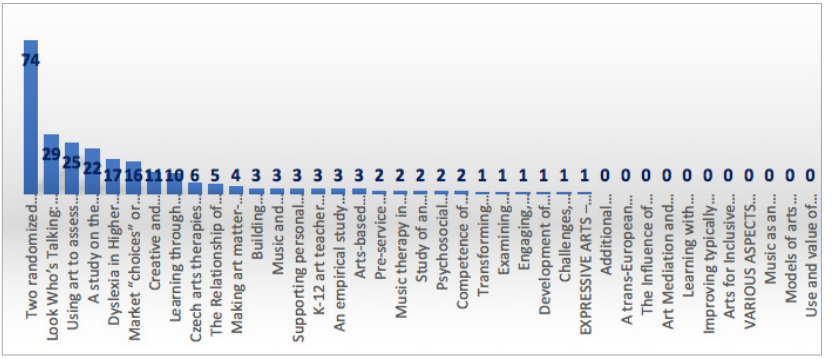


Figure 3 shows the number of papers by country of origin, based on an analysis of the country of origin of the authors of the selected papers, some of which were written by several authors from different countries. The data in Figure 3 show that the number of authors from the United Kingdom and the United States was the same, with 12 authors from each country. The Russian Federation follows with 10 authors, after which there were 5 authors each from Spain, Croatia, Greece and Australia. China follows with 4 authors, and then France and Kazakhstan with 3 authors. There are 2 authors each from five countries, namely Lithuania, the Czech Republic, Italy, Kosovo and Indonesia. Finally, there were eight countries with 1 author each, namely Hungary, Norway, Taiwan, New Zealand, Bahrain, Slovenia, Portugal and Canada. This shows that the use of arts education for children with disabilities has penetrated every continent.

Figure 4

Number of citations obtained

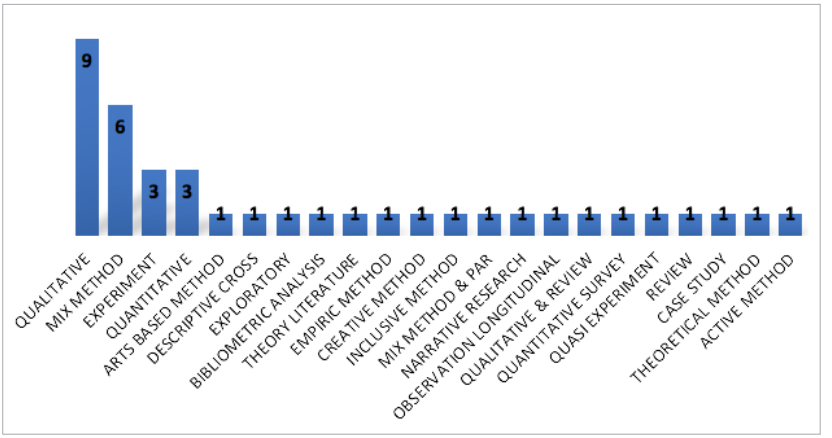


As shown in Figure 4, an analysis of the number of citations obtained for each paper reveals that the paper by Mehr et al. (2013) is the most cited paper, with a total of 74 citations, followed by the paper by Blaisdell et al. (2019), which is cited 29 times. Ranked third is the paper by Flowers et al. (2015)but their efficacy and feasibility across diverse contexts has not been adequately explored. To examine the potential utility of integrating art into evaluations of environmental education outcomes, we adapted an existing drawing prompt and corresponding grading rubric to assess the environmental attitudes and awareness of children (ages 6–12, which is cited 25 times, followed by the paper by Hsiao and Su (2021) with 22 citations. The other articles have fewer than 20 citations each.

Strategies, models and methods used in arts education settings for children with disabilities

RQ1 concerns the classification of papers based on the strategies, models and methods used in arts education settings for children with disabilities. Table 2 (below) shows the grouping of each category of strategies, models and methods used in arts education settings for children with disabilities. Several research methods are applied to the study of arts education for children with disabilities. From Figure 5, it can be seen that the qualitative research method is the most frequently used method in the papers examined in this study, indicating that most researchers are more interested in using qualitative methods than other research methods. The mixed method has the second highest frequency followed by the experimental and quantitative methods. Regarding RQ1, the results therefore show that the most frequently used method for research on arts education for children with disabilities in the last ten years has been the qualitative research method. Qualitative research is focused on understanding the experiences and perspectives of children with disabilities, their families and the art educators with whom they work. Qualitative research methods include interviews, observations and focus groups (Sugiyono, 2015). Researchers can conduct in-depth case studies of special needs children to explore how arts education affects their learning and development. This approach helps researchers to identify specific strategies that are effective for different types of disabilities. Mixed-methods research combines quantitative and qualitative research methods to gain a more comprehensive understanding of the impact of arts education on children with disabilities. Researchers use surveys or other quantitative measures to collect data on specific outcomes (such as improvements in motor skills or social-emotional development), while also gathering qualitative data on how children and families experience arts education. Ultimately, the research method chosen depends on the research question being investigated and the available resources. It is important to consider ethical considerations when researching children with disabilities, such as obtaining informed consent and ensuring that the research does not cause harm (Milbrandt et al., 2018).

Figure 5
Types of research methodology used in the articles



Tables 1 and 2 show that assessment using questionnaires and interviews is most favoured by researchers, as these tools enable users to provide written feedback. The questionnaire method can also be used as a quantitative value with a statistical approach such as the ANOVA method. A simple procedure is more popular because it does not take long.

In the period 2012–2022, researchers were more interested in using qualitative methods than other research methods. Mixed method has the second highest frequency, with six studies, followed by experimental and quantitative types. However, various research methods are also widely used in the application of research on arts education for children with disabilities. Various research methods can provide diverse research results related to the research on arts education for children with disabilities. The results regarding RQ2 show that the qualitative research method has been in great demand for the study of arts education for children with disabilities in the last ten years, followed by mixed methods.

Table 1

Model and method categories in arts education for children with disabilities

Model/Method	Definition	Research Papers	Number of Documents
Inclusive models	Inclusive models of arts education seek to provide opportunities for all students, including those with disabilities, to participate in arts education programmes alongside their peers. This may involve adapting teaching strategies and materials to meet the diverse needs of students, providing accommodations and modifications to support participation, and fostering a sense of belonging and community for all students.	(Žolgar & Stopar, 2016), (Puzanova et al., 2021), (Craw, 2015), (Al Hashimi et al., 2021), (Sydykova et al., 2020), (Rihter & Potočnik, 2022), (Santos & Lima-Rodrigues, 2016), (Cole et al., 2021), (Chapman & O'Gorman, 2022), (Devolli & Avdiu-Kryeziu, 2022), (Haerani et al., 2020), (Nieto-Miguel et al., 2022)	12
Specialised programmes	Specialised programmes for arts education may be designed specifically for students with disabilities and may focus on addressing specific needs or goals. For example, art programmes may use art as a tool for promoting emotional expression and well-being, while vocational art programmes may focus on developing skills that can lead to employment opportunities.	(Katušić & Burić, 2021), (Østergaard, 2019), (Nguyen Viet, et al, 2022), (Madrid-Manrique, 2020), (Erina et al., 2019), (Mehr et al., 2013), (Lian et al., 2020), (Bacon & Bennett, 2013), (Petsilas et al., 2019), (Carpio et al., 2017), (Shaughnessy, 2022), (Grosvenor & Pataki, 2017)	12
Community-based programmes	Community-based programmes for arts education may be offered outside traditional school settings and may involve partnerships between schools, community organisations and arts institutions. These programmes may be designed to provide additional opportunities for students with disabilities to engage in arts education, or to provide access to resources and expertise that may not be available within the school setting.	(Kamenets et al., 2021), (Theodotou, 2019), (Blaisdell et al., 2019), (Flowers et al., 2015), (Feliu-Torruella et al., 2021), (Theodotou, 2020)	6
Multidisciplinary programmes	Multidisciplinary programmes for arts education may involve collaboration between art educators, special education teachers, therapists and other professionals to address a range of needs and goals. For example, a programme may combine arts education with occupational therapy or speech therapy to promote the development of fine motor skills or communication skills.	(Kantor et al., 2019), (Gaztambide-Fernández & Parekh, 2017), (Kerby et al., 2021), (Martinec et al., 2022), (Kantor & Lei, 2020), (Dobson & Stephenson, 2022)	6

Model/Method	Definition	Research Papers	Number of Documents
Technology-based programmes	Technology-based programmes for arts education may use digital tools and resources to support learning and participation for students with disabilities. For example, students may use assistive technology to create digital art, or participate in virtual arts education programmes that provide access to resources and expertise from a distance.	(Hsiao & Su, 2021), (Strycker, 2020), (Corradi et al., 2022)	3

Table 2

Category strategies in arts education for children with disabilities

Strategy	Definition	Research Papers	Number of Documents
Visual supports	For students with visual impairments, providing tactile materials or using verbal descriptions to supplement visual instruction can help ensure that they can fully participate in art activities.	(Žolgar & Stopar, 2016), (Carpio et al., 2017)	2
Assistive technology	Assistive technology can be used to support students with a range of disabilities in participating in art activities. For example, students with communication or cognitive disabilities may use assistive technology to access digital art tools or to communicate their ideas and preferences.	(Hsiao & Su, 2021), (Strycker, 2020), (Madrid-Manrique, 2020), (Corradi et al., 2022)	4
Multi-sensory approaches	Multi-sensory approaches can help engage students with disabilities who may have sensory processing differences. For example, using different textures or scents in art materials, or incorporating music or movement into art activities, can help support participation and engagement.	(Puzanova et al., 2021), (Dobson & Stephenson, 2022), (Østergaard, 2019), (Kamenets et al., 2021), (Kantor et al., 2019), (Chapman & O'Gorman, 2022), (Flowers et al., 2015), (Craw, 2015), (Rihter & Potočnik, 2022), (Theodotou, 2019), (Santos & Lima-Rodrigues, 2016), (Cole et al., 2021), (Haerani et al., 2020), (Petsilas et al., 2019), (Kantor & Lei, 2020), (Mehr et al., 2013), (Gaztambide-Fernández & Parekh, 2017), (Nieto-Miguel et al., 2022), (Kerby et al., 2021), (Sydykova et al., 2020)	20

Strategy	Definition	Research Papers	Number of Documents
Social stories and scripts	Social stories and scripts can be used to help students with autism or other social communication difficulties understand expectations and routines during art activities, and to practise social skills related to sharing materials and collaborating with peers.	(Feliu-Torruella et al., 2021), (Martinec et al., 2022), (Theodotou, 2020), (Blaisdell et al., 2019), (Lian et al., 2020), (Erina et al., 2019)	6
Simplified instructions and steps	Simplifying instructions and breaking down complex steps into smaller, more manageable tasks can help students with intellectual disabilities or learning differences to better understand and participate in art activities.	(Shaughnessy, 2022)	1
Individualised instruction	Providing individualised instruction, including one-on-one support or small group instruction, can help ensure that students with disabilities receive the level of support they need to fully participate in art activities.	(Katušić & Burić, 2021), (Bacon & Bennett, 2013), (Devolli & Avdiu-Kryeziu, 2022), (Al Hashimi et al., 2021), (Ngyuen Viet, et al, 2022), (Grosvenor & Pataki, 2017)	6

Research has suggested that inclusive schools that use arts education as the primary approach can effectively promote the learning and development of children with disabilities. One review of the role of arts education in cognition and the curriculum found that such programmes can support the development of a range of skills and competencies, including cognitive, social-emotional and artistic skills (Eisner, 2020). Inclusive arts education programmes can also foster a sense of belonging and community for students with disabilities and provide opportunities for self-expression and creative exploration. Additionally, research has suggested that inclusive schools that use various inclusive strategies, including arts-based learning, can improve academic outcomes for all students, including those with disabilities. For instance, studies conducted in the United States, Western Australia, and Central and Eastern Europe found that schools with more inclusive practices, such as arts education, had better outcomes for students with disabilities than schools with less inclusive practices. Educational programme goals emphasise imaginative articulation, using aesthetic experiences as points of direction and motivation (Paris et al., 2018; Kárpáti, 2019). However, it is essential to keep in mind that the specific requirements of each student may depend on a range of factors, including the specific needs of individual students, the quality of instruction, and the level of support provided to teachers and students.

