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LEARNING ENVIRONMENT VARIABLES AND THE EFFICACY OF STUDENT LEARNING IN SECONDARY SCHOOL IN ABAK LOCAL GOVERNMENT, AKWA IBOM STATE

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Abstract/Izvleček Four research questions and four null hypotheses were formulated to guide the study. A simple random sampling technique was used in selecting 34 respondents from each 6 schools, with a sample size of 204 was selected from the population of 1,518. The instrument titled LEVSLEQ was used to elicit response from the respondent. The reliability of the research instrument yielded a co-efficient of 0.82. The data was analyzed using dependent t-test and was tested at .05 level of significance. The findings indicated that environmental variable studied influence students' learning effectiveness.

Spremenljivke učnega okolja in učinkovitost učenja srednješolcev v lokalni skupnosti Abak, država Akwa

Za usmerjanje raziskave smo oblikovali štiri ničelne hipoteze. Iz vsake od 6 šol smo s tehniko enostavnega naključnega vzorčenja izbrali po 34 respondentov in tako iz populacije 1518 učencev pridobili vzorec z 204 učenci. Za pridobitev odziva od respondentov je bil uporanljen instrument imenovan LEVSLEQ. Zanesljivost raziskovalnega instrumenta je dala koeficient 0,82. Podatke smo analizirali z uporabo t-testa za odvisne vzorce in preizkusili na ravni značilnosti v višini 0,05. Ugotovitve so pokazale, da okoljske spremenljivke vplivajo na učno učinkovitost učencev.

Keywords:
Learning, Environment, Learning Effectiveness, Students', Variables

Ključne besede:
učenje, okolje, učna učinkovitost, učenci, spremenljivke

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Introduction

Education is the process in which an individual acquires physical and social capabilities demanded by the society in which he/she is born into, so as to be useful and contribute to the development of the society at large. Education is the most important component of human resource development and is accorded a pride in many countries for developmental activities. There is no doubt that the importance of education cannot be overstated because there is no country that has succeeded without educating its people. Education is an instrument for the acquisition of appropriate skills, ability and competence both mental and physical also as equipment for individual to live and contribute to the development of his/her society (Lawal, 2003).

Learning environment has been defined in many ways by many authors a few decades ago, in relation to where effective academic learning can take place. Environment is defined by Freiberg (1999) as an aspect of the filed in which an individual functions. Academic environment therefore means a place where academic instructions are given by teachers to the learners and physical plants; faculty relations; leadership and decision making; environment that is welcoming and conducive for learning; environment that promotes communication and interactions; environment that promotes a sense of belonging and self-esteem and the environment that promotes learning and self-fulfillment which can make an individual face later academic tasks (Cotton, 2001).

Teaching and learning is a complex task which involves the process of bringing out from the learners the desirable change in behaviour through critical thinking. This process, however, does not take place in vacuum but in a structured environment to facilitate learning. Teachers need to ensure that their teaching techniques are effective so that their students are able to grasp what was being imparted to them during teaching and learning process.

It has been observed in the recent past that secondary school students in Nigeria are not living up to expectation in delivering quality results expected by the system. A lot of problems seem to be bedeviling the secondary school system there by making the system ineffective. Learning needs to be effectively impactful to students at every point in time when they are exposed to learning activities.

Learning effectiveness in this context refers to the extent to which learners can accomplish their pre-determined objectives. Learning effectiveness transcends beyond students passing final examinations. It also encompasses students' attainment in other domains of learning (the affective and the psychomotor domains). According to Bandele (2002), these other domains, apart from having influence on the cognitive achievement, also make the beneficiary of the education system live a fulfilled life and contribute meaningfully to the development of the society. The author argued that any deviation from these goals is a deviation from government's policy on education.

Teaching-learning interactive feedback is necessary in evaluating the level of understanding among the learners. Teachers must interact meaningfully with learners during lesson period. According to Freiberg (1999) where there is no vibrant and observable interaction between the teachers and learner, it could be deduced that learning has not taken place. He also opines that efficient teachers can make difficulties subjects look simple and interesting to the learners to understand without much stress.

Lowestein (1972) summits that the study of neurology reveals that, classroom challenges and feedback such as demonstrating method, questioning, and answering between teachers and learners can stimulate effective learning when classroom size is larger enough to accommodate learning. Appropriate use of teaching methods as well as usage of appropriate teaching aids and instructional materials have been claimed to contribute essentially to stimulating learning environment in school setting (Fraser, 2002). When classroom is large, where is tendency for the teacher to go round and inspect learner's works. A teacher can easily demonstrate his lessons by using any type of teaching aids which will improve the learners' effectiveness.

Adequate learning facilities are necessary for promoting effective learning. According to Anderson (1993), facilities such as comfortable writing desks and seats, decent and sizeable classroom blocks which are properly ventilated and illuminated can stimulate the learners towards learning effectively. Effective learning cannot take place without adequate learning facilities. Accounting to Sunday (2008), adequate learning facilities in school include well equip science laboratories and computer laboratories, library resources, geographical garden, ventilated and well illuminated classrooms can improve the way in which learners learn.

Slavin (1004) emphasizes that a school learning environment must be established at a noise free area, such environment should be carefully selected so that the students' attention may be not be distracted unnecessarily. School location needs to be large enough to accommodate games and sports recreation facilities for learners to interactive with in other to increase their psycho-motor skills. In another contribution any school that is located near market square is bound to suffer direct source of noise pollution. According to Denga (2002) who states that, the learners' attention is often drawn to where noise source is perceived and it causes distraction of concentration from effective reading activities. This is sometimes known as attention process by many educational learning psychologists. Noise becomes disturbing when its echo over-powers individuals' internal auditory barriers inside the inner ear system. In such cases the learners reading attention span get disturbed.

Based on these variables on students, there is need to examine the influence of learning environment variables on students learning effectiveness in Abak Local Government Area of Akwa Ibom State.

Purpose of the study

The main purpose of this study was to examine the influence of learning environment variables on students' learning effectiveness in Abak Local Government Area of Akwa Ibom State specifically, the study aimed at examining:

i. The effect of teacher-learners interactive feedback on students' learning effectiveness in secondary school.
ii. The effect of classroom size on students' learning effectiveness in secondary school.
iii. The impact of availability of learning facilities on students' learning effectiveness in secondary school.
iv. The impact of school location on students' learning effectiveness in secondary school.

Research Questions

In this study, the following research questions were raised to guide the study.

i. Do teacher-learners' interactive feedback as a significant relationship on learning effectiveness of secondary school students?
ii. How does classroom size as a significant relationship with students' learning effectiveness of secondary school students?
iii. Is there any significant relationship between availability of learning facilities on students' learning effectiveness of secondary school students?
iv. Is there any significant relationship between school location on students' learning effectiveness of secondary school students?

Research Hypotheses

In this study, four null hypotheses were raised and tested at 0.05 level of significance

i. There is no significant relationship between teacher-learners' interactive feedback on students' learning effectiveness of secondary school students.
ii. There is no significant relationship between classroom size on students' learning effectiveness of secondary school students.
iii. There is no significant relationship between available learning facilities on students' learning effectiveness of secondary school students.
iv. There is no significant influence of relationship between school location on students' learning effectiveness of secondary school students.

Significance of the study

This study is one that is highly desirable and important as its findings would be useful to students', teachers, school administrators, government and to guidance counsellors that are interested in education. The findings in this study would be beneficial in the following ways:

The result of this finding Would suggest ways in which classroom lesson could be made more interacting in order to encourage teacher-learners interactive feedback, Suggest ways in which new classroom blocks should be designed and equipped in order to promote students' learning effectiveness and also Suggest the types of classroom facilities, quality science and computer laboratory and library resources, to be provided in each public secondary school to and students' learning effectiveness.

The result of the study would be useful to school administrators and teachers by seeing the effect of making use of appropriate teaching aids for effective teaching and learning. It would also suggest to the government to build larger library blocks in each school, equip them, and employ active librarians to attend students. This would promote better study habits in the students. Also, the result of the study would be recommended to the government to always established schools at where there is least noise pollution. Finally, the result would suggest group counselling for secondary school students at regular bases on effective learning development.

Methodology

The researcher adopted the relational survey research design. This design enabled the researcher to reach out to selected secondary schools in the study area. It also allowed for investigation the extent of influence of teaching-learning interactive feedback, classroom size, available learning facilities as well as school location on learning effectiveness of secondary school students. With the use of this design, the researcher could select sample to present a population which was considered large. The sample of this study consisted of 204 Senior Secondary School Two (SS2) students would range from age 12-16 from six public secondary schools were randomly selected. In each sampled school, 34 students were selected to take part as respondents.

Instrumentation

The researcher developed an instrument for data collection called "learning environment variables and students learning effectiveness questionnaire (LEVSLEQ)". Experts in Test and Evaluation in the Department of Educational Foundation, Guidance and Counseling, Faculty of Education, University of Uyo,

critically scrutinized the contents of the questionnaire. The validators effected necessary corrections on the draft copy before accepting it suitable for further procedures. The questionnaire comprised of two sections, A and B. Section A comprised of items on the personal data of the respondent while, section B comprised of 29 items on study habits, with a breakdown of five items teaching-learning interactive feedback six items on the classroom size, six items on available learning facilities, six items, school location, six items and five items on learning effectiveness. The instrument had a 4–point rating scale as follows: Strongly Agree (SA) = 4, Agree (A) = 3, Disagree (D) = 2, Strongly Disagree (SD) = 1.

Result presentation

Item-by-Item Analysis of Research Questions

Answer of Research 1: Items on Teacher-Learners' Interactive Feedback

Mean and standard deviation was used in answering this question; the result of the analysis is as presented in table 1:

Table 1: Mean scores of the respondent on Teacher-Learners' Interactive Feedback (N=204)

S/N	Teacher-Learners' Interactive Feedback	SA	A	D	SD	M	SD	Remark
1.	I think faster when the teacher throws questions at me seeking answers.	96	396	76	10	3.21	0.73	Agreed
2.	I sometimes feel uncertain of my answers to teachers' questions during lesson interaction.	72	348	106	17	3.14	0.60	Agreed
3.	Interactive learning challenged me in the classroom.	81	321	96	22	3.79	0.65	Agreed
4.	Teaching-learning interactions make lessons becomes clearer and interesting.	164	399	48	8	3.15	0.76	Agreed
5.	My calculations become faster when mental sums are taught by my teacher.	224	363	32	11	3.51	0.70	Agreed
6.	The entire class becomes dull when there is no teaching-learning interaction during lessons.	248	354	28	10	3.92	0.62	Agreed
	Cluster Mean					3.45	0.68	

Data is Table 1 show the mean response of students on teaching-learning interactive. The mean score of 3.21 for item 1 indicates that the respondents agreed that they think faster when teacher throws question at them. The mean score of 3.14 for item 2 indicates that the respondents agreed that they feel uncertain when they were answered questions during teaching and learning. Item 3 with a mean score of 3.79 indicates that the respondents mostly agreed that class interaction challenges them. Item 4 with a mean score of 3.15 also indicates that the respondents agreed that class

interaction between them and their teachers' makes lesson clearer and interesting. The mean score of 3.51 for item 5 indicates that the respondents agreed that when mental sums are taught calculations becomes faster to them. Item 6 with a mean score of 3.92 indicated that the respondents agreed that class becomes dull when there is no interaction between them and their teachers. However, the grand mean of 3.45 for all the items indicate that the respondents agreed to a great extent that teacher-learners' interactive feedback helps them in learning effectively.

Answer of Research 2: Items on Classroom Size

Mean and standard deviation was used in answering this question; the result of the analysis is as presented in Table 2:

Table 2: Mean scores of the respondent on Classroom Size (N=204)

S/N	Classroom Size	SA	A	D	SD	M	SD	Remark
7.	Our classroom is too small for demonstration learning	44	312	138	20	3.24	0.73	Agreed
8.	Our Classroom is very large to enhance dramatizing lesson	96	294	122	21	3.62	0.95	Agreed
9.	Our classroom is spacious; it allows free flow of air to enhance effective demonstration learning.	72	336	114	17	3.73	0.78	Agreed
10.	Small classroom space is usually too stuffy to facilitate effective demonstration learning.	252	267	58	23	3.65	0.76	Agreed
11.	Our spacious classrooms are well illuminated, which Facilitates successful demonstration learning.	240	276	80	12	3.85	0.75	Agreed
12.	Our classrooms are too dark for meaningful learning through demonstration methods.	208	294	66	21	3.66	0.69	Agreed
	Cluster Mean					3.63	0.78	Agreed

Data in Table 2 show the mean response of students on their classroom size. The mean score of 3.24 for item 7 indicates that the respondents agreed that they learn less because of how small their class is. The mean score of 3.62 for item 8 indicate that the respondents agreed that they learn faster because of their classroom is large for dramatizing due lessons. Item 9 with a mean score of 3.73 also indicates that the respondents agreed that spacious classroom enhanced free airflow. The mean score of 3.65 for item 10 indicate that, the respondents agreed that small classroom is too stuffy for effective learning. The means score of 3.85 for items 11 indicate that, the respondents agreed that illuminated classroom aids there learning. Item 12 with mean score of 3.66 also indicates that, the respondents agreed that their classroom is dark and as such they can't learn effectively. However, the grand mean of 3.63 for

all items indicate that the respondents agreed to a great extent agreed that their classroom size is one of the factors that aid their learning to be effective.

Answer of Research 3: Items on Availability of Learning Facilities

Mean and standard deviation was used in answering this question; the result of the analysis is as presented in table 3:

Table 3: Mean scores of the respondent on Availability of learning Facilities (N=204)

S/N	Availability of Learning Facilities	SA	A	D	SD	M	SD	Remark
13	Modern encyclopedia in the school library motivated me to develop private study timetable for English language and other subjects.	81	321	96	22	3.12	1.17	Agreed
14.	Chemicals in the chemistry laboratory attracted my interest to learn chemistry on daily basis.	248	354	28	10	3.54	0.82	Agreed
15.	A well-equipped school physics laboratory encourages me to like physics as my best science subject.	96	396	76	10	3.65	1.15	Agreed
16.	An updated biological laboratory in my school attracts me to be serious with biology.	208	394	66	21	3.78	0.72	Agreed
17.	A standard geographical garden in my school makes me understand geography very effectively.	252	267	58	23	3.79	0.65	Agreed
18.	Counting aids in my school encouraged me to be proficient in mathematics.	276	240	90	10	3.85	0.75	Agreed
	Cluster Mean					3.62	0.87	Agreed

Field Work, 2019

Data in Table 3 shows the mean response of students on their availability of learning facilities. The mean score of 3.12 for item 13 indicates the respondents agreed that Modern encyclopedia motivates them to have private study timetable. The mean score of 3.54 for item 14 indicates that the respondents agreed that chemical in the chemistry laboratory attract them to learn chemistry. Item 15 with a mean score of 3.65means that the respondents agreed that a well equip physic laboratory encouraged them to makes physics their best subject. Item 16 with a mean score of 3.78 indicates that the respondents also agreed that update of biology laboratory in their school attracts them to be serious in learning biology. Item 17 with means score of 3.79 indicates that the respondents also agreed that geography garden in their schools make them understand geography. Item 18 with a mean score of 3.85 means that the respondents agreed that availability of counting aids makes them to be proficient in mathematics. However, the grand mean of 3.62 for all items indicate that the respondents to a great extent have a positive attitude towards the availability of learning facilities.

Answer of Research 4: Items on School Location

Mean and standard deviation was used fin answering these questions; the result of the analysis is as presented in table 4:

Table 4: Mean scores of the respondent on Availability of learning Facilities (N=204)

S/N	Availability of Learning Facilities	SA	A	D	SD	M	SD	Remark
13	Modern encyclopedia in the school library motivated me to develop private study timetable for English language and other subjects.	81	321	96	22	3.12	1.17	Agreed
14.	Chemicals in the chemistry laboratory attracted my interest to learn chemistry on daily basis.	248	354	28	10	3.54	0.82	Agreed
15.	A well-equipped school physics laboratory encourages me to like physics as my best science subject.	96	396	76	10	3.65	1.15	Agreed
16.	An updated biological laboratory in my school attracts me to be serious with biology.	208	394	66	21	3.78	0.72	Agreed
17.	A standard geographical garden in my school makes me understand geography very effectively.	252	267	58	23	3.79	0.65	Agreed
18.	Counting aids in my school encouraged me to be proficient in mathematics.	276	240	90	10	3.85	0.75	Agreed
	Cluster Mean					3.62	0.87	Agreed

Field Work, 2019

Data in Table 4 shows the mean response of students on their school location. The mean score of 2.98 for item 19 indicates the respondents agreed that their school is in the town and as such it disturbs their reading attention. The mean score of 3.16 for item 20 indicates that the respondents agreed that their school is in a quiet place and as such they can read for a longer period. Item 21 with a mean score of 3.10 means that the respondents agreed that their school is located near a major road and as such, vehicles noise disturb their reading attention. Item 22 with a mean score of 2.65 indicates that the respondents also agreed that their school is located near a residential quarter and as such, they are not disturb in their reading. Item 23 with means score of 3.14 indicates that the respondents also agreed that their school is located near a popular church and as such, they can't concentrate with their reading. Item 24 with a mean score of 2.92 means that the respondents agreed that their school is located near a market square, therefore, noise disrupts their learning attention. However, the grand mean of 3.15 for all items indicate that the respondents to a great extent agreed that school location is an important factor for an effective learning process.

Answer of Questions 5: Items on Learning Effectiveness

Mean and standard deviation was used in answering this question; the result of the analysis is as presented in table 5:

Table 5: Mean scores of the respondent on Learning Effectiveness (N=204)

S/N	Availability of Learning Facilities	SA	A	D	SD	M	SD	Remark
1.	My school environment is conducive for effective learning.	26	68	270	216	2.15	0.75	Disagreed
2.	Seeing life apparatus aids my learning more effective and make me understood what I was taught.	328	258	12	30	3.16	0.69	Agreed
3.	The availability of learning facilities motivated me to learning more.	292	252	52	21	3.51	0.70	Agreed
4.	Learning is fun with interactive and feedback because it makes me recall and knows more.	224	363	32	11	3.45	1.17	Agreed
5.	A conducive classroom makes me learn more.	208	294	66	21	2.92	0.62	Agreed
6.	My classroom size is conducive for effective learning.	252	267	58	23	2.73	0.78	Agreed
7.	My school location as influenced me negatively in my academic performance and learning.	164	399	48	8	3.16	0.69	Agreed
	Cluster Mean					3.01	0.77	Agreed

Field Work, 2019

Data in Table 5 shows the mean response of students on their learning effectiveness.

The mean score of 2.15 for item 1 indicates the respondents disagreed that their school environment is not conducive for them for effective learning. The mean score of 3.16 for item 2 indicates that the respondents agreed that seeing life apparatus aids their learning more effective and make them understood what they were taught. Item 3 with a mean score of 3.51 indicates that the respondents also agreed that they learn due to availability of learning facilities. Item 4 with means score of 3.45 indicates that the respondents also agreed that learning is fun because it makes them recall and known more. Item 5 with a mean score of 2.92 indicates that conducive classroom makes them learn more. Item 6 with means score of 2.73 indicates that the respondents also agreed that their conducive classroom size makes them learn effectively. Item 7 with means score of 3.16 indicates that the respondents also agreed that their school location influence them negatively in their academic performance. However, the grand mean of 3.01 for all items indicates that

the respondents to a great extent have a positive attitude towards learning effectiveness.

Hypothesis Testing

(Ho_1): There is no significant relationship between teacher-learners' interactive feedback and students' learning effectiveness.

Table 6: Dependent t-test analysis of the significant relationship between teacher-learners' interactive feedback and learning effectiveness in (N=204)

Variables	M	SD	t_{cal}	t_{crit}
Teacher-Learners' Interactive Feedback	30.01	5.78	3.11	1.97
Learning Effectiveness	34.49	4.15		

Field Work, 2019, Significant at .05 level, df = 203

The result as shown in Table 5 indicates that the calculated t-value of 3.11 is greater than the critical t-value of 1.97 at .05 level of significance and 203 degrees of freedom. With this result the null hypothesis that stated that there is no significance relationship between teacher-learners' interactive feedback and students learning effectiveness in Abak local government of Akwa Ibom State was rejected. This implies that there is significant relationship between teacher-learners' interactive feedback and students learning effectiveness in Abak local government of Akwa Ibom State.

(Ho_2): There is no significant relationship between of classroom size on students' learning effectiveness.

Table 7: Dependent t-test analysis of the significant relationship between Classroom Size and learning effectiveness (N=204)

Variables	M	SD	t_{cal}	t_{crit}
Classroom Size	14.28	4.01	2.89	1.97
Learning Effectiveness	12.96	3.2		

Field Work, 2019, Significant at .05 level, df = 203

The result as shown in Table 6 indicates that the calculated t-value of 2.89 is greater than the critical t-value of 1.97 at .05 level of significance and 203 degrees of freedom. With this result the null hypothesis that stated that there is no significance relationship between classroom size and students learning effectiveness in Abak local government of Akwa Ibom state was rejected. This implies that there is significant relationship between classroom size and students learning effectiveness in Abak local government of Akwa Ibom State.

(Ho_3): There is no significant relationship between available learning facilities and students' learning effectiveness.

Table 8: Dependent t-test analysis of the significant relationship between availability of learning facilities and students' learning effectiveness in (N=204)

Variables	M	SD	t_{-cal}	t_{-crit}
Availability of learning facilities	15.78.	4.71	3.02	1.97
Learning Effectiveness	16.41	5.41		

Field Work, 2019, Significant at .05 level, df = 203

The result as shown in Table 7 indicates that the calculated t-value of 3.02 greater than the critical t-value of 1.97 at .05 level of significance and 203 degrees of freedom. With this result the null hypothesis that stated that there is no significance relationship between availability of learning facilities and students' learning effectiveness in Abak local government of Akwa Ibom State was rejected. This implies that there is significant relationship between availability of learning facilities and students' learning effectiveness in Abak local government of Akwa Ibom State.

(Ho_4): There is no significant relationship between school location and students' learning effectiveness

Table 9: Dependent t-test analysis of the significant relationship between of School Location on students' learning effectiveness in (N=204)

Variables	M	SD	t_{-cal}	t_{-crit}
School Location	15.78	4.71	4.50	1.97
Learning Effectiveness	16.41	5.41		

Field Work, 2019, Significant at .05 level, df = 203

The result as shown in Table 7 indicates that the calculated t-value of 4.50 greater than the critical t-value of 1.97 at .05 level of significance and 203 degrees of freedom. With this result the null hypothesis that stated there is no significance relationship between school location and students' learning effectiveness in Abak local government of Akwa Ibom State was rejected. This implies that there is significant relationship between school location and students' learning effectiveness in Abak local government of Akwa Ibom State.

Discussion of Findings

This section handled the discussion of findings based on the data analysis and result of this study.

The result of findings in table 6 revealed that there is significant relationship between teacher-learners of secondary school Two (SS2) students' and their learning effectiveness in Abak local government of Akwa Ibom State.

This result agrees with earlier study done by Asuquo (2006), which claimed stimulated when there is sufficient response of the learners to the teachers' lesson it make the class very interactive and interesting which makes the learners to grasp whatever their teachers is passing across to them. This study also shares the view of Clifford (1972) which states that teachers must interact meaningfully with the learners during lessons to make the learners understand and learn effectively from the lesson. He also stressed that teacher-learners classroom interaction should aimed at making the learners to understand clearly what is taught. Based on the above discussion, it is expected that Senior Secondary School Two (SS2) students in Abak Local Government Area Akwa Ibom State whose teacher-learners' interactive feedback should be strengthen so as to enable them learn effectively.

The result of findings in table 7 revealed that there is significant relationship between classroom size of senior secondary school Two (SS2) students' and their learning effectiveness in Abak local government of Akwa Ibom State.

This result agrees with Essien (2009) who postulated that size of classroom can positively or negatively affect students' learning effectiveness. This finding here is in line with the view of Anderson (1993) who emphasizes that many teachable and learnable school subjects are in-scripted in the syllabus and schemes of work, demand demonstration and dramatic methods In order to carry the learners along during teaching-learning process. Such teaching method demands for large classroom space to enable all the learners participate effectively in the learning. Based on the above discussion, it is inferred that Senior Secondary Two (SS2) Students' in Abak Local Government Area of Akwa Ibom State should be provide with adequate classroom size that can stimulate and accommodate their learning process for effectively learning.

The result of findings in table 8 revealed that there is significant relationship between availability of learning facilities of senior secondary school Two (SS2) students' and their learning effectiveness in Abak local government of Akwa Ibom State.

This result is in accordance with the views of Ogunlade (2006) who conducted a research on learning environment and educational attainment in some school children in Ogun State revealed that no effective teaching-learning activities can be carried out where appropriate and corresponding learning materials and facilities are lacking. This result also in the line with the view of Denga (2002) who states that, availability of learning facilities is an integral part of learning process, if learning most take place there must be availability of learning facilities to aids effective learning process. Based on the above discussion, it is inferred that Senior Secondary Two (SS2) Students' in Abak Local Government Area of Akwa Ibom State should also be provide with available learning facilities that to aids effective learning.

The result of findings in table 9 revealed that there is significant relationship between school location of senior secondary school Two (SS2) students' and their learning effectiveness in Abak local government of Akwa Ibom State.

This result agrees with Okon (2003) who conducted a research on school location and effects on students' reading attention span in Calabar South locality. The result revealed that conducive school locations, such as noiseless zones promote reading attention span while Unconducive school locations such as those near musical shops, popular churches, market-square and motor parks does not promote reading attention span. The result in this study support the view of John, Miller and Miller, (1985) who states that effective reading cannot be accomplished where external source of noise pollution becomes the reading climate. Based on the above discussion, it is deduced that learning effectiveness of Senior Secondary School Two (SS2) Students in Abak Local Government Area of Akwa Ibom State is significantly influenced by students' school location.

Recommendation

The following recommendations were made based on the findings of this study:

i) Teachers should select appropriate teaching methods that can encourage the learners' interactive participation.

ii) The government should construct large new classrooms in the secondary schools, while ones should be refurbished to enhance effective academic activities.

iii) Learning facilities to students be adequately provided by parents and school owners if their children/students to achieve expected academic grades in examinations.

iv) Government and private individual should be mindful of where they erect school buildings to ensure learning effectiveness of their students.

v) School principals should strictly and frequently supervise classrooms when lessons are in progress to ensure teaching-learning effectiveness.

Conclusion

Based on the results of this study, it can be inferred that there is significant relationship between teachers-learners interactive feedback and classroom size on students' effective learning; Inferably, it was concluded that there is significant relationship between availability of adequate learning facilities and school location on secondary two (SS2) students' learning effectiveness in Abak Local Government Area of Akwa Ibom State.

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REVIJA ZA ELEMENTARNO IZOBRAŽEVANJE
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THE COGNITIVE ASPECT OF INTERACTIVE LEARNING AND TEACHING IN VISUAL ARTS EDUCATION

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Abstract/Izvleček The task of contemporary visual arts education is to enable quality interaction among all subjects of the teaching process, through which the students are encouraged to think, imagine, and develop higher-order cognitive activities. The objective of this empirical research study was to verify the differences in the results of students in the control and experimental groups (n=285) regarding their knowledge and understanding of visual arts content. Analysis of the results shows that the students in EG showed significantly better results compared to the students in CG, which means that the interactive model of learning and teaching positively influenced the students' understanding of visual arts content.

