DOI: https://doi.org/10.26529/cepsj.1491

Perceptions of Didactic Strategies among Pupils and Teachers in Primary School

Monika Mithans*[1], Joca Zurc[2] and Milena Ivanuš Grmek[3]

The quality of educational work is inextricably linked to many factors at the system, school, teacher, and student levels. This research was carried out within the project 'Education of Teachers as a Factor of Providing High-quality Life-long Learning in the Learning Society/The Society of Fast Socio-economic Changes and Unsure Future', funded by the Slovenian Research Agency. This paper provides a basic overview of the characteristics of open instruction, an umbrella term that combines active and learner-centred didactic strategies. The empirical section focuses on the use of didactic strategies. The survey was carried out with 1,536 primary school[4] pupils in Grades 7 and 9 and 263 of their teachers. Both pupils and teachers cited problem-based learning and research-based learning as the most commonly used didactic strategies, while project-based learning was the least frequently used. Despite the agreement on the most and least frequently used didactic strategies, there are statistically significant differences between pupils' and teachers' perceptions of all selected didactic strategies. Teachers reported that they used these strategies more often than was perceived by their pupils. We also found a statistically significant impact of better learning performance on the perception of certain didactic strategies. The results of the study raise new research questions, especially in the design of more detailed analyses of the use of didactic strategies in pedagogical practice.

Keywords: academic performance, didactic strategies, primary school, pupil activity

1 *Corresponding Author. Faculty of Education, University of Maribor, Slovenia; monika.mithans1@um.si.
2 Department of Education, Faculty of Arts, University of Maribor, Slovenia.
3 Faculty of Education, University of Maribor, Slovenia.
4 Slovenian basic education lasts nine years. Students enter primary school at the age of 6 and complete it at the age of 15.

Zaznavanje strategij pouka med učenci in učitelji v osnovni šoli

Monika Mithans, Joca Zurc in Milena Ivanuš Grmek

Kakovost vzgojno-izobraževalnega dela je neločljivo povezana s številnimi dejavniki na ravni sistema, šole, učiteljev in učencev. Raziskava, katere del predstavljamo v tem prispevku, je potekala v okviru projekta Izobraževanje učiteljev kot dejavnik zagotavljanja kakovostnega vseživljenjskega učenja v učeči se družbi/v družbi hitrih družbeno-gospodarskih sprememb in negotove prihodnosti, ki ga je financirala Javna agencija za raziskovalno dejavnost Republike Slovenije (ARRS). Prispevek ponuja grob pregled značilnosti odprtega pouka, ki kot nadpomenka združuje aktivne in v učence usmerjene strategije pouka. V empiričnem delu smo pozornost usmerili v preučevanje pogleda učencev in učiteljev na uporabo strategij pouka v pedagoški praksi. V raziskavi je sodelovalo 1.536 učencev 7. in 9. razreda osnovne šole in 263 njihovih učiteljev. Ugotovili smo, da učenci in učitelji kot najpogosteje uporabljeni strategiji pouka navajajo problemski in raziskovalni pouk, najredkeje pa se po mnenju obojih pojavlja projektni pouk. Kljub enotnosti o najpogosteje in najredkeje uporabljenih strategijah pouka med učenci in učitelji prihaja do statistično značilnih razlik v zaznavanju vseh strategij pouka. Učitelji namreč navajajo, da omenjene strategije uporabljajo pogosteje, kot to zaznavajo njihovi učenci. Ugotovili smo tudi statistično značilen vpliv boljšega učnega uspeha na zaznavanje nekaterih strategij pouka. Izsledki naše raziskave odpirajo nova raziskovalna vprašanja, predvsem pri načrtovanju podrobnejših analiz uporabe strategij pouka v pedagoški praksi.

Ključne besede: učni uspeh, strategije pouka, osnovna šola, aktivnost učencev

Introduction

Education and knowledge are indispensable assets and prerequisites for successful social and economic development. This is why there is increasing demand for more effective learning and teaching processes (Pelc, 2008).

Experts agree that pupils should be active participants in the educational process (Alvia & Gillies, 2020; Mithans, 2017; Mithans et al., 2017) in subjects with the possibility for active participation (Blažič et al., 2003; Mithans & Ivanuš Grmek, 2012).

Consequently, the role of the teacher, who was once the sole source and transmitter of knowledge (Holt-Reynolds, 2000), must also change (Kalin et al., 2017; Tahirsylaj et al., 2021). In a knowledge society, it is the teacher's effectiveness that is key to the effectiveness of the entire education system (Yar Yildirim, 2021). Therefore, teachers need to strive continuously to improve their educational work (Šorgo & Heric, 2020), to educate themselves throughout their careers, and to upgrade their knowledge (Torres-Cladera et al., 2021). The teacher is no longer merely a transmitter of knowledge. Increasingly, the role of the teacher is that of facilitator, animator and organiser of a stimulating learning environment, mentor, and promoter of independent learning (Cencič et al., 2008). Research shows that learning results are mainly determined by the quality of teaching (Hattie, 2008; Rowe, 2003; Timperley & Alton-Lee, 2008). It is, therefore, important that the teacher motivates and empowers pupils to learn independently and chooses didactic strategies that put them in the role of active agents (Kalin et al., 2017). The ability to use a variety of didactic strategies is thus one of the most important characteristics of an effective teacher (AgwuUdu, 2019).

The main purpose of this study is to identify the factors that contribute to the quality of educational work in primary schools. In this article, we will answer the question of which didactic strategies are most used in the upper grades of Slovenian primary schools and how the perception of them is influenced by academic performance.

Didactic Strategies

A strategy is 'a deliberate, planned process for achieving a set goal that guides one's overall behaviour' (Valenčič Zuljan & Kalin, 2020, p. 117). Similarly, didactic strategies concretise teachers' and pupils' learning activities towards achieving educational goals (Valenčič Zuljan & Kalin, 2020) and represent teachers' planned selection of teaching methods and forms (Strmčnik, 2001).

According to Valenčič Zuljan and Kalin (2020), the didactic strategy includes both traditional teaching (direct instruction) and different types of open instruction (Blažič et al., 2003; Peschel, 2010).