Art activities frequently involve fine motor skills, and arts education programmes for children with disabilities have shown a variety of positive outcomes in cognitive, motor or social-emotional development. Arts education programmes can provide opportunities to practise and enhance these skills for children with disabilities that affect their fine motor skills. According to Upitis (2001), art activities can provide a nonverbal means of self-expression, which is especially important for children whose disabilities affect their social or communication skills. Kárpáti (2019) reports that art activities, such as image as a medium of communication, can provide a setting for practising communication skills like expressing preferences, receiving feedback and working with peers. Alter et al. (2009) claim that arts education programmes can provide children with opportunities to express their knowledge, ideas and feelings, and to socialise with their peers and develop relationships through shared experiences. Children are roused by the need to communicate with others, to be engaged and to resolve individual issues or interests (Freedman et al., 2013). Art can open doors for young people's abilities to investigate their inventiveness and creative minds, which can decidedly influence their general prosperity and make a significant contribution to the broader community in developing identity, confidence, social participation and inclusion (Ewing, 2020). According to Boyd and Cutcher (2015), children can gain confidence and self-esteem by participating in art activities and creating art. The best practices in early childhood education theory, philosophy and pedagogy can inspire effective arts education in other educational settings. Children with disabilities who participate in arts education programmes may gain a variety of advantages that contribute to their overall development and well-being.

The effectiveness of inclusive schools that use arts education as the primary approach and a practical path in implementing individual education programmes and class activities

The paper classification problem referred to in RQ2 is based on the effectiveness of inclusive schools that use arts education as the primary approach and a practical path to implementing inclusive education in individual education programmes and class activities. Table 3 (above) shows the categorisation of each type of arts education into the primary strategy, the most efficient means of implementing arts education and inclusive education, such as class activities or individual education programmes. Comprehensive arts education projects might consolidate systems; for example, adjusting educational programmes and guidance to meet the different needs of students, providing proper facilities

and changes, and utilising a range of training approaches and materials to draw in and support all students. The art teacher's role also shifts to become a collaborator, support and resource for the school (Tarr, 2008). Additionally, students with disabilities, particularly those who may struggle with traditional literacy skills, can benefit from using the visual arts as a tool for developing visual literacy and communication skills. Art has potential for cognitive and affective growth beyond traditional assumptions about education through art for social and cultural settings (Kędra & Žakevičiūtė, 2019; Boughton, 1986; Kárpáti & Gaul, 2017).

Art educators, special education teachers and other professionals may collaborate to ensure that each student's needs are met when arts education is integrated into individual education programmes and classroom activities. In addition, ongoing teacher professional development and ongoing evaluation and monitoring of student progress may be necessary for effective implementation.

Several challenges and limitations are associated with different approaches to arts education for children with disabilities. Children with disabilities may require specialised materials or equipment to participate fully in art activities. Some strategies to address this challenge include seeking funding to purchase specialised materials, adapting existing materials and equipment, and collaborating with local organisations or businesses to support general education classrooms, as well as ensuring organisational structures and professional development that target the needs of special education students (Cherney et al., 2006; Malley & Silverstein, 2014). Children with disabilities may have difficulty communicating their preferences or needs related to art activities. Strategies to address this challenge include providing alternative modes of communication, such as picture boards or communication devices, and working with families and caregivers to better understand the child's communication needs (Heinisch & Gerber, 1988; Hajeak, 1980). Art educators may not have experience working with children with disabilities or may feel unsure how to adapt activities to meet their needs. Offering support to art teachers helps them to become familiar with the most forward-thinking patterns in arts education (Pataky, 2020). Strategies to address this challenge include providing professional development and training opportunities for educators, partnering with local organisations or experts, using the principles of Universal Design for learning, and creating a support network for educators to share resources and strategies (Malley & Silverstein, 2014).

Different approaches to arts education for children with disabilities are associated with a number of difficulties and limitations. In order to fully participate in art activities, children with disabilities may require specialised

materials or equipment. Some techniques to address this challenge include looking for financing to buy specific materials, adjusting existing materials and equipment and teaming up with neighbourhood associations or organisations to obtain donations so that arts teachers can address the needs of children with disabilities in their classroom or school (Malley & Silverstein, 2014). Children with disabilities may have trouble communicating their art-related preferences or requirements. It is therefore necessary to provide alternative means of communication, such as picture boards or communication devices, as well as to collaborate with families and caregivers in order to better understand the child's communication needs as a means of addressing this obstacle. Children with difficulty executing fine-motor movements will need customised arts equipment. Some art educators may not have prior experience working with disabled children or may be unsure about how to modify activities to meet their needs. Procedures may therefore be required in order to address this challenge, including improving proficiency and opening doors for teachers, cooperating with neighbourhood associations or specialists, and creating a support group for instructors to share resources and systems. Teachers who have participated in various forms of education and training and have gained experience in working with pupils with SEN are more positive about the inclusion of pupils with SEN (Rihter et al., 2023).

Transportation difficulties or financial constraints may make it difficult for children with disabilities to participate in community-based art programmes. Techniques to address this challenge include working with local area associations to provide transportation or other help, seeking grants or diminished cost programmes, and encouraging expanded availability and consideration of programmes based in the local area. Some teachers are turning to alternative methods of evaluation that include a variety of indicators (Kraft, 2006; Lund & Massey, 2016). There is a need for more research on the effectiveness of different approaches to arts education for children with disabilities and the specific outcomes that can be achieved through these programmes. Strategies to address this challenge include conducting rigorous research studies, sharing data and outcomes across organisations and programmes, and advocating for increased funding for research in this area.

A combination of strategies, including increased awareness, funding, collaboration and research, will be required to address the difficulties and limitations posed by various approaches to arts education for children with disabilities. Implementing arts education in inclusive education as individual education programmes and class activities can be complex. The effective paths may depend on a range of factors, including the needs and abilities of individual students,

the resources available and the specific goals of the programme. Collaboration between art educators, special education teachers and other professionals can be vital to implementing effective arts education programmes for students with disabilities. Art instructors obviously use additional art materials for educating and learning. However, there are therapeutic aspects of arts education and the best teachers will sustain their feelings of capability in a very valuable way. Arts have a significant role in controlling stress and improving relaxation, while art music therapy can also reduce stress (Davis & Thaut, 1989). Implementation may involve developing individual education plans that incorporate arts education goals, identifying appropriate accommodations and modifications, and ensuring that arts education activities are accessible to all students (Dunn-Snow et al., 2000; Huotilainen et al., 2018). Instructional procedures are needed for increasing teacher responsiveness to expressions of preference and choice among students with disabilities. Adapting arts education activities to meet the needs of individual students can be an effective strategy for promoting inclusive education. It may involve modifying materials, providing additional support or instruction, or using alternative communication or expression to accommodate diverse learning needs (Houghton et al., 1987). An essential component of inclusive arts education is the differentiation of instruction to meet the requirements of diverse students. Providing students with a variety of art-related activities and materials or employing a variety of teaching methods to accommodate a variety of learning styles may be necessary, because making art incorporates artistic causality, idiosyncratic meaning, and purposeful symbolisation (Kellman et al., 1988). Teachers and other professionals involved in arts education can benefit from receiving ongoing professional development to ensure that they have the knowledge and abilities necessary to effectively support diverse students. This might include preparing unambiguous arts education procedures or methodologies and more extensive preparation in comprehensive training and working with students with disabilities. The main purpose of arts education, whether formal (in the regular art classes) or informal (after school), is to equip students not only with the necessary skills to create art, but also with a set of mental tools to comprehend its meaning and appreciate it (Blagoeva, 2019). Assessing and observing the adequacy of arts education programmes for students with disabilities is fundamental to ensuring that they address the issues of individual students. According to Malley and Silverstein (2014), this may entail collecting data on student progress and outcomes and using this information to continuously adjust and enhance the arts education programme. Children with disabilities will benefit from experts who are committed to providing comprehensive instruction, so that children can achieve maximum educational benefits.

Information regarding research categories that frequently appear between 2012 and 2022 has been obtained from the formulation of the research questions. The results obtained depend on the subjectivity of the researcher, so there may be confirmation bias or inaccuracy in conducting the review. However, the results and analysis of the Systematic Literature Review (SLR) can provide important information for researchers or developers interested in arts education for children with disabilities in recent years. The results also demonstrate that the mode or trend of interest in researchers is similar to previous years. Another finding is that each category still has the same mode or trend as in previous years, demonstrating that researchers prefer to research arts education in inclusive settings. This is probably because arts education is more accessible to children than therapy, which has been used in everything from inclusive schools to hospitals.

Arts education has advantages not only as a means of entertainment, but also as a means of education. The results of the present survey can be utilised in advocating for the improvement of programming projects in the field of arts education. In addition, it is hoped that this information will serve as a reference when designing arts education for children with disabilities in other areas, such as outbound, role plays and art performances. Nonetheless, this exploration should be developed further. The author was the only researcher to investigate the obtained results, which therefore remain subjective. Additionally, since this study only focuses on Scopus data, additional research on arts education for children with disabilities is required moving forward.

Conclusions

This study conducted a Systematic Literature Review regarding research on arts education for children with disabilities. From 2012 to 2022, as many as 39 studies were conducted. The present SLR investigates public research on arts education for children with disabilities, within the specific categories of strategies, models and methods. Qualitative research methods used are questionnaires and interviews with a focus on the impact or results of learning that has been done. These results are expected to provide information to researchers or developers interested in arts education for children with disabilities. This research is also helpful in improving the quality of arts education for children with disabilities in education and community outreach. However, this research still tends to be based on subjective judgments. Future research is expected to carry out SLR by implementing a voting system for several people with field experts related to arts education research for children with disabilities to overcome the

elements of individual subjectivity or confirmation bias. In addition, further research can conduct SLRs regarding arts education for children with disabilities for 2020 and later, in order to create a track record of the development of arts education for children with disabilities.

Ethical statement

The research did not involve human and animal subjects. The reviews on which it was based aggregated studies that had already received ethical approval. Consequently, no additional ethical approval was necessary.

Disclosure statement

The authors have no conflict of interest to declare.

References

Al Hashimi, S., Sadoun, J., Almahoozi, Y., Jawad, F., & Hasan, N. (2021). Examining perceptions of inclusion of deaf and hard-of-hearing students in art and design higher education in Bahrain. *Cogent Arts and Humanities*, *8*(1). https://doi.org/10.1080/23311983.2021.1960698

Alter, F., Hays, T., & O'Hara, R. (2009). The challenges of implementing primary arts education: What our teachers say. *Australian Journal of Early Childhood*, *34*(4), 22–30. https://doi.org/10.1177/183693910903400404

Bacon, A. M., & Bennett, S. (2013). Dyslexia in higher education: The decision to study art. *European Journal of Special Needs Education*, *28*(1), 19–32. https://doi.org/10.1080/08856257.2012.742748

Blagoeva, N. V. (2019). Project-based integration of contemporary art forms into teaching visual arts to primary school students in the after-school art clubs. *International Journal of Education and the Arts*, *20*. https://doi.org/10.26209/ijea20n18

Blaisdell, C., Arnott, L., Wall, K., & Robinson, C. (2019). Look who's talking: Using creative, playful arts-based methods in research with young children. *Journal of Early Childhood Research*, *17*(1), 14–31. https://doi.org/10.1177/1476718X18808816

Boughton, D. (1986). Visual literacy: Implications for cultural understanding through art education. *Journal of Art & Design Education*, *5*(1–2), 125–142. https://doi.org/10.1111/j.1476-8070.1986.tb00193.x

Boyd, W., & Cutcher, L. (2015). Learning from early childhood philosophy, theory and pedagogy: Inspiring effective art education. *Australasian Journal of Early Childhood*, *40*(1), 91–98. https://doi.org/10.1177/183693911504000112

Carpio, C., Amérigo, M., & Durán, M. (2017). Study of an inclusive intervention programme in pictorial perception with blind and sighted students. *European Journal of Special Needs Education*, *32*(4), 525–542. https://doi.org/10.1080/08856257.2017.1297567

Chapman, S. N., & O'Gorman, L. (2022). Transforming learning environments in early childhood contexts through the arts: Responding to the United Nations Sustainable Development Goals. *International Journal of Early Childhood*, *54*(1), 33–50. https://doi.org/10.1007/s13158-022-00320-3

Cherney, I. D., Seiwert, C. S., Dickey, T. M., & Flichtbeil, J. D. (2006). Children's drawings: A mirror to their minds. *Educational Psychology*, *26*(1), 127–142. https://doi.org/10.1080/01443410500344167

Cole, S. M., Murphy, H. R., Frisby, M. B., Grossi, T. A., & Bolte, H. R. (2021). The relationship of special education placement and student academic outcomes. *Journal of Special Education*, *54*(4), 217–227. https://doi.org/10.1177/0022466920925033

Corradi, S., Crippa, C. M., Drąsutė, V., Sgaramella, T. M., & Ferrari, L. (2022). Arts for inclusive education: Insights from the Increa+ Project. *Journal of Higher Education Theory and Practice*, *22*(1), 92–105. https://doi.org/10.33423/jhetp.v22i1.4966

Craw, J. (2015). Making art matter-ings: Engaging (with) art in early childhood education, in Aotearoa New Zealand. *Journal of Pedagogy*, *6*(2), 133–153. https://doi.org/10.1515/jped-2015-0018

Davis, W. B., & Thaut, M. H. (1989). The influence of preferred relaxing music on measures of state anxiety, relaxation, and physiological responses. *Journal of Music Therapy*, *26*(4), 168–187. https://doi.org/10.1093/jmt/26.4.168

Derby, J. (2011). "I believe art educators can develop vibrant contributions to disability studies by culturing critical artmaking curricula that address disability." Disability studies and art education. *Studies in M Education: A Journal of Issues and Research*, *52*(2), 94–111.