Keywords:
interactive approach to learning and teaching, visual arts, cognitive abilities, creative thinking, critical thinking

Kognitivni vidik interaktivnega učenja in poučevanja pri pouku likovne umetnosti

Naloga sodobnega pouka likovne umetnosti je omogočiti kakovostno interakcijo med vsemi udeleženci učnega procesa, s pomočjo katere učence spodbujamo k razmišljanju, domišljiji, ustvarjanju novih idej in razvoju kognitivnih dejavnosti višjega reda. Cilj izvedene empirične raziskave je bil preveriti in analizirati razlike v rezultatih učencev v kontrolni (KS) in eksperimentalni skupini (ES) (n = 285) glede znanja in razumevanja vsebin pri pouku likovne umetnosti. Analiza rezultatov je pokazala, da so učenci v ES pokazali bistveno boljše rezultate v primerjavi z učenci v KS, kar pomeni, da je interaktivni model učenja in poučevanja pozitivno vplival na razumevanje vsebine pouka likovne umetnosti pri učencih.

Ključne besede:
interaktivni pristop učenja in poučevanja, pouk likovne umetnosti, kognitivne sposobnosti, kreativno mišljenje, kritično mišljenje

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Introduction

Modern pedagogical theories (constructivism, cognitive theories) define learning as a personal creative process that involves the active changing and transformation of facts, an individual's interpretation and organization of knowledge, and its use in everyday life. On the other hand, teaching is defined as a process of appropriate support for learning (Senge, 2000; Plut Pregelj, 2008). These definitions manifest a change in the school paradigm and a shift in the educational process from a transmission approach towards a transformational approach to learning and teaching. The transmission approach to learning and teaching is determined by the students' adoption of ready-made constructs of organized knowledge in a manner involving passive acceptance of the facts offered by their teacher. The transformational approach to learning and teaching is defined as an approach in which the teacher encourages the students' active participation through inquiry-centered learning (stimulating interaction, conversation, discussion, research, and problem-solving of visual arts tasks), through which students achieve their complete development (Mezirow (Ed.), 2000; Taylor, 2017; Paek, 2019). Changing the paradigm from behaviorism to cognitivism has had a considerable effect in the field of art, as previously the artistic fields were classified in the affective domain because they were not considered cognitive. This change marked the beginning of an understanding of art as a cognitive activity. Guilford (1968) and other creativity theorists place the classification of creative factors in the field of mental activity. Theories of perception, as well as contemporary theories of the symbolic characteristics of visual language, have been emphasizing the role of intellectual processes in understanding the visual symbols in artworks as well as "reading" them. This fact also emphasizes the importance of cognitive activities for both artistic expression and artistic reception in visual arts classes. Contemporary art education is based on developing pupils' productive, artistic-creative skills and their receptive abilities. The latter include art appreciation, where pupils are introduced to the acts of perceiving and receiving, thus evaluating and internalizing works of art (Duh, 2016). It can be concluded that cognitive development is necessary for the development of visual arts skills and that the development of various cognitive activities should be encouraged through visual arts classes. Learning new things is easier if pupils' knowledge is more structured, since this helps the learner add new information to the existing system and to use knowledge. Therefore, pupils need to

acquire cognitive learning strategies, i.e., how to organize and acknowledge already obtained knowledge (Arov, & Jǒg, 2017).

Cognitive development in the context of contemporary visual arts pedagogy theories

Efland (2002) cites Gardner and Eisner as the first theorists to point out in the 1980s the peculiarities of cognitive processes specific and unique to artistic thinking and creation, and which, as such, contribute to an individual's complete cognitive development. In his theory of multiple intelligences, Gardner (1993) states that every intelligent activity in itself involves multiple types of intelligence. Speaking in the context of visual arts, visual expression, for example, involves spatial intelligence. However, it may also include logical-mathematical intelligence if it is a representation of a linear perspective, or physical-kinesthetic intelligence if it is a three-dimensional design in sculptural material (Simmons, 2001). By criticizing the focus on verbal and mathematical systems of symbols in school curricula (and neglecting the artistic ones), Gardner (1993) also argues that a broader representation of various intelligence or symbol systems would extend the range of cognitive abilities, bringing balance to the curriculum. On the other hand, Eisner (1982, 2002) argues that the mind develops multiple forms of representation through experiences acquired through the senses, which can be based on visual perception, auditory and/or tactile sources. If it were possible to convey everything that people want to express in one or two forms, others would be unnecessary or redundant. Thus, each of the arts offers unique ways of presenting ideas and feelings. The presence of multiple areas of art in the school system can therefore be justified in terms of the cognitive skills they nurture. Art education is therefore a subject where pupils continuously express themselves creatively and also develop the ability to receive and perceive works of art (Duh, & Herzog, 2016). The richer range of experiences within individual school subjects creates the preconditions for shaping a wide range of cognitive potentials that students will be able to develop.

Today's postmodern society places increased demands on individuals for developing complex cognitive abilities, including those nurtured through various artistic forms. Efland (2002) cites four features provided by the arts, which can facilitate everyday life in today's circumstances. Those are as follows:

• the cognitive flexibility argument, which takes into account the complex and ill-structured character of learning, where judgements are made unguided by rules or generalisations that cover multiple cases, and this includes most situations in life;

• the integration of knowledge argument, where the interpretation of artworks draws strength from knowledge in collateral domains, enabling the learner to understand the context of the work;

• the imagination argument where imagination is identified as a pervasive structuring activity using metaphor and narrative to establish new meanings and achieve coherent, patterned, and unified representations; imagination is essential to our rational capacity to find significant connections, draw inferences, and solve problems;

• the aesthetic argument, which establishes the point that perceptually vivid aesthetic encounters in the arts have educational value.

Students' cognitive development within visual arts education

Students' cognitive development presupposes the activation of their cognitive abilities, by which they discover the reality around them. The development of the students' cognitive abilities is manifested in the reproduction or recognition of knowledge, and the development of intellectual capacities and skills that enable students to use that knowledge. Different thoughts are formed in the brain of an individual based on emotional experiences. By thinking about what we see, hear, or experience with other senses, we renew images, sounds, and feelings within ourselves and process them according to our own experiences and previous constructs. In the context of visual arts, the development of cognitive abilities implies an increasing perception and appreciation of space and objects in it, its visual characteristics, and relations between visual elements. Butina (1997) considers artistic thinking a special form of productive thinking that leads to an artistic experience, i.e., artistic production. This means that artistic thinking is an integral part of artistic expression, which gives it a creative characteristic. Thinking is a process that happens over time, but cognition is the result of that process. Visual

content is designed with the help of visual thinking, which enables the choice of the manner of artistic formulation and expression of an idea (Muhovič, 1992).

The complex character of visual arts classes influences the development of numerous cognitive functions and abilities through the process of visual cognition, visual thinking, processing collected data of visual and non-visual content, transformation of input through practical activity, and the assessment of one's own and other's artistic/visual messages i.e. visual literacy (Hardiman, 2019; Morris, Lummis, & Lock, 2018). Acquiring the knowledge of artistic concepts and visual language is one of the basic goals of teaching visual arts education in primary school. The teacher thus plays an important role in the process of the students' acquisition and understanding of visual arts knowledge. In order to properly stimulate cognitive development among students, the teacher should respect their developmental levels and adapt the teaching process to the cognition levels of a particular age group. The terms used in the syllabus should be used in teaching; a rich vocabulary should be used to refer to the visual arts content and to accustom students in this way to the specifics of visual arts language, i.e., talking about visual arts. The teacher should also seek appropriate teaching methods to guide students to understand the content material and draw their own conclusions. Teaching should be based on the problem-solving approach to learning and teaching, whereby the visual problem is indirectly revealed, and the teacher instructs the students through conversation to think about it, understand it, and seek possible solutions through visual expression based on new knowledge. The aim of visual arts education is for students to achieve in-depth processing of information, which ensures long-term memory and the capacity for knowledge application, as opposed to the surface capture of content that will remain only in short-term memory. Applied knowledge is characterized by mastering cognitive skills, learning strategies, research procedures, and problem solving.

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Opportunities to foster cognitive development through an interactive approach to learning and teaching in visual arts education

In visual arts classes, students learn in parallel through theory and practice, while actively constructing knowledge about the world and themselves. Teaching should be focused on stimulating learning through cognitive activities such as self-observation, classification, analysis, synthesis, comparison, generalization, inductive and deductive reasoning, analogy creation, and evaluation, as the highest goal for the cognitive domain, which includes the student's ability to evaluate artworks (ideas, procedures and processes) in accordance with specific goals, and to identify values and attitudes; evaluation includes all the levels mentioned above, conscious judgments and critical thinking of students.

In visual arts education, it is very important that there be appropriate interaction and cooperation between all subjects in the teaching process. It is most successfully achieved through an interactive approach to learning and teaching, in which the emphasis is placed on better communication among all subjects of the educational process and on the use of teaching strategies that provide greater student activity, such as learning through problem solving, active learning, experiential learning, learning through play, and group work (Tomljenović, 2015). Through these activities and the application of appropriate teaching methods, students are encouraged to think, compare, ask questions, imagine, create new ideas, develop artistic sensibility, and to develop higher-order cognitive activities such as analysis, synthesis, evaluation, and critical thinking. The use of art material and techniques increases the students' thinking, understanding, experience, and application of theoretical settings through artistic expression, which renders visual arts education an important area for simultaneous and complementary cognitive, affective, and psychomotor development.

The interpretive activity in constructing new knowledge is particularly present in visual arts education. It is important that the teacher does not have prejudices about one appropriate way of solving visual arts problems, but instead develops a sensitivity to student solutions, remaining open to new and different ideas, and through interaction with students and by asking them appropriate questions, seeks to understand the reasoning behind each student's perception. This can help in gaining insight into the students' mode and style of cognition, cognitive abilities,

attitudes and beliefs, as well as areas that still need to be developed. Knowing this is the basis for further selection and preparation of the teaching process and visual tasks. Since students create their own cognitive constructs, the teacher has the role of an indirect leader, coordinator, and one who directs students towards independent individual conclusions. The teacher should also provide the necessary sources of information and other materials that will help the students in building their own knowledge based on their own thinking, i.e., the transformation of their representations from one form to another. When gaining new knowledge in visual arts classes, it should be taken into account that the construction of knowledge occurs by linking new concepts to old structures if a connection is established between these. Therefore, students should be encouraged to engage in communication in which, based on their experience, they will come up with new ideas and, with the help of the teacher, draw new conclusions. This way of gaining knowledge is tied to Piaget's idea of resolving a cognitive conflict and to Vygotsky's theory of the zone of proximal development (Esola, & Nelson, 2019). Problem-based visual arts tasks provoke a cognitive conflict that triggers changes in the students' thinking and leads them to seek solutions independently and creatively.

In contemporary visual arts education, problem-solving strategies are used as a model for acquiring new visual knowledge and skills and using these in everyday life. According to Guilford (1968), creative thinking and problem solving are the same phenomenon. Both situations cause a cognitive conflict in an individual that can be resolved by using the old learning strategies in a new way, or by finding and using new strategies that lead to a satisfactory solution. In visual arts education, the purpose, goals, and tasks of problem solving are inseparably linked to the creative dimension of personality, so that solving them activates, in addition to cognitive skills, social, motivational, emotional, intuitive abilities, i.e., the entire conative area, including psychomotor abilities (Karlavaris, & Berce Golob, 1991). When discussing ways to provide the conditions for understanding what and how children learn in the arts, Eisner (2002) emphasizes precisely the visual arts problem, i.e., the situation in which students' existing conceptual and technical repertoires are insufficient to address what they confront; thus, they are encouraged to think about how to deal with the problem in new ways.

Methodology

Research problem and aims

In the Croatian school practice, especially at the level of homeroom teaching, visual arts education is still considered as a process aimed at developing expression, emotions and motor skills, without proper emphasis on the cognitive aspect of students' development (Tomljenović, & Novaković, 2014). The student's artistic activity is mainly directed towards the realization of the artistic motif using the given art techniques, but without the understanding and realization of other goals of visual arts classes, despite the guidelines for contemporary concepts in the Visual Arts Curriculum prescribed by the Croatian National Educational Standard (hereinafter: CNES). This attitude is also characteristic of teaching other arts, which are generally considered to be concrete and emotional, but not abstract or mental activities, in which the hands act rather than the head, and as more closely related to play than to work, practice, and benefit. However, the teaching tasks that art education places at the forefront – noticing subtle, qualitative artistic-aesthetic relationships, imagining possibilities, identifying elements of the visual language and their relationships, interpreting the metaphorical meanings of artworks, generating new and unusual ideas, taking advantage of unforeseen opportunities while working – require complex cognitive operations. Moreover, the contemporary conceptual teaching of visual arts offers numerous opportunities for the development of various cognitive activities.

The research described in this paper is part of a broader study conducted to improve the quality of visual arts education; this study focused on evaluating the impact of an optimized, interactive model of learning and teaching in visual arts on students' knowledge and understanding of visual content, abilities, and skills in the use of visual materials and techniques, as well as creativity in solving art tasks. This paper describes part of the research related to examining the effect of the application of an interactive model in visual arts on the acquisition by students of knowledge and understanding of visual content at the elementary school grade level. This part of the research aimed to develop a model of learning and teaching visual arts that will ensure the acquisition of greater knowledge and a better understanding of the visual content prescribed by CNES.

With regards to the research aims, the following hypothesis was formed:

H: Students in the experimental group will demonstrate greater knowledge and understanding of visual content than students in the control group.

Research Sample

Table 1: Number and distribution of students per grade

	Group	N	f	f%
Second grade	CG	71	143	50.2
	EG	72		
Forth grade	CG	68	142	49.8
	EG	74		
Total			285	100

The sample of participants in the pedagogical experiment included 285 second- and fourth-grade students from four elementary schools in Rijeka (Table 1).

Data Collection Procedure

The research was based on quantitative research paradigms, using a pedagogical experiment. In this paper, the results obtained by tests of knowledge are described and related to the verification of knowledge and understanding of the processed art content. The experiment was conducted in parallel groups (control and experimental groups), within which the effect of the implementation of the experimental teaching model was tested. The research included 16 second- and fourth-grade homeroom classes (students aged around 8 and 10 years); eight classes (four second-grade and four fourth-grade classes) represented the control group, and the other eight (four second-grade and four fourth-grade classes) constituted the experimental group.

When selecting a sample, the attempt was made to include classes which had the most similar characteristics (material and technical conditions of work; number, gender, and school achievement of the students). The classes were not physically contiguous; the sample consisted of 285 students (139 in the control group and 146 in the experimental group) and 16 homeroom teachers (eight in the control group and eight in the experimental group). The research was conducted as a painting

activity and included the implementation of five teaching units (one for verifying the initial state) carried out in the control and experimental groups.

For the purpose of verifying the variables, two different ways of performing the teaching process were included in the study. The first one used an optimized, interactive model of learning and teaching via modern teaching strategies and methods. Another way of teaching was implemented through the use of established approaches to learning and teaching according to the teachers' usual operating mode. Teachers in EG received additional training on the interactive approach to learning and teaching and were provided with specially designed instructional guidelines from the trained research leader for the implementation of each teaching unit. Teaching units containing the following visual problems were implemented in

- the second grade: 1. Light and dark colors; 2. Warm and cold colors; 3. Color tones (chromatic and achromatic colors); 4. Pure and mixed colors;
- the fourth grade: 1. Rhythm of warm and cold colors; 2. Color texture; 3. Color degradation; 4. Color harmony.

Teaching units were selected from the National Curriculum for Primary Schools (Nastavni plan i program za osnovnu školu, 2006) for the second and fourth grades of primary school, Visual Arts subject, area of painting.

For the purposes of the study, an instrument was designed that included tests of knowledge and understanding of visual concepts and content for second- and fourth-grade students. Knowledge tests were conducted in CG and EG at the beginning and the end of the pedagogical experiment. They included questions that tested the general visual knowledge in the area of painting prescribed by the Curriculum for the second and fourth grade. Objectivity and validity were calculated for the knowledge test. Statistical analysis of the tests was performed separately for the second and fourth grades. Taking the test took 10-20 minutes. Student testing was conducted by teachers who would normally teach in the classrooms that participated in the study. The tests were based on closed-ended questions that related to knowledge of the visual language, art materials, techniques, and motifs. At the beginning of the school year, as had been expected, some visual concepts were unknown to the students. The testing at the beginning and the end of the pedagogical experiment aimed to determine the difference in the students' level of knowledge and understanding of visual arts concepts and content at the beginning and the end

of the school year, i.e., to determine which group would achieve better results at the end of the school year compared to the initial state.

Basic descriptive statistics and inference statistics were used for the purpose of the study. The following statistics were used to process the results of knowledge tests of second- and fourth-grade students: descriptive statistics, the Kolmogorov-Smirnov (K-S) test to check the normality of the distribution of the results, and the non-parametric Mann-Whitney U test to compare the differences between the two groups (CG and EG). The collected data were analyzed with the statistical analysis software Statistica, Version 8.0, StatSoft, Inc.

Results and Interpretation

The knowledge test for second-grade students

Table 2: Results of Mann-Whitney's U test in CG and EG after performing initial and final knowledge tests in the second grades

					CG	EG
	Mann-Whitney U test	Wilcoxon W	Z	p	Median	Median
Initial	2501.500	5129.500	-.222	.824	13.0000	13.0000
Final	695.500	3251.500	-7.579	.000	16.0000	19.0000

Using the Mann-Whitney U test to compare the significance of the difference between the two independent groups of scores revealed that the difference in the achievement between the control and experimental group was not statistically significant ($Z = - .222$; $p > 0.05$) (Table 2). Based on the statistical analysis, it can be seen that the students in CG and EG had the same baseline on the first test at the beginning of the school year (before conducting the pedagogical experiment). The students in EG scored an average of 13.01 points on the initial test at the beginning of the school year, and the students in CG scored 13.16 points. In the final test, the students in EG achieved an average of 18.38 points, and the students in CG scored 15.66 points. The difference in success on the final test between the students in EG and CG, calculated using Mann-Whitney's U test, is statistically significant ($Z = -7.579$; $p < 0.01$) (Table 2).

The differences in the final test compared to the initial test are significantly greater in EG than in CG. The differences in the result in CG also go in the direction of result improvement; however, they are less pronounced than in EG. The most significant progress in CG was achieved in matters related to the classification of primary and secondary colors as well as warm and cold colors. The least progress was made in CG regarding issues related to recognizing the type of motif in the paintings. The greatest advances in EG were made in matters related to the recognition of light and dark colors, the recognition of painting techniques, and the recognition of the type of motif in the paintings. The least progress was observed in the recognition of warm colors and painting techniques of tempera and watercolors.

Analysis of the results shows that the interactive model of learning and teaching in this pedagogical experiment had an impact on achieving better results in the knowledge and understanding of visual concepts and content by the students in EG. In general, it is possible to observe considerable improvement within the experimental group and a slight improvement within the control group.

The knowledge test for fourth-grade students

Table 3: Results of the Mann-Whitney U Test in CG and EG after performing the initial and final tests in the fourth grades

					CG	EG
	Mann-Whitney U test	Wilcoxon W	Z	p	Median	Median
Initial	2401.000	5102.000	-.338	.736	13.0000	12.0000
Final	810.500	3156.500	-7.039	.000	14.0000	16.0000

Using the Mann-Whitney U test, it was found that the difference in achievement between the control and experimental groups in the initial state was not statistically significant ($Z = -, 338$; $p > 0.05$) (Table 3). Based on the statistical analysis, as with the second-grade students, it can be observed that the students in CG and EG had the same baseline on the first test at the beginning of the school year (before conducting the pedagogical experiment).

The comparison of CG and EG shows that the students in the experimental group averaged 12.10 points on the initial test at the beginning of the school year, while students in the control group scored 12.12 points. On the final test, students in the experimental group achieved an average of 16.32 points, and students in the control group 13.88 points. The difference in success on the final test between the students in CG and EG, calculated using the Mann-Whitney U test, is statistically significant ($Z = -7.039$; $p < 0.01$) (Table 3).

The differences on the final test compared to the initial test are significantly greater in EG than in CG. The differences in CG also go in the direction of result improvement, albeit less pronounced than in EG. The greatest advance in CG is evident in matters related to the classification of primary and secondary colors as well as warm and cool colors. The least progress in CG is evident in matters related to the recognition of motifs in the pictures. The major advances in EG are present in matters related to the recognition of achromatic and chromatic colors and the contrast of light and dark colors. The weakest progress in EG is evident in recognizing dynamic and moderate rhythm and contrast of warm and cold colors.

It can be concluded that there were statistically significant differences in the final state between EG and CG in the area of knowledge and understanding of visual material, which means that the students in EG showed better understanding and knowledge of visual terms and concepts than the students in CG.

Given the results in the final state between EG and CG in the second and fourth grades, it can also be concluded that the research hypothesis has been confirmed.

There is an assumption that the more pronounced success of the optimized model of teaching in EG, compared to results for the established approach to teaching in CG, is a consequence of designing visual arts tasks to stimulate communication between students and teachers and thus to yield better understanding and knowledge of visual content by students. By applying subject-specific (visual arts) teaching methods, the material was presented in accordance with specific visual arts problems in the field of painting, which means that students brcomr acquainted with the teaching content in a more appropriate, comprehensive, and interesting way. The teaching approach was tailored to different cognitive types, learning styles, and student ages, as the teaching materials were presented in a way that included a variety

of sensory experiences, teaching aids, inductive and deductive reasoning, as well as more or less structured teaching situations. In EG, the teaching units were conducted on the basis of well-established teaching preparations, with particular emphasis on how teaching materials were presented, and the use of appropriate teaching methods in order to include all students' learning styles and to stimulate student motivation, interest, and active interaction with the teacher and each other. The teachers received explanation on the importance of communicating with students and ways of asking appropriate questions, as well as the significance of stimulating active conversation as a basis for better adoption of visual concepts and developing critical and creative thinking and expression. EG teachers were particularly drawn to the need to use various teaching aids; for this reason, a PP presentation was prepared for each unit by the research leader, as well as various reproductions of artworks and other teaching aids.

As mentioned before, during the implementation of the experimental model of teaching, special attention was paid to active teacher-student interaction, during which the teachers presented the visual content in a planned and thoughtful way. They used meaningful questions related to the teaching material as a means to direct students toward recognition, identification, and interpretation of visual phenomena. The teachers had an active conversation with the students about the aesthetic and visual components of the artworks and encouraged them to make connections between the visual content and situations in everyday life. The questions also motivated the students to relate new visual knowledge to already adopted ideas and to elaborate their own conclusions with the aim of verbalizing their thoughts and ideas, encouraging self-expression to improve their thinking and production of ideas as well as developing self-confidence and critical thinking.

Using a variety of didactic aids, the teachers in EG created learning situations in which students could gain new experiences and develop cognitive skills in direct interaction with the learning material. In the teaching process, group work was also applied, during which the students solved art problems through creative play (puzzle-folding, color-matching of papers depending on the task, mosaic-stacking, word and image pairing, etc.). Through group work, students develop interaction with other students, share knowledge, feelings, and ideas, while developing the capacity for verbal and non-verbal communication, tolerance, and confidence.

Based on description of the activities carried out in EG, it can be concluded that the teaching of visual arts encompasses much more than mere visual expression. One of the basic goals of teaching visual arts is the development of creative imagination and fostering a number of skills that will help the student to solve problems creatively. The acquisition of knowledge relates not only to the knowledge of the visual arts content, but also to the knowledge of creativity, analysis, and visual communication (Turković, 2009), which implies the development of numerous and diverse cognitive functions. Thus, when we talk about the cognitive abilities that can be developed in visual arts classes, we should be aware that they refer, on the one hand, to activities in the field of reason, conceptualization, logic, and formal thought discourse and, on the other, to the realm of our equally worthy physical, perceptual, material, emotional, and imaginative nature (Turković, 2009). Guilford (1968) states that cognitive processes related to problem solving include convergent activity (analytical, logical thinking) and divergent activity (creative thinking). Activation of both types of thinking is crucial in effective problem solving, i.e., in the overall cognitive development of personality. The specificity of visual arts education, which combines the theoretical and practical/ creative part, provides optimal conditions for the development of both types of thinking. Chishti, and Jehangir (2014) find that early experiences with visual arts might have great influence on the attainment of cognitive abilities, such as creative thinking and problem solving. Visual arts education, as a domain for fostering divergent as well as convergent thinking, should promote problem-solving skills in students by having them observe visual elements and recognize the relation between them, understand the visual language through interactive conversation among all participants in the teaching process, and develop visual sensibility through artistic activities. The results of numerous studies also prove the importance of visual arts education in the development of higher-level thinking skills that are transferred to later life, as well as various cognitive skills, which lead to successful cognitive outcomes in other teaching areas and disciplines beyond the arts (Alter, 2009; Caiman, & Jakobson, 2019; Chishti, & Jehangir, 2014; Danesi, 2020; Eisner, 2002; Formichov, & Formichova, 2019; Ghanbari, 2015; Keinänen, Hetland, & Winner, 2000). However, research also shows that most primary school teachers still lack awareness of the need to develop certain cognitive abilities through arts, such as acquiring visual arts concepts and content, verbally expressing and interpreting knowledge and experiences in the field of art, or developing artistic and aesthetic attitudes (Tomljenović, & Novaković, 2014). Although most teachers consider this subject of great or very high importance in

primary school, most teachers also consider practical artistic activity as the most important part of visual arts teaching and thus affirm that understanding the importance and purpose of the subject is primarily related to the practical expression and development of manual skills (ibid.). This attitude is still deeply rooted in Croatian school practice at the primary school level. Tanay (2001) refers to the widespread view of the visual arts as a subject whose content cannot be learned but can only be mastered by exercise; Tanay sees the cause behind this attitude in the lack of expertise among classroom teachers, who believe that the teaching of visual arts is based on feelings and preference (talent) for the visual arts area. On the other hand, research results also show that the arts have not been taught adequately in pre-service teacher education courses and that (among other things) in-service teachers often have misconceptions about the purpose, tasks, and goals of visual arts teaching (Alter, Hayes, & O'Hara, 2009; Garvis, & Pendergast, 2012; Nilson, Fetherston, McMurray, & Fetherston, 2013); they might also feel insufficiently competent to teach visual arts (Garvis, 2009; Russell-Bowie, 2012; Tomljenović, & Novaković, 2019). Therefore, it is necessary to work continuously on updating study programs but also on the professional development of teachers in this area. The goal of lifelong teacher education is to change teachers' attitudes towards their role in the teaching process and to increase their awareness of their own responsibility for the quality of teaching, as well as their awareness of the need to change outdated approaches to learning and teaching in the direction of an (inter)active, dynamic, and professional approach to learning and teaching. The aim of visual arts education is to achieve in-depth processing of information by students, which ensures long-term memory and the application of knowledge, as opposed to the superficial capture of content that will remain in short-term memory. Applied knowledge is characterized by the mastery of cognitive skills, learning strategies, research procedures, and problem solving. Students also need to develop metacognitive knowledge – an awareness of their own ways of thinking and learning and of the potential need for changing them (Bakračevič Vukman, 2004). In order for these goals to be achieved, it is imperative that teachers be aware of them; knowledge of the goals, purpose, and outcomes of learning and teaching in visual arts education is a basic starting point for the successful realization of visual arts classes.

Two important types of thinking are developed in contemporary visual arts education: creative and critical thinking. Both types of thinking are vital life skills that make it easier to solve the complex problems generated by the ambiguity and uncertainty of daily life. Numerous studies demonstrate a significant positive correlation between encouraging the development of critical and creative thinking skills on cognitive learning outcomes (Alter, 2009; Siburian, Corebima, & Saptasari, 2019; Lin, & Wu, 2016). Although creative thinking is more often associated with the subject Visual Arts, the development of critical thinking should not be neglected. The capacity for critical thinking is proving increasingly important in today's world, in which new information multiplies rapidly, as it enables the creation of one's own concepts, attitudes, and ideas. Therefore, the ability to develop critical thinking is considered an important pedagogical competence that needs to be developed in teachers (Nilson, Fetherston, McMurray & Fetherston, 2013). The development of creative and critical thinking should be at the center of the educational process, as well as one of the basic goals not only in visual arts education but in teaching generally.