In our study, we rely on the definition developed by Blažič et al. (2003), which sees open instruction as a superset of, characterised by teachers not sticking rigidly to learning objectives, content, and methods but adapting them to the interests and abilities of their pupils. Modern didactic strategies focus on the life of the local community and on pupils' anticipation and participation in learning.

In the view of Blažič et al. (2003), these principles and other characteristics of open instruction are most clearly reflected in didactic strategies such as experiential learning, research-based learning, project-based learning, problem-based learning, action-oriented learning, cross-curricular learning, among others. These didactic strategies require teachers to teach actively and pupils to learn actively (Blažič et al., 2003; Ivanuš Grmek et al., 2009) and to cooperate with each other. They put the learner at the centre, giving them greater autonomy to learn and offering self-paced and personalised learning. As a consequence, these didactic strategies positively impact the sustainability and usability of knowledge and on, the development of creativity and critical thinking and contribute to the development of lifelong learning competences (Alvia & Gillies, 2020; Cencič et al., 2008; Filippatou & Kaldi, 2010; McPherson-Geyser et al., 2020). Their main goal is to enable the learner to play an active role in shaping his or her own learning (Cencič et al., 2008).

These didactic strategies share a tendency to link learning to pupils' prior knowledge and experiences, as well as to the learners' present. Pupils are given the opportunity to participate according to their abilities, which also helps to reinforce the principles of inclusive education (Alvia & Gillies, 2020; Filippatou & Kaldi, 2010).

Through didactic strategies, pupils learn new content in an active way by justifying their ideas, giving reasons for the correctness of the solutions given, and contributing to higher-quality learning outcomes through independent inquiry and reflection (Ivanuš Grmek et al., 2009).

By incorporating pupils' preferences and needs, these didactic strategies make a decisive contribution to increasing learning motivation and, consequently, learning performance (Ing et al., 2015). Other researchers have also shown a positive correlation between pupil activity and pupil performance (Fredricks et al., 2004). Keeping pupils highly engaged and active during lessons is one of the most important and challenging tasks for a teacher (Kozina & Vršnik Perše, 2015); this skill is still not sufficiently implemented in pedagogical

practice (Crook & Cox, 2022; Deslauriers et al., 2019; Mithans, 2017; Mithans et al., 2017; Mithans & Ivanuš Grmek, 2019).

The positive effects of open instruction on learning performance, self-regulation skills, critical thinking development, participants' attitudes, and similar factors are evidenced by the results of numerous studies (Alvia & Gillies, 2020; Cotič et al., 2020; Darhim et al., 2020; Fernandes, 2021; Ferrero et al., 2021; Harris & Bilton, 2019; Kaldi et al., 2009; Lazić et al., 2021; Sutrisna & Artini, 2020). However, for reasons of time efficiency and control over classroom work, traditional frontal teaching remains the dominant pedagogical practice (Plešec Gasparič, 2019); it is effective for achieving basic knowledge but less effective for learning more complex and creative content (Valenčič Zuljan & Kalin, 2020).

In the face of the constant changes and challenges of the present for the wider community, learner-centred teaching, made possible by open instruction, must find its way into pedagogical practice: to achieve all the goals of the educational process, it is necessary to combine different didactic strategies at all levels of education and to choose them according to the individual characteristics of the pupils.

The didactic competence of teachers and their willingness to improve continuously in this area is essential for the successful implementation and combination of didactic strategies that will truly enable the acquisition of in-depth knowledge and foster criticality and creativity. According to Revelle (2019), teachers play a central role in introducing new or different didactic strategies.

Research Problem and Aims

The results of our previous research indicate that student participation remains a challenge (Mithans et al., 2017) and that student participation also largely depends on open instruction (Mithans & Ivanuš Grmek, 2019).

Based on the benefits of open instruction, we were interested in which didactic strategies are most commonly used in the upper grades of Slovenian primary schools. We focused on pupils' perceptions of didactic strategies and on teachers' self-assessment of their use of particular didactic strategies. We were also interested in the role of the pupil's school performance in the perception of these strategies. The two initial hypotheses were as follows:

H1: There are statistically significant differences between primary school pupils' and teachers' perceived frequency of use of didactic strategies.

H2: School performance is a statistically significant indicator of differences in the perceived frequency of use of didactic strategies in pupils.

Method

The research is based on a survey methodology, using a questionnaire for pupils in Grades 7 and 9 in Slovenian primary schools and their teachers.

Sample of respondents

The survey was carried out with 1,536 primary school pupils in Grades 7 and 9 and 263 of their teachers. A random stratified representative sample was selected, including all 12 Slovenian statistical regions, with a random selection of 5 per cent of all primary schools in the Republic of Slovenia as the criterion. The demographic characteristics of the pupils and their teachers are shown in Tables 1 and 2.

Table 1

Demographic characteristics of the sample of pupils

Characteristic		n	f %	M (SD)	Min.–Max.
Gender	Girl	792	51.7	/	/
	Boy	739	48.3		
Age (years)	12	379	24.8	13.46 (1.10)	12–15
	13	416	27.2		
	14	381	25.0		
	15	351	23.0		
Grade	7	820	53.4	/	/
	9	716	46.6		

Note. M = mean; SD = standard deviation; / = could not be calculated given the nature of the test variables.

Nearly equal proportions of female pupils (51.7%) and male pupils (48.3%) participated in the survey. The average age of the respondents was 13.46 years. There was a slightly higher proportion of pupils aged 13 (27.2%) and 14 (25%) and a slightly lower, but evenly distributed, proportion of pupils aged 12 and 15. By grade, the respondents came from Grades 7 and 9 of primary school, with a slightly higher proportion of Grade 7 pupils (53.4%) (Table 1).