Devolli, A., & Avdiu-Kryeziu, S. (2022). Music as an inclusion tool: Can primary school teachers use it effectively? *Rast Müzikoloji Dergisi*, *10*(3), 345–363. https://doi.org/10.12975/rastmd.20221032

Dmitriev, A., Chukalskaya, V., Dmitrieva, S., Golubović, S., & Novosiltseva, E. (2020). The development of creative competence of primary school students under the condition of inclusive education. *E3S Web of Conferences, 210,* Article 18110. https://doi.org/10.1051/e3sconf/202021018110

Dobson, T., & Stephenson, L. (2022). A trans-European perspective on how artists can support teachers, parents and carers to engage with young people in the creative arts. *Children and Society*, *36*(6), 1336–1350. https://doi.org/10.1111/chso.12580

Dunn-Snow, P., Amelio, G. D., (2000). How art teachers can enhance artmaking as a therapeutic experience art therapy and art education. *Art Education, 53*(3), 46–53.

Eisner, E. W. (2020). The role of the arts in cognition and curriculum. In E. W. Eisner (Ed.), R*eimagining Schools: The Selected Works of Elliot W. Eisner* (pp. 84–93). Routledge.

Elpus, K. (2022). Access to arts education in America: The availability of visual art, music, dance, and theater courses in U.S. high schools. *Arts Education Policy Review*, *123*(2), 50–69. https://doi.org/10.1080/10632913.2020.1773365

Erina, I. A., Mychko, E. I., Sorokopud, Y. V., Karabulatova, I. S., & Streltsova, M. A. (2019). Development of communication skills in children with special needs (ADHD): Accentuation of the schoolboy's personality and musical preferences. *Universal Journal of Educational Research*, *7*(11), 2262–2269. https://doi.org/10.13189/ujer.2019.071103

Ewing, R. (2010). *Teaching drama: Lessons from its recent development in the UK*. Australian Council for Educational Research.

Ewing, R. (2020). The Australian curriculum: The arts. A critical opportunity. *Curriculum Perspectives*, *40*(1), 75–81. https://doi.org/10.1007/s41297-019-00098-w

Feliu-Torruella, M., Fernández-Santín, M., & Atenas, J. (2021). Building relationships between museums and schools: Reggio Emilia as a bridge to educate children about heritage. *Sustainability (Switzerland)*, *13*(7).

Flowers, A. A., Carroll, J. P., Green, G. T., & Larson, L. R. (2015). Using art to assess environmental education outcomes. *Environmental Education Research*, *21*(6), 846–864. https://doi.org/10.1080/13504622.2014.959473

Freedman, K., Heijnen, E., Kallio-Tavin, M., Kárpáti, A., & Papp, L. (2013). Visual culture learning communities: How and what students come to know in informal art groups. *Studies in Art Education*, *54*(2), 103–115. https://doi.org/10.1080/00393541.2013.11518886

Gaztambide-Fernández, R. A., & Parekh, G. (2017). Opções de mercado ou caminhos estruturados? Como educação especializada nas artes contribui para a reprodução da desigualdade [Market "choices" or structured pathways? How specialised arts education contributes to the reproduction of inequality]. *Education Policy Analysis Archives*, *25*. https://doi.org/10.14507/epaa.25.2716

Green, D., Karafa, K., & Wilson, S. (2021). Art therapy with grieving children: Effect on affect in the dual-process model. *Art Therapy*, *38*(4), 211–215. https://doi.org/10.1080/07421656.2020.1823197

Grosvenor, I., & Pataki, G. (2017). Learning through culture: Seeking "critical case studies of possibilities" in the history of education. *Paedagogica Historica*, *53*(3), 246–267. https://doi.org/10.1080/00309230.2016.1264981

Haerani, R., Masunah, J., Narawati, T., Rochyadi, E., & Mujiarto. (2020). Models of arts teacher's professional development. *International Journal of Higher Education*, *9*(6), 77–86. https://doi.org/10.5430/ijhe.v9n6p77

Hajeak, F. (1980). Creativity for the retarded. *Arts & Activities*, *88*(1), 64–66.

Heinisch, B. S., & Gerber, B. L. (1988). Questions art teachers ask about mainstreaming special education students. *Arts & Activities*, *102*(5), 49–59.

Houghton, J., Bronicki, G. J. B., & Guess, D. (1987). Opportunities to express preferences and make choices among students with severe disabilities in classroom settings. *Journal of the Association for Persons with Severe Handicaps*, *12*(1), 18–27. https://doi.org/10.1177/154079698701200104

Hsiao, P. W., & Su, C. H. (2021). A study on the impact of steam education for sustainable development courses and its effects on student motivation and learning. *Sustainability (Switzerland)*, *13*(7), 1–24. https://doi.org/10.3390/su13073772

Huotilainen, M., Rankanen, M., Groth, C., Seitamaa-Hakkarainen, P., & Mäkelä, M. (2018). Why our brains love arts and crafts. *FormAkademisk - Forskningstidsskrift for Design Og Designdidaktikk*, *11*(2), 1–17. https://doi.org/10.7577/formakademisk.1908

Kamenets, A. V., Anufrieva, N. I., Grushina, E. E., Gribkova, G. I., Ershova, O. V., & Yushchenko, N. S. (2021). The influence of performing arts competitions on the formation of artistic and pedagogical

space. *Edelweiss Applied Science and Technology*, *5*(1), 67–70. https://doi.org/10.33805/2576-8484.197

Kantor, J., Chráska, M., & Ludíková, L. (2019). Czech arts therapies in educational institutions. *Education Sciences*, *9*(2). https://doi.org/10.3390/educsci9020082

Kantor, J., & Lei, X. (2020). Arts-based assessment in educational settings. *International Journal of Evaluation and Research in Education*, *9*(4), 947–954. https://doi.org/10.11591/ijere.v9i4.20346

Kárpáti, A. (2019). Art education in Central and Eastern Europe. *The International Encyclopedia of Art and Design Education*, 1–17. https://doi.org/10.1002/9781118978061.ead107

Kárpáti, A. & Gaul-Ács, Á. (2017, October 19-21). *Nature or nurture? The significance of art education in developing visual literacy of young children* [Conference presentation]. Art Education Research Institute, 2nd Annual Symposium, Naperville, Illinois, United States. https://doi.org/10.13140/RG.2.2.19517.72167

Katušić, A., & Burić, K. (2021). Music therapy in educating children with developmental disabilities. *Croatian Journal of Education*, *23*(1), 63–79. https://doi.org/10.15516/CJE.V23I1.3915

Kędra, J., & Žakevičiūtė, R. (2019). Visual literacy practices in higher education: What, why and how?. *Journal of Visual Literacy*, *38*(1–2), 1–7. https://doi.org/10.1080/1051144X.2019.1580438

Kellman, J., Visual, S., Art, S., Symposium, T. A., & Kellman, J. (1988). Narrative and the art of two children with autism. *Visual Art Research*, *24*(2), 38–48.

Kementerian Kesehatan RI. (2018). Riskesdas 2018. *Laporan Nasional Riskesdas 2018*, *44*(8), 181–222. https://repository.badankebijakan.kemkes.go.id/id/eprint/3514/1/Laporan%20Riskesdas%202018%20Nasional.pdf

Kencana, D., Supriatna, M., & Yudha, E. S. (2020). Tinjauan pembelajaran visual ekspresif dalam program pendidikan inklusif [An overview of expressive visual learning in inclusive education programmes]. *Jurnal Ilmiah Pendidikan Citra Bakti*, *7*(2), 149–158. https://doi.org/10.38048/jipcb.v7i2.96

Kerby, M., Lorenza, L., Dyson, J., Ewing, R., & Baguley, M. (2021). Challenges, implications and the future of the Australian curriculum: The arts. *Australian Educational Researcher*, *48*(5), 901–922. https://doi.org/10.1007/s13384-021-00488-y

Kiling, I. Y., Due, C., Li, D. E., & Turnbull, D. (2018). Interventions supporting development of young children with disabilities at environmental risk in Indonesia: A scoping review. *SAGE Open*, *8*(1). https://doi.org/10.1177/2158244018754935

Kraft, M. (2006). Art education and disability: Re-envisioning educational efficiency. *The Journal of Social Theory in Art Education*, *26*(1), 302–322.

Lian, F., Zhang, Z., Ma, W., Wang, M., & Lin, Y. (2020). Improving typically developing children's acceptance toward children with autism via teaching with picture books. *International Journal of Developmental Disabilities, 68*, 354–364.

Lund, P. A., Lund, P. A., & Massey, L. (2004). Art teacher preparation and learners with exceptional needs. *Visual Arts Research*, *30*(1), 53–58.

Madrid-Manrique, M. (2020). Engaging, validating, imagining: A comicbased approach to (non) participation and empowerment. *International Journal of Education Through Art*, *16*(1), 43–61.

https://doi.org/10.1386/eta_00016_1

Malley, S. M., & Silverstein, L. B. (2014). Examining the intersection of arts education and special education. *Arts Education Policy Review*, *115*(2), 39–43. https://doi.org/10.1080/10632913.2014.883894

Martinec, R., Šimunović, D., & Jerković, V. K. (2022). Various aspects of using bibliotherapy in the field of education and rehabilitation. *Hrvatska revija za rehabilitacijska istraživanja*, *58*(1), 87–103. https://doi.org/10.31299/hrri.58.1.5

Mehr, S. A., Schachner, A., Katz, R. C., & Spelke, E. S. (2013). Two randomized trials provide no consistent evidence for nonmusical cognitive benefits of brief preschool music enrichment. *PLoS ONE*, *8*(12). https://doi.org/10.1371/journal.pone.0082007

Metzl, E. S (2022). Art is fun, art is serious business, and everything in between: Learning from art therapy research and practice with children and teens. *Children, 9*(9), Article 1320. https://doi.org/10.3390/children9091320

Milbrandt, M. K., Miraglia, K. M., & Zimmerman, E. (2018). An analysis of current research in studies in art education and the International Journal of Education Through Art. *Studies in Art Education*, *59*(1), 39–54. https://doi.org/10.1080/00393541.2017.1401882

Mumpuniarti, M., Ishartiwi, I., Azizah, N., & Prabawati, W. (2021). Parents' training needs for intellectual disability learning about daily life activities. *Cypriot Journal of Educational Sciences*, *16*(4), 1616–1630. https://doi.org/10.18844/cjes.v16i4.6026

Nguyen-Viet, T.-T.C., Robert, P., & Poezevara K. (2022). Art mediation and sensory atmosphere in the symbolization process: Arvak's Tesseract. *Evolution Psychiatrique, 85*(1), 95–108. https://10.1016/j.evopsy.2021.11.002

Nieto-Miguel, I., García, F. J. Á., Urchaga, J. D., & Guevara, R. M. (2022). Use and value of music as a didactic tool in primary school education. *Revista Electronica Complutense de Investigacion En Educacion Musical*, *19*, 83–91. https://doi.org/10.5209/reciem.74280

Østergaard, E. (2019). Music and sustainability education – a contradiction? *Acta Didactica Norge*, *13*(2), 1–20. https://doi.org/10.5617/adno.6452

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., … Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *The BMJ*, *372*(71). https://doi.org/10.1136/bmj.n71

Paris, L. F., Nonis, K. P., & Bailey, J. (2018). Pre-service arts teachers' perceptions of inclusive education practice in Western Australia. *International Journal of Special Education*, *33*(1), 3–20.