Conclusions and Practical Implications

This study was conducted to examine the extent to which the contemporary, interactive model of fine arts teaching can influence the stimulation of various cognitive activities in students and thus the quality of learning and understanding of teaching content. An interactive approach to teaching and learning in visual arts emphasizes better communication among all subjects in the educational process and on the use of teaching strategies that provide greater student activity, such as problem-solving learning, learning through play, active learning and experiential learning. This approach also encourages students to participate more in conversations with teachers, to express their opinions and ideas more easily, enabling them thereby to understand the teaching content better and to experience greater activity and creativity in the teaching process. An interactive approach to learning and teaching is also based on actively encouraging the development of students' cognitive abilities through observing, formulating problems and solving problems, asking and answering questions, making new conclusions, as well as understanding and using terms/elements of a visual language in their verbal and artistic expression. A knowledge test was used to test the second- and fourth-grade students' knowledge and understanding of visual content in the field of painting. The statistical analysis

of the results showed that students in the final state of EG achieved statistically significantly higher scores than students in CG, in both the second and fourth grades. This means that an optimized interactive model of learning and teaching, based on a problem-solving approach to art tasks, adopting and understanding art concepts and content through an active and self-directed approach to learning, independent inference, creative play, affective experience, and motor activity, has resulted in a better knowledge of visual concepts and a deeper understanding of the teaching material among students in EG. The results of the study showed that students in EG were more involved in discussions with teachers, more easily expressed their opinions and ideas, and were more active during the teaching process, which allowed them to adapt better and understand the lesson content.

This study opens up opportunities for further research that could go in several directions. It would be interesting for visual arts-pedagogical practice to explore the effects of the interactive teaching model in other areas of visual expression (drawing, three-dimensional design or printing). We believe that the results of the research will help in raising awareness among classroom teachers about the need to change their teaching approach in order to consciously and professionally stimulate the development of important cognitive skills in students, especially creative and critical thinking.

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REVIJA ZA ELEMENTARNO IZOBRAŽEVANJE
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INTERACTIVE EFFECTS OF ACOLOUR WHEEL MOTION GAME ON PUPILS' COGNITIVE DEVELOPMENT IN GRAPHIC ARTS

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Abstract/Izvleček Games can be instruments for fun and competition globally. However, despite their relevance for instruction, the awareness of key games and their use have not been significantly established. Therefore, the study investigates the interactive effects of colour wheel motion games on pupils' cognitive development in the field of graphic arts. The study included a pre-test and a post-test. The sample comprised 50 pupils: 25 boys and 25 girls. Two research hypotheses were tested. Findings revealed a significant difference between groups (experimental and control) and gender (boys and girls). Nevertheless, the use of the Colour Wheel Motion Game for learning was recommended for all pupils in secondary schools in Nigeria.

Interaktivni učinki gibalne igre z barvnim kolesom na kognitivni razvoj učencev pri grafiki

Igra je po vsem svetu sredstvo za zabavo in tekmovanje, a zavest o tem in uporaba igre kljub njenemu pomenu za učenje še nista zadosti uveljavljeni. Študija zato proučuje vzajemne učinke gibalne igre z barvnim kolesom na kognitivni razvoj na področju grafične umetnosti. Vključuje predhodno in naknadno testiranje; v vzorcu je bilo 50 učencev – 25 dečkov in 25 deklic. Preverjali smo dve raziskovalni hipotezi. Ugotovitve so pokazale pomembne razlike med učenci, ki so bili izpostavljeni gibalni igri z barvnim kolesom, in tistimi, ki niso bili. Uporaba gibalne igre z barvnim kolesom za učenje je priporočena ne glede na učence in spol.

Keywords:
Colour, Creative Arts, Game, Gender, Graphic arts.

Ključne besede:
barva, ustvarjalna umetnost, igra, spol, grafična umetnost

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Introduction

Colour is seen everywhere. Its origin and usage have been traced to cave men. Colour has been used by individuals as a symbolic and informative medium (Kumar & Joshi, 2006; Odewumi & Okonkwo, 2017; Schloss, Lessard, Walmsley & Foley, 2018). Hence, colour is the effect of light on an object. It is used for beautifications and considered a very important phenomenon that promotes information in visual form. Colour is sometimes called pigment (Johnson, 2014).

The study by Kurt and Osueke (2014) explained that colours are divided into primary, secondary and tertiary types. The authors further listed primary colours as red, blue and yellow, which are generally believed to be the origin of the other colours. This is because other colours are manufactured from them. On the issue other colours, Usman, Odewumi, Obotuke, Apolola and Ogunyinka (2014) acknowledged grey, white and black as neutral colours. These are also not the result of any colour mixture; instead, ash or grey having as components equal proportions of both white and black. Nevertheless, grey stands out in the background of other relative colours (Odewumi, Okeke, Abdulhammed, Uzoma, & Okeke, 2015). Colours can sometimes be differentiated on the basis of intensity, either darker or lighter in relation to the original colour, called the hue. In this regard, hue is the name given to the undiluted colour. The study by Odewumi, Adeniran and Falade (2018) proposed that the tones of both the brightness and the amount of shade produce tonal gradation of colour in terms of light and shade that varies a particular colour to produce varieties of colour for instruction.

Colours feature prominently in instruction; the value and worth are emphasised by researchers of teaching and learning. For example, the study by Olurinola and Omoniyi (2015) established colour as a positive means of retaining and sustaining undergraduate students' attention in an educational programme. In the same vein, Smilek, Dixon, Cudahy and Merikle (2002) found that colour perception by students from a wider computer screen revealed that students performed better in relation to matching the colour on the computer screen. Similarly, Onasanya (2002) established that the achievement of students exposed to coloured photographic prints was of great value when compared with their peers who had been exposed to black and white prints. However, this shows a distinct marginal gain over black and white photography. Moreover, colour sustains and stimulates the attention of learners; it

also grants the stimulus that is important for cognitive retention and boosts learning. Moreover, colour influences the readability of web-based e-learning materials on a defined range of the spectrum (Anderson, Muller & Hillyard, 2009; Richardson, Drexler & Delparte, 2014).

The colour spectrum attracts more attention than the colour wheel for instruction. A colour wheel exhibits colours in groups, and the components of both primary and secondary colours in a unique sphere. A study conducted by Bell (2013) established that the creation of a colour wheel is anchored to the wavelength of the seven colours on the spectrum. Similarly, Westfall (1962) explained the colour wheel as a string of unadulterated hues arranged credibly in a perfect circle. In the same vein, a colour wheel is a sphere comprising colours arranged in alternating primary and secondary colours (Pitchford & Mullen, 2005). Essentially, a colour wheel commonly guides the production and use of colours for instructional materials and games.

Globally, it has been realized that games form an integral part of both formal and informal education (Skwarchuk, Sowinski&LeFevre 2014; Dehkordi, 2017). Educational games can be applied and used in institutions of learning and homes. Ke (2008) established that when games no longer distract the attention of learners but inculcate learning and aid pupils' intellectual development, they can be said to be instructional games. A good environment constitutes a great opportunity for learning, and instructional games offer opportunities for continuity, even though negative consequences are a welcome part of the game and serve as a component part of the learners experience (Gee, 2009; Klopfer, Osterweil & Salen, 2009; Groff, Howells, & Cranmer, 2010).The study of Deubel (2013) classified games into two types-technological and non-technological games-based on the instructions. Additionally, Ash (2010) explained that games having the advantage of constant assessment, which arises as the player evaluates and receives immediate feedback.

However, Aleson-Carbonell and Guillén-Nieto (2012) stressed as paramount the significance of games being used in the context of instruction and as a supplement to classroom directives. The arrangement and structure of these games promote educational motivation for pupils to learn easily (Johannesson & Lundqvist, 2012). A study by Charsky (2010) maintained that there were complexities in identifying and classifying games in the context of their use for instruction. Games are pedagogical tools that develop pupils' intellectual abilities, while also promoting self-

confidence, which yields positive performances of pupils in instruction (Boyle, 2011; Backlund & Hendrix (2013).

Previous studies have established the usefulness of games. In fact, Egenfeldt-Nielsen (2016) found that games improve memorization; this, in turn, stimulates cognitive learning by pupils and promotes pupil health. Games broaden the pupils' experiences and improve learning (Wastiau, Kearney and Van den Berghe, 2009). Games encourage constant practicing to avoid failure (Groff, Howells & Cranmer, 2010). They can encourage pupil self-actualisation (Fleer, 2010). Games also provide opportunities for formative instruction (Heritage, 2010). Learners are more active in a game when there is space for narration of stories within the game, and this helps with many learning issues (Barab, Arici & Jackson, 2005).

Poor performance and lack of interest in graphic arts among primary school pupils constitute a problem in Nigerian elementary schools. Consequently, efforts have continuously been made to improve teaching and learning because these are the foundation on which the life education of the individual is built. For example, the study by Herga, Čagran and Dinevski (2016) mentioned that lack of motivation among instructors is a crucial factor in the poor performance of pupils in school. Similarly, Copriady (2014) established that teacher competence is paramount in the education of learners; therefore, unqualified teachers are a problem in the elementary education of pupils. Moreover, Olorundare (2014) identified poor instructional materials and methods. The study by Schutt and Linegar (2013), along with Omorogbe and Celestine (2013), agreed that the abstract nature of some subjects on the school curriculum contributed to the problem. Celestine (2013) also identified inadequate and inexperienced teachers as a predicament in teaching and learning. Archibong (2012) pointed out poor timetabling for lessons, while Gambari (2010) mentioned the lack of relevant textbooks. Despite these problems, Li and Qiu (2018) stressed that parental background has a major influence on the educational process of their children. Therefore, integrating games into the school curriculum will go some way towards solving educational problems.

The use of traditional instructional tools such as games in instruction is becoming a burning issue among instructors and educational institutions. Although gaming as instruction could be seen as an intrusion on learning, the role of the educator should be to increase learners' motivation and engagement, to promote skill acquisition, and

to develop learner interaction and collaboration, especially with their peers, allowing them to actualise gaming values in real-world situations (Wendel, Hertin, Göbel, & Steinmetz, 2010; Simsek, 2016).

Furthermore, studies even argue that the performance of males and females using games differs. For example, a study by Achor and Imoko (2010) established that games reveal a significant effect by gender on pupils' achievement. Also, Adeleke (2008) discovered that boys' and girls' performances are not equal, and there is significant difference in their performances. In the same vein, Bassey, Joshua and Asim (2008) found a significant difference in gender achievement in favour of male students. Nevertheless, Kinzie and Joseph (2008) established that girls more frequently engaged in video games for learning and discovery than their male peers did.

In another development, Maguth, List and Wunderle (2015) examined the influence of video games on the teaching of world history. The study established that video games provide learners with a digitally relevant world that facilitates the learning of both abstract concepts and theories. Similarly, Bunch, Robinson, Edwards and Antonenko (2014) compared the effect of instruction by lecture and discussion to digital, game-based instruction on learner achievement in both agriculture and mathematics; the study shows that using digital games in the agricultural context of animal science does promote learners' achievement. Furthermore, a study by Ibitoye and Olaifa (2018) evaluated indigenous Yoruba Language Learning through a Game-based Model; the study assesses the cognitive knowledge of game users in term of language, coaches the users through a range of amusing game stages, and predicts the situation of the language learners by using a two-level predictive analytics technique.

This study confirmed the relevance of games in the context of teaching and learning, which has been the focus of many scholars in education. Although educational games serve as a support tool in teaching and learning, studies on games for instruction have been relatively scarce globally. The existing literature reports that games provide learning opportunities in diverse disciplines through collaboration. The study of McLaren, Adams, Mayer and Forlizzi (2017) researched game instruction in Mathematics, concluding that students learn more about decimal points through games. Also, Kao (2014) conducted research on the effect of learning

English with a digital, game-based tool; the study meta-analysis established that digital games were more effective in transmission of theoretical knowledge collaboratively than individually in practical applications.

In another development, scholars have revealed the significance of graphics in the context of creative arts. For example, Mustamir (2019) studies how to improve learning in the Cultural Arts and Filter Art Graphic Materials among the Class IX E pupils of SMP Negeri 3 Surabaya; the study concluded that the method of screen printing can be improved and learning achieved in filter printing on graphic art resources. Moreover, Odewumi and Idowu (2014)examined Origami (paper folding) in teaching selected graphic arts content to the Junior Secondary School in Ogbomoso, Nigeria. The study revealed the success of paper folding in the graphic world of instruction, and the learning outcomes were positive.

This study therefore determined to fill the gap created by previous studies on the use of games to elicit positive response from pupils based on the classroom teaching of graphics. No known studies of games have included the colour wheel motion game that is the focus of this study. Therefore, the study examined the effect of the colour wheel motion game on pupils' achievement and assessed the interactive effect of this game on pupils' cognitive development in the field of graphic arts, an offshoot of Creative Arts in elementary education in the Nigerian school system.

Research hypotheses

These two hypotheses were tested in the study:

$H0_1$: There is no significant difference in achievement of pupils exposed to the colour wheel motion game and of those taught with conventional methods.

$H0_2$**:** There is no significant difference in the achievement of male and female pupils exposed to the colour wheel motion game.

Methodology

The research design adopted for the study is Quasi-experimental, using pre- and post-testing. The relevant population comprised all primary school pupils in the Ogbomoso North Local Government area of Oyo State, Nigeria, and the sample for the study involved 50 pupils, 25 boys and 25 girls, ranging between 10 and 12 years of age, in Primary five (Basic 5). Pupils were selected from two primary schools (a private and a public school). These were grouped into experimental and control groups.

The criteria for school selection were that both be elementary basic schools, established for the past 15 years. Additionally, trained teachers had to have been teaching the pupils in the school for the past five years. Also necessary was evidence of the pupils' readiness for reading and understanding English. There had to be provision of a classroom with enough space for the exhibition of the game instruments and for pupils to sit conveniently to write the objective paper based on the test items. The study lasted six weeks, with the first week used to familiarise pupils with the game content and playing of the game. The final week was used for evaluation of the Game Curriculum Content (GCC)in the colour card envelope, before the pupils were administered the test instrument i.e. the 'Colour Wheel Rotational Game Test' (CWRGT) as summative.

Research Instrument

The intervention instrument, the Colour Wheel Rotational Board (CWRB), was developed by researchers in line with model specifications from Morrison, Ross, Kemp, and Kalman (2007).The model comprised nine interrelated phases, from identification of the instructional design problem, to the evaluation unit for the instrument. The intervention game included lesson content adapted for four weeks of intensive instruction. Similarly, a major test instrument, the Colour Wheel Rotational Game Test' (CWRGT), was developed through extraction and selection of questions from the validated Common Entrance Examination for Junior Secondary School in Oyo State, based on relevant topics. In the same vein, the methodologies, coupled with the appropriate instructional media, were used by teachers withthe conventional group.

The field trial for the Colour Wheel Motion Board (CWMB) was done through administration of the instrument on another set of 15 pupils (8 males and 7 females) from another public primary school that is part of the main study populationby two experienced instructors who team-taught the trial. A reliability coefficient of 0.67 was obtained with Kuder-Richardson (KR-20).The comments and suggestions from the experienced instructors were used in producing the final copy of the Colour Wheel Rotational Game and the test items.

Experimental Procedure

The experimental process was set out in the game guide and manual, which was distributed to both pupils and teachers for proper monitoring of the study. The experimental group, which consisted of 25 pupils, were taught how to rotate the colour wheel. Three different colour wheels were presented to a group of four to five pupils; "ColourWheel A" consisted of a perfect circle, including both primary and secondary colours, in six units and stationed on a large table (Fig. 1). "Colour wheel B" consisted of 15 colour variations, from tertiary colours formed from the secondary colours, and "Colour wheel C" comprised a 12-unit segment of colour terminology. Each pupil holds the edge of the colour wheel motion game board, which rotates anti-clockwise(Fig. 2). When the rotation stops at a point where the arrow is stationed, the pupil picks the white envelope at the back of the unit of colour indicated by the arrow (Fig. 3). The envelope contains a 3- by 4-inchwhite card, which explains the topics and gives detailed content and a summary about each unit of colour reflecting the inverse colour (Fig. 4). These cards were written in bold and placed at the back of each unit segment of colour for the pupils to read in4 to 5 minutes, afterwards returning the envelope to its place. This was done repeatedly by each pupil; a total of 6 colour wheel motion game boards were presented to pupils in the experimental classroom, to avoid congestion; thus, 4 to 5 pupils could handle each colour wheel motion game board in a group. It should be noted that the experimental group were mandated to participate fully and were well supervised during the gaming process or game playing, with the use of the 3 different colour wheel games provided.

Each envelope contained adetailed explanation of the teaching content for each colour on the wheel. The conventional group were team-taught the topics (Colours wheel; Primary colours: Secondary colours, Tertiary Colours and Colour terminology) by teachers with assistance from the researchers in the classroom.

The Test Instrument named Colour Wheel Rotational Game Test (CWRGT), was extracted from the validated Oyo State Common Entrance Examination into Junior Secondary Schools past question. The test instrument consisted of three sections, A, B and C. The first Section "A" was for the pupils' name, school and gender;"B" was for the test duration; and "C for 25 multiple-choice, objective questions. The Colour Wheel Rotational Game Test item on the instrument has five options, "A - E" from which the correct answer can be selected. The CWRGT tests were administered by pencil and paper to the pupils after engaging the students with the (Colour Wheel Rotational Game).This was done in a classroom where pupils were assigned numbers attached to each seat. Scoring of the Colour Wheel Rotational Game Test(CWRGT) items is based on2 marks for the correct answer and 0 for a wrong answer, for a total of 50 obtainable marks. The sixth week witnessed the evaluation of the game and the game content in the envelopes, followed by administration and marking of the test, and handing over pupil scores to the researchers for data analysis.

Hypothesis testing

$H0_1$: There is no significant difference in achievement of pupils exposed to the colour wheel motion game and of those taught with conventional methods.
In testing the significant difference in the achievement of pupils taught with the Colour Wheel Motion Game and of those exposed to conventional methods, the hypothesis was tested using ANCOVA with the pre-test serving as covariates.

Table 1: ANOVOCA Table of Pupils Taught with the Colour Wheel Motion Game and Those Exposed to the Conventional Method.

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	1351.723[a]	6	225.287	6.173	.001
Intercept	5998.089	1	5998.089	164.352	.000
Pre-Test	322.606	1	322.606	8.840	.008
Treatment	1240.811	5	248.162	6.800	.001
Error	656.917	18	36.495		
Total	134796.000	25			
Corrected Total	2008.640	24			

Significant at 0.05 alpha levels.

The results in Table 1 above show the comparison of post-test mean scores for the experimental and control groups. The calculated F value of 6.800 is significant because the significant value of .000 is lower than the 0.05 alpha levels. This implies that the experimental group exposed to the Colour Wheel Motion Game performed better than the control group taught with the conventional method. The hypothesis is therefore rejected.

$H0_2$**:** There is no significant difference in the achievement of male and female pupils exposed to the colour wheel motion game.

In testing the significant difference in the achievement of boys and girls taught with the Colour Wheel Motion Game, the hypothesis was tested using t-test statics to compare the mean for both boys and girls, as shown in Table 2.

Table 2: t-test Statistics for Boys and Girls Taught with the Colour Wheel Motion Game

Variables	No	Mean	SD	df	t-value	p-value
Boys	25	69.00	12.24			
				48	14.225	.000
Girls	25	31.00	5.55			

The t-test result displayed in Table 2 above shows that the P- value is not greater than 0.05; this indicates that there is a significant difference in the mean performance between boys and girls in the two schools. Thus, the null hypothesis was not retained.

Discussion of the findings

The study on the interactive effects of the colour wheel motion game on pupils' cognitive development in the field of graphic artsin Nigeria has proved to be positive and useful for instruction. The results from the testing of hypothesis one show a clear and significant difference between the mean figures for pupils exposed to the Colour Wheel Motion Game and the figures for those taught the conventional way. This is an indication that the pupils exposed to the Colour Wheel Motion Game have higher academic achievement than those taught the conventional way. Analysis of hypothesis two shows that there is a significant difference in the mean for boys and girls exposed to the Colour Wheel Motion Game; the mean for the boys' achievement was notably higher than that of the girls. The boys' achievement level on the colour wheel game can be rated higher than that of the girls.

The findings agreed with the study of Pintrich (2003),who confirmed that games promote the intellectual abilities of learners and build learner self-confidence. Our findings were also in agreement with those of Boyle (2011), who established that games were effective in developing learners' cognitive domain. Similarly, the findings are in line with the study by Mayer (2014), which uncovered a relatively slight difference in comparison with conventional methods in teaching mathematics. Moreover, the findings concur with the study by Clark, Tanner-Smith and Killingsworth (2015), who reported that educational games were positive and effective in classroom instruction. The findings also support those of McLaren, Adams, Mayer and Forlizzi (2017), who reported that games are significantly beneficial and more enjoyable forms of instruction.

These findings contradict the study by Zirawaga, Olusanya and Maduku (2017),whose findings revealed that learners who rely on games are occasionally secluded from social life interaction. The findings are also opposite to those from the study by Johnson and Mayer (2010), whose findings demonstrated pupils learning advantages for pupils of self-explanation in educational games.

Conclusion

Overall, the study of the interactive effects of this colour wheel motion game on pupils' cognitive development in the field of graphic arts proved to be positive in the given instruction. The colour wheel motion game has proven to be an educational game that promotes meaningful learning among learners. Moreover, the colour wheel motion game can also be grouped with the technology of instruction, instructional packages, and instructional devices in teaching and learning processes that uphold the significance of learning. The study also established that colour concepts and terminology can be learned easily through the use of the colour wheel motion game. This is a clear indication that each player can express their cognitive knowledge about the colours acquired from the colour wheel game by performing excellently on the given test. The colour wheel motion game promotes social skills, interaction and collaboration among pupils. Additionally, the colour wheel motion game builds pupils' interest in active learning. Overall pupils' exposure to frequent operation of the rotational wheel builds muscular fitness and develops the pupils' psychomotor domain.

In relation to the findings from the study, it was ultimately recommended that teachers should be using the Colour Wheel Rotational Game for teaching primary colours, secondary colours, and tertiary colours among primary school pupils in the field of graphic arts**.** The stakeholders should embrace using the colour wheel motion game in the teaching and learning of colours and other related topics in the curricula context. Overall, sharing, findings on the use and outcome of the colour wheel motion game at the relevant association meetings, seminars and conferences will promote awareness and make learning more meaningful.

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REVIJA ZA ELEMENTARNO IZOBRAŽEVANJE
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MEDPREDMETNO POVEZOVANJE GIBANJA IN GLASBE V ZGODNJEM OBDOBJU OTROŠTVA

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gibalne spretnosti, ritmični posluh, načelo horizontalne povezanosti, medpredmetno povezovanje gibanja in glasbe, eksperimentalni program

Izvleček/Abstract

Namen raziskave je bil preučiti učinke eksperimentalnega programa, ki temelji na povezovanju področij gibanja in glasbe, na usvajanje temeljnih gibalnih spretnosti in na razvoj ritmičnega posluha. V raziskavi je sodelovalo 62 otrok, starih od 5 do 6 let. Rezultati so pokazali, da so otroci gibalno-glasbenega in gibalnega programa dosegli večji napredek v temeljnih gibalnih spretnostih in stopnji razvitosti ritmičnega posluha kot otroci kontrolne skupine. Ob upoštevanju načela horizontalne povezanosti različnih področij dejavnosti in različnih vidikov otrokovega razvoja in učenja se je eksperimentalni gibalno-glasbeni program pokazal kot učinkovitejši.

Integration of Movement and Music in Early Childhood

The purpose of this study was to examine the influence of an experimental programme based on the integration of movement and music on the development of fundamental movement skills and rhythmic abilities. Sixty-two children aged from 5 to 6 years participated in the study. Results showed that children who were included in the music and movement programme as well as those included in the movement-only programme improved more in fundamental movement skills and rhythmic abilities than children from the control group. Considering the principle of horizontal integration of different curricular areas and different viewpoints on the child's development and learning, the experimental music and movement programme proved to be more effective.

Keywords:
movement skills, rhythmic abilities, principle of integration, integration of movement and music, experimental programme

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Teoretična izhodišča

Medpredmetno povezovanje je didaktični pristop, v okviru katerega je učenje organizirano tako, da povezuje skupne značilnosti učnih področij v smiselno celoto. Kurikulum za vrtce (1999) v okviru načela horizontalne povezanosti spodbuja medpodročno povezovanje šestih področij (gibanje, jezik, družba, matematika, umetnost in narava), ki poudarja soodvisnost vidikov otrokovega razvoja in s tem upravičenost in uporabnost povezovanja dejavnosti različnih področij. Kurikularne povezave so glede na število vključenih predmetov lahko enopredmetne, če obstajajo znotraj posameznega predmeta, in večpredmetne, če obstajajo med dvema predmetoma, med več ali vsemi predmeti (Pavlič Škerjanc, 2008; Varl in Duh, 2017). Medpredmetno povezovanje lahko temelji na ravni vsebin, ciljev in/ali procesov. Povezovanje, ki temelji samo na učni snovi, »[…] še ne zagotavlja uspešne povezave med predmeti, saj tovrstni pristop ni v skladu s sodobnimi kurikularnimi strategijami, ki bolj kot učno vsebino poudarjajo pomen procesov in ciljev učenja« (Sicherl - Kafol, 2007, str. 115). V smislu medpredmetnosti lahko torej pri načrtovanju izhajamo iz učnih ciljev različnih ravni zahtevnosti in področij otrokove osebnosti (afektivne, kognitivne, psihomotorične), ki postanejo glavni element povezovanja med različnimi predmetnimi področji. »Prednosti takšnega pristopa so, da učenci pri medpredmetnem reševanju učnih situacij razvijajo interes in motivacijo, dosegajo boljše učne uspehe, izražajo samozavest in so zmožni vzpostavljati transfer učnih znanj in spretnosti med različnimi predmetnimi področji« (Denac, Čagran, Žnidaršič in Sicherl - Kafol, 2013, str. 42).

Temeljne gibalne spretnosti

Temeljne gibalne spretnosti (TGS) predstavljajo osnovne gradnike kasnejših specializiranih gibanj, ki so potrebni za sodelovanje v različnih športnih dejavnostih v obdobju mladostništva in odraslosti (Gallahue in Ozmun, 2006; Seefeldt, 1980).

Otroci, ki so bolj vešči v TGS, v večji meri sodelujejo pri športnih aktivnostih v kasnejših obdobjih življenja in izkazujejo boljšo telesno pripravo (Barnett, Van Beurden, Morgan, Brooks in Beard., 2008; Gašparović, Petrić, Štemberger, Rakovac, in Blažević, 2017; Hardy, King, Farrell, Macniven in Howlett, 2009; Jaakkola, Yli - Piipari, Huotari, Watt in Liukkonen, 2016; Morrow idr., 2013) kot manj vešči otroci. Neustrezno pridobljene TGS pomenijo pomanjkanje gibalnih kompetenc, to pa praviloma vodi v neprimerno in neredno telesno in/ali športno dejavnost v odraslosti (Pišot, 2012). Prav zaradi tega je pomembno, da otroke pričnemo seznanjati s TGS že v zgodnjem otroštvu.