Table 2
Demographic characteristics of the sample of teachers

Characteristic		n*	f %	M (SD)	Min.–Max.
Gender	Women	214	81.7	/	/
	Men	48	18.3		
Age (years)	25–35	44	16.7	45.92 (9.92)	25-66
	36–45	92	35.1		
	46–55	67	25.6		
	56 and over	59	22.5		
Professional title	Without promotion	50	19.2	/	/
	Mentor	83	31.8		
	Advisor	101	38.7		
	Counsellor	27	10.3		
Formal education	Teacher education	246	94.3	/	/
	Non-teaching degree with PAI	15	5.7		
Subject area	Foreign languages	41	15.6	/	/
	Slovenian	30	11.4		
	Mathematics	25	9.5		
	Sport	30	11.4		
	Arts courses	21	8.0		
	Study orientations	116	44.1		

Note. M = mean; SD = standard deviation; / = could not be calculated given the nature of the test variables.
* There is a discrepancy in the demographic characteristics of the sample, with some teachers not answering all demographic questions.

Table 2 shows that 81.7 per cent of the teachers participating in the survey were female and 18.3 per cent were male. The average age of the respondents was 45.9 years, with a standard deviation of 10 years, which means that most of the teachers surveyed were aged between 36 and 56 years. This is confirmed by the frequency distribution of age groups, which places 60.7 per cent of the teachers surveyed in the 36–55 age group. The oldest teacher in the study was 66 years and the youngest 25 years. Most of the participants had already achieved the title of Advisor (38.7%) or Mentor (31.8%). The majority of the teachers (94.3%) had completed teacher-training degree programmes, while 5.7 per cent of the teachers surveyed had obtained their teaching qualifications through the Pedagogical-Adult Education (PAI) programme.

Measuring Instrument

A closed-ended questionnaire was used to collect the data. There were two versions of the questionnaire: one to be completed by the pupils and one by their teachers. Both questionnaires included demographic questions such as gender and age in the introductory part.

For pupils, the demographic section was complemented by questions on the school grade and final grades in Slovenian, mathematics and the first foreign language. Based on the final grades collected, a new variable, 'academic performance', was created for further analysis, representing the overall average score of the final grades in the three subjects. The demographic section of the teacher questionnaire also included questions on the professional title, type of formal education received, and subject(s) taught.

The demographic questions were followed by 14 variables defining didactic strategies. The set of these variables was identical on both versions of the questionnaire, with a slight difference in the format to address each group of respondents adequately. Pupils and teachers rated the frequency of use of the selected didactic strategies on a three-point scale (3 = frequently, 2 = rarely, 1= never). The measurement instrument was tested in a case study in the north-eastern part of the Republic of Slovenia.

Table 3 shows the results of the calculated Cronbach alpha coefficients, which were used to assess the reliability of the questionnaires by scale. For all three rating scales studied, we found adequate reliability of the data collected, as Cronbach's alpha coefficient showed values ranging from 0.78 to 0.84, thus confirming adequate reliability of the questionnaire for both pupils and teachers.

Table 3

Assessing the reliability of the questionnaire on pupils' perceptions of didactic strategies and school performance and the questionnaire on teachers' self-assessment of their use of didactic strategies

Rating scale		Number of variables (n)	Cronbach's alpha
Pupils	Didactic strategies	14	0.797
	Academic performance	3	0.835
Teachers	Didactic strategies	14	0.780

Data Collection Process and Ethical Considerations

Data collection took place from May to June 2019, using a face-to-face approach (paper-pencil) in the primary schools included in the survey. The data collection was carried out with the help of school coordinators, who

helped us to carry out the survey. The coordinators worked with the teachers, collected the questionnaires, and helped with the organisational arrangements for the survey.

All data collection was carried out in accordance with the fundamental approaches of research ethics, such as anonymity, voluntary participation, and the possibility to withdraw from the research at any time without consequences for the participant. For all pupils surveyed, parents or legal guardians gave written consent to participate in the survey before data collection began.

Data Analysis Methods

All analyses were carried out using SPSS statistical software, version 26.0. Firstly, measures of descriptive statistics were calculated for all variables. Depending on the type of variable, we calculated frequencies and percentages (nominal and ordinal variables), as well as calculated measures of the front values and the dispersion of the data (means, standard deviations, minimum and maximum, skewness and kurtosis). Further analyses were performed to check whether the conditions for inferential statistics were met, such as Cronbach's alpha coefficients to determine the reliability of the data, the Kolmogorov-Smirnov test for normality of distribution, Pearson's correlation coefficient, and a scatter plot to determine the linear dependence between variables.

In the next step, the variables assessing the didactic strategies were grouped into categories using qualitative categorical analysis. The 14 statements assessed were grouped into the following five didactic strategies: experiential learning (n=4), problem-based learning (n=3), research-based learning (n=3), cross-curricular learning (n=2) and project-based learning (n=2).

To test the hypotheses, we used linear regression and t-tests for dependent samples. Differences at $p \leq 0.05$ were considered statistically significant. The interpretation of the results also took into account the effect sizes of the statistical tests (Cohen's d, beta).

Results

Pupils' and Teachers' Perceptions of Didactic Strategies

Table 4

Comparison between pupils' and teachers' perceptions of didactic strategies

Didactic strategy	Pupils	Teachers	t (p)	Cohen's d
	M (SD)*	M (SD)*		
Problem-based learning	2.28 (0.47)	2.67 (0.37)	**-15.090 (<0.001)**	0.458
Research-based learning	2.21 (0.37)	2.55 (0.29)	**-16.368 (<0.001)**	0.362
Experiential learning	1.97 (0.42)	2.48 (0.46)	**-16.821 (<0.001)**	0.430
Cross-curricular learning	1.92 (0.51)	2.41 (0.39)	**-17.457 (<0.001)**	0.494
Project-based learning	1.65 (0.50)	1.93 (0.60)	**-7.239 (<0.001)**	0.518

Note: * rating scale: 1 = never, 2 = rarely, 3 = frequently; M = mean; SD = standard deviation; Cohen's d = effect size of t-test

The results in Table 4 show that pupils in Grades 7 and 9 of primary school perceived problem-based learning (M=2.28, SD=0.47) and research-based learning (M=2.21, SD=0.37) as the most frequently used didactic strategies. Teachers also said these were the two most commonly used didactic strategies.