Pataky, G. (2020). "Do not touch it!" Today's children's visual competencies in comparison with the pre-digital era in light of their art educational environment. *Center for Educational Policy Studies Journal*, *10*(4), 75–96. https://doi.org/10.26529/cepsj.925

Petsilas, P., Leigh, J., Brown, N., & Blackburn, C. (2019). Creative and embodied methods to teach reflections and support students' learning. *Research in Dance Education*, *20*(1), 19–35. https://doi.org/10.1080/14647893.2019.1572733

Puslapdik. (2021, December 3). *Hari Disabilitas International 2021. Kepemimpinan dan partisipasi penyandang disabilitas menuju tatanan dunia yang inklusif, aksesibel dan berkelanjutan pasca Covid 19*. [Leadership and participation of persons with disabilities towards an inclusive, accessible and sustainable world order post-Covid 19]. https://puslapdik.kemdikbud.go.id/hari-disabilitas-internasional-2021-libatkan-penyandang-disabilitas-pascacovid-19/

Puzanova, Z. V., Simonova, M. A., Filippov, V. M., & Larina, T. I. (2021). Additional education for children with special needs and disabilities in the Russian Federation: National monitoring concept. *Vysshee Obrazovanie v Rossii*, *30*(6), 27–34. https://doi.org/10.31992/0869-3617-2021-30-6-27-34

Rasmitadila, Humaira, M. A., & Rachmadtullah, R. (2021). Teachers' perceptions of the role of universities in mentoring programs for inclusive elementary schools: A case study in Indonesia. *Journal of Education and E-Learning Research*, *8*(3), 333–339. https://doi.org/10.20448/JOURNAL.509.2021.83.333.339

Rihter, J., Košak Babuder, M., & Selan, J. (2023). Competence of Slovenian art teachers in working with pupils with special educational needs. *Educational Studies*, *49*(4), 628–643. https://doi.org/10.1080/03055698.2021.1873740

Rihter, J., & Potočnik, R. (2022). Preservice teachers' beliefs about teaching pupils with special educational needs in visual art education. *European Journal of Special Needs Education*, *37*(2), 235–248. https://doi.org/10.1080/08856257.2020.1862340

Santos, G. D., & Lima-Rodrigues, L. M. (2016). Expressive arts – Embodying inclusive teachers. *Journal of Research in Special Educational Needs*, *16*, 506–509. https://doi.org/10.1111/1471-3802.12177

Schwartz, D. C., & Pace, D. (2008). Students create art: Expanding an after-school program. *TEACHING Exceptional Children*, *40*(4), 50–54. http://search.proquest.com/docview/61855654/1410F2A07886E2BC5B/434?accountid=14026#

Shaughnessy, N. (2022). Learning with labyrinths: Neurodivergent journeying towards new concepts of care and creative pedagogy through participatory community autism research. *Critical Studies in Teaching and Learning*, *10*(SI), 127–150. https://doi.org/10.14426/cristal.v10iSI.546

Strycker, J. (2020). K-12 art teacher technology use and preparation. *Heliyon*, *6*(7). https://doi.org/10.1016/j.heliyon.2020.e04358

Sugiyono. (2015). *Memahami penelitian kualitatif* [*Understanding qualitative research*]. Alfabeta.

Sydykova, R. S., Yussupova, A. A., Berekeshev, G. K., Smailova, T. A., & Kuldanov, N. T. (2020). Psychosocial foundations for pedagogical skills formation of future specialists in the special educational environment. *Journal of Intellectual Disability - Diagnosis and Treatment*, *8*(3), 485–496. https://doi.org/10.6000/2292-2598.2020.08.03.26

Tarr, P. (2008). New visions: Art for early childhood a response to art: Essential for early learning a position paper by the Early Childhood Art Educators Issues Group (ECAE). *Art Education*, *61*(4), 19–24. https://doi.org/10.1080/00043125.2008.11652064

Upitis, R. (2001). *Arts education for the development of the whole child.* Elementary Teachers' Federation of Ontario.

Theodotou, E. (2019). Supporting personal and social development through child-led art projects in the early years settings. *Early Child Development and Care*, *189*(11), 1889–1900. https://doi.org/10.1080/03004430.2017.1418739

Theodotou, E. (2020). An empirical study comparing different art forms to develop social and personal skills in early years education. *Education 3-13*, *48*(4), 471–482. https://doi.org/10.1080/03004279.2019.1618890

UNICEF Indonesia. (2023). *Discussion Paper: Key issues for children with disabilities in Indonesia*. https://www.unicef.org/indonesia/social-policy/publication/key-issues-children-with-disabilities

Wadeson, H. (2010). *Art psychotherapy* (2nd ed.). John Wiley & Sons, Inc.

WHO. (2021). *Global report on health equity for persons with disabilities*. https://www.who.int/publications/i/item/9789240063600

Winner, E., Goldstein, T., & Vincent-Lancrin, S. (2013). *Art for art's sake?: The impact of arts education*. Educational Research and Innovation. OECD Publishing. https://www.oecd.org/content/dam/oecd/en/publications/reports/2013/06/art-for-art-s-sake_g1g21e09/9789264180789-en.pdf

Žolgar, I., & Stopar, M. L. (2016). Pre-service teachers' confidence in teaching students with visual impairments in inclusive education. *Hrvatska revija za rehabilitacijska istraživanja*, *52*(1), 51–62. https://doi.org/10.31299/hrri.52.1.5

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The Big Five Factors of Personality Traits and Leadership Practices of Academic Department Chairs: A Predictive Study

Mohammed Ali Assiri[1]

This study investigated whether the big five factors of personality traits can predict academic department chairs' leadership practices. The study had a predictive research design; the data were collected from 424 participants in the 2023 academic year, and the instruments of this study were two questionnaires. The study found that the big five factors of personality traits predict the leadership practices of academic department chairs. Two factors of personality traits, conscientiousness and openness to experience, were statistically significant and predicted the practices in modelling leadership. Four factors (agreeableness, conscientiousness, openness to experience, and extroversion) were statistically significant and predicted leadership practices in inspiring a shared vision. Three factors (neuroticism, extroversion, and conscientiousness) were statistically significant and predicted leadership practices in challenging processes. Two factors (conscientiousness and openness to experience) were statistically significant and predicted leadership practices enabling others to act. Three factors (conscientiousness, agreeableness, and openness to experience) were statistically significant and predicted leadership practices encouraging the heart. The study recommended that academic leaders be required to consider personality traits as an important dimension in selecting and assigning academic department chairs and other academic leaders at all levels at higher education institutions.

Keywords: personality traits, leadership practices, academic leader

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Velikih pet dejavnikov osebnostnih lastnosti in prakse vodenja predstojnikov fakultetnih oddelkov: napovedna študija

Mohammed Ali Assiri

Ta študija je ugotavljala, ali lahko velikih pet dejavnikov osebnostnih lastnosti napoveduje prakse vodenja pri predstojnikih fakultetnih oddelkov. Študija je imela napovedni raziskovalni načrt; podatki so bili zbrani prek 424 udeležencev v študijskem letu 2023, instrumenta te študije pa sta bila dva vprašalnika. Študija je pokazala, da velikih pet dejavnikov osebnostnih lastnosti napoveduje prakse vodenja predstojnikov fakultetnih oddelkov. Dva dejavnika osebnostnih lastnosti, tj. vestnost in odprtost za izkušnje, sta bila statistično značilna in sta napovedovala prakse pri zglednem vodenju. Štirje dejavniki (prijetnost, vestnost, odprtost za izkušnje in ekstravertnost) so bili statistično značilni in so napovedovali prakse vodenja pri navdihovanju skupne vizije. Trije dejavniki (nevroticizem, ekstravertiranost in vestnost) so bili statistično značilni in so napovedovali prakse vodenja pri preizpraševanju procesov. Dva dejavnika (vestnost in odprtost za izkušnje) sta bila statistično značilna in sta napovedovala prakse vodenja, ki omogočajo drugim, da ukrepajo. Trije dejavniki (vestnost, prijetnost in odprtost za izkušnje) so bili statistično značilni in so napovedovali vodstvene prakse spodbujanja srčnosti. Študija je priporočila, da bi morali vodje fakultetnih oddelkov upoštevati osebnostne lastnosti kot pomembno dimenzijo pri izbiri in imenovanju predstojnikov teh oddelkov in drugih akademskih vodij na vseh ravneh v visokošolskih ustanovah.

Ključne besede: osebnostne lastnosti, prakse vodenja, akademski vodja

Introduction

Leadership is a complex phenomenon in all organisations, including those in the higher education setting. For many years, philosophers and scholars have attempted to investigate leadership to provide a clear and comprehensive understanding of how it occurs. Leadership has been defined according to the perspectives and backgrounds of these scholars.

Stogdill (1974) reviewed many leadership studies and the body of literature and discovered many different meanings of leadership. Northouse (2018) defined leadership as 'a process whereby an individual influences a group of individuals to achieve a common goal' (p. 5). Yukl (2013) provided this definition: 'leadership has been defined in terms of traits, behaviours, influence, interaction patterns, role relationships, and occupation of an administrative position' (p. 2). Additionally, Bass and Bass (2008) stated that the definition of leadership is broad and can be defined based on many concepts, such as personality, a process, purposeful behaviour, an exercise of influence, power, a differentiated role, and a symbol. Obviously, leadership emphasises three key points: 1) the leader who best affects the followers and encourages them, 2) the followers who follow the leader and trust him, and 3) the leadership processes that include behaviour and strategies that enable an institution to achieve its target goal.

In higher education institutions, academic leadership is more important than ever in organising and managing colleges and universities. Academic leadership influences students' achievement, the quality of the academic programme, the scientific research, faculty and staff performance, and the relationship with the community and stakeholders (Vilkinas et al., 2009). 'To be successful, academic leaders need to develop a broad understanding of how their college or university is structured and functions, and simultaneously understand the loci of decision making on institutional issues' (Hendrickson et al., 2013, p.1). Obviously, academic leaders must acquire knowledge and skills to deal with environmental changes, high competition, and new demands. Academic leadership includes specific tasks, functions, and responsibilities executed by academic leaders' behaviours and actions.

Siddique et al. (2011) found that academic leaders influence their institutions by making them more effective. They serve students better academically, personally, and professionally. Also, academic leaders work to improve the quality of faculty and motivate them. Hendrickson et al. (2013) stated several roles for academic department chairs, including 'creating a culture of adaptation and change, developing a shared vision and mission, embracing conflict toward problem resolution, developing an academic and intellectual community,

fostering growth and professional development, and developing evaluation processes and strategic plans' (p. 295). Gmelch (2019) reviewed many studies conducted in the last three decades, and he identified the most important roles and duties for the academic department chair as follows: 'represent department to administration, maintain conducive work climate, develop long-range goals, recruit and select faculty, enhance quality of teaching, manage department resources, solicit ideas to improve department, evaluate faculty performance, inform faculty of institutional concerns, and teach and advise students' (p. 14). In other words, the department chairs are responsible for leading academic affairs, administrative duties, and moving toward vision and intended goals.

Leadership scholars have endeavoured to study leadership through multiple approaches, including personality traits, behavioural, situational, and leader-and-follower relations (Hughes et al., 2006). Yukl (2013) also added the power-influence approach and integrative approach. These approaches are discussed in many theories developed by scholars to describe the nature of leadership and its consequences. These approaches are also interrelated and interactive. These two approaches are elaborated below to understand and explore what personality traits and behaviours determine leadership in general and higher education.

The personality approach is one of the most important in studying leadership behaviour. In many studies, scholars concentrate on the specific personality traits that clearly differentiate leaders from subordinates (Jago, 1982; Bass & Bass, 2008). Researchers considered the traits approach to explain and justify how personality traits of leaders influence and shape their leadership behaviours (Bryman, 1992; Dinh et al., 2014). More specifically, many researchers are interested in investigating visionary and charismatic leadership (Antonakis & Day, 2018; Bass & Bass, 2008; Bennis & Nanus, 2007; Nadler & Tushman, 2012). The personality trait is a reliable and valid approach for understanding and explaining leadership behaviours.

Personality is 'the dynamic and organized set of characteristics possessed by a person that uniquely influence his or her cognitions, motivations, and behaviours in various situations' (Ryckman, 2008, p. 4). Also, personality is 'the organized pattern of distractive traits of a specific person' (Bass & Bass, 2008, p. 103). Larsen and Buss (2017) wrote that 'the personality is influenced by traits that the person is born with and how they develop over time' (p. 15). Therefore, a person's personality refers to consistent and distinguished differences among individuals.