TGS delimo na stabilnostne spretnosti (stoja na eni nogi, vrtenje ipd.), lokomotorne spretnosti (tek, skoki ipd.) in manipulativne spretnosti (prijemi, meti žoge ipd.). Vsaka TGS je sestavljena iz preprostih gibalnih akcij, ki si sledijo v časovnem zaporedju in ustvarjajo edinstven gibalni vzorec vsake spretnosti. Za otrokov razvoj je pomembno, da usvoji časovno usklajen gibalni vzorec, saj to pogojuje njegovo pravilno izvedbo in s tem uporabnost takšne gibalne spretnosti. Strokovnjaki ugotavljajo, da otroci v današnjem času zamujajo v usvajanju TGS ali jih sploh ne usvojijo (Beurden, Zask, Barnett in Dietrich, 2002; Stratton idr., 2009; Lemos, Avigo in Barela; 2012; Stodden idr., 2008). Za usvajanje TGS je pomembno, da vzgojitelj, učitelj ali športni pedagog pri učenju usmerjajo otroke, saj jih lahko s tem učinkovito vodijo k pravilni izvedbi ali jim pomagajo nadoknaditi morebitne primanjkljaje (Goodway, Robinson in Crowe, 2013; Petrić, Kostadin in Peić, 2018). Otroci se namreč TGS ne naučijo sami od sebe, ampak jih k temu morajo voditi odrasli (Clarke, 2007) tako, da jim omogočajo izvajanje TGS in zagotavljajo njihovemu razvoju primerno učno okolje, v katerem mora prevladovati gibalno-didaktična igra kot osnovna učna metoda (Zoglowek in Aleksandrovich, 2016).

Elementarne glasbene sposobnosti – ritmični posluh

Časovni potek glasbenega dogajanja določajo: ritem, metrum in tempo. Ritem je zaporedno ponavljanje dveh ali več zvočnih elementov, ki prinaša urejenost, metrum je izmenjava poudarjenih z nepoudarjenimi zvočnimi elementi ritmičnega gibanja, tempo pa je določena hitrost izvajanja osnovne ritmične enote ali glasbenega dela.

Ritmični posluh, poleg melodičnega posluha, spada med elementarne glasbene sposobnosti. Sloboda (1986) meni, da ritmičnega vedenja ne zasledimo pred prvim

letom starosti. Da lahko neko vedenje opredelimo kot ritmično, se mora pojaviti eno od naslednjih vedenj: podelitev dobe, imitacija danega ritmičnega vzorca, ritmično gibanje ali udarjanje ob glasbi, izpustitev dobe, pri čemer se po pavzi otroci zopet pravilno vključijo v ritmični tok. V drugem letu starosti se povečata število in kakovost reakcij na glasbo. Boljša je tudi koordinacija gibov ob glasbi. Moog (1968) je ugotovil, de se je desetina otrok med 18. in 24. mesecem sposobna krajši čas ritmično gibati ob glasbi. Velik preskok v razvoju ritmičnega posluha lahko opazimo po petem letu starosti (Božič, Habe in Jerman, 2007), kjer je viden napredek na področju ohranjanja ritma, tako v hoji kot v ploskanju. Med ritmične sposobnosti uvrščamo: zaznavanje osnovnega glasbenega utripa, izvajanje podelitve dobe, usklajevanje gibanja z glasbo ter ohranjanje enakomernega osnovnega glasbenega utripa skozi glasbeno tišino (Borota in Kovačič Divjak, 2015). Ritmični posluh pri otroku razvijamo z različnimi glasbenimi dejavnostmi, kot so izvajanje (petje in igranje), poslušanje in ustvarjanje glasbe; preverjanje razvitosti ritmičnega posluha pa z glasbeno-didaktičnimi igrami, ki nam ponujajo priložnost, da si otrok še intenzivneje razvija določeno glasbeno sposobnost (Denac, 2012a, 2012b).

Povezovanje področij gibanja in glasbe

Gibanje in glasba sta pri poučevanju v vzajemni odvisnosti. Glasba lahko pomaga otrokom pri učenju gibalnih spretnosti in gibanje lahko pomaga pri razvijanju glasbenih sposobnosti. Ritem in takt lahko opredeljujeta enakomernost ponavljanja delov gibalne spretnosti. Pri učenju TGS je ponavljanje njenih delov, ki ustvarjajo gibalni vzorec, ključnega pomena za pravilno izvedbo, zato je ritem v procesu učenja TGS zelo pomemben. Vključevanje glasbe omogoča poudarjanje posameznih delov spretnosti oziroma spreminjanje izvedbe v celoti (nežni, odrezavi, mehki, težki gibi), kar lahko pomaga otroku pri učenju spretnosti (Pistotnik, 2011; Rajtmajer, 2011). Ob glasbi postane gibanje sproščeno, urejeno in intenzivnejše (Denac, 2012a), hkrati pa gibanje ob ritmični spremljavi spodbudi zavedanje različnih telesnih položajev in s tem izboljša kinestetični občutek (Phillips - Silver in Trainor, 2005).

Številni glasbeni pedagogi, med njimi tudi Emil Jaques Dalcroze in Carl Orff, so zagovarjali gibanje kot enega izmed ključnih korakov v poučevanju glasbe (Sušić, 2017). Z gibom otroci izražajo metrum ter gib uporabijo kot sredstvo za oblikovanje in izražanje zvočnih predstav, zato je koristno, da poučevanje glasbe gradimo na povezovanju gibanja in glasbe. Emil Jaques Dalcroze (1865–1950) velja za pionirja

poučevanja glasbe s pomočjo gibanja telesa. Znana je njegova misel, da lahko vsako glasbeno idejo izrazimo z gibanjem telesa in vsako gibanje telesa lahko preoblikujemo v glasbeno gibanje (Dalcroze, 1932). Njegov pristop k poučevanju glasbe obsega ritmično vzgojo oz. ritmiko, solfeggio z vajami za slušno občutljivost za glasbo oz. za študij glasbene teorije in prakse ter improvizacijo. Dalcroze kot ključne elemente za razvoj muzikalnosti vključuje – poleg izražanja logičnih misli (govor) in občutkov (zvok) – tudi telesno izražanje (gesto) (Bachmann, 1995). Osnovni cilj Dalcrozovega didaktičnega pristopa je s pomočjo ritma in telesne dejavnosti ustvariti neposredno pot med telesom, umom in občutki (Thresher, 1964). Med učenjem lahko otroci usklajujejo gibanje ob ritmu, ali poustvarjajo ritem na podlagi gibanja. Podobnih pogledov je bil Carl Orff (1895–1982), ki je v svoj inovativni pristop k poučevanju glasbe vključeval gibanje ob glasbi, petje osnovnih melodičnih motivov in intervalov, igranje osnovnih ritmov in improvizacijo (Thresher, 1964).

Povezovanje gibanja in glasbe je lahko uporaben didaktičen pristop (Hallam, 2010). Razvijanje ritmičnih sposobnosti naj bi pripomoglo k boljšemu razumevanju in pomnjenju različnih gibanj. Izvajanje gibalnih spretnosti ob glasbi, ki je ritmično usklajena z gibanjem, pripomore k bolj natančni (Anshel in Marisi, 1978; Painter, 1966) in pravilni (Beisman, 1967) izvedbi teh spretnosti. Prav tako umeščanje gibanja v poučevanje glasbe izboljša ritmične sposobnosti (Zachopoulou, Derri, Chatzopoulos in Ellinoudis, 2003). Študije so pokazale, da je medpredmetno povezovanje gibanja in glasbe v predšolskem obdobju učinkovitejše za usvajanje lokomotornih spretnosti kot samo gibanje (Zachopoulou, Bakle in Deli, 2006; Derri, Tsapakidou, Zachopoulou in Kioumourtzoglou, 2001) in prosta igra (Brown, Sherrill in Gench, 1981; Deli, Bakle in Zachopoulou, 2006).

Problem, namen in cilji raziskave

Medtem ko študije v mednarodnem prostoru dokazujejo pozitivne učinke povezovanja gibanja in glasbe na usvajanje TGS v predšolskem obdobju, v slovenskem prostoru ne zasledimo podobne študije. Prav tako se študije učinkov povezovanja gibalnih in glasbenih vsebin omejujejo na ločeno preverjanje vplivov takšnega programa na usvajanje gibalnih spretnosti in razvoj ritmičnih sposobnosti. Zato smo se lotili raziskave, v okviru katere smo preverjali, kako povezovanje gibalnih in glasbenih dejavnosti v predšolskem obdobju vpliva na usvajanje različnih

TGS in razvoj ritmičnih sposobnosti. Pri tem nas je zanimalo, ali je gibalno-glasbeni program uspešnejši od gibalnega programa in javnega programa za predšolske otroke.

Raziskovalna vprašanja

Zastavili smo si naslednji raziskovalni vprašanji:

- Ali obstajajo razlike med začetnim in končnim stanjem otrok gibalno-glasbenega programa, gibalnega programa in javnega programa v TGS ter razvitosti ritmičnega posluha?

- Ali obstajajo razlike v napredku TGS in ritmičnega posluha med skupinami, v katerih se je izvajal gibalno-glasbeni program, gibalni program oz. javni program?

Metodologija

Raziskovalna metoda

Uporabili smo enofaktorsko eksperimentalno raziskovalno metodo s tremi modalitetami in skupinami otrok kot primerjalnimi skupinami.

Raziskovalni vzorec

Raziskovalni vzorec je bil neslučajnostni iz konkretne populacije predšolskih otrok, starih od 5 do 6 let (M = 5,6; SD = 0,4). Z namenom in vsebino raziskave je bilo predhodno seznanjeno vodstvo vrtca, ki je podalo soglasje k izvajanju zastavljenega programa in postopkom zbiranja podatkov. V raziskavo so bili vključeni samo otroci, katerih starši so podali soglasje k sodelovanju v raziskavi. Vključenih je bilo 62 otrok, od tega 53 % (n = 33) dečkov in 47 % deklic (n = 29). Otroci so bili razdeljeni v dve eksperimentalni skupini in eno kontrolno skupino. V eksperimentalni skupini je bilo vključenih 35 otrok, od tega 18 otrok (29 %) v skupino gibalno-glasbenega programa (GGLP) in 17 otrok (27 %) v skupino gibalnega programa (GP). V kontrolno skupino, ki je izvajala usmerjene dejavnosti

s področja gibanja in glasbe v skladu z javnim programom (JP) za predšolske otroke, je bilo vključenih 27 (44 %) otrok.

Postopki zbiranja podatkov

Temeljne gibalne spretnosti

Podatke smo zbrali s kvantitativno tehniko, s standardiziranimi merskimi nalogami, primernimi za otroke, stare od 3 do 10 let (Okely, Booth in Chey, 2004). Vsaki lokomotorni (tek in sonožni vertikalni skok) in manipulativni (podaja žoge z obema rokama, odbijanje žoge na mestu, udarec žoge z nogo in udarec žoge z loparjem) gibalni spretnosti smo določili šest kazalcev, po katerih smo ocenjevali pravilno izvedbo gibanja. Za vsak pravilno izveden kazalec je otrok prejel točko, tako da je razpon ocene za posamezno gibalno spretnost znašal od 0 do 6 točk. Skupno oceno smo izračunali tako, da smo ocene posameznih gibalnih spretnosti sešteli. Otrok je lahko skupaj dosegel 36 točk, od tega za sklop lokomotornih spretnosti 12 točk in za sklop manipulativnih spretnosti 24 točk. Pred izvedbo posamezne gibalne spretnosti so otroci prejeli navodila v obliki razlage, vsaka spretnost pa je bila tudi demonstrirana.

Dva ocenjevalca, ki sta bila usposobljena za ocenjevanje gibalnih spretnosti, sta ocenila vsakega otroka. Aritmetično sredino obeh ocen smo uporabili za nadaljnjo statistično obdelavo. Ocene ocenjevalcev so pokazale visoko notranjo konsistentnost ≥ 0,70 (Fayers in Machin, 2013) za vseh šest obravnavanih gibalnih spretnosti (Cronbach $\alpha = 0{,}98$), prav tako tudi za sklop lokomotornih (Cronbach $\alpha = 0{,}93$) in manipulativnih spretnosti (Cronbach $\alpha = 0{,}85$). Interklasni koeficient korelacije je pokazal visoko stopnjo zanesljivosti ≥ 0,80 med ocenjevalcema za lokomotorne (ICC = 0,81–0,89) in manipulativne spretnosti (ICC = 0,80–0,87), prav tako tudi znotraj ocenjevalcev (lokomotorne ICC = 0,89; manipulativne ICC = 0,85).

Ritmični posluh

Podatke o stopnji razvitosti ritmičnega posluha smo zbrali z naslednjimi testi:

a) *Test za ugotavljanje enakih in različnih ritmični vzorcev* (Gordon, 1986)

Otroci ugotavljajo, ali sta dva ritmična vzorca enaka ali različna. Test rešujejo tako, da obkrožijo dva enaka obraza, če slišijo dva enaka ritmična vzorca, oz. dva različna obraza, če slišijo dva različna ritmična vzorca. Posamezna vprašanja so označena z risbami predmetov, ki so otrokom znani. Ritmični test je sestavljen iz petnajstih nalog in dveh poskusnih nalog. Vsaka pravilno rešena naloga se oceni z eno točko.

b) *Test za posnemanje govorjenih ritmičnih fraz* (Denac, 2002)
Test je izdelan za namene raziskovalne naloge in vsebuje naloge za posnemanje govorjenih ritmičnih fraz. Test sestavlja pet nalog za posnemanje govorjenih ritmičnih fraz in dve poskusni nalogi. Kriterij za ocenjevanje je stopnja pravilne ponovitve govorjenih ritmičnih fraz. V celoti pravilno rešena naloga je ocenjena s tremi točkami, delno pravilno rešena naloga z dvema točkama in v celoti nepravilno rešena z eno točko.

c) *Test za prepoznavanje kratkih in dolgih tonov* (Denac, 2002)
Na klavirju na tonu g1 zaigramo kratke in dolge tone. Dolžino trajanja otroci zapisujejo z ravno črto. Test vsebuje deset nalog. Vsaka pravilno rešena naloga je ocenjena z eno točko.

č) *Test za ugotavljanje težkih in lahkih dob* (Denac, 2002)
Na boben izvajamo štiridobni takt s poudarjenimi in nepoudarjenimi dobami. Ko otrok zasliši poudarjeno dobo, na papir v kvadrat nariše piko. Izvajanje vključuje deset poudarjenih in deset nepoudarjenih dob. Vsaka pravilno rešena naloga se ovrednoti z eno točko.

d) *Test za ugotavljanje skladnosti gibanja v ritmu skladbe Franz Schubert: Vojaška koračnica* (Denac, 2002)
Otroci najprej samo prisluhnejo skladbi. Ob ponovnem poslušanju jih spodbudimo za gibalno izražanje doživetij in predstav glasbenega dela in opazujemo skladnost gibanja v ritmu glasbe. Skladno gibanje v celotni skladbi ocenimo s tremi točkami, skladno gibanje v delu skladbe ocenimo z dvema točkama, neskladno gibanje v celotni skladbi z eno točko.

Postopki obdelave podatkov

Podatke smo kvantitativno obdelali z osnovno opisno statistiko, razliko med otroki, ki so sodelovali v gibalno-glasbenem programu, gibalnem programu in javnem programu, pa smo preverili z enofaktorsko analizo variance. V nadaljevanju analize smo razlike med pari programov ugotavljali s pomočjo Bonferronijevega testa. Velikost učinka smo izračunali s pomočjo η^2, pri čemer smo učinek interpretirali: 0–0,01 = nepomemben učinek, 0,02–0,13 = majhen učinek, 0,13–0,25 = srednje velik učinek in ≥ 0.26 = velik učinek (Cohen, 1988). Razlike med začetnim in končnim stanjem posamezne skupine smo preverili s t-preizkusom za odvisne vzorce. Velikost učinka smo izračunali s pomočjo Cohenovega d-indeksa, pri čemer smo učinek interpretirali: 0–0,1 = nepomemben učinek, 0,2–0,4 = majhen učinek, 0,5–0,7 = srednje velik učinek in ≥ 0.8 = velik učinek (Cohen, 1992). Napredek smo izračunali kot razliko med ocenami končnega stanja in začetnega stanja (napredek [točke] = končno stanje [točke] – začetno stanje[točke]).

Eksperimentalni program

Gibalno-glasbeni program (GGLP) je trajal pet tednov in vključeval 19 usmerjenih dejavnosti, katerih cilj je bil usvojiti izbrane gibalne spretnosti (tek, sonožni vertikalni skok, podaja žoge z obema rokama, odbijanje žoge na mestu, udarec žoge z nogo in udarec žoge z loparjem) in doseči višjo stopnjo razvitosti ritmičnega posluha. Vsaka usmerjena dejavnost je bila sestavljena iz uvodnega dela, v katerem so se otroci čustveno in telesno pripravili na glavni del, v katerem so izvajali različne naloge, ki so povezovale gibanje in glasbo, ter zaključnega dela, v katerem so se otroci umirili. V povprečju je trajala vsaka usmerjena dejavnost 40 minut. Nekaj primerov povezovanja gibanja in glasbe: reproduciranje enakih in različnih ritmičnih in melodičnih vzorcev (npr. enakomerno odbijanje žoge v danem ritmu, visoko/nizko odbijanje žoge glede na višino tona), posnemanje govorjenih ritmičnih fraz (npr. posnemanje govorjene ritmične fraze z odbijanjem žoge s pomočjo loparja), prepoznavanje dolgih in kratkih tonov (npr. igra spreminjanja dolžine korakov pri teku v skladu z dolgimi/kratkimi toni, hiter odriv – doooolg skok), prepoznavanje lahkih in težkih dob (npr. stečem/lahke dobe in se močno odrinem/težka doba ob igranju na ksilofon), usklajevanje gibanja z ritmom glasbe (npr. uskladitev zaleta in udarca žoge z nogo z igranim ritmom na tamburin, razgibavanje ob glasbi). Večino

dejavnosti smo izvedli v okviru glasbeno-didaktičnih iger z jasno zastavljenimi cilji, ki so temeljili na medpredmetnem povezovanju gibalnih in glasbenih dejavnosti.

Gibalni program (GP) je trajal pet tednov in zajemal 19 usmerjenih dejavnosti, katerih cilj je bil usvojiti izbrane gibalne spretnosti (tek, sonožni vertikalni skok, podaja žoge z obema rokama, odbijanje žoge na mestu, udarec žoge z nogo in udarec žoge z loparjem). Struktura in čas trajanja posamezne usmerjene dejavnosti sta bila enaka dejavnosti gibalno-glasbenega programa. Bistvena razlika med programoma je bila v tem, da se v okviru gibalnega programa pri izvajanju temeljnih gibalnih spretnosti ni uporabljala glasba. Večina didaktičnih iger je bila enaka tistim, ki smo jih uporabili v sklopu gibalno-glasbenega programa.

Eksperimentalna skupina je bila deležna gibalno-glasbenega in gibalnega programa, *kontrolna skupina* pa je v času eksperimenta izvajala usmerjene dejavnosti s področja gibanja in glasbe v skladu z *javnim programom* (JP) za predšolske otroke. V tem času je izvedla pet vadbenih ur in pet glasbenih uric, ki se med seboj niso povezovale. Vadbene ure so zajemale premagovanje poligonov z različnimi naravnimi oblikami gibanja, glasbene urice pa izvajanje različnih glasbenih dejavnosti.

Dejavnosti GGLP, GP in JP so izvajale vzgojiteljice in pomočnice vzgojiteljic, ki tudi sicer vodijo delo v oddelku. S tem smo se želeli izogniti ustvarjanju umetnega okolja, v katerem se otroci morda ne bi počutili prijetno, kar bi lahko vplivalo na rezultate raziskave. Načrtovanje GGLP in GP smo opravili skupaj z vzgojiteljicami, tako da so bile z načrtovanimi dejavnostmi dobro seznanjene, kar je omogočilo učinkovito izvajanje in evalvacijo teh dejavnosti.

Rezultati in interpretacija

Pred izvedbo eksperimenta smo analizirali začetno stanje oziroma stopnjo razvitosti TGS in ritmičnega posluha skupin GGLP, GP in JP. Analiza variance je potrdila, da v začetnem stanju med skupinami ni bilo statistično značilnih razlik v razvitosti ritmičnega posluha (vsi $p \geq 0{,}207$) in TGS (vsi $p \geq 0{,}206$), razen v sonožnem vertikalnem skoku ($F = 6{,}881$, $p = 0{,}002$, $\eta 2 = 0{,}19$). Pri tem je skupina JP ($M = 4{,}74$; $SD = 0{,}90$) dosegla statistično značilno boljši rezultat (Bonfferonijev test $\alpha_c < 0{,}0167$) kot skupina GGLP ($M = 3{,}72$; $SD = 1{,}02$).

Tabela 1: Razlika v izbranih TGS med začetnim in končnim stanjem JP.

		AS	SO	t	p (t)	d
Udarec žoge z nogo	ZS	5,04	1,224	1,093	0,285	–0,24
	KS	4,74	1,228			
Tek	ZS	5,48	0,700	–1,000	0,327	0,26
	KS	5,67	0,734			
Sonožni vertikalni skok	ZS	4,74	0,903	0,205	0,839	–0,05
	KS	4,70	0,724			
Podaja žoge z obema rokama	ZS	4,26	1,228	–0,501	0,621	0,14
	KS	4,41	0,971			
Odbijanje žoge na mestu	ZS	3,96	1,091	0,000	1,000	0,00
	KS	3,96	1,091			
Udarec žoge z loparjem	ZS	3,26	0,813	–1,664	0,108	0,51
	KS	3,74	1,059			

*Legenda: ZS – začetno stanje, KS – končno stanje, AS – aritmetična sredina, SO – standardni odklon, t – vrednost t-testa za odvisne vzorce, p (t) – statistična značilnost t-testa za odvisne vzorce, d – Cohenov d, * p(t) < 0,05*

Ocene izbranih TGS JP so pokazale, da ni prišlo do statistično značilnih razlik med začetnim in končnim stanjem (vsi $p \geq 0{,}108$). Največji učinek je JP imel na napredek otrok v udarcu žoge z loparjem (d = 0,51) in najmanjšega oz. nikakršnega na odbijanje žoge na mestu (d = 0,00) (tabela 1).

Tabela 2: Razlika v stopnji razvitosti ritmičnega posluha med začetnim in končnim stanjem JP.

		AS	SO	t	p (t)	d
Prepoznavanje enakih in različnih ritmičnih vzorcev	ZS	8,22	2,259	0,442	0,662	–0,12
	KS	7,93	2,731			
Posnemanje govorjenih ritmičnih fraz	ZS	10,33	2,882	–2,327	0,028*	0,45
	KS	11,52	2,424			
Prepoznavanje kratkih in dolgih tonov	ZS	3,37	2,677	–0,736	0,468	0,11
	KS	3,67	2,660			
Prepoznavanje lahkih in težkih dob	ZS	3,22	1,396	0,250	0,805	–0,05
	KS	3,15	1,512			
Skladnost gibanja v ritmu glasbe	ZS	2,41	0,572	–1,727	0,096	0,34
	KS	2,59	0,501			

*Legenda: ZS – začetno stanje, KS – končno stanje, AS – aritmetična sredina, SO – standardni odklon, t – vrednost t-testa za odvisne vzorce, p (t) – statistična značilnost t-testa za odvisne vzorce, d – Cohenov d, * p(t) < 0,05*

V meritvah razvitosti ritmičnega posluha otrok JP je prišlo do statistično značilnih razlik med začetnim in končnim stanjem pri posnemanju govorjenih ritmičnih fraz (t = –2,33; p = 0,028; d = 0,45) (tabela 2). Otroci JP so dosegli na končnem merjenju (M = 11,52; SD = 2,42) za 1,19 točke boljši rezultat kot na začetnem merjenju (M = 10,33; SD = 2,88). Pri drugih nalogah ni prišlo do statistično značilnih razlik (vsi p ≥ 0,096), prav tako so bili učinki majhni oz. zanemarljivo majhni.

Tabela 3: Razlika v izbranih TGS med začetnim in končnim stanjem GP.

		AS	SO	t	p (t)	d
Udarec žoge z nogo	ZS	4,88	1,054	0,643	0,529	–0,15
	KS	4,71	1,160			
Tek	ZS	4,94	1,298	–1,765	0,097	0,71
	KS	5,65	0,702			
Sonožni vertikalni skok	ZS	4,47	0,800	–2,393	0,029*	0,70
	KS	5,12	1,054			
Podaja žoge z obema rokama	ZS	4,29	0,849	–1,852	0,083	0,51
	KS	4,82	1,237			
Odbijanje žoge na mestu	ZS	3,65	1,115	–4,070	0,001*	1,11
	KS	4,88	1,111			
Udarec žoge z loparjem	ZS	3,47	1,179	–1,329	0,203	0,33
	KS	3,88	1,269			

*Legenda: ZS – začetno stanje, KS – končno stanje, AS – aritmetična sredina, SO – standardni odklon, t – vrednost t-testa za odvisne vzorce, p (t) – statistična značilnost t-testa za odvisne vzorce, d – Cohenov d, * p(t) < 0,05*

Ocene v izbranih TGS med začetnim in končnim stanjem skupine GP so pokazale statistično značilne razlike s srednje velikim učinkom v sonožnem vertikalnem skoku (t = –2,39; p = 0,029; d = 0,70) in statistično značilne razlike z velikim učinkom v odbijanju žoge na mestu (t = –4,07; p = 0,001; d = 1,11) (tabela 3). Pri aktivnosti, kjer so otroci odbijali žogo na mestu, je bilo končno stanje (M = 4,88; SD = 1,11) za 1,23 točke boljše od začetnega stanja (M = 3,65; SD = 1,12), rezultat se je izboljšal za 34 %. Pri sonožnem vertikalnem skoku je bilo končno stanje (M = 5,12; SD = 1,05) za 0,65 točke boljše od začetnega stanja (M = 4,47; SD = 0,80). Poleg sonožnega vertikalnega skoka so se pokazale razlike s srednje velikim učinkom GP še pri teku (d = 0,71) in podajanju žoge (d = 0,51). Pri udarcu žoge z loparjem (d = 0,33) so se pokazale razlike z majhnim učinkom, pri udarcu žoge z nogo pa so bili učinki zanemarljivo majhni (d = –0,15).

Tabela 4: Razlika v stopnji razvitosti ritmičnega posluha med začetnim in končnim stanjem GP.

		AS	SO	t	p (t)	d
Prepoznavanje enakih in različnih ritmičnih vzorcev	ZS	9,00	2,574	0,695	0,497	0,25
	KS	9,65	2,621			
Posnemanje govorjenih ritmičnih fraz	ZS	9,12	2,497	–3,125	0,007*	0,57
	KS	10,59	2,671			
Prepoznavanje kratkih in dolgih tonov	ZS	4,18	3,187	–1,456	0,165	0,24
	KS	4,94	3,172			
Prepoznavanje lahkih in težkih dob	ZS	2,76	1,678	–2,954	0,009*	0,85
	KS	4,18	1,667			
Skladnost gibanja v ritmu glasbe	ZS	2,18	0,636	–2,063	0,056	0,50
	KS	2,47	0,514			

*Legenda: ZS – začetno stanje, KS – končno stanje, AS – aritmetična sredina, SO – standardni odklon, t – vrednost t-testa za odvisne vzorce, p (t) – statistična značilnost t-testa za odvisne vzorce, d – Cohenov d, * p(t) < 0,05*

Meritve stopnje razvitosti ritmičnega posluha so pokazale statistično značilne razlike med začetnim in končnim stanjem skupine GP z velikim učinkom v prepoznavanju lahke in težke dobe (t = –2,95; p = 0,009; d = 0,85) in s srednje velikim učinkom v posnemanju govorjenih ritmičnih fraz (t = –3,13; p = 0,007; d = 0,57) (tabela 4). Otroci so bili v končnem stanju (M = 4,18; SD = 1,67) za kar 51 % točk boljši v prepoznavanju lahke in težke dobe kot v začetnem stanju (M = 2,76; SD = 1,68). GP je vplival s srednje velikim učinkom še na skladnost gibanja v ritmu glasbe (d = 0,50), vendar brez statistično značilne razlike (t = –2,06; p = 0,056). Na prepoznavanje enakih in različnih ritmičnih vzorcev (d = 0,25) in dolgih in kratkih zvokov (d = 0,24), je imel GP majhen učinek.