Despite the finding that problem-based and research-based learning are the didactic strategies most perceived by both pupils and teachers, they are still perceived by pupils to be rare, while teachers judge that they are often included in their teaching. According to pupils, teachers also rarely used experiential learning (M=1.97, SD=0.42) or cross-curricular learning (M=1.92, SD=0.51), while teachers were fairly unanimous in their opinion that they include experiential (M=2.48, SD=0.46) and cross-curricular learning (M=2.41, SD=0.39) more often in their teaching.

Project-based learning was perceived by children to be the least represented strategy (M=1.65, SD=0.50), occurring rarely or never. Teachers also perceived project-based learning as the least represented strategy (M=1.93, SD=0.60), occurring rarely or never.

Teachers ranked the presence of all five assessed didactic strategies statistically significantly higher than pupils ($p < 0.001$). Cohen's d effect size, with values ranging from 0.36 to 0.52, indicates a medium-strong effect size for statistically significant differences between pupils' and teachers' opinions. The most marked difference was found in the least represented didactic strategy, namely project-based learning (0.52).

The pupils surveyed were quite unanimous in their opinions (SD≤0.51) when evaluating all strategies. The greatest unanimity was found in their assessment of the incidence of research-based learning (84.7% perceived that it was rarely present). Pupils' opinions were slightly more divided when it came to rating the incidence of cross-curricular teaching, which may reflect different perceptions of this didactic strategy among pupils.

Similarly, the teachers surveyed showed the highest level of agreement (SD=0.29) in their assessment of the use of research-based learning (72.7% of them used it frequently). The teachers' opinions were most divided when it came to project-based learning (SD=0.60), which was used frequently by 27.1% of respondents and never by 14.1%.

Table 5

The incidence of the didactic strategies that pupils think their teachers use

Didactic strategy	Statement	M (SD)	Min.–Max.
Problem-based learning	Teachers prepare assignments and encourage us to find sources and solutions independently.	2.44 (0.63)	1–3
	Teachers present us with a problem (a question) and let us find our own solutions.	2.22 (0.67)	1–3
	Teachers encourage us to detect problems (open questions) as they teach.	2.19 (0.67)	1–3
Research-based learning	Teachers encourage us to formulate research questions and find answers to them.	2.55 (0.59)	1–3
	Teachers guide us to come to our own conclusions through research.	2.41 (0.61)	1–3
	Teachers encourage us to express our own ideas and thoughts about solutions to the research problem.	2.27 (0.65)	1–3
	We also do research outside the classroom (in the library, in the laboratory, in nature, etc.).	1.62 (0.57)	1–3
Experiential learning	Teachers include observation of paintings, art techniques, films, etc.	2.28 (0.64)	1–5
	Teachers also integrate our experience of the content into their lessons.	2.08 (0.67)	1–3
	We play different roles in the classroom.	1.54 (0.60)	1–3
Cross-curricular learning	Teachers integrate the content of different subjects in their lessons.	2.22 (0.66)	2–3
	The lessons are taught simultaneously by teachers of different subjects, each presenting their own aspect.	1.63 (0.74)	1–3
Project-based learning	Teachers involve us in projects.	1.76 (0.72)	1–3
	With the help of teachers, we work on project assignments.	1.53 (0.58)	1–3

Three features of inquiry- and problem-based learning that encourage independent learning, research and problem-solving were rated by pupils as frequently occurring: 'Teachers encourage us to formulate research questions and find answers to them' (M=2.55); 'Teachers prepare assignments and encourage us to find sources and solutions independently' (M=2.44); and 'Teachers guide us to come to our own conclusions through research' (M=2.41).

Table 6

Teachers' self-assessment of didactic strategies

Didactic strategy	Statement	M (SD)	Min.–Max.
Problem-based learning	I encourage pupils to perceive problems by presenting the learning content.	2.79 (0.43)	1–3
	I present the problem and let the pupils find their own solutions.	2.70 (0.47)	1–3
	I prepare assignments and encourage pupils to find sources and solutions independently.	2.52 (0.55)	1–3
Research-based learning	I encourage pupils to express their own ideas and thoughts about possible solutions to the research problem.	2.89 (0.34)	1–3
	I guide pupils to come to their own conclusions through research.	2.76 (0.44)	1–3
	I prepare materials and encourage pupils to formulate their own research questions and find their own answers.	2.54 (0.52)	1–3
	We also do research outside the classroom (in the library, in the laboratory, in nature, etc.).	2.01 (0.63)	1–3
Experiential learning	I integrate the pupils' experiences into my lessons.	2.82 (0.41)	1–3
	I include observation of paintings, art techniques, films, etc., in my teaching.	2.41 (0.70)	1–3
	I organise the lessons in such a way that the pupils play different roles.	2.22 (0.71)	1–3
Cross-curricular learning	In my teaching, I integrate the content of different subjects.	2.85 (0.35)	2–3
	Teachers from different subjects come together to present their points of view.	1.97 (0.62)	1–3
Project-based learning	We work with pupils on project assignments.	1.96 (0.71)	1–3
	I involve pupils in projects.	1.90 (0.72)	1–3

Among the individual statements in Table 6, teachers gave the highest rating to the statement, 'I encourage pupils to express their own ideas and thoughts about possible solutions to the research problem' (M=2.89, SD=0.34). This statement falls under research-based learning. Teachers also rated very

highly (M≥0.8) didactic strategies that integrate cross-curricular integration (team integration), pupil experiences (experiential learning), and encouraging pupils to identify problems (problem-based learning).

Academic Performance as a Determinant of Pupils' Perceptions of Didactic Strategies

In this section, we present the results in relation to the second hypothesis, which tested how average academic performance predicts pupils' perceptions of didactic strategies. Table 7 shows the average final grades of the surveyed pupils in the three core subjects of primary education, namely Slovenian language, mathematics and (first) foreign language, as well as the overall average grade for all three. Primary school pupils achieved the highest average score in a foreign language (3.82), followed by Slovenian (3.60) and mathematics (3.54). The overall mean score was 3.66 (SD=0.91).