Researchers have been interested in studying personality and identifying the differences among individuals. Many psychologists and researchers

emphasise that these traits are the most important domain for gaining knowledge about the nature of personality (Amelang et al., 1991; Goldberg, 1993; Larsen & Buss, 2017). There are two ways to define traits. The 'first views traits as the internal properties of persons that cause their behaviours. The second views traits as descriptive summaries of behaviours' (Larsen & Buss, 2017, p. 91). Clearly, traits are characteristics that describe how individuals are different from each other.

Northouse (2018) stated that throughout the twentieth century, researchers conducted many overviews regarding the traits approach. These overviews emphasise that the traits of the leader influence the leadership process. Kirkpatrick and Lock (1991) pointed out that 'it is unequivocally clear that leaders are not like other people' (p. 59). Additionally, several personality traits of leaders were determined, including 'intelligence, insight, responsibility, initiative, persistence, self-confidence, extroversion, cooperativeness, influence, dominance, motivation, integrity, ability, conscientiousness, openness, agreeableness, and emotion' (Northouse, 2018, p. 22). In other words, leaders have different personality traits from followers.

To identify and classify personality traits, researchers provided some personality models, including the hierarchical model, the 16-factor model, the circumplex taxonomy model, and the five-factor model (Larsen & Buss, 2017). In this study, the five factors model will be employed because 1) it has broad traits, 2) it is a persuasive model, 3) and in recent decades, this model has been proven reliable and valid to describe the most important traits of personality (Bass & Bass, 2008).

In recent decades, researchers have studied the basic factors that describe the most significant aspects of personality (McCrae & Costa, 1987; Peabody & Goldberg, 1989; Goldberg, 1993). These basic factors are called 'the big five factors model of personality', which are 1) neuroticism, 2) extraversion, 3) openness to experience, 4) agreeableness, and 5) conscientiousness (Goldberg, 1990; Costa, 1994; Larsen & Buss, 2017). These five factors will be elaborated on the following paragraphs.

Neuroticism refers to the person's tendency to experience worry, insecurity, distress, emotionality, nervousness, and tension (Bass & Bass, 2008; Goldberg, 1990). Neurotic persons are negative and pessimistic (George, 1996; Williams, 1997). Neuroticism includes these facets: 'anxiety, angry hostility, depression, impulsiveness, vulnerability and self-consciousness' (Costa, 1994, p. 228).

Extraversion refers to people who are called enthusiastic, officious, and assertive individuals (Bass & Bass, 2008; Barrick & Mount, 1991, 1993). They are optimistic and positive and see the world favourably (George, 1996). This factor

includes six facets: 'warmth, gregariousness, assertiveness, activity, excitement-seeking and positive emotion' (Costa, 1994, p. 228).

The openness to experience factor refers to people with imagination, creativity, curiosity, and intellect (Bass & Bass, 2008; Goldberg, 1990). These people tend to be creative, informed, and insightful (Goldberg, 1990). This factor's facets are 'fantasy, aesthetics feelings, actions, ideas and values' (Costa, 1994, p. 228).

Agreeableness means that a person tends to be sympathetic, accepting, cooperative, and nurturing (Bass & Bass, 2008; Goldberg, 1990). They are more likely friendly and pleasant. The agreeableness factor includes six facets: 'trust, straightforwardness, altruism, compliance, modesty, and tender mindedness' (Costa, 1994, p. 228).

Conscientiousness refers to persons who tend to be dependable, organised, controlled, responsible, hardworking, efficient, and ambitious (Barrick & Mount, 1991, 1993; Goldberg, 1990). They are more ethical and moral individuals. This factor includes six facets: 'competence, order, dutifulness, achievement striving, self-discipline and deliberation' (Costa, 1994, p. 228).

The leadership behaviour approach relates to the behaviours of leaders, which means 'what leaders do and how they act' (Northouse, 2010, p. 69). The study of leaders' behaviour is a significant approach to understanding the leadership phenomena because 'behaviour is often easier to measure and can be observed' (Hughes et al., 2006, p. 199). Relevant literature and scholars argue the history of the leadership behaviour approach. Yukl (2013) states that 'the behaviour approach began in the early 1950s […] to pay closer attention to what managers actually do on the job' (p. 12). In higher education institutions, Tahiraj and Krek (2022) provide a framework for academic leaders to plan changes to accomplish better outcomes according to organisational culture. This emphasises that leadership behaviour refers to leaders' practices, actions, and styles toward the activities, functions, responsibilities, and demands of the job.

The behaviour approach is rooted in earlier studies at Ohio State University (Hemphill et al., 1951; Hemphill & Coons, 1957; Halpin, 1957; Stogdill, 1963), and University of Michigan (Cartwright & Zander, 1960; Katz & Kahn, 1966; Likert, 1961, 1967). Later, in the 1960s, Blake and Mouton studied leadership behaviour and provided their model, the 'Managerial Grid'. This model was revised and renamed the 'Leadership Grid' (Blake & Mouton, 1964, 1978, 1985; Blake & McCanse, 1991). Clearly, the behaviour approach focuses on the two dimensions of being task-oriented and relations-oriented, which produce different leadership behaviours.

In the last two decades of the twentieth century, a group of scholars

conducted several studies to investigate leadership behaviour. Kouze and Posner conducted research using surveys and questionnaires and analysed many cases of leadership to look into the leadership dynamic. They pointed out five common leadership behaviours or practices, which include '(1) model the way, (2) inspire a shared vision, (3) challenge the process, (4) enable others to act, and (5) encourage the heart' (Kouze & Posner, 2017, p. 12–13). These five practices will be discussed below.

'Model the way' is a significant behaviour for leaders to earn the respect of others. Leaders are required to be a good example. They must align their actions with shared values. Leaders must share values, principles, and beliefs. Their daily actions must demonstrate leaders' values, principles, and beliefs. Model the way enables leaders to win the regard and the right of employees to lead them (Kouze & Posner, 2017).

'Inspire a shared vision' means that leaders must be able to imagine the future and have a vision for their organisations. They must be able to achieve a vision and dream. Leaders see a clear vision and inspiration as tools for movement and change. Leaders must inspire others, share their vision, and encourage them to believe in it. Clear goals, enthusiasm, and communication are important to inspire a shared vision (Kouze & Posner, 2017).

'Challenge the process' concerns innovative things, services, and processes. Leaders need to look outside to change the status quo. They search for new opportunities and improvement. Change requires taking risks, recognising new ideas, embracing these ideas, and accepting challenges. Leaders must learn from their daily actions and practices. They increase the possibility of success and meet challenges (Kouze & Posner, 2017).

'Enable others to act' refers to dreams and goals that teams' actions have achieved. Leaders need to establish good teams by fostering trust, relationships, deep competence, confidence, collaboration, feeling strong, capability, commitment, and accountability. Leaders must engage and involve all individuals in the work environment. Leaders are required to empower others and increase self-determination. These practices enable others to take risks and make changes. Enabling others helps leaders to complete tasks and achieve goals by making that possible for others (Kouze & Posner, 2017).

'Encourage the heart' means leaders must inspire others to carry out their work and duties. The most powerful means to do that is recognition. Leaders must recognise contributions by others and appreciate all individuals' excellence. Also, leaders must acknowledge successful aspects and provide positive feedback and support. This will enhance individuals' morale, contributions, and cooperation. Encouragement enables leaders to link individuals'

performance with rewards. Leaders must ensure that the individuals benefit from their behaviours aligned with the organisation's values (Kouze & Posner, 2017). These five leadership behaviours and practices enable academic leaders to do their best and accomplish the most important things.

The literature and empirical studies indicate that different leadership behaviours and personality traits are linked. Yahay (2011) found that there are relationships between personality types and transformational and transactional leadership. Solaja et al. (2016) found a connection between leadership communication style and personality traits. More specifically, leadership behaviours and styles are related to the big five factors of personality traits as one approach to studying personality. Alkahtani et al. (2011) argued that the big five factors of personality traits were positively correlated between managers' leadership and their lead-changing capabilities. Simic and Ristic (2017) found a statistically significant correlation between the big five factors of personality traits and leadership styles and that the dominant correlation was between transactional leadership and extraversion. Mahdinezhad et al. (2018) revealed that the effective behaviours of academic leaders relate to effective academic leadership in higher education. Zulfqar et al. (2021) discovered that academic leaders' development programmes influence their leadership behaviours and practices. Plainly, personality traits and leadership behaviours influence academic department chairs' actions and practices to carry out their roles and responsibilities.

This body of literature and study findings corroborate that the personality traits of academic department chairs influence their leadership behaviours and practices so that there is no separation between the personality traits and leadership behaviours and practices. Therefore, the purpose of this study was to investigate if the big five factors of personality traits can predict the leadership practices of academic department chairs.

Research Questions

In this study, these questions were answered:

1. To what extent can the big five factors of personality traits predict the leadership practices of academic department chairs in modelling the way?
2. To what extent can the big five factors of personality traits predict the leadership practices of academic department chairs in inspiring a shared vision?
3. To what extent can the big five factors of personality traits predict the leadership practices of academic department chairs in challenging the process?
4. To what extent can the big five factors of personality traits predict the leadership practices of academic department chairs in enabling others to act?

5. To what extent can the big five factors of personality traits predict the leadership practices of academic department chairs in encouraging the heart?

Method

Participants

This study was conducted in Saudi Arabia. The academic department chairs of 28 Saudi Public Universities were the target population of this study for whom 'the researcher wishes to generalise the results of the study' (Ary et al., 2010, p. 149), whereas the accessible population is 'the population of subjects accessible to the researcher for drawing a sample' (Ary et al., 2010, p. 149). The researcher selected universities randomly. Therefore, the accessible population for this study includes all academic department chairs in the following universities: King Abdulazizes University, Imam Mohammed Bin Saud University, King Fasil University, King Kalid University, Tabu University, Jouf University, Majmaah University, and Taif University. Thus, the sample was drawn from the accessible population in these eight selected universities, which includes 423 participants, as described in Table 1.

Table 1
Description of study participants (N = 423)

Variables	Type	*n*	%
Gender	Male	181	43%
	Female	242	57%
Years of Leadership Experience	Less than 5 years	102	24%
	5–10 years	130	31%
	More than 10 years	191	45%
Scientific Degree	Assistant Professor	80	19%
	Associate Professor	212	50%
	Full Professor	131	31%
Total of Participants		423	100%

Instruments

The instrument of this study was a questionnaire. This study used two instruments to collect the data. The first instrument was the Big Five Personality Inventory, designed to measure personality traits. This inventory helped to understand the structure of personality and why leaders act the way they do. The original version of this inventory was developed by Costa and McCrae in

the 1980s and 1990s (Costa & McCrae, 1985, 1992). John et al. (2008) developed the short version of this inventory, which includes '44 items in five dimensions: neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness' (p. 157).

The researcher obtained permission from the authors to use the Big Five Personality Inventory as an instrument in this study for empirical study purposes. Next, the researcher adapted the Big Five Personality Inventory to a short version for academic department chairs. It included 15 items in 5 dimensions: neuroticism (3 items), extraversion (3 items), openness to experience (3 items), agreeableness (3 items), and conscientiousness (3 items). Finally, the rating scale was a five-point scale (disagree, slightly disagree, neutral, slightly agree, agree). This study measured the validity of the developed short form of the Big Five Personality Inventory. The Pearson Correlation Coefficient was used as presented in Table 2. Finally, the reliability was calculated using Cronbach's Alpha for the dimensions in Table 3.

Table 2

Pearson Correlation Coefficient of the Big Five Personality Inventory (N = 423)

Neuroticism		Extraversion		Openness to experience		Agreeableness		Conscientiousness	
Items	The Correlation Coefficient	Items	The Correlation Coefficient	Items	The Correlation Coefficient	Items	The Correlation Coefficient	Items	The Correlation Coefficient
1	0.815**	4	0.877**	7	0.887**	10	0.889**	13	0.974**
2	0.837**	5	0.855**	8	0.919**	11	0.880**	14	0.949**
3	0.391**	6	0.876**	9	0.874**	12	0.889**	15	0.969**
0.507**		0.872**		0.790**		0.899**		0.888**	

** Correlation is significant at the 0.01 level (2-tailed).

Table 3

Cronbach's Alpha Scores for the Reliability of the Big Five Personality Inventory (N = 423)

Dimensions	Number of items	Cronbach's Alpha
Neuroticism	3	0.749
Extraversion	3	0.836
Openness to experience	3	0.872
Agreeableness	3	0.860
Conscientiousness	3	0.902
All items	15	0.908

The second instrument used in this study was the Leadership Practices Inventory (LPI). This instrument is rooted in the earlier work of Kouze and Posner, who investigated leadership practices in science in 1980. They developed this inventory to describe the behaviours that label their practices (Kouze & Posner, 2007, 2012, 2017). 'The Leadership Practices Inventory (LPI) includes 30 items divided into five dimensions: model the way, inspire a shared vision, challenge the process, enable others to act, and encourage the heart. Each dimension consists of 6 items' (Kouze & Posner, 2017, p. 5).