Tabela 5: Razlika v izbranih TGS med začetnim in končnim stanjem GGLP.

		AS	SO	t	p (t)	d
Udarec žoge z nogo	ZS	4,39	1,290	–4,373	0,000*	0,97
	KS	5,39	0,778			
Tek	ZS	5,28	1,018	–1,844	0,083	0,41
	KS	5,61	0,608			
Sonožni vertikalni skok	ZS	3,72	1,018	–7,114	0,000*	2,32
	KS	5,50	0,514			
Podaja žoge z obema rokama	ZS	3,94	0,938	–6,101	0,000*	1,67
	KS	5,44	0,856			
Odbijanje žoge na mestu	ZS	3,72	1,127	–8,043	0,000*	1,78
	KS	5,33	0,686			
Udarec žoge z loparjem	ZS	3,56	1,294	–6,519	0,000*	1,48
	KS	5,22	0,943			

*Legenda: ZS – začetno stanje, KS – končno stanje, AS – aritmetična sredina, SO – standardni odklon, t – vrednost t-testa za odvisne vzorce, p (t) – statistična značilnost t-testa za odvisne vzorce, d – Cohenov d, * p(t) < 0,05*

Razlike v izbranih TGS med začetnim in končnim stanjem GGLP so pogoste in velike, saj obstajajo statistično značilne razlike skoraj pri vseh nalogah (tabela 5). GGLP je z velikim učinkom deloval na napredek v naslednjih TGS: sonožni vertikalni skok (t = –7,11; p = 0,000; d = 2,32), odbijanje žoge na mestu (t = –8,04; p = 0,000; d = 1,78), podaja žoge z obema rokama (t = –6,10; p = 0,000; d = 1,67), udarec žoge z loparjem (t = –6,52; p = 0,000; d = 1,48) in udarec žoge z nogo (t = –4,37; p = 0,000; d = 0,97). Na tek je gibalno-glasbeni program vplival z majhnim učinkom (d = 0,41). Glede na rezultate lahko sklepamo, da so dejavnosti gibalno-glasbenega programa imele pozitiven vpliv na rezultat večine TGS, z izjemo teka.

Tabela 6: Razlika v stopnji razvitosti ritmičnega posluha med začetnim in končnim stanjem GGLP.

		AS	SO	t	p (t)	d
Prepoznavanje enakih in različnih ritmičnih vzorcev	ZS	9,44	2,093	–1,528	0,145	0,49
	KS	10,61	2,725			
Posnemanje govorjenih ritmičnih fraz	ZS	10,44	2,526	–5,692	0,000*	1,05
	KS	12,89	2,139			
Prepoznavanje kratkih in dolgih tonov	ZS	3,83	3,222	–4,745	0,000*	1,08
	KS	7,06	2,733			
Prepoznavanje lahkih in težkih dob	ZS	4,06	2,940	–1,228	0,236	0,36
	KS	5,00	2,326			
Skladnost gibanja v ritmu glasbe	ZS	2,17	0,618	–5,333	0,000*	1,53
	KS	2,89	0,323			

*Legenda: ZS – začetno stanje, KS – končno stanje, AS – aritmetična sredina, SO – standardni odklon, t – vrednost t-testa za odvisne vzorce, p (t) – statistična značilnost t-testa za odvisne vzorce, d – Cohenov d, * p(t) < 0,05*

Glede na prikazane podatke lahko sklepamo, da so dejavnosti GGLP pozitivno vplivale na razvoj ritmičnega posluha (tabela 6). Medpredmetno povezovanje gibanja in glasbe se je pokazalo kot učinkovito pri skladnosti gibanja v ritmu glasbe (t = –5,33; p = 0,000; d = 1,53), prepoznavanju dolgih in kratkih tonov (t = –4,75; p = 0,000; d = 1,08) in posnemanju govorjenih ritmičnih fraz (t = –5,69; p = 0,000; d = 1,05). Srednje velik učinek se je pokazal pri prepoznavanju enakih in različnih ritmičnih vzorcih (d = 0,49), majhen učinek pa pri prepoznavanju lahkih in težkih dob (d = 0,36).

Tabela 7: Razlike v napredku v izbranih TGS med JP, GP in GGLP.

		N	AS	SO	Levenov preizkus homogenosti varianc		Preizkus razlik (ANOVA)		η^2
					F	p (F)	F	p (F)	
Udarec žoge z nogo	JP	27	–0,30	1,409	1,105	0,338	6,734	0,002*	0,19
	GP	17	–0,18	1,131					
	GGLP	18	1,00	0,970					
Tek	JP	27	0,19	0,962	8,869	0,000	0,709 Welch	0,499 Welch	0,04
	GP	17	0,71	1,649					
	GGLP	18	0,33	0,767					
Sonožni vertikalni skok	JP	27	–0,04	0,940	0,798	0,455	16,947	0,000*	0,36
	GP	17	0,65	1,115					
	GGLP	18	1,78	1,060					
	JP	27	0,15	1,537	1,289	0,283	5,791	0,005*	0,16

Podaja žoge z obema rokama	GP	17	0,53	1,179					
	GGLP	18	1,50	1,043					
Odbijanje žoge na mestu	JP	27	0,00	1,494					
	GP	17	1,24	1,251	1,675	0,196	10,007	0,000*	0,25
	GGLP	18	1,61	0,850					
Udarec žoge z loparjem	JP	27	0,48	1,503					
	GP	17	0,41	1,278	0,951	0,392	5,294	0,008*	0,15
	GGLP	18	1,67	1,085					

*Legenda: N – število merjencev, AS – aritmetična sredina, SO – standardni odklon, ANOVA – enofaktorska analiza varianc, Welch – Welchev F-preizkus, η^2 – eta na kvadrat, * p(t) < 0,05*

Izidi analize variance so pokazali, da obstajajo statistično značilne razlike v napredku med JP, GP in GGLP z velikim učinkom glede na učni program v sonožnem vertikalnem skoku (F = 16,947, p = 0,000, $\eta 2$ = 0,36) (tabela 7). Delno lahko nastalo razliko pripišemo tudi razliki v začetnem stanju, v katerem je skupina JP dosegla statistično značilno boljši rezultat kot skupina GGLP. Otroci v zgodnjih fazah psihomotoričnega učenja namreč praviloma dosegajo večje napredke v procesu učenja kot tisti v kasnejših fazah. Seveda pa lahko pri tako velikih razlikah v aritmetičnih sredinah (JP = –0,04; GGLP = 1,78) večji del napredka vendarle pripišemo programu vadenja. Srednje velik učinek glede na učni program s statistično značilnimi razlikami med skupinami se je pokazal pri odbijanju žoge na mestu (F = 10,007, p = 0,000, $\eta 2$ = 0,25), udarcu žoge z nogo (F = 6,73, p = 0,002, $\eta 2$ = 0,19), podaji žoge z obema rokama (F = 5,791, p = 0,005, $\eta 2$ = 0,16) in udarcu žoge z loparjem (F = 5,294, p = 0,008, $\eta 2$ = 0,15). Pri vseh omenjenih TGS lahko razberemo tendenco v napredku JP < GP < GGLP (udarec žoge z nogo, sonožni vertikalni skok, podaja žoge z obema rokama, odbijanje žoge na mestu) oz. GP < JP < GGLP (udarec žoge z loparjem), ki kaže, da je GGLP doprinesel k največjemu napredku.

Majhen učinek glede na program brez statistično značilnih razlik med skupinami se je pokazal pri teku (F = 0,709, p = 0,499, $\eta 2$ = 0,04). Razberemo lahko tendenco v napredku JP < GGLP < GP, ki kaže, da je GP doprinesel k največjemu napredku v teku. Nadaljnja analiza s pomočjo Bonfferonijevega popravka (α_c < 0,0167) je pokazala, da sta bila GP in GGLP statistično značilno uspešnejša od JP v podaji žoge z obema rokama in odbijanju žoge na mestu. GGLP je bil statistično značilno uspešnejši od JP in GL v udarcu žoge z nogo, sonožnem vertikalnem skoku in udarcu žoge z loparjem.

Tabela 8: Razlike v stopnji razvitosti ritmičnega posluha JP, GP in GGLP.

		N	AS	SO	Levenov preizkus homogenosti varianc		Preizkus razlik (ANOVA)		η^2
					F	p (F)	F	p (F)	
Prepoznavanje enakih in različnih ritmičnih vzorcev	JP	27	–0,30	3,484	0,223	0,801	0,998	0,375	0,03
	GP	17	0,65	3,840					
	GGLP	18	1,17	3,240					
Posnemanje govorjenih ritmičnih fraz	JP	27	1,19	2,646	2,774	0,071	1,749	0,183	0,06
	GP	17	1,47	1,940					
	GGLP	18	2,44	1,822					
Prepoznavanje kratkih in dolgih tonov	JP	27	0,30	2,091	1,929	0,154	8,814	0,000*	0,23
	GP	17	0,76	2,166					
	GGLP	18	3,22	2,881					
Prepoznavanje lahkih in težkih dob	JP	27	–0,07	1,542	5,452	0,007	3,686 Welch	0,037* Welch	0,08
	GP	17	1,41	1,970					
	GGLP	18	0,94	3,262					
Skladnost gibanja v ritmu glasbe	JP	27	0,19	0,557	0,350	0,706	4,995	0,010*	0,14
	GP	17	0,29	0,588					
	GGLP	18	0,72	0,575					

*Legenda: N – število merjencev, AS – aritmetična sredina, SO – standardni odklon, ANOVA – enofaktorska analiza varianc, Welch – Welchev F-preizkus, η^2 – eta na kvadrat, * p(t) < 0,05*

Analiza variance je pokazala, da obstajajo statistično značilne razlike v napredku med JP, GP in GGLP s srednje velikim učinkom glede na učni program v prepoznavanju dolgih in kratkih tonov (F = 8,814, p = 0,000, $\eta 2$ = 0,23) in skladnosti gibanja v ritmu glasbe (F = 4,995, p = 0,010, $\eta 2$ = 0,14) ter z majhnim učinkom v prepoznavanju lahke in težke dobe (F = 3,686, p = 0,037, $\eta 2$ = 0,08). Kljub temu da analiza variance ni pokazala statistično značilne razlike med programi, pa smo ugotovili majhen učinek učnih programov še pri posnemanju govorjenih ritmičnih fraz (F = 1,749, p = 0,183, $\eta 2$ = 0,06) ter pri prepoznavanju enakih in različnih ritmičnih vzorcev (F = 0,998, p = 0,375, $\eta 2$ = 0,03).

Pri večini merskih postopkov preverjanja razvitosti ritmičnega posluha lahko razberemo tendenco v napredku JP < GP < GGLP, ki kaže, da je GGLP vplival na stopnjo razvitosti ritmičnega posluha pri predšolskih otrocih. GP se je izkazal kot najuspešnejši pri prepoznavanju lahkih in težkih dob, medtem ko je JP pričakovano najmanj vplival oz. zanemarljivo malo vplival na napredek v razvoju ritmičnega

posluha. Glede na Bonfferonijev test ($\alpha_c < 0{,}0167$) smo ugotovili, da je GGLP statistično značilno uspešnejši od GP in JP pri skladnosti gibanja v ritmu glasbe in prepoznavanju dolgih in kratkih zvokov.

Sklep

Izsledki raziskave kažejo, da povezovanje področja gibanja in glasbe pozitivno vpliva na učenje TGS in na razvoj ritmičnega posluha. S pomočjo usmerjenih dejavnosti, v katerih se prepletajo gibalne in glasbene vsebine, lahko otroci v enakem času in z enakim številom dejavnosti bolje usvojijo TGS kot otroci, ki vadijo TGS brez vključevanja glasbe. Enak učinek povezovanja gibanja in glasbe sta potrdili raziskavi Zachopoulou, Bakle in Deli (2006) in Derri, Tsapakidou, Zachopoulou in Kioumourtzoglou (2001).

Predvidevamo, da glasba spodbuja celostno učenje brez pretiranega osredotočanja na posamezne dele TGS, to pa ima za posledico bolj koordinirano in natančnejšo izvedbo gibanja. Predvsem v zgodnjem otroštvu je znano, da analitično odpravljanje napak pri izvedbi gibalnih spretnosti lahko privede do rušenja zaporedja gibalnih akcij, značilnih za posamezno spretnost (Marinšek in Rajtmajer, 2017). Z osredotočanjem na posamezno napako lahko onemogoči pravilno izvedbo drugih vidikov spretnosti, to pa opazimo kot neskladno oz. nepravilno izvedeno gibanje. Na podlagi rezultatov naše raziskave lahko sklepamo, da ob spremljavi glasbe otrok dojame gibalno spretnost bolj celostno kot brez njene spremljave. Glasba – s pomočjo aktivacije različnih vidikov ritmičnih sposobnosti – v tem primeru nastopi kot sredstvo spoznavnega procesa gibanja. Ob uporabi glasbe pri učenju gibanja se otroci odzivajo s telesom in razumom na tisto, kar slišijo oz. čutijo, zato lahko takšno učenje opredelimo kot celostni spoznavni proces.

Ugotovili smo tudi, da povezovanje gibanja in glasbe ugodno vpliva na razvoj ritmičnega posluha, še posebej se to kaže v sposobnosti skladnega gibanja v ritmu glasbe in prepoznavanju trajanja tonov. Takšen didaktični pristop ne ustvarja samo miselne predstave o ritmu, ampak v omenjene predstave vključuje tudi gibalni aparat, ki otroku veliko bolj celostno in plastično osmisli ritmični vidik glasbe. Očitno večje število različnih senzornih kanalov, ki jih preko miselnih procesov in telesne aktivnosti vključujemo v poučevanje glasbe, spodbuja razvoj ritmičnega posluha. Prav na interakcijskem odnosu procesov spoznavnega, čustvenega in gibalnega polja

pa temelji glasbeni razvoj otroka. Kot nekoliko manj uspešno se je izkazalo povezovanje gibanja in glasbe v prepoznavanju oziroma doživljanju poudarjenih in nepoudarjenih dob, to pa lahko pripišemo manjšemu obsegu glasbeno-gibalnih dejavnosti v povezavi z občutenjem metruma.

Pomembno se nam zdi izpostaviti, da so tudi otroci GP dosegli višjo stopnjo v razvoju ritmičnega posluha v primerjavi z otroki JP. To potrjuje vpliv posameznih področij dejavnosti na celostni razvoj otrokove osebnosti oziroma na različne vidike otrokovega razvoja in učenja. Izsledki raziskave potrjujejo, da medpredmetno povezovanje velja za učinkovit didaktični pristop, ki otroka spodbuja k osmišljanju vsebin, omogoča trdnejše povezave med informacijami in s tem pripomore k trajnejšemu in bolj uporabnemu znanju.

Summary

Interdisciplinary teaching connects the common characteristics of various learning areas into a meaningful whole. Interdisciplinarity is promoted by the Kindergarten Curriculum within the principle of horizontal alignment, which points out that the linking of activities from various fields is justified and made useful by the interdependent nature of developmental aspects of children (Kurikulum za vrtce, 1999).
Existing studies of the effects of linking movement and musical content are limited to the examination of influences of such programmes on either motor skills or the development of rhythmic abilities separately. Therefore, we undertook a study into how the linking of motor and music activities in the pre-school period influences the acquisition of fundamental movement skills (FMS) and the development of rhythmic abilities (RA).

Sixty-two children aged from five to six years participated in the study and were divided into a movement group (MG; n =17), a music and movement group (MMG; n = 18), and a control group (CG; n = 35). The MG participated in a five-week movement programme; the MMG participated in a five-week music and movement programme, and the CG was engaged in a standard five-week programme according to the Curriculum for kindergarten (1999).

The FMS and the RA were assessed before and after the implementation of the intervention programme. The Test of Gross Motor Development – Second Edition (TGMD-2) was used for qualitative assessment of six FMS (Ulrich, 2000). We identified the level of development of rhythmic abilities with the following tests: *same and different rhythmic pattern identification; repetition of spoken rhythmical phrases; identification of long and short tones; stressed and unstressed beat identification; and coherence of movement with the rhythm of a composition* (Gordon, 1986; Denac; 2002, 2012a).

The research findings showed that linking movement and music had positive effects on FMS learning and the development of RA. With guided activities combining content from the fields of movement and music, children were able to apprehend FMS better than children who practiced FMS without music within the same period of time and with an equal number of activities. The same effect of linking movement and music had previously been confirmed in studies by Zachopoulou, Bakle and Deli (2006) and Derri, Tsapakidou, Zachopoulou and Kioumourtzoglou (2001).

We assume that music stimulates holistic learning without excessive focus on individual parts of FMS, resulting in a better coordinated and more accurate execution of movement. It is known that, particularly in early childhood, an analytical approach to correcting mistakes in the execution of motor skills can lead to disruption of the sequence of motor actions typical of an individual skill (Marinšek and Rajtmajer, 2017). Focusing on an individual mistake can prevent correct execution of other elements of the skill, which can be observed as a poorly coordinated or incorrect movement. Music can help a child to apprehend a motor skill more holistically, without getting entangled in the details. Music activates various aspects of rhythmic abilities, thus acting as a means for psychomotor learning. When music is used in the learning process, children react to what they hear or feel with their minds and bodies; therefore, such learning can be defined as a holistic cognitive process.

We also observed that linking movement and music had positive effects on the development of RA, which was reflected particularly in the ability to move coherently along with the rhythm of the music and in tone duration identification. Such a teaching approach not only creates cognitive conceptions of rhythm, but also includes the locomotor apparatus in those conceptions, which gives a child a much more holistic and plastic representation of the rhythmic aspect of music. It seems

that involving a higher number of sensory channels in music teaching through cognitive processes and physical activity results in better learning results. The linking of movement and music was somewhat less successful with regard to identification of stressed and unstressed beats, which can be attributed to a smaller number of motor activities related to meter.

These research findings confirmed interdisciplinary teaching as an efficient teaching approach that encourages children to put the content into context, while enabling stronger connections among items of information, thus contributing to the creation of more durable and useful knowledge.

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REVIJA ZA ELEMENTARNO IZOBRAŽEVANJE
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THE WORLDVIEW OF PRE-SERVICE AND IN-SERVICE TEACHERS ABOUT HEALTH EDUCATION

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Abstract/Izvleček Health is coconsidered as goodness; therefore, schools should be places where healthy habits, along with evidence-based medical knowledge and practices, are taught and practiced. The key persons in education are teachers, so their opinions and worldviews should not be neglected. The objective of this work was to identify opinions about health education among Slovenian teachers. We investigated the worldviews of and differences between pre-service and in-service Biology teachers about health education. The questionnaires were delivered to 163 Sloveian participants. Most differences in opinion occurred in the nutrition field between younger and older participants. The majority of participants (85%) agree that "Providing knowledge or developing behavior that is respectful of one´s own health" is the main goal of health education.

Pogledi učiteljev in bodočih učiteljev na zdravstveno vzgojo
Zdravje je zelo pomembna vrednota, zato bi v šolah učence morali poučevati in usposabljati za zdrav način življenja. To bi moralo temeljiti na medicinskih dokazih, znanju in dobrih praksah. V sistemu izobraževanja so ključne osebe učitelji, zato ne smemo zanemariti njihovih mnenj o zdravstveni vzgoji. Namen raziskave je bil pridobiti mnenja slovenskih učiteljev biologije in študentov biologije o zdravstveni vzgoji. Na vprašalnik je odgovorilo 163 slovenskih udeležencev. Razlike v mnenjih med mlajšimi in starejšimi udeleženci so bile vezane na mnenja glede prehrane. Večina udeležencev (85 %) se strinja, da je »zagotavljanje znanja ali razvijanje vrednote lastnega zdravja« glavni cilj zdravstvene vzgoje.

Keywords:
Biohead-Citizen project, teachers' conceptions, Health Education.

Ključne besede:
pogledi učiteljev, projekt Biohead-Citizen, zdravstvena vzgoja

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Introduction

To wish someone good health is a traditional birthday or New Year's wish probably in all cultures around the world. However, for this wish to be realized, it should be supported by healthy habits at the personal level and medical support at the societal level. Because health is such an important and highly positioned value, some people may take a commercial or other kind of interest in it, not always on an honest basis. In addition, even when honestly meant, many suggestions for a healthy lifestyle do not necessarily follow the evidence and, what is worse, such advice can sometimes be worthless or even harmful (Brownson, Fielding, & Maylahn, 2009; Waters, & Doyle, 2002). Because of the great importance and serious consequences of health, everybody should be properly educated in finding and evaluating evidence about proposed practices that can sometimes be competitive. Such education should not be left to self-education and chance alone. Therefore, schools should be places where healthy habits, along with evidence-based medical knowledge and practices, are taught and reinforced. Because of rapid development in the field and information overload, teachers' knowledge about and attitudes toward health issues are not necessarily flawless. As a result, an amalgam of correct and incorrect knowledge and habits can be transferred into teaching practice. Given the theoretical worldview that actual behavior is the result of many predictors, among them opinions, preferences, perceived importance, perceived effort, motivation, self-efficacy and many others listed in classic theories (e. g. Ajzen 1991; Bandura, 1996; Deci, & Ryan, 1985), any effort to change habits is challenging. Therefore, knowledge is vital, not only about the existence, but also about the strength of such factors affecting actual behavior, and this is the heart of the problem addressed in this paper.

The Universal Declaration of Human Rights (UDHR) has established "human rights as the foundation for freedom, justice and peace in the world" (Center for the Study of Human Rights, 1994, p. 1). If people neglect or violate just one of these rights, whether civil, political, economic, social or cultural, "this could have profound effects on health" (Cotter, Chevrier, El-Nachef, Radhakrishna, Rahangdale, et al., 2009, p. 1). Pommier, Jourdan, Berger, Vandoorne, Piorecka, and De Carvalho (2009, p. 183) found that "many European Union (EU) countries (including Slovenia) are striving to offer a high level of service, while striking a balance between viability and cost". These strategies affect school health promotion (Lear, 2002; Lee, Tsang, Lee & To, 2003; Waggie, Gordon, & Brijlal, 2004) and "can make a significant

contribution to pupils' health and well-being" (UNESCO, 2005; UNICEF, 2006; WHO, 2003). To improve health promotion in schools in each country, various approaches have been adopted. Some approaches incorporate health promotion into the curriculum and teaching practice of regular teachers, while others involve healthcare services, such as school welfare services, and/or a combination of both. In promoting health, schools can sometimes make links to external professionals and local health services. Saint-Leger (1999, p.113) wrote, "Health services can be successfully involved in health programs if these are associated with the school program as a whole and if the work of the healthcare practitioners is complementary to that of other school professionals."

In a hectic lifestyle, one means for sustaining a rich and productive life is to ensure that people preserve and protect their own physical and mental health. According to Günay, Cavas, & Hamurcu (2015, p. 142), societies comprising "healthy individuals are more successful and productive". Therefore, health issues must be given importance from early childhood and need to be geared towards an appropriate lifestyle, first in the family, then in school and prolonged as a lifelong set of values and habits. This is why some researchers draw attention to the importance of health education in schools for the prevention of unhealthy habits and the improvement of healthy ones (Inel, Günay, Evrekli & Hamurcu, 2011; Jourdan, Samdal, Diagne, & Carvalho, 2008). Teaching about and for health is complex, because health "education involves many issues, such as physical health and ways to protect it, adequate and balanced nutrition, drug abuse, sexual health, hazardous substances for health and working out" (Günay, et al., 2015, p. 142). Schools should enable students to build competence in taking action to improve their health by educating students about a healthy lifestyle (Aragâo, & Sacadura, 2002; Kemm, & Close, 1995; Pike, and Foster, 1995; Tones, & Tilford, 2001). Health education should be included at all educational levels, from primary and lower secondary levels, to upper secondary general and vocational schools. It should be promoted as a trans-curricular and cross-curricular competence by all educators, regardless of their discipline, with the aim of promoting a healthy lifestyle as a lifelong attitude among their students. Only in such a way can learning about health issues be described as both a process and an outcome: evident and continuing change in knowledge or behavior. Teaching about health topics is not enough because "transfer of learning occurs when characteristics inherent to the students prompt them to demonstrate the competence (knowledge, skills, attitude and behavior)" (Botma, Van Rensburg, Heyns & Coetzee, 2013, p.

32). Therefore, teachers who are providers of "health education in schools not only need to have efficient and sufficient knowledge but should also serve as role models for their students" (Günay, et al., 2015, p. 142). Despite the complexity of health education, it should not be taught and promoted only by some teachers (e.g. Biology teachers) and health professionals (e. g. school nurses or invited professionals) because transfer of knowledge and skills, as well as attitudes concerning health are vital core competencies required by students and should be facilitated by all educators (Lauder, Sharkey, & Booth, 2004).

Health education in Slovenian schools

Despite the growing understanding of the significance of the protection and promotion of health, formal health education in Slovenia is not at the appropriate quality level. "Teachers have a key role in the implementation and sustainability of effective health promotion in schools, but their health training is of paramount importance" (Jourdan, Pironom, Berger, & Carvalho, 2012, p. 668). By checking core curricular documents for the Slovenian school system (program of elementary and secondary schools (2011)), one can recognize that health education was beyond the focus of the creators of these documents. For example, even in the White Book on Education in the Republic of Slovenia (2011), health education and its promotion are mentioned only as a general goal and are not further elaborated. From such evidence, one could conclude that the Slovenian elementary and secondary school curricula do not guide students sufficiently towards achieving knowledge about health, while gaining skills and experience in health issues.

In practice, health education is mainly delegated to Science and Biology teachers, where some learning goals and objectives are added mostly to Biology topics. For example, health education is incorporated into the syllabus of Biology in the 8th grade of elementary school, jointly with the anatomy and physiology of the human body. Slovenian 9-year compulsory elementary school programs, general secondary school programs and vocational programs do not have separate courses or subjects dedicated to health education. In the school subject Household (5th and 6th grade) can be found topics about health food, but this is just one aspect of health education. Some non-governmental organizations have identified the gap in health education and are implementing a revival of such a course in schools (Borovnik Lesjak, Šorgo, & Strnad, 2019). Most Slovenian primary and secondary schools perform health

promotion within the project Schools for Health in Europe network (SHE; 2017). The SHE network "aims to support organizations and professionals to further develop and sustain school health promotion in each country by providing a European platform for school health promotion" (SHE, 2017). According to SHE, promoting health in schools can support students in reaching the school's educational and social objectives. The advantages of health-promoting schools include better learning achievement; better health among students; better care for students; improved school atmosphere; higher job satisfaction; more action that is efficient and even a better school image (SHE, 2017).

The question is whether performance of health-education by the European SHE project is enough to provide students with health knowledge at a satisfactory level. The SHE project places no special stress on teachers' preferences in health education, which is very important in health education. Contrary to Slovenian practice, health education in Finnish schools, for example, is introduced at two levels. ˝Firstly, by the national core curriculum and secondly by the individual curricula in each school˝ (Kuurala, Carvalho, Clement, Bogner, Kyllönen, Hänninen et al., 2006, p. 330).

Teachers must follow national curricula and syllabi, but they also have their own conceptions and value systems, which influence teaching practices in health education. Pommier et al. (2009) compared health education in seven European countries: Belgium, Denmark, France, Spain, Switzerland, Poland and Portugal. All seven countries have different approaches to health education, but the health services in these countries were mostly the same. Further evidence that teachers from different countries should not be taken as a uniform cohort is provided in studies by Šorgo et al. (2015) and Šorgo et al. (2017), leading to the conclusion that each entity should perform its own primary research on issues of interest.