Table 7

Academic performance of pupils surveyed

Subject area	Total	Grade 7	Grade 9
	M (SD)	M (SD)	M (SD)
Slovenian*	3.60 (1.00)	3.66 (1.00)	3.52 (1.00)
Mathematics	3.54 (1.10)	3.57 (1.10)	3.51 (1.09)
(First) foreign language	3.82 (1.07)	3.86 (1.08)	3.78 (1.05)
Average academic performance	3.66 (0.91)	3.70 (0.92)	3.60 (0.91)

Note. M = mean; SD = standard deviation; p = statistical significance of the test; * final grade in the previous school year: 1 = unsatisfactory, 2 = satisfactory, 3 = good, 4 = very good, 5 = excellent; the average academic performance is the combined average of the final grades in Slovenian, mathematics and (first) foreign language.

Linear regression was used to investigate the relationship between pupils' perceptions of didactic strategies and their academic performance. Linear regression is particularly suited to identifying influences and relationships between two variables and predicting the outcome of the dependent variable based on changes in the value of the independent variable. Before the calculation, we checked that the variables we wanted to include in the regression analysis (i.e., the final grades in Slovenian, mathematics and foreign language, and the grades of all the included didactic strategies) met the conditions. The distribution normality of the variables was checked using the skewness and kurtosis coefficients and the Kolmogorov-Smirnov test. Linear correlation between dependent variables was established using Pearson's correlation coefficient and

a scatter plot. The variables included were shown to meet the conditions for inclusion in the linear regression.

Table 8

Linear regression of the effect of pupils' academic performance on their perceptions of the incidence of didactic strategies

Didactic strategy (dependent)	Academic performance (independent)	B	Beta	R^2	F (p)
Problem-based learning	Average academic performance	0.048	**0.093***	0.009	**12.914 (0.001)**
Research-based learning	Average academic performance	0.051	**0.125***	0.016	**23.645 (<0.001)**
Experiential learning	Average academic performance	0.023	0.049	0.002	3.568 (0.059)
Cross-curricular learning	Average academic performance	-0.051	**-0.091***	0.008	**12.221 (<0.001)**
Project-based learning	Average academic performance	0.014	0.025	0.001	0.923 (0.337)

Note. B = unstandardised coefficient; Beta = standardised coefficient; R^2 = proportion of explained variance of the model; F (p) = statistical significance of the model: one-factor analysis of variance (ANOVA); * statistical significance of partial correlation $p \leq 0.001$; Average academic performance = calculated average grade from the final grade in Slovenian, mathematics and the first foreign language.

The linear regression showed that pupils' performance in primary school, calculated based on the average of their final grades in the three core subjects (Slovenian, mathematics, and foreign language), is a statistically significant predictor of their perception of three didactic strategies, namely experiential learning ($p < 0.001$), cross-curricular learning ($p < 0.001$) and problem-based learning ($p = 0.001$) (Table 8). For all three didactic strategies, we also found statistically significant partial correlations, indicating a weak correlation between pupils' perceptions of the didactic strategies and their academic performance. Higher-achieving pupils perceive a statistically significant increase in the presence of experiential ($\beta = 0.125$) and problem-based ($\beta = 0.093$) learning and a decrease in the presence of cross-curricular learning ($\beta = -0.091$). Among the statistically significant correlations obtained, the strongest was the correlation between learning performance and perception of research-based learning, which shows that a one-point increase in academic performance leads

to a 0.05-point increase in perception of research-based learning. Similar predictive power applies to cross-curricular and problem-based learning. Pupils' academic performance in primary school did not emerge as an influential factor in perceptions of project-based and experiential learning.

Discussion

In our research, we found that teachers and pupils perceived problem-based and exploratory instruction, which are very similar, as the most used didactic strategies (Blažič et al., 2003). Jančič Hegediš and Hus (2019) also found in their study that teachers of Grades 4 and 5 most often incorporate problem-based and research-based learning into their teaching practice.

The presence of these strategies in pedagogical practice is gratifying, as they have a positive impact on the development of critical thinking and lifelong learning (Darhim et al., 2020; Ivanuš Grmek et al., 2009) and thus contribute to the performance of the important goal of education: to teach pupils to think and to become lifelong learners. In addition, independent problem-solving stimulates pupils' thought processes, increases the possibility of internalising knowledge, and thus contributes to better academic performance (Kozina & Vršnik Perše, 2015).

However, it should be noted that approaches that promote problem-solving are not universally effective. The use of certain didactic approaches alone does not necessarily have a positive impact on the quality of learning, as also explained by cognitive load theory. In the early stages of knowledge acquisition, didactic approaches based on self-discovery can be ineffective because they overload the pupil's working memory. In this case, guided approaches are more effective. It is important, too, to be aware that approaches that are effective for less proficient learners are not necessarily effective for more proficient learners (Hattie & Yates, 2014). Therefore, to realise all these benefits, it is essential to consider pupils' capacities (Blažič et al., 2003; Košir et al., 2020). In order to implement these strategies well, the teacher must have good knowledge of and respect for the backgrounds and abilities of the pupils, as well as the didactical competence to implement the strategies.

It should be noted that pupils rarely perceive the integration of these strategies in the classroom. Project-based learning was perceived by both teachers and pupils to be the least frequently used didactic strategy and was identified by Jančič Hegediš and Hus (2019) as the strategy that occurs least frequently in pedagogical practice. Project-based learning is characterised by pupils learning about an interdisciplinary topic, which is why it occurs mainly

outside the regular classroom (Blažič et al., 2003; Ivanuš Grmek & Hus, 2006). In our opinion, this is why it is less widespread in pedagogical practice, as it requires networking with external experts, more detailed planning, and more time. Nevertheless, it is worth considering the possibilities of integrating project-based learning into teaching practice, as research has shown that it has a positive impact on pupils' motivation, autonomy, metacognitive skills, academic performance, and other important attributes (Gerhana et al., 2017; Lazić et al., 2021).

The less frequent integration of these didactic strategies into teaching practice is mainly attributed by teachers at all levels of education to a lack of time, too many classes, and poor matching of curricular content with the strategies (Jahan et al., 2016; Jančič Hegediš & Hus, 2019), and a high level of comfort with traditional approaches to teaching (Jahan et al., 2016). Teachers cite reasons related to their competence to implement different didactic strategies less frequently, which Jančič Hegediš and Hus (2019) link to the fact that it is easier to find reasons for not implementing active didactic strategies in one's own pedagogical practice in external factors rather than in one's own competence. This is why we believe that future teachers and practitioners need to strengthen and develop self-reflection skills that allow them to provide quality feedback and improve their performance as a result.