To employ the Leadership Practices Inventory (LPI) as a second instrument in this study, the researcher did the following. First, permission to use this inventory was obtained from the authors. Then, a short version of this inventory was developed to make it a more usable and applicable form for the participants. The short version included 15 items in five dimensions: model the way (3 items), inspire a shared vision (3 items), challenge the process (3 items), enable others to act (3 items) and encourage the heart (3 items). Finally, the rating scale was three-point (seldom, sometimes, always). This short version of the Leadership Practices Inventory (LPI) ensured the correlation between items and dimensions of this inventory. The Pearson Correlation Coefficient was used as presented in Table 4. Lastly, Cronbach's Alpha was calculated to ensure reliability, as presented in Table 5.

Table 4

Pearson Correlation Coefficient of the Leadership Practices Inventory (N = 423)

Model the way		Inspire a shared vision		Challenge the process		Enable others to act		Encourage the heart	
Items	The Correlation Coefficient	Items	The Correlation Coefficient	Items	The Correlation Coefficient	Items	The Correlation Coefficient	Items	The Correlation Coefficient
1	**0.855	4	**0.844	7	**0.851	10	**0.791	13	**0.783
2	**0.933	5	**0.901	8	**0.894	11	**0.823	14	**0.836
3	**0.911	6	**0.755	9	**0.807	12	**0.786	15	**0.862
**0.881		**0.889		**0.852		**0.803		**0.824	

** Correlation is significant at the 0.01 level (2-tailed).

Table 5

Cronbach's Alpha Scores for the Reliability of the Leadership Practices Inventory (N = 423)

Dimensions	Number of items	Cronbach's Alpha
Model the way	3	0.882
Inspire a shared vision	3	0.782
Challenge the process	3	0.805
Enable others to act	3	0.701
Encourage the heart	3	0.713
All items	15	0.928

Research Design

This quantitative study was a predictive research design. The main aim of the predictive study is to investigate 'the extent to which a criterion behaviour pattern can be predicted' (Gall, et al., 2007, p. 421). The predictive research design allows researchers to discover whether multiple variables are linked and determine the magnitude of the correlation between two or more variables (Fraenkel et al., 2012; Warener, 2020). Therefore, the predictive research design is used to predict an existing phenomenon.

This predictive research design includes two variables, 'the variable that is used to make the prediction is called predicator variable, the variable about which the prediction is made is called criterion variable' (Fraenkel et al., 2012, p. 333). In this predictive research design, the predictor variable was independent, while the criterion variable was dependent. This means the degree to which the predictor variable can predict the criterion variable. To achieve the purpose of this study, this predictive research design enables the researcher to investigate the degree to which the big five factors of personality traits can predict the five leadership practices of academic department chairs. Thus, the predictor variable was a personality trait, while the criterion variable was a leadership practice.

The data was collected during the 2023 academic year. These procedures were followed. First, permission was received to use these questionnaires in this study. Second, official permission was obtained to distribute the questionnaires to chosen universities in Saudi Arabia. Third, the online questionnaires were distributed to participants through online links. They clicked on the online links and answered the questionnaires. Fourth, the researcher made the online questionnaire links available for five weeks. Fifth, the participants were sent a reminder message to encourage them to answer the questionnaires. Finally, three weeks later, the researcher closed the online questionnaire links and began a data analysis process.

To analyse the data, descriptive and inferential statistics were used. The frequencies and percentages were computed to describe the participants of the study. Also, the coefficient of correlation was computed to measure the validity of the questionnaires. Then, the Cronbach Alpha was calculated to measure the reliability of the questionnaires. Finally, multiple regression was used to answer the study questions, and the results were reported according to the chosen ($p < .05$) significance level.

Results

This section presents the results that answer the questions of this study:

1. To what extent can the big five factors of personality traits predict the leadership practices of academic department chairs in modelling the way? To answer this question, multiple regression was calculated, and the results were presented in Tables 6 and 7.

Table 6

Model summary of regression analysis between the big five factors of personality traits and the leadership practices in modelling the way (N = 423)

Model	*R*	R^2	*Df*	*F*	*p*
1	.767	.588	5	119.16	*.000

*Regression is significant at the 0.05 level.

Table 6 shows that the overall regression model analysis was statistically significant, F (5, 417) = 119.16, p = .000, R^2 = .588. This means that the big five factors of personality traits as predicator variables positively predict the leadership practices in modelling the way.

Table 7

Model coefficients analysis between the big five factors of personality traits and leadership practices in modelling the way (N = 423)

Predictor Variables	*B*	β	*t*	*p*
Neuroticism	-.033	-.035	-1.053	.293
Extroversion	.070	.070	1.273	.204
Openness to experience	.193	.176	4.023	*.000
Agreeableness	.101	.097	1.544	.123
Conscientiousness	.654	.743	11.855	*.000

* Regression is significant at the 0.05 level

In Table 7, the results revealed the coefficients to look at for each of the predictors separately. The amount of unique variance of predictors is as follows. Two predictor variables were statistically significant and predicted the leadership practices in modelling the way, respectively conscientiousness (β = .743, t = 11.855, p = .000) and openness to experience (β = .176, t = 4.023, p = .000). In contrast, three predictor variables were not statistically significant in predicting the leadership practices in modelling the way that were neuroticism (β = -.035, t = -1.053, p = .293), extroversion (β = .070, t = 1.273, p = .204), and agreeableness (β = .097, t = 1.544, p = .123).

2. To what extent can the big five factors of personality traits predict the leadership practices of academic department chairs in inspiring a shared vision? To answer this question, multiple regression was calculated, and the results were presented in Tables 8 and 9.

Table 8

Model summary of regression analysis between the big five factors of personality traits and the leadership practices in inspiring a shared vision. (N =423)

Model	*R*	R^2	*Df*	*F*	*P*
1	.673	.453	5	69.16	*.000

* Regression is significant at the 0.05 level.

Table 8 displays that the overall regression model analysis was statistically significant, F (5, 417) = 69.16, p = .000, R^2 = .453. This means that the big five factors of personality traits as predicator variables positively predict the leadership practices in inspiring a shared vision.

Table 9

Model coefficients analysis between the big five factors of personality traits and the leadership practices in inspiring a shared vision. (N = 423)

Predictor Variables	*B*	β	*t*	*p*
Neuroticism	-.066	.071	1.842	.066
Extroversion	.201	.201	3.192	*.002
Openness to experience	.176	.161	3.200	*.001
Agreeableness	.395	.381	5.247	*.000
Conscientiousness	.230	.263	3.634	*.000

* Regression is significant at the 0.05 level.

The results in Table 9 display the coefficients of all predictors separately. The amount of unique variance of these predictors is as follows. Four predictor variables were statistically significant and predicted the leadership practices in inspiring a shared vision, respectively agreeableness (β = .381, t = 5.247, p = .000), conscientiousness (β = .263, t = 3.634, p = .000), openness to experience (β = .161, t = 3.200, p = .001), and extroversion (β = .201, t = 3.192, p = .002). In contrast, one predictor variable was not statistically significant in predicting the leadership practices in inspiring a shared vision: neuroticism (β = .071, t = 1.842, p = .066).

3. To what extent can the big five factors of personality traits predict the leadership practices of academic department chairs in challenging the process? To answer this question, multiple regression was used, and the results were presented in Tables 10 and 11.

Table 10

Model summary of regression analysis between the big five factors of personality traits and the leadership practices in challenging the process (N = 423)

Model	*R*	R^2	*Df*	*F*	*p*
1	.492	.242	5	26.673	*.000

* Regression is significant at the 0.05 level.

Table 10 illustrates that the overall regression model analysis was statistically significant, F (5, 417) = 26.673, p = .000, R^2 = .424. This means that the big five factors of personality traits as predicator variables positively predict the leadership practices in challenging the process.

Table 11

Model coefficients analysis between the big five factors of personality traits and the leadership practices in challenging the process (N = 423)

Predictor Variables	*B*	β	*t*	*p*
Neuroticism	.133	.165	3.628	*.000
Extroversion	.135	.155	2.089	*.037
Openness to Experience	.011	.012	.204	.838
Agreeableness	.091	.101	1.185	.237
Conscientiousness	.145	.191	2.242	*.025

* Regression is significant at the 0.05 level.

The results in Table 11 illustrate the coefficients of all predictors separately. The amount of unique variance of these predictors is as follows. Three predictor variables were statistically significant in predicting the leadership practices in challenging the process, respectively neuroticism (β = .165, t = 3.628, p = .000), extroversion (β = .155, t= 2.089, p= .037), and conscientiousness (β = .191, t = 2.242, p = .025). In contrast, two predictor variables were not statistically significant to predict the leadership practices in challenging the process: openness to experience (β = .012, t = .204, p = .838) and agreeableness (β = .101, t = 1.185, p = .237).

4. To what extent can the big five factors of personality traits predict the leadership practices of academic department chairs in enabling others to act? To answer this question, multiple regression was calculated, and the results were presented in Tables 12 and 13.

Table 12

Model summary of regression analysis between the big five factors of personality traits and the leadership practices in enabling others to act (N =423).

Model	*R*	R^2	*Df*	*F*	*p*
1	.448	.201	5	20.998	*.000

* Regression is significant at the 0.05 level.

Table 12 reveals that the overall regression model analysis was statistically significant, F (5, 417) = 20.998, p = .000, R^2 = .448. This finding means that the big five factors of personality traits as predictor variables positively predict leadership practices in enabling others to act.

Table 13

Model coefficients analysis between the big five factors of personality traits and the leadership practices in enabling others to act (N =423).

Predictor Variables	*B*	β	*t*	*p*
Neuroticism	-.196	-.239	-5.131	*.000
Extroversion	.095	.108	1.414	.158
Openness to Experience	.202	.210	4.404	*.000
Agreeableness	.047	.051	.584	.560
Conscientiousness	.319	.414	4.741	*.000

* Regression is significant at the 0.05 level.

The results in Table 13 reveal the coefficients of all predictors separately. The amount of unique variance of these predictors is as follows. Two predictor variables were statistically significant to predict the leadership practices in enabling others to act, respectively conscientiousness (β = .414, t = 4.741, p = .000) and openness to experience (β = .210, t = 4.404, p = .000). While two predictor variables were not statistically significant to predict the leadership practices of enable others to act, extroversion (β = .108, t = 1.414, p = .158), and agreeableness (β = .051, t = .584, p = .560). Neuroticism (β = -.239, t = -5.131, p = .000) was negatively statistically significant in predicting the leadership practices enabling others to act.

5. To what extent can the big five factors of personality traits predict the leadership practices of academic department chairs in encouraging the heart? To answer this question, multiple regression was calculated, and the results were shown in Tables 14 and 15.

Table 14

Model summary of regression analysis between the big five factors of personality traits and the leadership practices in encouraging the heart. (N = 423).

Model	*R*	R^2	*Df*	*F*	*p*
1	.604	.365	5	47.889	*.000

* Regression is significant at the 0.05 level.

Table 14 shows that the overall regression model analysis was statistically significant, F (5, 417) = 47.889, p = .000, R^2 = .365. This finding means that the big five factors of personality traits as predicator variables positively predicted the leadership practices in encouraging the heart.

Table 15

Model coefficients analysis between the big five factors of personality traits and the leadership practices in encouraging the heart. (N =423).

Predictor Variables	*B*	β	*t*	*p*
Neuroticism	-.048	-.092	-2.211	*.028
Extroversion	-.139	-.246	-3.627	*.000
Openness to Experience	.105	.171	3.149	*.002
Agreeableness	.162	.278	3.554	*.000
Conscientiousness	.189	.383	4.942	*.000

* Regression is significant at the 0.05 level.

The results in Table 15 show the coefficients of all predictors separately. The amount of unique variance of these predictors is as follows. Three predictor variables were statistically significant and predicted the leadership practices in encouraging the heart, respectively conscientiousness (β = .383, t = 4.942, p = .000), agreeableness (β = .278, t = 3.554, p = .000), and openness to experience (β = .171, t = 3.149, p = .002). In contrast, two predictor variables were negatively statistically significant and did not predict the leadership practices in encouraging the heart: extroversion (β = -.246, t = -3.627, p = .000) and neuroticism (β = -.092, t = -2.211, p = .028).