Purpose and aims of the research

The aim of this study was to identify opinions about health education among educators in Slovenian schools. Special emphasis was given to preservice and in-service teachers of Biology. Our research questions were as follows:

(1) Is there a difference in the mean scores for views about health according to the participants' status (pre-service teachers; students of primary non-pedagogical streams with the potential to become teachers in the future; in-service teachers and others employed in the field of education (non-teachers))?
(2) Is there a difference in the mean scores according to the participants' ages?

Methodology

The research method was a survey conducted among the target group (educators) using a questionnaire developed within the Biohead-Citizen project (2004-2008: Carvalho, Clément, Bogner, & Caravita, 2008 and translated into the Slovenian language.

Questionnaire

The questionnaire in this study was assembled and validated within the Biohead-Citizen research project (2004-2008: Carvalho, Clément, Bogner, & Caravita, 2008). It contains 142 questions on 6 topics: Health Education; Human Reproduction and Sex Education; Ecology and Environmental Education; Human Brain; Human Genetics and Human Origin; and 16 questions related to personal information (gender, age, education, religion, religious opinions and so on). The English questionnaire was translated into Slovenian according to specific rules for controlled translation and validation. For this study, 21 questions concerning Health Education were used and four questions related to personal information (gender, age, level of education and occupation). In 14 questions, participants had to choose between ˝I do not agree˝ (1) and ˝I agree˝ (4) on a four-point Likert scale (Table 2): A52, B1, B2, B6, B9, B12, B15, B16, B21, B22, B23, B25, B26, and B27.

Question A55 used a semantic differential scale to measure the connotative meaning of things. Participants were asked to mark a number on a four-point scale between two options to express agreement or disagreement: Providing knowledge (1) vs. Developing behavior that is respectful of one's own health (4).

Questionnaire

Completion of the questionnaires was anonymous (Clément, and Carvalho, 2007). In the Biohead-Citizen project, the questionnaire was aimed at pre- and in-service teachers with mainly academic backgrounds (Life Sciences, Home Language and other academic backgrounds). The Slovenian version of the questionnaire used in this investigation was provided on-line by the 1ka web service (https://www.1ka.si/). It was sent out by e-mail from September 20, 2016, to January 16, 2017, meaning a four-month collection period. We sent e-mails to pre- and in-service Science teachers (Biology, Chemistry and Physics) and Home Language teachers. The initial request was sent to 564 in-service and pre-service Biology and Slovenian language teachers from a mailing list assembled by the authors. They were asked to forward our request and questionnaire link to their colleagues, which yielded responses from persons who were not our primary target group. By the end of the collection period, 339 participants had started answering the questionnaire, and 163 participants had completed the whole questionnaire. The structure of the respondents was as follows: 130 (79.7%) were females; 50 (39.5%) were in-service teachers, 11 (6.2%) pre-service teachers, 49 (27.7%) students of non-pedagogical programs, and 30 (16.9%) employed in education, but not in a teaching capacity. In the exploratory phase of the research (data not presented), it was revealed that statistical differences between sub-groups, even if significant, were present in only three items (A52, B6, B23); however, these were small and did not exceed the $r = 0.3$ threshold levels for effect size, which allows us to consider our sample as representative of a homogenous group, at least when opinions about health in school are considered. Eighty-three percent of the in-service teachers are teachers of Biology or another Science subject (Physics or Chemistry). The other in-service teachers teach a variety of subjects such as Mathematics, Slovene Language, Foreign Language and Social Sciences, but none were teachers of Art or Sport. Because of the small statistical differences between subgroups established at the exploratory phase of the research, all participants were in most cases considered as a single group regarding their teaching fields.

Participants were divided into two age groups: those up to 35 years old comprised 109 (61.6%) participants, and those over 36 years old comprised 53 (30.2%) participants. One participant did not give her age.

Statistical procedures

To answer the research questions, statistical analyses were performed with the IBM SPSS 22.0 statistical package. The statistical procedures employed were as follows:

- Three questions (A52, B6 and B27) were presented as negations. In the appropriate statistical analysis, those three questions were reverse coded and are denoted (R).

- for statistical analysis, variables were checked for normality with application of the Kolmogorov-Smirnov Z test (KS test) at the 0.05 significance level. Nonparametric statistics (Mann-Whitney and Kruskal-Wallis) was performed because not all variables followed normal distribution (Erceg-Hurn, and Mirosevich, 2008). Owing to skewed data distribution, mode and median are reported, and means and standard deviations to obtain a better impression of the central tendencies and data distribution. The reliability of the scales was explored by calculating the Cronbach's alpha and by further analysis with the 'alpha if item deleted' procedure in order to foresee potential improvements to the scales. Given the satisfactory alpha levels and to preserve the breadth of the scale, no items were deleted from a pool even if an increase in alpha was predicted.

- Effect sizes were calculated by application of the formula $r = -z/\sqrt{N}$ (Field, 2013).

- Principal Component Analysis with Direct Oblimin Rotation was used to explore the component structure of the attitudes toward health education in the school scales. Values of KMO (0.88) and Bartlett's test (Chi-Square = 755.67; df = 66; $p < 0.001$) permitted further analysis. Principal components with Eigenvalues above 1 and items with loadings above the 0.4 level are reported (Field, 2013), owing to the breadth of the reported findings; however, parallel analysis (Flora, and Curran, 2004) was the preferred choice to explore the number of components to be retained. Parallel analysis was calculated by an online engine (Patil, Singh, Mishra & Donavan, 2017). Correlations were checked as part of the analysis provided by Factorial and Regression procedures. Pearson's correlation coefficients

were calculated; coefficients below the 0.05 level (two-tailed) were considered significant.

- A multivariate logistic regression model was used to evaluate the association between each variable and the dependent variable (view of health), while controlling for all other variables (Corder, & Foreman, 2009).

Statistical significance was set at $p < 0.05$. Incomplete questionnaires were discarded. Questionnaires were kept anonymous, and participants involved in the research were all volunteers.

Results

Opinions about health education

Results for participants' opinions on 14 items about health education on a four-point scale are provided in Table 1. More detailed results about differences between participants' opinions are presented in Appendix 1.

Table 1: Descriptive statistics about opinions on health education. Results are sorted by decreasing means of answers. (N = 163).

Items		F1%	F2%	F3%	F4%	Total	Median	Mode	Mean	SD
B25	I should eat more fresh vegetables.	11.3	13	21.5	49.7	95.5	4	4	3.15	1.06
B12	I would like to eat more fruit.	12.4	12.4	29.4	42.4	96.6	3	4	3.05	1.04
B23	Schools have to take into account public health policies.	15.3	7.3	31.6	41.2	95.5	3	4	3.04	1.07
B16	I should use olive oil more often in my food.	11.3	19.2	34.5	31.1	96	3	3	2.89	0.99
B1	Health Education at school improves pupil behavior.	16.9	23.7	22	33.9	96.6	3	4	2.75	1.12
B2	I would like to eat fish more often.	22	26.6	34.5	13.6	96.6	3	4	2.72	1.12
B22	Teachers should not be obliged to teach health education if they do not feel confident.	22.6	20.3	27.1	26.6	96.6	3	3	2.6	1.13
B26	Health education at school mainly involves developing the personal skills of pupils such as self-esteem or stress management.	13	36.7	35.6	10.7	96	2	2	2.46	0.86
B15	It is chiefly up to the school nurse and doctor to provide health education.	18.6	31.1	35.6	10.7	96	2	3	2.4	0.93
B9	I would like to eat less meat.	29.4	28.8	20.3	17.5	96	2	1	2.27	1.09
$B27_{(R)}$	It is exclusively the family's responsibility to deal with health education.	40.7	27.7	14.1	13.6	96	2	1	2.01	1.07
B21	Health education at school must be restricted to providing scientific information (diet, sleeping cycle, drug risk).	41.2	25.4	20.9	7.9	95.5	2	1	1.95	0.99
$B6_{(R)}$	It would be good to put more fat in my food.	42.4	31.1	9.6	14.1	97.2	2	1	1.95	1.06
$A52_{(R)}$	It is acceptable that poor people not have access to the same health care quality as rich people.	65.5	10.2	2.8	18.1	96.6	1	1	1.73	1.18

Note. "I do not agree" (1) and "I agree" (4). Items denoted with R were reverse coded; however, in the table they are presented in the format as received.

The highest level of disagreement occurred with statement $A52_{(R)}$, where 65.5% of participants disagreed: It is acceptable that poor people not have access to the same health care quality as rich people. The highest level of agreement was given to statements B12, B16 and B25, which, together with disagreement with $B6_{(R)}$, indicates that participants are aware of the basic principles of healthy nutrition.

Opinions about health education

Only in three items (A52, B6$_{(R)}$ and B23) were statistically significant differences between different occupational subgroups identified (Appendix 2); however, effect sizes did not exceed medium levels.

Statistically significant differences $\chi^2 = 8.129$; $p = 0.043$ were identified in item A52: It is acceptable that poor people not have access to the same health care quality as rich people. Pre-service and in-service teachers more frequently disagree with this item than respondents from non-pedagogical fields.

In item B6$_{(R)}$, It would be good to put more fat in my food, there were statistically significant differences $\chi^2 = 8.064$; $p = 0.045$. In-service teachers more frequently disagree with item B6$_{(R)}$ than other groupsWith the item B23, Schools have to take into account public health policies, there were statistically significant differences $\chi^2 = 10.059$; p = 0.018. In-service teachers more frequently disagree with item B23 than other groups.

Differences in participants' opinions according to age

Participants were separated by age into two groups: up to and including 35 years old and over 36 years old. Between these two groups, there were statistically significant differences in the following four items:

B6$_{(R)}$: It would be good to put more fat in my food; ($U = 2214.500$; $Z = -2.566$; p (2-tailed) = 0.01). Effect size between groups is small ($r = 0.26$). Younger populations were statistically more in agreement with item B6$_{(R)}$.

B9: I would like to eat less meat; ($U = 2107.500$; $Z = -2.738$; p (2-tailed) = 0.006). Effect size between groups is small ($r = 0.19$). Younger populations were statistically more in disagreement with item B9.

B12: I would like to eat more fruit; ($U = 2331.000$; $Z = -2.129$; p (2-tailed) = 0.033). Effect size between groups is small ($r = 0.21$).

B25: I should eat more fresh vegetables; (U = 2166.000; Z = -2.566; p (2-tailed) = 0.10). Effect size between groups is small (r = 0.21). Younger populations were statistically more in agreement with item B25.

Principal component structure of attitudes toward health education in school

Owing to the small differences between subgroups, PCA was performed only on the entire dataset. In our study, 14 items on opinions (Table 1) form three components that can be retained (Table 2) on the basis of Eigenvalue > 1 criteria, and two on the basis of results from the parallel analysis. With the two remaining components (Table 2), 52.20% of variance can be explained. Both components have appropriate Cronbach's alphas, as well. Items B1 (*Health Education at school improves pupil behavior*) and B2 (*I would like to eat fish more often*) loaded to the third component and, according to parallel analysis, should be discarded. Items B9 (*I would like to eat less meat*) and B26 (*Health education at school mainly involves developing the personal skills of pupils such as self-esteem or stress management*) did not load above the 0.4 level and were therefore also excluded from the pool.

Table 2: Rotated Component Matrix of participants' opinions.

Items*	Items	Component	
		1	2
B12	I would like to eat more fruit	0.75	
B22	Teachers should not be obliged to teach health education if they do not feel confident	0.75	
B23	Schools have to take into account public health policies	0.70	
B25	I should eat more fresh vegetables	0.69	
B16	I should use olive oil more often in my food	0.67	
$A52_{(R)}$	It is acceptable that poor people not have access to the same health care quality as rich people	0.63	
B15	It is chiefly up to the school nurse and doctor to provide health education		0.83
B21	Health education at school must be restricted to providing scientific information (diet, sleeping cycle, drug risk)		0.68
$B27_{(R)}$	It is exclusively the family's responsibility to deal with health education		0.62
$B6_{(R)}$	It would be good to put more fat in my food		- 0.55
	Explained variance	40.95	11.25
	Eigenvalue	4.91	1.35
	Cronbach's alpha	0.85	0.72

** See Table 1 for a complete list of the items. Items denoted with R were reverse coded; however, in the table they are presented in the format as received.*

With the first component, we can explain 41% of variance (Cronbach's alpha = 0.85). The first component combines mostly positive attitudes towards a healthy lifestyle. It comprises agreement by the majority of participants, who think that consuming appropriate food results in a healthier life, which can be regarded as a positive message, when transferring values to students. However, in Slovenian reality, foods like fruit, vegetables and olive oil are generally more expensive than complementary alternatives, which could cause a discrepancy between knowledge and actual behaviour. Positive messages include agreement with the statement that "*Schools have to take into account public health policies*" and disagreement with the statement "*It is acceptable that poor people not have access to the same health care quality as rich people*". The item "*Teachers should not be obliged to teach health education if they do not feel confident*," is important in the teaching of all subjects and targets the entire educational system, not just health education. Someone who does not feel confident in a subject cannot transmit knowledge in an appropriate way to the learners, and learners cannot acquire appropriate knowledge. However, about 40% of respondents do not agree with the statement, which was interpreted to mean that health issues should be taught under any circumstances. In fact, these responses reflect reality, because Health Education is left to the self-education of teachers, given that health education in practice is not part of their formal education even in Biology pre-service training, let alone for teachers in other areas.

The second component (Cronbach's alpha = 0.72) explains 11% of variance and comprises four items (B15, B21, $B27_{(R)}$ and $B6_{(R)}$). Item $B6_{(R)}$ "*It would be good to put more fat in my food*" loads negatively to the component, and because of the context of the other items, was excluded from commentary. The remaining three items centre on the concept of professionalism and leaving us with three items. The second component deals with the idea that health education should not be left exclusively to families, and that more than scientific information should be provided, leading us to the conclusion that schools should not only instruct about health, but offer more general education about it, as well. Opinion is divided about who should provide such education.

Opinions about the main goal of health education in school

Item A55 (Table 3) was structured for participants to choose between two options on a differential scale, between F1: "*Providing knowledge*" and F4: "*Developing behavior that is respectful of one's own health*", and in this way to express their opinion about the main goal of health education in school. More than 85% of participants agree with the statement that "*Providing knowledge or developing behavior that is respectful of one´s own health*" is the main goal of health education. Even more, no statistically significant differences were found between participants' occupations, showing the homogeneity of the opinion.

Table 3: Participants' opinions in question A55 and statistically significant differences by participants' occupation.

Question A55	F1%	F2%	F3%	F4%	Median	Mode	Mean	SD	χ^2	*p*
F1: Providing knowledge; F4: Developing behaviour that is respectful of one's own health	4.5	8.5	30.5	50.8	4	4	3.35	0.84	7.023	0.07

However, opinions did statistically significantly differ between the two age groups ($U = 10.54$; $p < 0.001$), even though the effect size is small ($r = 0.19$). Older participants believe that the main goal of health education in school is to provide knowledge, but younger participants, in contrast, believe that the main goal of health education in school is to develop behavior that is respectful of one's own health.

Discussion and conclusions

In this study, we investigated the conceptions among Slovenian participants (including pre- and in-service teachers, non-pedagogical students and other participants) regarding health education. The professional literature describes two paths of health education in schools, one based on the biomedical model, and the other on the social health model. In the Biohead-Citizen project, there were 19 participating countries, where health education was primarily taught in Biology

classes. Because of this, a biochemical model of health education could be detected (biology facts), and this carried a risk that the teaching emphasized biology facts rather than social and psychological elements (Caussidier, Hage, Munoz, Remki, Larribi, and Khzami; 2011), although both are vital for basic and complete citizen health knowledge. Among Slovenian participants, there were significant differences in social and psychological health preferences. For in-service teachers, it is statistically unacceptable for poor people to lack access to the same health care quality as rich people. The reason most probably lies in the social component of teaching, reflecting that teachers should provide the same quality of knowledge to all students, no matter their social status. In-service teachers are statistically more in disagreement with the statement that schools have to take into account public health policies, which indicates that they are dissatisfied with the current status of such policies. Among Finnish pre- and in-service teachers, the principal goal of education is more to influence pupils' behavior than to provide scientific knowledge about health. Data on teachers' attitudes and values with regard to health issues is insufficient (Pommier et al., 2009). Because of the sociocultural variables of health education (e. g. the principal ones being religion and country of residence), it is important to know teachers' perceptions about health (Caussidier et al., 2011). For example, French teachers, more than Lebanese, Moroccan or Tunisian teachers, thought that health education improved the behavior of students and developed pupils' skills (Carvalho, Clément, Bogner, and Caravita, 2008). Behavior and skills are part of the social health model. This might suggest that French health education, based on the health promotion model, had an impact on these French teachers. Slovenian teachers have open ways of talking about health. Health education is dependent on their own health knowledge and personal conceptions about health. Another point of view emerged from the statement about nutrition and health, where more respomdents disagree that it would be good to consume more fat. In-service teachers are statistically more in disagreement with this statement than other groups, which reflects the teachers' awareness of the health consequences of too much fat. In other participant's views about health education, there were no statistically significant differences.

Slovenian participants were separated by age, into a group 35 or below and a group over 36. Statistically significant differences between the age groups were found in the nutrition field. Younger participants were statistically more in agreement that it would be good to consume more fat. This can be interpreted as an awareness that

we should not totally eliminate fat from the diet, although the fashion and advertising industries promote good health without fat. Younger participants are aware of the importance of fat for human health, but probably they do not consume it enough. Teacher awareness of fat consumption could be related to student awareness. Kobe, Štimec, Hlastan Ribič and Fidler Mis (2012), in the first Slovenian national representative study, found that the diet of Slovenian adolescents did not meet the recommendations for healthy eating. Between 2003 and 2005, adolescents between 15 and 16 years old did not consume enough vegetable oils. The older population in our research think that they consume enough fat.

The study among the Slovenian population showed a significant percentage of people who still have unhealthy nutrition habits (Koch, Gabrijelčič Blenkuš, Gregorčič & Kostanjevec, 2014), which can be related to our study. The younger population in our study statistically agree that they would like to eat more fruit and vegetables. They probably do not eat enough fruit and vegetables but are aware of the importance of this for good health. Between the younger and older groups, there is a statistical difference in opinion about the quantity of meat consumption. The younger group disagree with the statement that they would like to eat less meat. Slovenian students mostly eat in fast food outlets or restaurants with a meat-based menu, so they can hardly imagine meals without meat.

Is "*Providing knowledge*" or "*Developing behavior that is respectful of one´s own health*," the main goal of health education was the question under investigation. The majority of participants (85%) agree with the statement that "*Providing knowledge or developing behavior that is respectful of one´s own health*" is the main goal of health education. This shows that the socioeconomic model of education is the preferred option over the biomedical models. However, there does exist a gap, because recent Biology teachers lack appropriate training.

At the end of the Biohead-Citizen project, it was established that all 19 countries involved had health education and promotion strategies in schools, but very diverse personal approaches, methodology and quantity of health education. The variation in strategies for health education is influenced by many factors, like national and political beliefs, economic and health policy in each country, the role of health professionals, religion, different curriculums, institutional culture, school system organization and school physical and social environments. These are among the

reasons that teachers' views on health education differ and have an important influence on teachers' beliefs and which textbooks they use. This study did not analyze the Slovenian syllabi and textbooks from a health education perspective, but this could be recommended for future research, as in the Biohead-Citizen project.

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Appendix 1

Appendix 1: Results of statistical tests for participants' opinions on health education based on participants' opinions.

Items	Kruskal- Wallis test	*p*
B23	18.000	0.02
$A52_{(R)}$	43.000	0.04
$B6_{(R)}$	45.000	0.04
B9	85.000	0.08
B25	98.000	0.10
B12	265.000	0.27
B2	279.000	0.28
B21	318.000	0.32
B22	378.000	0.38
B1	636.000	0.64
$B27_{(R)}$	684.000	0.68
B15	747.000	0.75
B16	883.000	0.88
B26	997.000	0.99

Appendix 2

Appendix 2: Effect sizes for three items (A52, $B6_{(R)}$ and B23) with statistically significant differences between different occupational subgroups.

		Items		
		$A52_{(R)}$	$B6_{(R)}$	B23
	Participants' occupation subgroup	*It is acceptable that poor people not have access to the same health care quality as rich people.*	*It would be good to put more fat in my food.*	*Schools have to take into account public health policies.*
Effect size	non-pedagogical students and other non-pedagogical participants	small ($r = 0.09$)	small ($r = 0.09$)	small ($r = 0.08$)
	pre-service student teachers and non-pedagogical students	small ($r = 0.12$)	small ($r = 0.05$)	small ($r = 0.13$)
	pre-service student teachers and in-service teachers	small ($r = 0.21$)	medium ($r = 0.30$)	small ($r = 0.28$)
	pre-service student teachers and other non-pedagogical participants	small ($r = 0.21$)	small ($r = 0.13$)	small ($r = 0.04$)
	in-service teachers and non-pedagogical students	small ($r = 0.25$)	small ($r = 0.22$)	small ($r = 0.25$)
	in-service teachers and other non-pedagogical participants	medium ($r = 0.32$)	small ($r = 0.29$)	small ($r = 0.30$)

REVIJA ZA ELEMENTARNO IZOBRAŽEVANJE
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POUČEVANJE SPOZNAVANJA OKOLJA IN NARAVOSLOVNI KAPITAL UČENCEV

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Izvleček/Abstract V prispevku predstavljamo potek in rezultate raziskave, katere osnovni namen je podrobneje spoznati poučevanja učnega predmeta spoznavanje okolja. Ugotovili smo, da učiteljice v prvem vzgojno-izobraževalnem obdobju ocenjujejo, da so motivirane za delo in kompetentne za poučevanje predmeta spoznavanje okolja. Pri tem se čutijo manj pripravljene za poučevanje fizikalnih, kemijskih, tehniških, sociooloških in psiholoških vsebin kot za poučevanje drugih vsebin. Nadalje ugotavljamo, da določene naravoslovne postopke, kot so analiza in interpretacija podatkov, raziskovanje in delo z računalniki, izvajajo manj pogosto od drugih postopkov. Pri vrednotenju znanja se opirajo predvsem na pisne in ustne odgovore učencev.

Teaching early science and pupil's natural science capital
This paper presents in detail the results of research in which the primary interest was teaching early science in the 1st trimester of elementary school. It was concluded that, in terms of popularity, expressed by the teacher's own estimation of their competence to teach a specific course, the introduction to environmental science falls a little above average. With regard to the frequency of carrying out various activities, it was established that teachers employ the following activities less than others: connecting, interpreting, organising and analysing data by carrying out simple research and using ICT and e-learning. Teachers prefer to assess the students' knowledge with the evaluation method rather than with other assessment methods.

Ključne besede: spoznavanje okolja, naravoslovno znanje, spoznavni procesi in postopki, oblike poučevanja, ocenjevanje znanja.

Keywords: natural science, scientific knowledge, scientific skills, methods of teaching, assessment of knowledge

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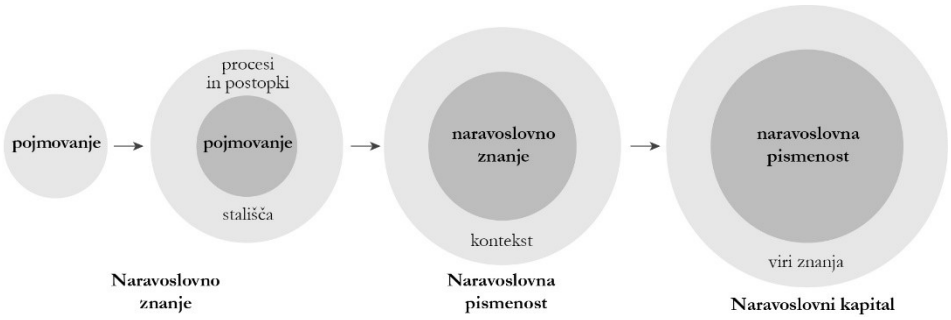
Uvod

V drugi polovici prejšnjega stoletja je dozorelo spoznanje, da naravoslovno znanje ni zgolj domena inženirjev in znanstvenikov, temveč ga mora v določeni meri imeti vsak posameznik, če se želi uspešno spopadati z izzivi sodobnega časa. Ob tem se je začelo vse bolj poudarjati, da je znanje mnogo več kot le poznavanje in razumevanje določenih dejstev in zakonitosti (Raper in Stinger, 1987; Harlen, 1992) ter da učenje poteka vse življenje in na vsakem koraku. Kljub razširitvi pojmovanja znanja (slika 1) in uvedbi določenih sprememb v poučevanju so začeli znanstveniki ugotavljati, da to samo po sebi še ne zadošča za uspešno naravoslovno udejstvovanje posameznika v družbi. Zato so v 80-ih in 90-ih letih prejšnjega stoletja začeli govoriti o različnih vrstah pismenosti (slika 1), ki znanje postavljajo v različne kontekste oziroma poleg znanja zajemajo tudi zmožnost in pripravljenost posameznika za aktivno udejstvovanje v družbi. Omenjeno je predstavljeno tudi v smernicah za izobraževanje v 21. stoletju, ki jih je pripravil Unesco (Delors in drugi, 1996). V zadnjih letih znanstveniki v Veliki Britaniji (Archer in drugi, 2014, 2015) ugotavljajo, da zmožnost in pripravljenost za naravoslovno udejstvovanje za dejansko udejstvovanje ne zadošča, temveč morajo biti posamezniku dostopni tudi viri znanja, do katerih mora znati dostopati in jih uporabljati. Zato raje kot o pismenosti govorijo o naravoslovnem kapitalu (slika1).

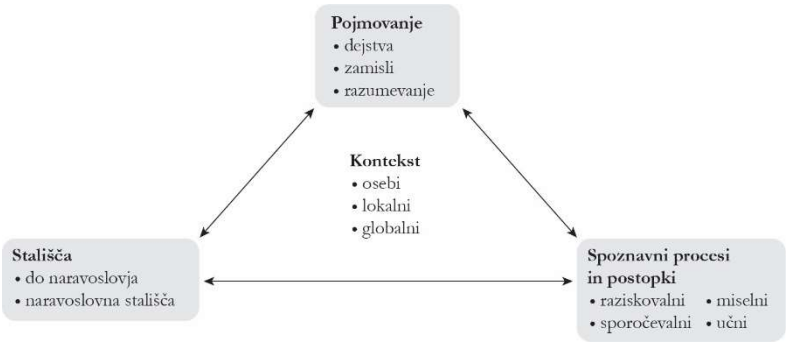


Slika 1: Shematski prikaz spreminjanja pojmovanja naravoslovnega znanja.

Teoretična izhodišča

Naravoslovno znanje, naravoslovna pismenost in naravoslovni kapital

Današnje pojmovanje znanja je razvidno iz Unescove opredelitve učenja kot vsake pridobitve ali spremembe védenja, informiranosti, razumevanja, stališč, spretnosti, zmožnosti ali vedênja, z izkustvom, vajo, s poučevanjem ali študijem (UNESCO, 2012). Naravoslovno znanje je najpogosteje opredeljeno kot preplet posameznikovega naravoslovnega pojmovanja (angl. *concepts*), spoznavnih procesov in postopkov (angl. *skills*) ter njegovih stališč (angl. *attitudes*) v povezavi z naravoslovjem (slika 2). Podrobnejše opredelitve se med avtorji nekoliko razlikujejo. Tako po Raper in Stinger (1991) naravoslovno pojmovanje tvorijo dejstva (poimenovanja, definicije, dogovori), zamisli (splošne zamisli, načela, znanstveni zakoni in teorije) in razumevanje. Harlen in Qualter (2009) spoznavne procese in postopke delita na raziskovalne, miselne, učne in sporočevalne (slika 2). Pri tem omenjata predvsem zastavljanje vprašanj, napovedovanje, načrtovanje zbiranja in zbiranje podatkov, analiziranje in interpretacijo podatkov, sporočanje, oblikovanje sklepov, razvrščanje, urejanje, primerjanje, prepoznavo vzorcev, reševanje problemov ter povzemanje. Glede naravoslovnih stališč je med avtorji največ razhajanj; mi se bomo oprli na Gardnerjevo (1975) delitev na odnos do naravoslovja (angl. *attitudes towards science*) in naravoslovne vrednote (angl. *scientific attitudes*). Odnos do naravoslovja zajema zanimanje za naravoslovje, naravnanost do naravoslovja, družbeno odgovornost na področju naravoslovja ipd.; naravoslovne vrednote pa radovednost, dojemljivost, intelektualno poštenost, preudarnost, skepso ipd.