As pupils have few opportunities to acquire knowledge through active didactic strategies at the primary level of education, it is understandable that even at higher levels of education, they lack the necessary knowledge to participate actively in different didactic strategies and are consequently unwilling to do so, as confirmed by the results of the research conducted by Jahn et al. (2016).

The results of our study confirm the hypothesis that there are differences in teachers' and pupils' perceptions of didactic strategies. Statistically significant differences emerged for all didactic strategies, with teachers rating the integration of different strategies into their teaching practice higher than their pupils. As the responsibility for the quality of the educational process lies with the teachers, it was expected that they would give socially desirable answers. It could also be due to pupils being critical of the teacher's activities or, conversely, to the teacher not being critical of his or her own actions, but the repeated results, which generally show differences between teachers and pupils in this direction, suggest that pupils do not adequately perceive teachers' efforts. This has been pointed out in previous studies (Ivanuš Grmek et al., 2007; Javornik et al., 2008). This discrepancy is worrying, as it raises doubts about the adequacy of communication between teachers and pupils. This is why the identified pupil-teacher gap needs further research attention in the future.

An analysis of the relationship between perceptions of didactic strategies and pupils' learning performance in primary school showed a statistically significant relationship between academic performance and perceptions of experiential learning, cross-curricular and problem-based learning. Pupils with higher scores were more likely to report the presence of research- and problem-based learning. In contrast, higher-performing pupils perceived less cross-curricular teaching. These findings raise new questions and the need for further research. The reciprocal relationship between academic performance and teaching methods also deserves further attention. This raises new questions about strategies, forms, and methods of work in primary school practice and provides opportunities for future in-depth quantitative and qualitative empirical research.

Conclusion, Limitations and Further Research

International research shows the positive impact of active learning on pupil performance (Kozina & Vršnik Perše, 2015). It should be noted at this point that the use of certain didactic strategies alone does not necessarily contribute to better quality learning (Košir et al., 2020).

In this context, our research findings that open instruction is still not sufficiently embedded in pedagogical practice from the learners' perspective and that perceptions of strategies' use vary between learners and teachers warrant further research attention to explore the factors that influence the effective use of these strategies in teaching practice and to address the different judgements made by teachers and learners.

However, when interpreting the findings, it is important to bear in mind some of the limitations of the study. First, the limited set of five didactic strategies (problem-based learning, research-based learning, experiential learning, cross-curricular learning, and project-based learning) was analysed in this study. However, in the pedagogical practice of primary school education, it is also possible to predict other didactic strategies and approaches which may not have been recognised within the five studied didactical approaches in this study. Therefore, further studies should extend this studied set of didactic strategies to identify which approaches are used in primary school teaching practice.

Second, this study's findings are based on a monomethod research approach, which was based on quantitative interviews with pupils and teachers. A mixed methods research approach, which combines qualitative and quantitative research methods (Creswell, 2014), could provide a more in-depth and comprehensive insight into the issues at hand and increase the validity and

reliability of the results obtained. This limitation does not detract from the credibility of the findings but rather suggests the need for further research and development monitoring of teaching practice in the research field, including qualitative approaches to research such as interviews and focus groups, and, above all, a complementary approach between the two methodologies.

The findings of our research and in-depth reflection on the reasons behind these findings can serve as a basis for teacher training and reflection on what today's teachers need to be able to implement didactic approaches in their teaching practice that will enable their pupils to acquire the highest quality and lasting knowledge. We can conclude from the above that knowledge and use of different didactic strategies alone is not enough to improve the learning process, as a quality learning process requires the broader concept of educational work to be taken into account with a heterogeneous group of learners.

References

AgwuUdo, D. (2019). Comparative effects of individualized and cooperative learning instructional strategies on senior secondary school pupils' academic performance in organic chemistry. *Electronic Journal of Science Education*, *22*(2), 1–14. https://files.eric.ed.gov/fulltext/EJ1188015.pdf

Alvia, E., & Gillies, R. M. (2020). Promoting self-regulated learning through experiential learning in the early years of school: A qualitative case study. *European Journal of Teacher Education*, *44*(2), 135–157. https://www.tandfonline.com/doi/full/10.1080/02619768.2020.1728739

Blažič, M., Ivanuš Grmek, M., Kramar, M., & Strmčnik, F. (2003). *Didaktika: Visokošolski učbenik* [Didactics: Higher education textbooks]. Visokošolsko središče, Inštitut za raziskovalno in razvojno delo.

Cencič, M., Cotič, M., & Medved Udovič, V. (2008). Pouk v družbi znanja [Education in knowledge society]. In V. Medved Udovič, M. Cotič, & M. Cencič (Eds.), *Sodobne strategije učenja in poučevanja* [Modern learning and teaching strategies] (pp. 8–15). Univerza na Primorskem, Pedagoška fakulteta.

Cotič, N., Plazar, J., Istenič Starčič, A., & Zuljan, D. (2020). The effect of outdoor lessons in natural sciences on pupils' knowledge, through tablets and experiential learning. *Journal of Baltic Science Education*, *19*(5), 747–763. http://oaji.net/articles/2020/987-1602524649.pdf

Creswell, J. W. (2014). *Research design: Qualitative, quantitative and mixed methods approaches* (4th ed.). Sage Publications.