Discussion

A body of related literature and several empirical studies highlighted that leaders' personalities have influenced leadership behaviours and practices as a complex phenomenon. In this study, the results showed that the big five factors of personality traits predictor variables predict the leadership practices of academic department chairs. This result is similar to other studies that confirmed that personality traits are related to a variety of leadership behaviours and practices, including transformational and transactional leadership, communication, and lead-changing (Judge et al., 2002; Yahay et al., 2011; Alkahtani et al., 2011; Solaja et al., 2016; Simic & Ristic, 2017). In the context of higher education institutions, this study indicates that the big five factors of personality traits of academic department chairs influence their leadership.

The results indicate that conscientiousness and openness to experience positively and significantly predicted the leadership practices in modelling the way. Academic department chairs practice model the way through respecting others, observing rights, showing a good example, and sharing values and beliefs (Kouze & Posner, 2017). These results are consistent with other studies' results and related literature, which indicate that conscientiousness includes having ideas and values, organisation, control, responsibility, and dutifulness. Openness to experience includes being active, insightful, and curious and requires having imagination and good values (Barrick & Mount, 1991, 1993; Bass & Bass, 2008; Costa, 1994; Goldberg, 1990). It can be remarked that this result is logically parallel to the body of related literature. Thus, it can be concluded that conscientiousness and openness to experience enable academic department chairs to practice model the way in their leadership.

The study found that agreeableness, conscientiousness, openness to experience, and extroversion positively and significantly predicted leadership practices in inspiring a shared vision, which contains many personality

characteristics and traits such as the ability to imagine the future, propose the vision, make change, encourage the team, communicate with others, and have enthusiasm (Kouze & Posner, 2017). These results are similar to previous research results and literature, which conclude that agreeableness, conscientiousness, openness to experience, and extroversion include insightfulness, creativity, imagination, and enthusiasm, optimistic traits that support the academic department chairs to be inspired and visionary (Barrick & Mount, 1991, 1993; Bass & Bass, 2008; Costa, 1994; Goldberg, 1990). Additionally, agreeableness and conscientiousness are the most significant predictors in inspiring a shared vision because the related literature found these two predictors are more related to trust, cooperation, straightforwardness, control, responsibility, hard work, and competence (Bass & Bass, 2008; Costa, 1994).

According to these results, neuroticism, extroversion, and conscientiousness positively and significantly predicted leadership practices in challenging the process. The practices of academic department chairs challenge the process by taking risks, seeking improvement, recognising new ideas, accepting the challenge, learning from daily actions, and increasing success (Kouze & Posner, 2017). These results may indicate that the personality traits neuroticism, extroversion, and conscientiousness support leaders in challenging the process. Other research and literature found that neuroticism relates to vulnerability, worry, and a tendency to experience, and extroversion relates to positivity, gregariousness, and assertiveness. Finally, conscientiousness relates to dependability, control, hard work, and striving to achieve (Barrick & Mount, 1991, 1993; Bass & Bass, 2008; Costa, 1994; Goldberg, 1990).

Two predictor variables positively and significantly predicted the leadership practices in enabling others to act: conscientiousness and openness to experience. For academic department chairs, enabling others to act requires establishing and leading a good team, maintaining truthful relationships, collaborating with others, empowering and encouraging others, and having commitment and accountability (Kouze & Posner, 2012; Kouze & Posner, 2017). Similar to other studies, these results could indicate that these two predicators contain traits that reinforce academic leaders to empower others to act, which indicates that conscientiousness refers to a person who is dependable, ambitious, ethical, and moral, while openness to experience refers to a person who is curious, intellectual, creative, and has ideas (Barrick & Mount, 1991,1993; Bass & Bass, 2008).

Finally, the results revealed that three predictor variables positively significantly predicted the leadership practice in encouraging the heart, including conscientiousness, agreeableness, and openness to experience. Academic

department chairs encourage the heart because they have to appreciate the individual's excellence, provide support and feedback, recognise performance, enhance morale and contributions, and align the benefits with values (Barrick & Mount, 1991, 1993; Bass & Bass, 2008; Costa, 1994; Goldberg, 1990). Such results may indicate that these three personality traits enable academic leaders to continue to encourage the heart in their leadership practices, which are consistent with the results of other studies and research, which confirmed that conscientiousness relates to being organised and ethical as well as to morale and efficiency; agreeableness includes cooperativeness, trust, and altruism; and openness to experience relates to ethics, values, and feelings (Barrick & Mount, 1991, 1993; Bass & Bass, 2008; Costa, 1994; Goldberg, 1990).

Conclusion

This study examined whether the big five factors of personality traits can predict leadership practices of academic department chairs. The main conclusion is that they significantly predicted the leadership practices of academic department chairs. Additionally, the study revealed that the big five factors of personality traits differed in their ability to predict leadership practices. This conclusion indicates that the impact of personality traits has varied in each leadership practice.

Based on the study's results, academic leaders must consider personality traits as an important dimension when selecting and assigning academic department chairs and other academic leaders at all levels at higher education institutions. Moreover, further research must be conducted to understand personality traits and leadership practices better. It could be useful to conduct a deep study about the impact of the facets of each of these big five factors of personality traits on leadership practices. Further studies are needed to examine the influence of new variables, such as gender and age, on the correlation between the big five factors of personality traits and leadership practices.

Disclosure statement

The author has no conflict of interest to declare.

References

Alkahtan, A., Abu-Jarad, I., & Sulaiman, M. (2011). The impact of personality and leadership styles on leading change capability of Malaysian Managers. *Australian Journal of Business and Management Research*, *1*(2), 70–99. http://www.ajbmr.com/articlepdf/ajbmr_vo1no2_06.pdf

Amelang, M., Herboth, G., & Oefner, I. (1991). A prototype strategy for the construction of a creativity scale. *European Journal of Personality, 5*(4), 261–285. https://doi.org/10.1002/per.2410050402

Antonakis, J., & Day, D. (2018). *The nature of leadership*. SAGE.

Ary, D., Jacobs, L., Sorensen, C., & Razavieh, A. (2010). *Introduction to research in education*. Wadsworth.

Barrick, M., & Mount, M. (1991). The big five personality dimensions and job performance: A meta-analysis. *Personnel Psychology, 44*(1), 1–26.

Barrick, M. & Mount, M. (1993). Autonomy as a moderator of the relationship between the big five personality dimensions and job performance. *Journal of Applied Psychology, 78*(1), 111–118.

Bass, B., & Bass, R. (2008). *The Bass Handbook of leadership, theory research & managerial applications.* Free Press.

Bennis, W., & Nanus, B. (2007). *Leaders: the strategies for taking charge*. Harper Business.

Blake, R., & McCanse, A. (1991). *Leadership dilemmas-grid solutions*. Gulf.

Blake, R., & Mouton, J. (1964). *The managerial gird*. Gulf.

Blake, R., & Mouton, J. (1978). *The new managerial gird*. Gulf.

Blake, R., & Mouton, J. (1985). *The new managerial gird III*. Gulf.

Bryman, A. (1992). *Charisma and leadership in organizations*. Sage.

Cartwright, D., & Zander, A. (1960). *Group dynamics: Research and theory*. Evanston, Row Peterson.

Costa, P. (1994, July). *Work and personality: Use of the NEO PI-R in industrial/organizational psychology* [Paper presentation]. International Congress of Applied Psychology 1994, Madrid, Spain.

Costa, P., & McCrae, R. (1985). *The neo personality inventory manual*. Psychological Assessment Resources.

Costa, P., & McCrae, R. (1992). Four ways five factors are basic. *Journal of Personality and Individual Differences, 13*(6), 653–665. https://doi.org/10.1016/0191-8869(92)90236-I

Dinh, J., Lord, R., Gardner, W., Meuser, J., Liden, R., & Hu, J. (2014). Leadership theory and research in the new millennium: Current theoretical trends and changing perspectives. *The Leadership Quarterly, 25*(1), 36–62. https://doi.org/10.1016/j.leaqua.2013.11.005

Fraenkel, J., Wallen, N., & Hyun, H. (2012). *How to design and evaluate research in education.* McGraw Hill.

Gall, M., Gall, J., & Borg, R. (2007). *Educational research: An introduction*. Pearson Education.

George, J. (1996). Trait and state affect. In K. Murphy (Ed.), *Individual differences and behavior* (pp. 145–171). Jossey-Bass.

Gmelch, W. (2019). The call for department chair leadership: why chairs serve, what they do, how they develop, how long they serve, and is there life after chairing. *International Journal of Leadership and Change, 7*(1), 9–19. https://digitalcommons.wku.edu/ijlc/vol7/iss1/1

Goldberg, L. (1990). An alternative description of personality: The big-five factor structure. *Journal of Personality and Social Psychology, 59,* 1216–1229.

Goldberg, L. (1993). The structure of phenotypic personality traits. *American Psychologist, 48,* 26–34.

Halpin, A. (1957). The observed leader behavior and ideal leader behavior of aircraft commanders and school superintendents. In R. M. Stogdill & A. E. Coons (Eds.), *Leader behavior. Its description and measurement.* Ohio State University: Bureau of Business Research.

Hemphill, J., & Coons, A. (1957). Development of the leader behavior description questionnaire. In R. M. Stogdill & A. E. Coons (Eds.), *Leader behavior: Its description and measurement.* Ohio State University: Bureau of Business Research.

Hemphill, J., Seigel, A., & Westie, C. (1951). *An exploratory study of relations between perceptions of leader behavior, group characteristics, and expectations concerning the behavior of ideal leaders.* Ohio State University: Personnel Research Board.

Hendrickson, R., Lane, J, Harris, J., & Dorman, R. (2013). *Academic leadership and governance of higher education*. Stylus.

Hughes, R., Ginnett, R., & Curphy, G. (2006). *Leadership enhancing the lessons of experience.* McGraw-Hill.

Jago, A. (1982). *Leadership: Perspectives in theory and research. Management Science, 28*(3), 315–336.

John, O., Naumann, L., & Soto, C. (2008). Paradigm shift to the integrative big five trait taxonomy: History, measurement, and conceptual issues. In O. P. John, R. W. Robins, & L. A. Pervin (Eds.), *Handbook of personality: Theory and research* (pp. 114–158). Guilford.

Judge, T., Bono, J., Ilies, R., & Gerhardt, M. (2002). Personality and leadership: A qualitative and quantitative review. *Journal of Applied Psychology, 87,* 765–780.

Katz, D., & Kahn, R. (1966). *The social psychology of organizations*. Wiley.

Kirkpatrick, S., & Locke, E. (1991). Leadership: Do traits matter. *The Executive, 5*, 48–60.

Kouze, J., & Posner, P. (2007). *The leadership challenge*. Jossey-Bass.

Kouze, J., & Posner, P. (2012). *The leadership challenge*. Jossey-Bass.

Kouze, J., & Posner, P. (2017). *LPI: Leadership practice inventory*. https://2u.pw/zGdFNoq

Kouze, J., & Posner, P. (2017). *The leadership challenge*. Jossey-Bass.

Larsen, R., & Buss, D. (2017). *Personality psychology: Domains of knowledge about human nature.* McGraw Hill.

Likert, R. (1961). An emerging theory of organizations, leadership and management. In L. Petrullo & B. M. Bass (Eds.), *Leadership and interpersonal behavior*. Holt Rinehart & Winston.

Likert, R. (1967). *The human organization*. McGraw-Hill.

Mahdinezhad, M., Mansor, M., Rmbeli, N., Hashim, E., & Shahhosseini, M. (2018). Effective Academic Leadership: Key Aspects of Leader Behavior in Higher Education. *International Journal of Academic Research in Business and Social Sciences, 8*(9), 657–665. http://dx.doi.org/10.6007/IJARBSS/v8-i9/4646

McCrae, R., & Costa, P. (1987). Validation of the five-factor model of personality across instruments and observers. *Journal of Personality and Social Psychology, 52*, 81–90.

Nadler, D., & Tushman, M. (2012). *Leadership for organizational change*. Jossey-Bass.

Northouse, P. (2010). *Leadership: Theory and practice*. SAGE.

Northouse, P. (2018). *Leadership: Theory and practice*. SAGE.

Peabody, D., & Goldberg, L. (1989). Some determinants of factor structures from personality-trait descriptors. *Journal of Personality and Social Psychology, 57*, 552–567.