Slika 2: Shematski prikaz naravoslovnega znanja (Povzeto po Raper in Stinger, 1991, str. 11, nadgrajeno s Harlen in Qualter, 2009, Gardner, 1975 in OECD, 2017.)

Z reformo poučevanja naravoslovja v ZDA konec 80-ih in v začetku 90-ih se je namesto o naravoslovnem znanju začelo govoriti o naravoslovni pismenosti (Ruhterford in Ahlgren, 1991). Naravoslovno pismenost, ki v svojem jedru zajema naravoslovno znanje, lahko razumemo kot zmožnost uporabe naravoslovnega znanja, informacij in procesov za razumevanje sveta okoli sebe, zmožnost in pripravljenost vključevanja v argumentirane razprave ter sodelovanja v odločitvah, ki zajemajo naravoslovno tematiko. Organizacija za gospodarsko sodelovanje in razvoj (OECD, 2017) posredno opredeljuje naravoslovno pismenost s področji preverjanja v raziskavi PISA 2015, ki so: kontekst, znanje, kompetence (spoznavni procesi in postopki) in stališča, pri čemer kontekst deli na osebni, lokalni in globalni (slika 2), znanje pa na vsebinsko, procesno in epistemološko. Nedavne raziskave v Veliki Britaniji o naravoslovnem udejstvovanju odraslih (Archer in drugi, 2014, 2015) so pokazale, da naravoslovna pismenost ni najbolj zanesljiv napovednik aktivnega družbenega udejstvovanja. Zato so po vzoru socialnega, kulturnega in ekonomskega kapitala kot napovednik »naravoslovne uspešnosti« posameznika uvedli t. i. naravoslovni kapital, ki vključuje naravoslovno znanje ter njegove izkušnje in vire znanja (slika 1). Sistematično učenje naravoslovnih vsebin oziroma gradnja znanstvenega kapitala se v Sloveniji začne v vrtcu in nadaljuje v prvem vzgojno-izobraževalnem obdobju v okviru predmeta spoznavanje okolja.

Poučevanje učnega predmeta spoznavanje okolja

Poučevanje učnega predmeta spoznavanja okolja je izjemno zahtevno, saj učne vsebine izhajajo iz več kot desetih naravoslovnih in tehničnih (kemija, fizika, biologija, informatika, tehnika in tehnologija) ter družboslovnih (zgodovina, geografija, komunikologija, sociologija, psihologija, etnologija, ekonomija in politologija) znanstvenih ved. Temu so dodane še druge vsebine (prometna varnost, okoljska vzgoja, zdrav način življenja). Učitelji v prvem vzgojno-izobraževalnem obdobju morajo imeti kakovostno in poglobljeno znanje na vseh naštetih področjih ter poznati številne povezave med njimi, saj pri učnem predmetu spoznavanje okolja gradijo temelje naravoslovne pismenosti. Iz učnega načrta (Kolar in drugi, 2011) je razvidno, da temelji na konstruktivističnem pristopu. Ivanuš Grmek in sodelavci (2009) pri tem posebej poudarjajo lastno aktivnost učencev. Petek (2012) takšen pristop opredeljuje kot raziskovalno didaktični pouk, ki temelji na raziskovanju in reševanju problemov. Rajšp s sodelavci (2013) ob tem opozarja, da mora biti znanje v čim večji meri pridobljeno na osnovi lastnih izkušenj v neposrednem okolju. O

pomembnosti uporabe različnih metod ocenjevanja znanja piše Skribe Dimec (2007).

Raziskave poučevanja naravoslovja in naravoslovnega znanja učencev

V Sloveniji je bilo v zadnjih letih narejenih kar nekaj raziskav na področju zgodnjega poučevanja naravoslovja. Skribe Dimec (2013) ugotavlja, da je diferenciacija pouka premalo prisotna v učnem načrtu za predmet spoznavanje okolja ter pripadajočih učnih gradivih in učnih pripravah študentov razrednega pouka. Dolenc Orbanić in Furlan (2015) za študente razrednega pouka ugotavljata, da se ne čutijo dovolj usposobljeni za poučevanje naravoslovja in bi pri tem uporabljali predvsem tradicionalne učne pristope. Pevec (2012) v povezavi z nadaljnjim izobraževanjem in usposabljanjem učiteljev ugotavlja, da je po mnenju učiteljev kakovost tovrstnih izobraževanj v splošnem slaba, zato se jih učitelji le neradi udeležujejo. Podobno ugotavlja tudi Polak s sodelavci (2005). Ivanuš Grmek in sodelavci (2009) ugotavljajo, da ima projektni pouk velik vpliv na znanje in interes učencev. Cotič in sodelavci (2019) dokazujejo pozitivne vplive izkustvenega učenja v naravnem okolju ob hkratni uporabi IKT (informacijsko-komunikacijska tehnologija). Hkrati Rajšp in sodelavci (2013) ugotavljajo, da pouk spoznavanja okolja preredko poteka v naravnem okolju, za kar učitelji navajajo predvsem organizacijske in finančne težave. V povezavi z naravoslovnim znanjem učencev v prvem vzgojno-izobraževalnem obdobju Petek in Glažar (2015) ugotavljata, da je naravoslovno znanje učencev v starosti 7–9 let pomanjkljivo, predvsem to velja za sposobnosti sporočanja, napovedovanja in sklepanja ter zbiranja in urejanja informacij. Posebej zanimivi so izsledki mednarodne raziskave TIMSS 2015, v kateri se naši četrtošolci po znanju naravoslovja uvrščajo na 11. mesto med učenci 47 držav, udeleženk raziskave. Zadnjih 20 let je opazna tudi stalna težnja naraščanja dosežkov naših četrtošolcev v znanju naravoslovja (Pavešić in Svetlik, 2016). Podrobnejša analiza razkrije, da so naši četrtošolci v povprečju slabši pri sklepanju in imajo precej bolj odklonilna stališča do naravoslovja kot vrstniki iz večine držav udeleženk. Tudi njihovi starši izražajo odklonila stališča do naravoslovja. Omenjena raziskava pokaže še, da pri nas 41 % četrtošolcev učijo učitelji z izobrazbo, ki ni univerzitetna (večinoma gre za diplomante bivših pedagoških akademij), kar je slabše od mednarodnega povprečja. Učitelji zaostajajo za mednarodnim povprečjem tudi pri strokovnem izpopolnjevanju.

Raziskovalni problem

Glede na pomen poučevanja učnega predmeta spoznavanje okolja za razvoj naravoslovnega kapitala in splošnega spoznavnega razvoja učencev ter na ugotovljena odstopanja v naravoslovni pismenosti naših četrtošolcev, ki so jih pokazale raziskave (Petek in Glažar, 2015; Pavešić in Svetlik, 2016), se nam zdi potrebno raziskati razloge za nastale razmere in oblikovati predloge za njihovo izboljšanje. Ker učni načrt po naši presoji ni osnovni vir težav, smo se osredinili na učitelja in njegovo poučevanje. Zanima nas profil učitelja v prvem vzgojno-izobraževalnem obdobju, v kolikšni meri sledi zahtevam in vsebinam učnega načrta, ali je ustrezno usposobljen in motiviran za delo, katere oblike ocenjevanje znanja uporablja in katere aktivnosti izvaja pri pouku. Pričakujemo namreč, da bodo odgovori na omenjena vprašanja razkrili stanje na področju poučevanja spoznavanja okolja in razloge zanj.

Cilj raziskave

Osnovni namen naše raziskave je natančneje preučiti poučevanja učnega predmeta spoznavanje okolja v prvem vzgojno-izobraževalnem obdobju. Ker splošna raziskava na tem področju po našem védenju pri nas še ni bila opravljena, raziskavo načrtujemo kolikor se da široko. Na osnovi izsledkov raziskave želimo določiti usmeritve za nadaljnje raziskave, s katerimi bi natančneje opredelili vzroke za ugotovljene razmere ter možnosti in predloge za izboljšave. Zato smo si zastavili naslednje raziskovalne cilje, in sicer ugotoviti:

- kakšen je profil učitelja prvega vzgojno-izobraževalnega obdobja;
- katere naravoslovne postopke vključujejo učitelji v pouk spoznavanja okolja in v kolikšni meri;
- katere vsebinske sklope iz učnega načrta učitelji najraje/najmanj radi poučujejo in
- katere oblike ocenjevanja znanja uporabljajo učitelji pri pouku spoznavanja okolja in v kolikšni meri.

Metodologija

Metode

Pri raziskovanju smo uporabili deskriptivno in kavzalno-neeksperimentalno metodo empiričnega pedagoškega raziskovanja, pri čemer smo uporabili kvantitativni pristop, ki je temeljil na statistični obdelavi numeričnih podatkov, pridobljenih s tehniko zbiranja podatkov z vprašalnikom.

Vzorec

Uporabili smo priložnosti neslučajnostni vzorec, v katerega smo vključili udeležence predstavitev učnih gradiv v organizaciji založbe DZS, ki so potekale v marcu 2019 v Ljubljani, Mariboru, Celju, Novem mestu in Novi Gorici. Na tem mestu velja opozoriti, da je zaradi neslučajnostnega vzorca potrebna določena previdnost pri oblikovanja sklepov in posploševanju.

Zbiranje podatkov

Podatke smo zbirali z natisnjenim vprašalnikom, ki so ga izpolnili udeleženci omenjenih predstavitev. Skupaj smo prejeli 114 izpolnjenih vprašalnikov, od katerih štirje niso ustrezali dvema selekcijskima pogojema za uvrstitev v vzorec, in sicer: vsaj eno leto poučevanja v prvem vzgojno-izobraževalnem obdobju, trenutno opravljanje dela razrednika (delo v podaljšanem bivanja ali pomočnika učitelja ne ustreza pogoju) v prvem vzgojno-izobraževalnem obdobju. Zaradi anonimnosti anketiranja ne vemo, s koliko različnih šol prihajajo respondenti, upravičeno pa domnevamo, da vsaj s 50 šol, saj se je omenjenih predstavitev udeležilo natanko 200 učiteljev z 89 različnih šol.

Obdelava podatkov

Podatke iz anketnih vprašalnikov smo s pomočjo šifranta prenesli v elektronske preglednice in jih obdelali s programom SPSS. Najprej smo izvedli faktorsko analizo z metodo glavnih komponent, s katero smo preverjali veljavnost in zanesljivost instrumenta. Rezultati omenjene analize potrjujejo, da uporabljeni vprašalnik ustreza kriteriju konstruktne veljavnosti, saj prvi faktor pojasni 21,13 % variance.

Zanesljivost smo preverili s postopkom faktorizacije (rtt = 0,852) ter s Cronbachovim α-testom (α = 0,904), ki sta pokazala, da gre za zanesljiv instrument. Zaradi velikega števila pomensko sorodnih spremenljivk smo se odločili, da s faktorsko analizo določimo skupne faktorje za nadaljnjo analizo podatkov. Preverjanje upravičenosti faktorske analize s testom KMO (Kaiser-Mayer-Olkinova mera) Bartlettovim χ^2-preizkusom (f = 0,542, χ^2= 3625,092, p = 0,000) potrjuje, da je faktorska analiza upravičena. S faktorsko analizo z rotacijo promax smo iz nabora 43 spremenljivk oblikovali 9 faktorjev oziroma dimenzij, za katere smo ocenili, da so smiselne za našo raziskavo (vse imajo lastno vrednost, višjo od 1). Seznam dimenzij in pripadajočih spremenljivk je prikazan v preglednici 1. Dva faktorja, katerih lastna vrednost je sicer presegala 1, smo zavrgli, ker sta združevala raznorodne spremenljivke in jima nismo mogli pripisati smiselnega konstrukta oziroma dimenzije.

Preglednica 1: Dimenzije, dobljene s faktorsko analizo in spremenljivke, ki tvorijo dimenzije.

Dimenzije	Vrednost nasičevanja in opis spremenljivk, ki sestavljajo dimenzijo:	
Ocenjevanje, ki ne temelji na vrednotenju odgovorov:	0,812	Vrednotenje izvedbe projektne naloge
	0,766	Vrednotenje fizičnega izdelka
	0,762	Vrednotenje praktične dejavnosti
	0,649	Vrednotenje javne predstavitve
	0,613	Vrednotenje vsebine portfolia
Povezovanje in interpretacija podatkov (sklepanje, povezovanje, vrednotenje, argumentiranje):	0,823	Argumentiranje
	0,783	Sklepanje (npr. ... zato, ker ...)
	0,760	Povezovanje (npr. čim bolj ..., tem ...)
	0,740	Vrednotenje informacij
	0,647	Branje iz učbenikov ali drugih virov
	0,626	Samostojno iskanje podatkov
	0,503	Opisovanje (pojavov, naprav ...)
Lastna ocena motiviranosti učitelja:	0,830	Učiteljevo navdušenje nad poklicem
	0,826	Učitelja delo navdihuje
	0,792	Učitelj v svojem delu najde veliko smisla
	0,765	Zadovoljstvo učitelja s svojim poklicem
	0,707	Učitelj je ponosen na svoje delo
	0,663	Učitelj želi svoj poklic še dolgo opravljati
Biološke učne teme:	0,850	Živa bitja
	0,792	Življenjska okolja
	0,747	Zdrav način življenja
	0,599	Človeško telo
	0,591	Okoljska vzgoja

Izvajanje preprostih raziskav:	0,757	Učenci samostojno načrtujejo poskuse (ali raziskave)
	0,748	Učenci predstavljajo rezultate poskusov (ali raziskav)
	0,614	Učenci izvajajo poskuse (ali raziskave) po navodilih
	0,610	Učenci berejo iz učbenikov ali drugih virov
	0,589	Učenci izvajajo raziskave (npr. anketiranje)
Urejanje in analiza podatkov (primerjanje, urejanje, razvrščanje):	0,895	Urejanje (po določenih kriterijih)
	0,885	Razvrščanje (po določenih kriterijih)
	0,819	Primerjanje (po določenih kriterijih)
Fizikalne, kemijske in tehnične učne teme:	0,873	Sile in gibanje
	0,784	Zvok in svetloba
	0,734	Lastnosti snovi
	0,532	Prostor (geografski pojmi)
Delo z IKT in elektronskimi vsebinami:	0,793	Učenci si ogledujejo interaktivne vsebine
	0,761	Učenci rešujejo interaktivne naloge
	0,738	Uporaba IKT
Sociološke in psihološke teme:	0,829	Skupnosti (šola, družina ...)
	0,715	Jaz (čustva, odnosi ...)
	0,588	Promet (pravila, varnost ...)

Za potrebe analize podatkov smo oblikovali tudi referenčne dimenzije (preglednica 2).

Preglednica 2: Referenčne dimenzije in spremenljivke, ki tvorijo dimenzije.

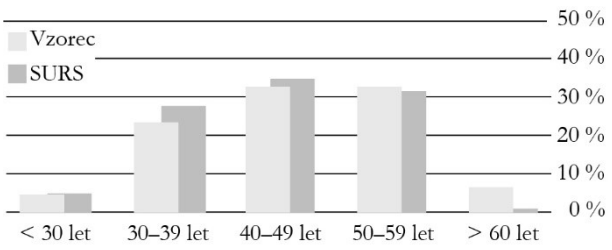
Dimenzije	Spremenljivke, ki sestavljajo dimenzijo:
Ocenjevanje znanja, ki temelji na vrednotenju odgovorov:	Vrednotenje ustnih odgovorov Vrednotenje pisnega izdelka
Druge aktivnosti in spoznavni procesi:	Poslušajo učiteljevo razlago nove snovi Sprašujejo med razlago nove snovi Opazujejo učitelja pri izvajanju poskusa Rešujejo naloge v delovnem zvezku (ali na delovnih listih) Razpravljajo o obravnavani snovi Opazujejo in opisujejo naravne pojave (npr. vreme) Usmerjeno opazovanje Merjenje in zapis meritev Grafično prikazovanje podatkov Interpretiranje grafičnih prikazov
Druge učne teme:	Čas (dan, teden, leto ...) Nekoč in danes Obdelava gradiv Vremenski pojavi

Za analizo posameznih spremenljivk in dimenzij smo uporabili osnovno deskriptivno statistiko: aritmetično sredino ($\overline{X}$) in standardni odklon (S). Razlike spremenljivke oziroma dimenzije glede na izbrani kriterij smo ugotavljali z neparametričnim Kruskal-Wallisovim H-preizkusom, ker niso bili izpolnjeni pogoji za parametrične preizkuse. S parametričnim t-preizkusom za odvisne vzorce smo preverjali razlike med dimenzijami.

Rezultati in interpretacija

Profil respondentov

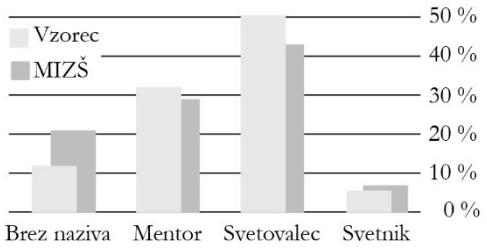
V raziskavi je sodelovalo 114 respondentov, štirje so bili izločeni kot neustrezni. Od 110 respondentov, ki ustrezajo selekcijskim pogojem in so njihovi odgovori zajeti v analizi, je 50 (45,9 %) učiteljic 1. razreda, 25 (22,9 %) učiteljic 2. razreda, 21 (19,3 %) učiteljic 3. razreda in 13 (11,9 %) učiteljic kombiniranih oddelkov, ena učiteljica ni podala odgovora. Učitelja ni nobenega.



Starost	f	f %
Manj kot 30 let	5	4,7
30–39 let	2	23,4
40–49 let	3	32,7
50–59 let	3	32,7
60 let in več	7	6,5
Skupaj	1	100,0

Slika 3: Prikaz strukture učiteljic glede na njihovo starost (natančnejši podatki so v preglednici) našega vzorca v primerjavi z uradnimi podatki o starostni strukturi učiteljic prvega in drugega vzgojno-izobraževalnega obdobja v letu 2014 (SURS).

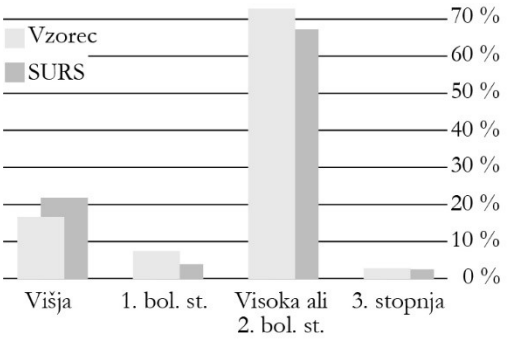
Učiteljice, zajete v raziskavi, so bile v povprečju stare 45 let in imele 21 let delovne dobe. Dobljena starostna struktura (slika 3) se dobro ujema z uradnim podatkom o starostni strukturi učiteljic 1. in 2. vzgojno-izobraževalnega obdobja v letu 2014 (SI-STAT, 2018).



Strokovni naziv	f	f %
Brez naziva	1	11,9
Mentor	3	32,1
Svetovalec	5	50,5
Svetnik	6	5,5
Skupaj	1	100,0

Slika 4. Prikaz strukture učiteljic glede na strokovni naziv (natančnejši podatki so v preglednici) našega vzorca v primerjavi z uradnimi podatki o strukturi strokovnih delavcev v osnovni šoli glede na strokovni naziv (MIZŠ).

Največ učiteljic, zajetih v raziskavi, ima naziv svetovalec (50,5 %). Ugotovljena struktura se z uradnimi podatki, pridobljenimi z Ministrstva za izobraževanje, znanost in šport razhaja predvsem pri učiteljicah brez naziva in učiteljicah z nazivom svetovalec (slika 4).

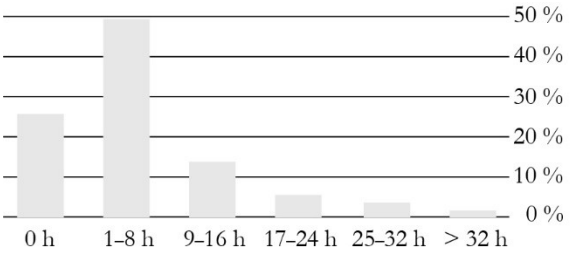


Stopnja izobrazbe	f	f %
Višješolski študij	18	16,8
1. bolonjska stopnja	8	7,5
Visokošolski študij ali 2. bolonjska stopnja	78	72,9
Specializacija, znanstveni magisterij ali doktorat	3	2,8
Skupaj	107	100,

Slika 5. Prikaz strukture učiteljic glede na dokončano stopnjo izobrazbe (natančnejši podatki so v preglednici) našega vzorca v primerjavi z uradnimi podatki o izobrazbeni strukturi učiteljic 1. in 2. vzgojno-izobraževalnega obdobja v letu 2014 (SURS).

Največ učiteljic je kot najvišjo doseženo stopnjo izobrazbe navedlo zaključen 4-letni univerzitetni študij oziroma izobraževanje 2. bolonjske stopnje (72,9 %). Ugotovljena izobrazbena struktura (slika 5) se dokaj dobro ujema z uradnim podatkom o izobrazbeni strukturi učiteljic 1. in 2. vzgojno-izobraževalnega obdobja v letu 2014 (SI-STAT, 2018).

Kot vidimo na sliki 6, se približno četrtina učiteljic (25,7 %) v zadnjih dveh letih v povezavi z učnim predmetom spoznavanje okolja po lastnih navedbah ni dodatno usposabljala, približno polovica (49,5 %) je opravila do 8 ur dodatnega usposabljanja. Če v izračunu povprečnega števila ur dodatnega usposabljanja upoštevamo zgornje meje intervalov, ugotovimo, da so se učiteljice v zadnjih dveh leti v povezavi z učnim predmetom spoznavanje okolja v povprečju dodatno usposabljale približno 8 ur.



Št. ur usposabljanja	f	f %
0 ur	2	25,7
1–8 ur	5	49,5
9–16 ur	1	13,8
17–24 ur	6	5,5
25–32 ur	4	3,7
Več kot 32 ur	2	1,8
Skupaj	1	100,0

Slika 6. Prikaz strukture učiteljic glede na opravljene ure strokovnega usposabljanja v povezavi s predmetom spoznavanje okolja v zadnjih dveh letih (natančnejši podatki so v preglednici).

Na podlagi primerjav različnih struktur vzorca s pripadajočimi strukturami celotne populacije lahko sklepamo, da vzorec po osnovnih parametrih dobro odslikava celotno množico. Vzorec je po našem prepričanju tudi geografsko dovolj raznolik. Pri posploševanju rezultatov na celotno populacijo moramo biti kljub temu previdni, saj naš vzorec vendarle ni slučajnosten.

Lastna ocena motiviranosti za delo

Zanimalo nas je, ali obstajajo razlike v lastni oceni motiviranosti učiteljic glede na to, koliko let že poučujejo in glede na razred, v katerem poučujejo.

Preglednica 3. Rezultat Kruskal-Wallisovega preizkusa za preverjanje razlik v lastne oceni motiviranosti glede na leta poučevanja učiteljic v našem vzorcu (N = 109).

			Kruskal-Wallisov H-test	
Leta poučevanja	n	$\overline{R}$	H	P
10 let in manj	19	57,74	0,639	0,687
11–20 let	38	56,68		
21–30 let	22	50,98		
31 let in več	30	54,08		

Rezultat Kruskal-Wallisovega preizkusa (H = 0,639, P = 0,687) pokaže, da med učiteljicami z različnim številom let poučevanja ne obstajajo statistično pomembne razlike v lastni oceni motiviranosti.

Preglednica 4. Rezultat Rezultat Kruskal-Wallisovega preizkusa za preverjanje razlik v lastni oceni motiviranosti glede na razred, v katerem poučujejo učiteljice v našem vzorcu (N = 108).

			Kruskal-Wallisov	
Razred	n	$\overline{R}$	H	P
1. razred	49	49,74	3,990	0,263
2. razred	25	52,68		
3. razred	21	65,38		
Kombinirani oddelki	13	58,35		

Rezultat Kruskal-Wallisovega preizkusa (H = 3,990, P = 0,263) pokaže, da tudi med učiteljicami, ki poučujejo v različnih razredih, ne obstajajo statistično pomembne razlike v lastni oceni motiviranosti.

Lastna ocena kompetentnosti za poučevanje posameznih učnih predmetov

Pri vprašanju, kateri učni predmet najbolj oziroma najmanj rade poučujejo, in pri vprašanju, za poučevanje katerega učnega predmet se počutijo najbolj oziroma najmanj kompetentne, je več kot četrtina učiteljic podala neveljavne odgovore (kot kaže, se niso mogle odločiti le za en odgovor).

Preglednica 5. Število in strukturni odstotek (v oklepaju) učiteljic glede na to, kateri predmet najraje/najmanj rade poučujejo oziroma glede na oceno lastne kompetentnosti za poučevanje posameznega predmeta.

Trditev	MAT	SLJ	SPO	LUM	GUM	ŠPO	Skupaj
Najraje poučujem	37 (53,6 %)	20 (29,0 %)	7 (10,1 %)	4 (5,8 %)	1 (1,5%)	0 (0,0 %)	69 (100 %)
Najmanj rad(a) poučujem	4 (5,1 %)	1 (1,3 %)	7 (8,9 %)	9 (11,4 %)	44 (55,7 %)	14 (17,7 %)	79 (100 %)
Najbolj sem kompetenten/-na za	38 (52,8 %)	23 (31,9 %)	5 (6,9 %)	2 (2,8 %)	4 (5,6 %)	0 (0,0 %)	72 (100 %)
Najmanj sem Kompetenten/-na za	3 (3,8 %)	0 (0,0 %)	6 (7,6 %)	17 (21,5 %)	40 (50,6 %)	13 (16,5 %)	79 (100 %)

Zato nismo opravili podrobnejše statistične analize omenjenih dveh vprašanj, kljub temu smo ugotovili, da učni predmet spoznavanje okolja, ki nas posebej zanima, pri nobenem od naštetih vprašanj ne izstopa (preglednica 5). Za omenjeni učni predmet lahko upravičeno domnevamo, da ga učiteljice rade poučujejo oziroma se za njegovo poučevanje počutijo kompetentne, saj je po »priljubljenosti« oziroma »kompetentnosti« takoj za matematiko in slovenščino ter ga le manjši del učiteljic (8,9 % oz. 7,6 %) postavlja na zadnje mesto.

Izvajanje pouka naravoslovja izven matične učilnice

Zanimalo nas je (Preglednica 6), kako pogosto učiteljice izvajajo pouk naravoslovja izven matične učilnice. Ugotovili smo, da večina učiteljic (91,7 %) vsaj trikrat na leto izvaja pouk spoznavanja okolja v naravi (od tega dobri dve tretjini več kot petkrat letno), da slabi dve tretjini učiteljic (63,3 %) vsaj trikrat na leto z učenci obiščeta različne vzgojno-izobraževalne ustanove, le 38,9 % učiteljic pa več kot trikrat letno uporabi računalniško učilnico. (Podrobnejši podatki so v preglednici 6.) Če smo

lahko s pogostostjo izvajanja pouka v naravi zmerno zadovoljni, pa tega ne moremo trditi za izvajanje pouka v računalniški učilnici ter različnih kulturnih in izobraževalnih ustanovah.