Crook, D. J., & Cox, P. (2022). A case for complexity-informed participatory action research with young people. *Education, Citizenship and Social Justice, 17*(2), 188–202. https://doi.org/10.1177/174619792199515

Darhim, D., Prabawanto, S., & Susilo, B. E. (2020). The effect of problem-based learning and mathematical problem posing in improving pupil's critical thinking skills. *International Journal of Instruction*, *13*(4), 103–116. https://www.e-iji.net/dosyalar/iji_2020_4_7.pdf

Deslauriersa, L., McCartya, L. S., Miller, K., Callaghana, K. & Kestin, G. (2019). Measuring actual learning versus feeling of learning in response to being actively engaged in the classroom. *PNAS, 116*(39), 19251–19257. https://doi.org/10.1073/pnas.1821936116

Fernandes, H. V. J. (2021). From pupil to tutor: A journey in problem-based learning. *Currents in Pharmacy Teaching and Learning*, *13*(12), 1706–1709. https://doi.org/10.1016/j.cptl.2021.09.037

Ferrero, M., Vadillo, M. A., & Leo´n, S. P. (2021). Is project-based learning effective among kindergarten and elementary pupils? A systematic review. *PLoS ONE*, *16*(4), 1–14. https://doi.org/10.1371/journal.pone.0249627

Filippatou, D., & Kaldi, S. (2010). The effectiveness of project-based learning on pupils with learning difficulties regarding academic performance, group work and motivation. *International Journal of Special Education*, *25*(1), 17–26. https://files.eric.ed.gov/fulltext/EJ890562.pdf

Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement. Potential of the concept, state of evidence. *Review of Educational Research*, *74*(1), 59–109. https://doi.org/10.3102/00346543074001059

Gerhana, M. T. C., Mardiyana, M., & Pramudya, I. (2017). The effectiveness of project-based learning in trigonometry. *Journal of Physics: Conference Series*, *895*(2017), 1–6. https://iopscience.iop.org/article/10.1088/1742-6596/895/1/012027

Harris, R., & Bilton, H. (2019). Learning about the past: Exploring the opportunities and challenges of using an outdoor learning approach. *Cambridge Journal of Education*, *49*(1), 69–91. https://doi.org/10.1080/0305764X.2018.1442416

Hattie, J. (2008). *Visible learning: A synthesis of over 800 meta-analyses relating to performance*. Taylor & Francis.

Hattie, J., & Yates, G. (2014). *Visible learning and the science of how we learn.* Routledge.

Holt-Reynolds, D. (2000). What does the teacher do? Constructivist pedagogies and prospective teachers' beliefs about the role of a teacher. *Teaching and Teacher Education*, *16*(1), 21–32. https://doi.org/10.1016/S0742-051X(99)00032-3

Ing, M., Webb, N. M., Franke, M. L., Turrou, A. C., Wong, J., Shin, N., & Fernandez, C. H. (2015). Pupil participation in elementary mathematics classrooms: The missing link between teacher practices and pupil performance? *Educational Studies in Mathematics*, *90*(3), 341–356.

Ivanuš Grmek, M., Čagran, B., & Sadek, L. (2009). *Eksperimentalna študija primera pri pouku spoznavanja okolja* [An experimental case study in environmental education]. Pedagoški inštitut.

Ivanuš Grmek, M., Javornik, M., Vršnik Perše, T., Rutar Leben, T., Kobal Grum, D., & Novak, B. (2007). *Gimnazija na razpotju* [Grammar school at the crossroads]. Pedagoški inštitut.

Ivanuš Grmek, M., & Hus, V. (2006). Odprti pouk pri predmetu spoznavanje okolja [Open instruction in environmental education]. *Sodobna pedagogika*, *57*(2), 68–83. http://www.dlib.si/stream/URN:NBN:SI:doc-ZYTIDKSW/0737a990-5119-482d-8cda-0da43eeaaa5f/PDF

Jahan, F., Siddiqui, M., AlKhouri, M., Ahuja, A., & Alward, M. (2016). Active teaching and learning strategies in medical education: Perception and barriers among faculty members at Oman Medical College, Sohar/Bowshar Sultanate of Oman. *Turkish Journal of Family Medicine & Primary Care*, *10*(1), 13–18. https://dergipark.org.tr/en/pub/tjfmpc/article/256211

Jančič Hegediš, P., & Hus, V. (2019). Representation of teaching strategies based on constructivism in social studies. *International Journal of Innovation and Learning*, *25*(1), 64–77. https://www.researchgate.net/publication/330048759_Representation_of_teaching_strategies_based_on_constructivism_in_social_studies

Javornik, M., Ivanuš Grmek, M., & Vršnik Perše, T. (2008). Didaktičnometodične značilnosti pouka v splošnih gimnazijah [Didactic-methodological features of teaching in general grammar schools]. *Pedagoška obzorja*, *23*(2), 62–77. http://www.dlib.si/listalnik/URN_NBN_SI_doc-Q86EZ7B4/63/index.html#zoom=z

Kaldi, S., Filippatou, D., & Govaris, C. (2009). Project-based learning in primary schools: Effects on pupils' learning and attitudes. *International Journal of Primary, Elementary and Early Years Education*, *39*(1), 35–47. https://doi.org/10.1080/03004270903179538

Kalin, J., Peklaj, C., Pečjak, S., Puklek Levpušček, M., & Valenčič Zuljan, M. (2017). Elementary and secondary school pupils' perceptions of teachers' classroom management competencies. *Center for Educational Policy Studies Journal*, *7*(4), 37–62.

Košir, K., Vršnik Perše, T., Ograjšek, S., & Ivanuš Grmek, M. (2020). Spodbujanje aktivnega študija, kot ga zaznavajo študenti [Promoting active learning as perceived by pupils]. *Andragoška spoznanja*, *26*(2), 33–46.

Kozina, A., & Vršnik Perše, T. (2015). Aktivnosti učencev in dijakov pri pouku v povezavi z njihovimi dosežki: Mednarodna primerjava [Pupil active engagement and academic performance: International comparisons]. In D. Hozjan (Ed.), *Aktivnost učencev v učnem procesu [Pupil active engagement in the learning process]* (pp. 29–44). Univerza na Primorskem, Pedagoška fakulteta. https://www.pef.upr.si/mma/Aktivnosti%20u%C4%8Dencev%20v%20u%C4%8Dnem%20procesu/20151001130447 17/

Lazić, B. D., Knežević, J. B., & Maričić, S. M. (2021). The influence of project-based learning on pupil performance in elementary mathematics education. *South African Journal of Education*, *41*(3), 1–10. http://dx.doi.org/10.15700/saje.v41n3a1909

McPherson-Geyser, G., de Villiers, R., & Kavai, P. (2020). The use of experiential learning as a teaching strategy in life sciences. *International Journal of Instruction*, *13*(3), 877–894. https://eric.ed.gov/?id=EJ1259307

Mithans, M. (2017). *Participacija učencev pri pouku in na šoli* [Pupil participation in the classroom and in the school]. Doctoral dissertation. Univerza v Mariboru, Pedagoška fakulteta. https://dk.um.si/IzpisGradiva.php?id=65569

Mithans, M., & Ivanuš Grmek, M. (2012). Spreminjanje položaja učenca v Sloveniji v 20. stoletju [Changes in pupils' situation in Slovenia in the twentieth century]. *Revija za elementarno izobraževanje*, *5*(2/3), 55–72.