Ryckman, R. (2008). *Theories of personality*. Thomson Wadsworth.

Simic, J., & Ristic, M. (2017). The Relationship between personality traits and managers leadership styles. *European Journal of Social Sciences Education and Research, 11*(2), 195–200.

Siddique, M., Aslam, H., Khan, M., & Fatima, M. (2011). Impact of academic leadership on faculty's motivation, and organizational effectiveness in higher education system. *International Journal of Business and Social Science, 2*(8), 184–191.

Solaja, O., Idowu, F., & James, A. (2016). Exploring the relationship between leadership communication style, personality traits and organizational productivity. *Serbian Journal of Management, 11*(1), 99–117.

Stogdill, R. (1963). *Manual for the Leader Behavior Description Questionnaire form XII.* Ohio State University: Bureau of Business Research.

Stogdill, R. (1974). *Handbook of leadership: A survey of theory and research*. Free Press.

Tahiraj, I., & Krek, J. (2022). Organizational culture in public university: A case study in Kosovo. *Center for Educational Policy Studies Journal, 12*(3), 127–147. https://doi.org/10.26529/cepsj.1198

Vilkinas, T., Ladyshewsky, R., & Saebel, J. (2009). *Academic leadership: building capacity*. Learning and Change Teaching Council.

Warener, R. (2020). *Applied Statistics I: Basic Bivariate Techniques*. SAGE.

Williams, S. (1997). Personality and self-leadership. *Human Resource Management Review, 7*, 139–155.

Yahaya, N., Taib, M., Ismail, J., Shariff, Z., Yahaya, A., Boon, Y., & Hashim, S. (2011). Relationship between leadership personality types and source of power and leadership styles among managers. *African Journal of Business Management, 5*(22), 9635–9648.

Yukl, G. (2013). *Leadership in organizations*. Pearson.

Zulfqar, A., Valcke, M., Quraishi, U., & Devos, G. (2021). Developing academic leaders: evaluation of a leadership development intervention in higher education. *SAGE Open, 11*(1), 1–15.

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Milena Košak Babuder, Vesna Bilić, Nika Obed, Tanja Virant and Milena Valenčič Zuljan, *Učenci s posebnimi potrebami in medvrstniško nasilje* [*Special Needs Students and Peer Violence*], Faculty of Education, University of Ljubljana, 2024; 248 pp.: ISBN: 978-961-253-322-9

Reviewed by Nevenka Maras[1]

The problem of peer violence is an intriguing and frequent subject of scientific research and study, but the problem of violence among special needs children is rather neglected in this respect. In the literature, the problems of special needs children are often identified as risk factors regarding peer victimisation. Their negative experiences reflect in turn on their primary difficulties and school success, making them, in a sense, doubly at risk. Due to their vulnerability and lack of developed resources to successfully cope with traumatic experiences, this group of children deserves special attention and protection; there is a need to sensitise both the public and professionals towards their problems. We believe that the book *Učenci s posebnimi potrebami in medvrstniško nasilje* (Special Needs Students and Peer Violence) contributes significantly to successfully dealing with these problems, as the problems that special needs children face in their relationships with peers are explicitly defined and supported by scientific evidence, which is fundamentally important when it comes to prevention and intervention in schools.

The monograph is structured in two broad thematic units that include theoretical discussion and present the results of the empirical research conducted. The first part provides general definitions and outlines the conceptualisation and description of types of violence at schools (violence of parents towards teachers, violence among teachers, etc.). Attention is then directed towards peer violence and its forms, characteristics, risk factors and consequences. A

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very important section refers to addressing peer violence on the level of the education system and schools, and to the role of teachers dealing with the problem of peer violence.

Violence against special needs children is discussed in a separate section. The introduction highlights how often certain groups of special needs children are exposed to violence (children with pronunciation difficulties and language disorder or autistic spectrum disorder; hearing or sight impaired children; children with intellectual and learning difficulties or ADHD; children with chronic diseases). Prevalence data about the exposure of special needs children to various classic forms of violence (physical, verbal, relational and sexual) and electronic violence are analysed, and it is determined that these groups are more often exposed to peer violence in their schools than their peers without special needs. Although children with special needs are most often the victims of peer violence, the authors of the monograph suggest, based on the relevant literature, that they are in fact sometimes the perpetrators, and that they are even more frequently found in the role of perpetrator-victim. The results of the research reveal the severity of the problem, and the focus is therefore on the potential risk factors (familiar, school and social), especially the individual factors (the children's visible outer and behavioural features, social skills deficits, few or no friends, and lack of peer support) that often lead to victimisation.

The prevalence data give the impression that cruelty is part of the everyday life of special needs children, which is why reducing peer violence is a priority in schools, with the teacher's role being especially important in this respect. Consequently, there is a separate chapter on the competence of teachers to cope with peer violence, i.e., various factors are analysed that predict how successful teachers cope with peer violence among children. The chapter includes discussion of teachers' professional qualities and their ability to act, and offers insight into the acquired skills that teachers need to successfully solve the problems of peer violence in both the real and virtual worlds.

After the theoretical part, the next two chapters present the results of qualitative and quantitative research, which represents the added value of this book and its special contribution.

The main goal of the quantitative research was to analyse the experiences of teachers and special and rehabilitation pedagogues in primary schools in Slovenia regarding their recognition of and reactions to peer violence, especially when it is directed towards special needs students, in order to gain an insight into their assessed level of competence.

The results show that most of the research participants had encountered peer violence (82%), and 61.1% had intervened actively, i.e., they had reacted to

witnessed violence, stopped it and similar. The research established that perception of the severity of the violence is influenced more by its form than by the student's status (whether he/she is a special needs child or not) or the professional orientation of the participating professional (rehabilitation pedagogue or teacher). When it comes to the forms of peer violence, relational violence is perceived as the least serious, as confirmed by other research, and the participants are less likely to intervene in cases of relational violence. Interestingly, the research participants assessed electronic violence as the most serious form. Furthermore, the research results suggest that teachers' reactions are influenced to a high degree by their perception of the seriousness of the peer violence incident. The research participants typically use active strategies when dealing with direct forms of peer violence (physical, verbal), including individual or group conversations with students or informing the school administration, whereas they mostly ignore cases of indirect violence, especially relational violence. Furthermore, it was established for all of the participants that they are more likely to react in cases of violent behaviour involving special needs students, who objectively need more help and support.

With regard to perception of competence, there were no differences between the research participants regarding gender, age, occupation or personal involvement in violent incidents during their education. They estimate that they are most competent when it comes to recognising students' roles in different forms of violence, and least competent when it comes to electronic violence, which is the domain in which they also feel least efficient. Discussing these results, the authors claim that it is expected that participants feel less competent and efficient in cases of electronic violence, as this is a new form of violence that, due to advancing technology, has various modalities and requires additional knowledge and new methodological approaches.

The participants acquire competences for recognising and reacting to peer violence through solving specific cases of peer violence in cooperation with professionals and colleagues from other schools; only very rarely do they attribute these competences to their university education. Discussing the results, the authors point out that peer violence content is not an obligatory part of programmes intended to prepare future teachers for their everyday confrontation with unpleasant situations among peers and for implementing preventive activities.

The way teachers and other education professionals cope with peer violence is determined by their opinions and beliefs. The research participants mostly agreed with the statement that peer violence can be prevented by persistent pedagogical work in class and school, which additionally confirms that

they are well aware of the important role they play. The participants mostly disagreed with the statement that violence among students does not affect their school success, which implies knowledge about the possible consequences of this form of violence. The authors postulate negative consequences of different beliefs and opinions, which is why students receive significantly less help from adults.

As expected, the research participants mostly strongly and expressly sympathise with students who are involved in cases of peer violence. The least empathy was expressed in cases of relational violence and the most empathy in cases of electronical violence. Only the most relevant results of this complex and important research are presented here.

In their effort to gain a more complete and deeper insight into the experiences of special needs children regarding their involvement in peer violence, and to acquire valuable information in this regard, the authors also conducted qualitative research. As the authors themselves explain, the qualitative method was chosen because some children – such as those with writing, reading or comprehension difficulties, or problems understanding complex social situations and similar – find it difficult to participate in quantitative research. Furthermore, this research approach was considered especially suitable for understanding meaning and interpreting subjective, often unpleasant experiences of vulnerable groups due to its fluidity and flexibility. The authors also included children's parents in the research, as their goal was to analyse the problem from different perspectives. All of the participants were from Croatia.

It was established that special needs children are exposed to all of the forms of peer violence mentioned in the introductory part. They often experience not only physical violence from their peers, but are subject to verbal violence almost every day as well. However, the most frequent and apparently painful form is relational violence that includes direct (caricaturing behaviour and making fun of somebody's flaws) and indirect (ignoring and isolating) forms of violence aimed at making other children laugh at the victim, develop negative attitudes towards them or even hurt or deconcentrate them. Although it is rarely mentioned, the research results show that special needs children and teenagers are exposed to sexual violence from their peers as well. In this regard, they described their painful experiences, e.g., touching of their intimate parts, being ridiculed when they cannot defend themselves or escape since they are in a wheelchair. Stealing passwords, identity theft and social network misuse are more common in special needs groups, which the victims themselves attribute to their low computer literacy and their inability to protect themselves and recognise bad intentions, as well as their need to connect with their peers who ask

various favours of them (sharing passwords and similar). Even though parents know that their children are exposed to peer violence, they are not aware of the fact that they experience sexual and electronic violence as well. The research participants themselves state that they are not only victims of peer violence, but that some of them behave violently and in an unfriendly way towards their peers, provoking, teasing or irritating them, which causes a violent response that they in turn react to violently, thus placing themselves in the perpetrator-victim group.

Although special needs children have a strong desire to make friends with their peers, they have considerable problems achieving this. For some of them, it is mostly the lack of interactions and mutual understanding, caused by their primary difficulty, that creates distance between them and their peers, resulting in their feeling hurt and rejected. If they succeed in befriending their peers, this protects them from peer violence. In conclusion, the authors emphasise the necessity to teach this group of children how to build friendship with their peers, which could have a positive influence on their sense of satisfaction and success.

Special needs children and teenagers describe their reactions to violent situations as *'bitter experiences'* accompanied with feelings of *'deep hurt and injustice'* that are hard to forget, stating that they have had *'nightmares'* due to these experiences and have even acted in a self-destructive way sometimes. After violent experiences, parents notice that their children feel sad and afraid, and they themselves feel very angry. The research results imply that both children and their parents are dissatisfied with the support they receive in society and in educational institutions when it comes to special needs children.

On the theoretical and cognitive level, the importance of this monograph lies in the systematisation of the quantitative research results about the incidence of peer violence among special needs children, and the analysis of the forms of violence depending on the type of difficulty. The combination of theoretical and empirical research provides an insight into how much special needs children suffer in interactions with their peers, thus expanding our knowledge of their inner emotions and experiences caused by their peers' violent behaviour. It is therefore the concept of this book that provides a deeper, more complete and comprehensive depiction of special needs children and their experiences with the phenomenon of peer violence.

In conclusion, the authors state that children who are different (whether in their appearance, behaviour or speech, etc.) and who have communicative difficulties and underdeveloped social skills mostly find it difficult to be accepted by other children and are more likely to be misunderstood, stigmatised and

victimised. The peers of these children view their characteristics as weaknesses, and their sensitivity and vulnerability is often a trigger for violent behaviour. The victimisation they experience influences their confidence in a negative way, resulting in increased anxiety and withdrawal from social interactions in order to protect themselves from more unpleasant experiences. All of this has a negative effect on their emotional and social life and amplifies their primary difficulties. Such experiences are perceived as extremely painful by both the children and their parents, who believe that these problems are far too rarely spoken about and even more rarely dealt with appropriately in educational institutions. The authors emphasise the role and competence of teachers who recognise negative interactions early and do not allow those behavioural patterns to become common among their students. It is therefore important to train teachers to develop constructive strategies of creating and maintaining positive and friendly relationships between peers, but also to develop their assertive skills and encourage proactive coping with unpleasant experiences. In order for teachers to be able to respond to children's needs adequately and protect them from violence, it is necessary to invest in training, additional educational programmes and professional development.

The present monograph is intended for students of teacher education faculties, teacher practitioners and all those who analyse and research educational practices in order to better understand special needs children in their interaction with their peers. It will also be useful for creators of education policies, enabling them to proactively create the preconditions for implementing quality programmes in which the subject of preventing peer violence against special needs children is considered indispensable.

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