Preglednica 6. Število in strukturni odstotek učiteljic glede na to, kako pogosto izvajajo pouk spoznavanja okolja v računalniški učilnici, v naravi (izven območja šole) ter v različnih kulturnih in izobraževalnih ustanovah (N = 108, 109, 109).

	V računalniški		V naravi		V kulturnih in	
Pogostost	f	f %	f	f %	f	f %
Več kot 5-krat letno	15	13,9	70	64,2	20	18,3
3- do 5-krat letno	27	25,0	30	27,5	49	45,0
1- do 2-krat letno	39	36,1	7	6,4	34	31,2
Nikoli	27	25,0	2	1,8	6	5,5

Ob tem ne gre pozabiti, da je v predmetniku osnovne šole v vsakem razredu predvidenih 15 dni dejavnosti, pri katerih naj bi bil pouk zastavljen drugače kot običajno, tudi v smislu mesta izvajanja pouka.

Oblike ocenjevanja

Zanimalo nas je, ali obstajajo razlike v pogostosti uporabe različnih oblik ocenjevanja znanja glede na to, koliko let že poučujejo, in glede na razred, v katerem poučujejo.

Preglednica 7: Rezultat Kruskal-Wallisovega preizkusa za preverjanje razlik v pogostosti uporabe oblik ocenjevanja znanja pri predmetu spoznavanje okolja, ki ne temeljijo na vrednotenju odgovorov glede na leta poučevanja učiteljic (N = 109).

			Kruskal-Wallisov	
Leta poučevanja	n	$\overline{R}$	H	P
10 let in manj	19	57,58	0,398	0,941
11–20 let	38	53,78		
21–30 let	22	57,30		
31 let in več	30	53,23		

Rezultat Kruskal-Wallisovega preizkusa (H = 0,398, P = 0,941) pokaže, da med učiteljicami z različnim številom let poučevanja ne obstajajo statistično pomembne razlike v pogostosti uporabe oblik ocenjevanja znanja, ki ne temeljijo na vrednotenju odgovorov.

Preglednica 8. Rezultat Kruskal-Wallisovega preizkusa za preverjanje razlik v pogostosti uporabe oblik ocenjevanja, ki ne temeljijo na vrednotenju odgovorov glede na razred, v katerem poučujejo učiteljice v našem vzorcu (N = 108).

			Kruskal-Wallisov	
Razred	n	$\overline{R}$	H	P
1. razred	49	55,70	2,646	0,449
2. razred	25	54,86		
3. razred	21	59,05		
Kombinirani oddelki	13	41,92		

Rezultat Kruskal-Wallisovega preizkusa (H = 2,646, P = 0,449) pokaže, da tudi med učiteljicami, ki poučujejo v različnih razredih, ne obstajajo statistično pomembne razlike v pogostosti uporabe oblik ocenjevanja znanja, ki ne temeljijo na vrednotenju odgovorov.

Preglednica 9. Rezultat t-preizkusa za odvisne vzorce za pogostost uporabe oblik ocenjevanja, ki ne temeljijo na vrednotenju odgovorov in oblik ocenjevanja, temelječih na vrednotenju odgovorov.

Dimenzija	$\overline{X}$	S	Korelacija		T-preizkus		
			R	P	t	g	2P
Oblike ocenjevanja	2,80	0,67	0,146	0,130	15,068	108	0,000
Oblike ocenjevanja	1,63	0,56					

*N = 109

Rezultat t-preizkusa za odvisne vzorce za preverjanje razlik v pogostosti uporabe obeh oblik ocenjevanja znanja pokaže, da sta pogostosti njune uporabe nizko pozitivno in statistično povezani (R = 0,146, P = 0,130). T-preizkus pokaže (t = 15,068, g = 108, 2P = 0,000), da med pogostostjo uporabe obeh oblik ocenjevanja obstajajo statistično pomembne razlike. Učiteljice v povprečju pogosteje uporabljajo

oblike ocenjevanja, ki temeljijo na vrednotenju odgovorov ($\overline{X}$ = 1,63), kot oblike ocenjevanja, ki ne temeljijo na vrednotenju odgovorov ($\overline{X}$ = 2,80).

Če zagovarjamo tezo, da raznolikost in uravnoteženost oblik ocenjevanja znanja pripomore k boljšemu naravoslovnemu znanju oziroma kapitalu učencev, lahko iz dobljenih podatkov z gotovostjo sklepamo, da na področju ocenjevanja znanja obstajajo možnosti za izboljšave.

Izvajanje različnih aktivnosti z vključenimi določenimi naravoslovnimi postopki

Zanimalo nas je, ali obstajajo razlike v pogostosti izvajanja določenih aktivnosti (izbor temelji na dimenzijah, dobljenih s faktorsko analizo) glede na to, koliko let učiteljice že poučujejo in glede na razred, v katerem poučujejo. Rezultati Kruskal-Wallisovih preizkusov (H_1 = 5,860, P_1 = 0,119; H_2 = 3,730, P_2 = 0,292; H_3 = 5,608, P_3 = 0,132; H_4 = 3,781, P_4 = 0,286) (Preglednica 10) za preverjanje razlik glede pogostosti izvajanja izbranih aktivnosti pokažejo, da med učiteljicami z različnim številom let poučevanja ne obstajajo statistično pomembne razlike v pogostosti izvajanja aktivnosti, ki vključujejo izbrane postopke. (Podrobnejši prikaz rezultatov je v preglednici 10.)

Preglednica 10. Rezultati Kruskal-Wallisovih preizkusov za preverjanje razlik v pogostosti aktivnosti, ki vključujejo izbrane postopke, glede na leta poučevanja učiteljic v našem vzorcu (N = 110).

	Povezovanje		Izvajanje		Urejanje		Delo z IKT in	
Leta poučevanja	n	$\overline{R}$	n	$\overline{R}$	n	$\overline{R}$	n	$\overline{R}$
10 let in manj	19	55,74	19	61,21	19	47,08	19	54,21
11–20 let	39	64,73	39	60,85	39	61,67	39	63,13
21–30 let	22	50,20	22	50,50	22	44,50	22	50,45
31 let in več	30	47,40	30	48,60	30	52,92	30	50,10
Kruskal-Wallisov H-test	H_1 = 5,860		H_2 = 3,730		H_3 = 5,608		H_4 = 3,781	
	P_1 = 0,119		P_2 = 0,292		P_3 = 0,132		P_4 = 0,286	

Kljub temu lahko v preglednici 10 opazimo, da učiteljice, ki poučujejo med 11 in 20 leti, najpogosteje izvajajo aktivnosti, povezane z izbranimi postopki.

Preglednica 11. Rezultati Kruskal-Wallisovih preizkusov za preverjanje razlik v pogostosti izvajanja aktivnosti, ki vključujejo izbrane postopke, glede na razred, v katerem poučujejo učiteljice v našem vzorcu (N = 109).

	Povezovanje		Izvajanje		Urejanje		Delo z IKT in	
Razred	n	$\overline{R}$	n	$\overline{R}$	n	$\overline{R}$	n	$\overline{R}$
1. razred	50	65,18	50	60,21	50	48,46	50	57,07
2. razred	25	42,04	25	50,74	25	57,98	25	53,36
3. razred	21	53,81	21	57,60	21	64,61	21	51,69
Kombinirani	13	42,69	13	38,96	13	43,00	13	55,54
Kruskal-Wallisov H-test	$H_1 = 11,495$		$H_2 = 5,419$		$H_3 = 6,309$		$H_4 = 0,531$	
	$P_1 = 0,009$		$P_2 = 0,114$		$P_3 = 0,098$		$P_4 = 0,912$	

Rezultati Kruskal-Wallisovih preizkusov ($H_1 = 11,495$, $P_1 = 0,009$; $H_2 = 5,419$, $P_2 = 0,114$; $H_3 = 6,309$, $P_3 = 0,098$; $H_4 = 0,531$, $P_4 = 0,912$) za preverjanje razlik glede pogostosti izvajanja aktivnosti, ki vključujejo izbrane postopke, pokažejo, da med učiteljicami, ki poučujejo v različnih razredih obstajajo statistično pomembne razlike le pri pogostosti izvajanja aktivnosti, ki vključujejo povezovanje in interpretacijo podatkov. Iz preglednice 11 je razvidno, da učiteljice 2. razredov ($\overline{R} = 42,04$) in kombiniranih oddelkov ($\overline{R} = 42,69$) v povprečju najpogosteje izvajajo aktivnosti, ki vključujejo povezovanje in interpretacijo podatkov, učiteljice 1. razredov pa jih v povprečju izvajajo najredkeje ($\overline{R} = 65,81$). Rezultat za 1. razred je v skladu s pričakovanji, saj gre za zahtevnejše spoznavne procese, ki jih je pri višji starosti učencev lažje in smiselneje izvajati, ne moremo pa na ta način pojasniti dejstva, da je pogostost izvajanja omenjenih dejavnosti v 3. razredu manjša kot v 2. razredu.

Zanimala nas je tudi primerjava pogostosti izvajanja izbranih aktivnosti s pogostostjo izvajanja drugih aktivnosti.

Rezultati t-preizkusov (Preglednica 12) za odvisne vzorce za preverjanje razlik pogostosti izvajanja posameznih izbranih aktivnosti s pogostostjo izvajanja drugih aktivnosti pokažejo, da gre v vseh primerih za pozitivno in šibko do zmerno statistično povezanost ($R_1 = 0,464$, $2P_1 = 0,114$; $R_2 = 0,394$, $2P_2 = 0,000$; $R_3 = 0,390$, $2P_3 = 0,006$; $R_4 = 0,420$, $2P_4 = 0,000$).

Preglednica 12. Rezultat t-preizkusa za odvisne vzorce za pogostost uporabe aktivnosti, ki vključujejo izbrane postopke in aktivnosti, ki jih ne vključujejo.

Dimenzija	$\overline{X}$	S	Korelacija		T-preizkus		
			R	P	t	g	2P
Povezovanje in	2,32	0,58	0,464	0,000	1,594	109	0,114
Druge aktivnosti	2,24	0,35					
Izvajanje preprostih	3,04	0,45	0,394	0,000	18,825	109	0,000
Druge aktivnosti	2,24	0,35					
Urejanje in analiza	2,40	0,58	0,390	0,000	2,789	105	0,006
Druge aktivnosti	2,24	0,33					
Delo z IKT- in e-	2,64	0,63	0,420	0,000	7,386	109	0,000
Druge aktivnosti	2,24	0,35					

*N = 110

T-preizkusi pokažejo, da z izjemo aktivnosti, ki vključujejo povezovanje in interpretacijo podatkov, med pogostostjo izvajanja izbranih aktivnosti in pogostostjo izvajanja drugih aktivnosti obstajajo statistično pomembne razlike. Iz preglednice 12 je razvidno, da učiteljice v povprečju manj pogosto kot druge aktivnosti ($\overline{X}$ = 2,24 oz. 2,25) izvajajo aktivnosti, ki vključujejo preproste raziskave ($\overline{X}$ = 3,04), urejenje in analizo podatkov ($\overline{X}$ = 2,40) in uporabo IKT in elektronskih vsebin ($\overline{X}$ = 2,64).

Pripravljenost za poučevanje posameznih tematskih sklopov

Zanimalo nas je, ali obstajajo razlike v pripravljenosti učiteljic za poučevanje izbranih tematskih sklopov (izbor temelji na dimenzijah, dobljenih s faktorsko analizo) glede na to, koliko let učiteljice že poučujejo, in glede na razred, v katerem poučujejo.

Rezultati Kruskal-Wallisovih preizkusov (H_1 = 1,901, P_1 = 0,407; H_2 = 3,416, P_2 = 0,332; H_3 = 1,607, P_3 = 0,658) za preverjanje razlik glede pripravljenosti učiteljic za izvajanje izbranih treh tematskih sklopov kažejo, med učiteljicami z različnim številom let poučevanja ne obstajajo statistično pomembne razlike v pripravljenosti za izvajanje izbranih treh tematskih sklopov. (Podrobnejši prikaz rezultatov je v preglednici 13.)

Preglednica 13. Rezultati Kruskal-Wallisovih preizkusov za preverjanje razlik v pripravljenosti učiteljic za poučevanje izbranih tematskih sklopov glede na leta poučevanja učiteljic v našem vzorcu (N = 109).

	Biološke teme		Fizikalne, kemijske in tehniške teme		Sociološke in psihološke teme	
Leta poučevanja	n	$\overline{R}$	n	$\overline{R}$	n	$\overline{R}$
10 let in manj	19	55,68	19	61,84	19	57,24
11–20 let	39	61,13	39	59,09	39	58,79
21–30 let	22	49,57	22	51,57	22	49,64
31 let in več	30	50,40	30	47,75	30	52,40
Kruskal-Wallisov H-test	$H_1 = 1,901$		$H_2 = 3,416$		$H_3 = 1,607$	
	$P_1 = 0,407$		$P_2 = 0,332$		$P_3 = 0,658$	

Preglednica 14. Rezultati Kruskal-Wallisovih preizkusov za preverjanje razlik v pripravljenosti učiteljic za poučevanje izbranih tematskih sklopov glede na razred, v katerem poučujejo učiteljice v našem vzorcu.

	Biološke teme		Fizikalne, kemijske in tehniške teme		Sociološke in psihološke teme	
Razred	n	$\overline{R}$	n	$\overline{R}$	n	$\overline{R}$
1. razred	50	55,13	50	58,33	50	49,67
2. razred	25	50,32	25	48,24	25	52,76
3. razred	21	56,03	21	53,98	21	70,43
Kombinirani oddelki	13	57,77	13	52,62	13	51,92
Kruskal-Wallisov H-test	H1 = 0,694		H2 = 1,825		H3 =7,150	
	P1 = 0,875		P2 = 0,610		P3 =0,067	

Rezultati Kruskal-Wallisovih preizkusov ($H_1 = 0,694$, $P_1 = 0,875$; $H_2 = 1,825$, $P_2 = 0,610$; $H_3 = 7,150$, $P_3 = 0,067$) za preverjanje razlik glede pripravljenosti učiteljic za izvajanje izbranih tematskih sklopov kažejo, da med učiteljicami, ki poučujejo v različnih razredih ne obstajajo statistično pomembne razlike v pripravljenosti za

izvajanje izbranih tematskih sklopov. (Podrobnejši prikaz rezultatov je v preglednici 14.)

Zanimala nas je tudi primerjava pripravljenosti učiteljic za izvajanje izbranih treh tematskih sklopov s pripravljenostjo učiteljic za izvajanje drugih tematskih sklopov.

Rezultati t-preizkusov za odvisne vzorce za preverjanje razlik pripravljenosti za izvajanje izbranih tematskih sklopov s pripravljenostjo za izvajanje drugih tematskih sklopov pokažejo, da gre v vseh treh primerih za pozitivno in zmerno statistično povezanost (R_1 = 0,478, R_2 = 0,637, R_3 = 0,460, $2P_1 = 2P_2 = 2P_3$ = 0,000) (Preglednica 15). T-preizkusi pokažejo, da med pripravljenostjo za izvajanje vseh treh izbranih tematskih sklopov in pripravljenostjo za izvajanje drugih tematskih sklopov obstajajo statistično pomembne razlike.

Preglednica 15. Rezultati t-preizkusov za odvisne vzorce za pripravljenost učiteljic za izvajanje izbranih vsebin in drugih vsebin.

Dimenzija	$\bar{X}$	N	S	Korelacija		T-preizkus		
				R	P	t	g	2P
Biološke teme	1,40	109	0,47	0,478	0,000	–4,654	108	0,000
Druge teme	1,61	109	0,46					
Fizikalne, kemijske in tehniške teme	2,15	109	0,62	0,637	0,000	11,743	108	0,000
Druge teme	1,61	109	0,46					
Sociološke in psihološke teme	2,41	109	0,46	0,460	0,000	– 4,322	108	0,000
Druge teme	1,61	109	0,46					

Kot je razvidno iz preglednice 15, učiteljice v povprečju izražajo večjo pripravljenost za izvajanje bioloških vsebin ($\bar{X}$ = 1,40) kot za izvajanje drugih vsebin ($\bar{X}$ = 1,61), hkrati pa nižjo pripravljenost za izvajanje fizikalnih, kemijskih in tehniških vsebin ($\bar{X}$ = 2,15) ter sociooloških in psiholoških vsebin ($\bar{X}$ = 2,41) kot za izvajanje drugih vsebin. Rezultati za biološke ter fizikalne, kemijske in tehniške vsebin so pričakovani,

saj veljajo za manj oziroma bolj zahtevne, rezultata za sociološke in psihološke teme pa si ne znamo zadovoljivo pojasniti.

Sklep

Ugotovitve

Primerjava osnovnih lastnosti vzorca s podatki za celotno populacijo kaže, da vzorec, kljub temu da ni slučajnosten, po omenjenih lastnostih zadovoljivo odslikava populacijo. Tudi instrument se je izkazal za ustreznega.

Ugotovili smo, da izkušenost učiteljic in razred, v katerem poučujejo, glede na uporabljene statistične metod ne vpliva na njihovo motivacijo za delo. Do podobne ugotovitve smo prišli tudi pri pogostosti uporabe oblik ocenjevanja, ki ne temeljijo na vrednotenju odgovorov. Pri ocenjevanju znanja se pokaže, da učiteljice pogosteje ocenjujejo znanje z vrednotenjem odgovorov kot z drugimi oblikami ocenjevanja. To sicer ni najbolj vzpodbuden rezultat, je pa pričakovan, saj si drugačne oblike ocenjevanja (ocenjevanje izdelkov, postopkov, portfolija ipd.) šele vtirajo pot v stalno učno prakso. Temu pritrjujejo tudi rezultati raziskave, ki sta jo opravili Dolenc Orbanić in Furlan (2015).

Ugotovili smo, da se po priljubljenosti oziroma po oceni lastne kompetentnosti za poučevanje učni predmet spoznavanje okolja uvršča nekoliko nad povprečje priljubljenosti učnih predmetov v prvem vzgojno-izobraževalnem obdobju. Z rezultatom smo lahko zadovoljni, ni pa z njim moč pojasniti odklonilnega odnosa naših četrtošolcev in njihovih staršev do naravoslovja, ki ga je razkrila raziskava TIMSS 2015 (Pavešić in Svetlik, 2016).

Ugotovili smo, da večina učiteljic izvaja pouk v naravi več kot 5-krat na leto, v različnih kulturnih in izobraževalnih ustanovah manj kot 5-krat na leto, v računalniški učilnici pa manj kot 2-krat na leto. Glede na didaktična priporočila v učnem načrtu za učni predmet spoznavanje okolja (Kolar idr., 2011) bi moral pouk pogosteje potekati izven matične učilnice. Temu pritrjujejo tudi ugotovitve raziskave, ki jo je opravila Rajšp s sodelavci (2013), da pogostejše izvajanje pouka v naravnem okolju pozitivno vpliva na naravoslovno znanje.

V povezavi s pogostostjo izvajanja različnih aktivnosti smo ugotovili, da učiteljice redkeje kot druge aktivnosti izvajajo aktivnosti, ki vključujejo povezovanje in interpretacijo ter urejanje in analizo podatkov. Podobno velja za aktivnosti, ki vključujejo preproste raziskave ter uporabo IKT in e-gradiv. Tudi ta rezultat ni presenetljiv, saj gre pri delu s podatki za kognitivno, pri izvajanju raziskav in uporabi IKT pa za tehnično in organizacijsko zahtevnejše aktivnosti. Manj pogosta uporaba IKT se ujema z ugotovitvijo, da učiteljice redko izvajajo pouk v računalniški učilnici. Glede na ugotovitve raziskave, ki jo je opravila Cotič s sodelavci (2019), lahko upravičeno domnevamo, da bi pogostejše izvajanje omenjenih aktivnosti pozitivno vplivalo na dvig naravoslovne pismenosti.

Doprinos raziskave in njene omejitve

Namen raziskave je bil osnovni pregled izvajanja učnega predmeta spoznavanja okolja v prvem vzgojno-izobraževalnem obdobju, zato raziskava ne daje natančnega vpogleda v obravnavano problematiko in tudi ne ponuja nobenih konkretnih rešitev. Kljub temu so lahko ugotovitve pričujoče raziskave izhodišče za načrtovanje obširnejših in bolj poglobljenih raziskav. Pri vrednotenju doprinosa raziskave ne gre pozabiti, da je zaradi neslučajnostnega vzorca možnost oblikovanja sklepov in upravičenost posploševanja ugotovitev omejena.

Nadaljnje možnosti za raziskovanje

Nadaljnje raziskovanje bi bilo smiselno usmeriti v iskanje razlogov za manj pogosto uporabo določenih načinov ocenjevanja, za manj pogosto izvajajo določene aktivnosti in večjo oziroma manjšo priljubljenost določenih tem. V ta namen bi bilo treba uporabiti druge tehnike zbiranja podatkov, kot so intervju, fokusne skupine, opazovanje. V prihodnjih raziskavah bi bilo smiselno podrobneje raziskati vpliv različnih dejavnikov na naravoslovni kapital učencev. Prav zato bi bilo treba razviti instrument za merjenje naravoslovnega znanja posameznega učenca.

Summary

In the second half of the last century, there was already a strong perception of natural science as a subject which was widely discussed not just amongst engineers and scientists, but, to an extent, by everyone, if they wanted to successfully cope with challenges of the modern era. The emphasis then moved to the idea that knowledge and understanding of certain facts was not enough on its own. Despite the growth of knowledge, and its role in learning processes, procedures and opinions, as well as relevant changes in the teaching system, scientists observed that this was still insufficient to engage individuals successfully with the world of natural sciences. With the reforms made in the US educational system at the end of the 1980s, knowledge of natural science is now referred to as natural science literacy. This concept is based on the notion that the modern society needs educated "users", who can think, or "owners" of knowledge in natural science – in other words, scientifically literate individuals. Recent research findings on distinctions in natural science engagement in the adult life in the British population showed that natural science literacy is not, in itself, a guarantee of an active engagement in natural science within society.

In connection with the active use of natural science, the concept of natural science capital of an individual is becoming more and more established, which, according to the social, cultural and economic capital model, including natural science knowledge, experiences and resources that the individual has acquired. Research shows though, that the school's influence on students' natural science capital is limited, but nevertheless important. Balanced development of all areas of natural science capital requires a well-trained and motivated teacher who is an expert in different areas of study, actively involves students in learning, using different methods and teaching environments, developing various cognitive processes and examining and evaluating their knowledge in different ways. Detailed teaching of the subject learning about the environment in Slovenia has not been carefully studied, but the results of the international TIMMS 2015 study may be of help to us. In this paper, we present in more detail the course and results of the research, in which we were primarily interested in the teachers' profile in the 1st trimester of the elementary school and what methods of teaching and assessment of knowledge are used by those teachers during the learning process of the environment and to what extent. We were also interested in what their attitude is towards individual thematic clusters. Based on

quantitative analysis of the collected material, we present some of the most important findings.

We have come to the conclusion that the teachers´ experience and the class they have been assigned to do not influence the teachers´ motivation to work. We have come to a similar conclusion regarding the frequency of the different methods of knowledge assessment that are not based on the evaluation of students´ answers. The knowledge assessment rather shows that the teachers prefer to assess the students' knowledge with the evaluation method rather than with other assessment methods. That is not an encouraging result but it is an expected one, as other ways of examining knowledge are only paving their way to become incorporated into the learning practice. In endorsing increasing knowledge of natural science, we should aspire to more knowledge assessment methods that are not based on evaluating students' answers.

We have concluded that in terms of popularity, expressed by the teacher's own estimation of their competency to teach a specific course, music was placed in last position, while introduction to environmental science falls a little above average. We are pleased with the result because we were especially interested in the field of environmental science. However, this result fails to further explain the conclusions of the international TIMMS 2015 study, which shows that our students have taken a more negative stance to natural science in comparison to their peers from other countries.

With regard to the frequency of carrying out different activities, we discovered that the teachers employ the following activities less than others, namely connecting, interpreting, organising and analysing data by carrying out simple research and using ICT and e-learning. This result is not surprising either, because working with data is considered as an advanced cognitive skill, while carrying out research and application of ICT are considered as technically and organisationally advanced activities. We assume that the higher frequency of the activities mentioned above would positively affect the increase of knowledge in natural science.

We discovered that classes which introduce environmental science are delivered in natural enivironment very frequently, however teachers less frequently take their students to cultural and educational institutions and even are even less likely to make use of computer classrooms. This study has given us a good overall view of the running of introduction to environmental science during the early school years and has also established a good platform for the future planning of new expanded and in-depth research in this field.

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4. Končno odločitev o objavi članka sprejme urednik na temelju priporočil recenzentov. Pri tem utemeljitve za svojo odločitev ni dolžan navesti.
5. Besedilo članka mora biti pripravljeno v skladu z Navodili avtorjem.
6. Avtor jamči, da so v članku predstavljeni podatki natančni, verodostojni in izvirni. Ko je članek sprejet v objavo, avtor podpiše Izjavo o etičnosti raziskovanja in Izjavo avtorja o izvirnosti članka. Vsi članki gredo skozi postopek za ugotavljanje plagiatorstva.

Navodila za oblikovanje besedila

Pri pripravi besedila članka upoštevajte naslednja navodila:

1. Tipkopis oddajte kot dokument v programu Microsoft Word. Nabor pisave je Times New Roman, velikost črk 12 za osnovno besedilo in 10 za povzetka v slovenskem in angleškem jeziku, literaturo in citate, če so daljši od 3 vrstic, razmik med vrsticami pa je 1,5. Vodilni naslovi naj bodo zapisani krepko, prvi podnaslovi ležeče, drugi podnaslovi pa navadno. Naslovov in strani ne številčite in ne uporabljajte velikih tiskanih črk.
2. Besedilo članka naj ne presega 8.000 besed, vključno z izvlečkom, literaturo in ključnimi besedami.
3. Naslov članka naj ne presega 15 besed in naj bo v slovenskem in angleškem jeziku.
4. Članek naj ima na začetku izvleček (sinopsis) v slovenskem jeziku ter njegov prevod v angleškem jeziku (oziroma obratno) in naj ne presega 100 besed. Za izvlečkom naj bo 5 ključnih besed. Pred navedbo literature naj bo povzetek (500-700 besed) v angleščini, če je članek napisan v slovenščini.
5. V članku ne uporabljajte ne sprotnih ne končnih opomb.
6. Vire navajajte v skladu s standardom APA (American Psychological Association) standardom. V literaturo vključite samo v tekočem besedilu navedene vire, ki jih uredite po abecednem vrstnem redu.
7. V posebnem dokumentu pošljite naslednje podatke: ime in priimek avtorja, akademski naziv, organizacijo, kjer je avtor zaposlen, elektronski naslov, naslov bivališča in naslov prispevka.

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Knjige: priimek, začetnica imena avtorja, leto izida, naslov, kraj, založba.
Duh, M. (2004). *Vrednotenje kot didaktični problem pri likovni vzgoji.* Maribor*:* Pedagoška fakulteta.

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Planinšec, J. (2002). Športna vzgoja in medpredmetne povezave v osnovni šoli. *Šport*, *50* (1), 11–15.

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Fošnarič, S. (2002). Obremenitve šolskega delovnega okolja in otrokova uspešnost. V M. Juričič (ur.), *Šolska higiena: zbornik prispevkov* (str. 27–34). Ljubljana: Sekcija za šolsko in visokošolsko medicino SZD.

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