Mithans, M., Ivanuš Grmek, M., & Čagran, B. (2017). Participation in decision-making in class: Opportunities and pupil attitudes in Austria and Slovenia. *Center for Educational Policy Studies Journal*, *7*(4), 165–183.

Mithans, M. & Ivanuš Grmek, M. (2019). Open Classes and Participation in Decision-Making in Class. *Croatian Journal of Education, 21*(Sp.Ed.No.1/2019), 167–180. https://doi.org/10.15516/cje.v21i0.3432

Pelc, S. (2008). Vpliv zahtev sodobne družbe na strategije učenja in poučevanja [The influence of modern society on learning and teaching strategies]. In V. Medved Udovič, M. Cotič, & M. Cencič (Eds.), *Sodobne strategije učenja in poučevanja* [Modern learning and teaching strategies] (pp. 3–7). Univerza na Primorskem, Pedagoška fakulteta.

Peschel, F. (2010). Freiraum statt Einschränkung: Offener Unterricht muss konsequenter umgesetzt werden. In T. Bohl, K. Kansteiner-Schänzlin, M. Kleinknecht, B. Kohler, & A. Nold (Eds.), *Selbstbestimmung und Classroom-Management. Empirische Befunde und Entwicklungsstrategien zum guten Unterricht* (pp. 93–114). Julius Klinkhardt Verlagsbuchhandlung.

Plešec Gasparič, R. (2019). Učne oblike v tradicionalnem učnem procesu in pri didaktični inovaciji obrnjeno učenje in poučevanje [Within-class pupil grouping in traditional instruction and in flipped learning and teaching innovation]. Doctoral dissertation. Univerza v Ljubljani, Pedagoška fakulteta. http://pefprints.pef.uni-lj.si/id/eprint/5781

Revelle, K. Z. (2019). Teacher perceptions of a project-based approach to social studies and literacy instruction. *Teaching and Teacher Education*, *84*(2019), 95–105. https://doi.org/10.1016/j.tate.2019.04.016

Rowe, K. (2003). The importance of teacher quality as a key determinant of pupils' experiences and outcomes of schooling. In *Proceedings of the Australian Council for Educational Research (ACER) Research Conference, "Building teacher quality: What does the research tell us?"* (pp. 15–23). ACER. https://research.acer.edu.au/cgi/viewcontent. cgi?article=1000&context=research_conference_2003

Strmčnik, F. (2001). *Didaktika: Osrednje teoretične teme* [Didactics: Central theoretical topics]. Znanstveni inštitut Filozofske fakultete.

Sutrisna, G., & Artini, L. P. (2020). Does problem-based learning affect pupils' speaking skill and attitude toward ELL? *RETORIKA Jurnal Ilmu Bahasa*, *6*(2), 131–138. https://doi.org/10.22225/jr.6.2.2315.131-138

Šorgo, A., & Heric, J. (2020). Motivational and demotivational factors affecting a teacher's decision on whether to do research. *Center for Educational Policy Studies Journal*, *10*(3), 77–97.

Tahirsylaj, A., Smith, W. C., Khan, G., & Wermke, W. (2021). The conceptual and methodological construction of a 'global-teacher identity through TALIS. *Center for Educational Policy Studies Journal*, *11*(3), 75–94.

Timperley, H., & Alton-Lee, A. (2008). Reframing teacher professional learning: An alternative policy approach to strengthening valued outcomes for diverse learners. *Review of Research in Education*, *32*(1), 328–369. https://journals.sagepub. com/doi/10.3102/0091732X07308968

Torres-Cladera, G., Simó-Gil, N., Domingo-Peñafiel, L., & Amat-Castells, V. (2021). Building professional identity during pre-service teacher education. *Center for Educational Policy Studies Journal*, *11*(3), 35–54.

Valenčič Zuljan, M., & Kalin, J. (2020). *Učne metode in razvoj učiteljeve metodične kompetence* [Teaching methods and the development of teacher's methodology compentence]. Pedagoška fakulteta, Agencija za raziskovanje RS.

Yar Yildirim, V. (2021). The opinions of effective teachers about their preferred teaching methods and techniques. *International Online Journal of Education and Teaching*, *8*(1), 76–94. https://eric.ed.gov/?id=EJ1286677

Biographical note

Monika Mithans, PhD, is an assistant professor in the field of pedagogy at the Faculty of Education, Department of fundamental Pedagogical Subjects at the University of Maribor, Slovenia. Her main areas of research are school participation, modernization of the educational process and curriculum changes.

Joca Zurc has three PhDs (Kinesiology, Philosophy and Statistics) and is an Assistant Professor of Research Methodology and Kinesiology at the Department of Education, Faculty of Arts, University of Maribor, Slovenia. She has over 20 years of experience in qualitative, quantitative and mixed methods research. Besides methodological studies, her main research interests focus on academic and learning achievements, a healthy lifestyle and the well-being of school children. Between 2017 and 2019, she was awarded a JSPS Fellowship for a postdoctoral research study at Okayama University in Japan. She is currently Deputy Dean for International Cooperation and Promotion at the Faculty of Arts, University of Maribor.

Milena Ivanuš Grmek, PhD, is a full Professor of Pedagogy at the University of Maribor, Faculty of Education, Slovenia. Her main areas of research are learning and teaching in various fields of education, modernization of educational process, curriculum changes and higher education didactics.