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Predictors of the Frequency of Using the Digital Textbook as a Methodological Factor of Digital Transformation

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Abstract

The paper explores the frequency of using digital textbooks for the Croatian language course in primary education. The aim of the research was to determine whether teachers' years of service, promotion to higher ranks and the assessment of personal digital competencies influenced the use of digital textbooks. Differences in the frequency of use were also examined with regard to the digital textbook platform and the grade in which teachers teach, and teachers' opinions on the advantages and disadvantages of their application were analysed. The results show that digital competencies are the only significant predictor of the frequency of using digital textbooks, while years of service and promotion to higher ranks were not significant. Differences in the frequency of use were identified with regard to the platform on which the digital textbooks were designed. No correlation has been established between the frequency of use and the grade in which teachers teach. Teachers emphasize interest, accessibility, unification of content and positive influence on students' motivation as the most important advantages. The most frequently highlighted shortcomings relate to insufficient technical equipment of schools. In conclusion, the results indicate that the digital textbook is an important methodological factor in the digital transformation of the education system.

Keywords: *Croatian language; digital competences; primary education; strengths and weaknesses of digital textbooks*

Introduction

In the modern society characterised by continuous technological progress, digitalisation has become an integral component of all areas of human activity, including the education

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system. The digital transformation of education entails not only equipping schools with technological infrastructure and applying digital educational programs and tools, but also changes in methodological approaches that will be aligned with student needs in the contemporary social and technological context. Within this framework, the digital textbook goes beyond its digitized version of the printed edition and develops into a complex technological teaching tool that enables interaction, multimedia and adaptation to the individual educational needs of students. The digital textbook is defined as a methodologically articulated source of knowledge, aligned with the curriculum and intended for the educational process, structured using digital technology with multimedia and interactive elements included (Ivančić, 2026).

In the Republic of Croatia, the textbook has been legally designated as a teaching tool in accordance with *Ordinance on the textbook standard and members of expert panels for the assessment of textbooks and other educational materials* (NN, 9/2019-196) intended for perennial use, which can be published in the form of a book or in another form (electronic textbook or part thereof) (Act on Textbooks and Other Educational Materials for Primary and Secondary School, NN 116/2018 – 2288).

The systematic introduction of digital content into the Croatian education system started with the "e-schools" project (2015-2022), which laid the foundations of digitally mature schools through the process of equipping classrooms and developing digital educational content (DOS) intended for teachers and pupils from the 5th grade of primary school to the 4th grade of high school. This content is available without restrictions via the Edutorij platform on the https://edutorij.carnet.hr/e-skole/digitalni-obrazovni-sadrzaj website. There is also the website e-lektire (https://lektire.skole.hr/#) whose content, although somewhat limited, is intended for primary and secondary school pupils and includes only reading materials. According to the aforementioned definition, digital textbooks for primary education were developed by Croatian publishers on platforms that were initially designed for this purpose or the existing ones were used. These digital textbooks have been approved for use in the teaching process in the Republic of Croatia and have been used in Croatian schools since the school year 2018/2019.

Theoretical framework

Digital textbooks: designation and characteristics

In general, the textbook is considered to be a teaching aid designed for teaching and learning purposes, which presents the information in a structured manner consistent with the curriculum and educational standards. Many scientists regard it as a source of knowledge (Malic, 1986; Hummel, 1998) and stress its important role in the educational process (Neuner, Edmondson, Mikk, Haycrofz, Sheldon, Hutchinson and Torres according to Andraka, 2020). Modern scientific literature pays particular attention to the distinction between digital versions of printed textbooks and digital textbooks enriched with interactive and multimedia elements. The latter do not simply reproduce

content in a digital format, but represent complex teaching tools that enable students (users) to interact actively with the content and provide feedback on student activities and responses. The technical characteristics of the platforms on which these textbooks were designed also provide a range of very significant additional functionalities such as writing and storing notes, the ability to save records, adapt content to students with learning disabilities, adaptability and the ability to customize visual elements, including increasing font size and changing the background colour (Ivančić, 2023).

Digital textbooks differ from printed textbooks in terms of interactivity that takes the form of interactive tasks. Such content enables the student to actively participate in the learning process and take an active role in the process (Brnic et al., 2024). At the same time, teachers are allowed to enrich the teaching content and integrate content that is not available in printed versions of textbooks. Furthermore, digital textbooks are characterized by multimedia and the possibility of dynamic visualisation of content. Unlike static representations typical of printed textbooks, digital formats integrate videos, animations, and simulations. Dynamic visualisations make it easier to understand abstract phenomena and help reduce cognitive burden while solving more demanding tasks (Mayer, 2014; Degner, Moser & Lewalter, 2021; Brnic et al., 2024). One of the important features of digital textbooks is automated feedback. Modern computer systems allow students (users) to immediately check the accuracy of the answers and provide guidance for further work (Rezat, 2021). In addition, digital textbooks enable the adaptation of the content to the needs of each individual student. It is achieved by offering tasks of different levels of complexity and different approaches to achieving the learning outcomes. Therefore, it is an excellent teaching tool that allows for the individual abilities, personal interests and pace of learning of each student to be taken into account (Sayed et al., 2022; Brnic et al., 2024).

Despite the numerous advantages of digital textbooks in comparison with the printed versions, scientific literature also warns of certain limitations in their application. Efficient use of digital textbooks requires developed digital user competences, appropriate computer skills and the availability of stable technological infrastructure. In addition, their educational efficiency depends to a large extent on teachers' methodological competences and their ability to integrate digital technologies into the teaching process (Anichini et al., 2017).

Development, forms and implementation of digital textbooks in the Republic of Croatia

"Digital literacy represents one of the key competences of contemporary education, and the textbook, as the central teaching material in the school context, can play an important role in its development." (Avdić i Košutić, 2026) In the last decade, the development of digital textbooks in the Republic of Croatia has been inextricably linked to the systematic efforts invested in the digital transformation of education, primarily within the framework of the project "e-schools: Establishment of a System of

Development of Digitally Mature Schools" implemented by the Croatian Academic and Research Network (CARNET). There are two forms of approved digital textbooks for use in primary education teaching process: digital educational content (DOS) and PDF printed textbooks enriched with digital content. They vary according to availability: the content can be displayed on the textbook page or displayed on a new website, one by one (Ivančić, 2026). The use of digital textbooks in the Republic of Croatia has been scientifically studied during the last ten years. The findings of many studies confirm that teachers use digital textbooks in the teaching process (Pović et al., 2015; Budinski and Kolar Billege, 2016; Čanić, 2017; Valenta and Dumančić, 2019; Kolar Billege and Ivančić, 2022), but their level of usage is lower than the international average (Markočić Dekanić et al., 2025) and the positive aspect is associated with teachers' views on the digital textbook content (Jukić Matijević i Glasnović Gracin, 2025).

In conclusion, the development of digital textbooks in Croatia has evolved from the primary focus on hardware equipment to the development of complex digital ecosystems (Jandrić, 2015), with the key challenge still being the integration of the content into the everyday primary education methodological practice.

Digital competences and promotion of teachers to higher ranks

The European Digital Competence Framework for Educators (Redecker, 2017) has established a common model for teachers at all levels. The model brings 22 key competences divided into six areas, covering professional inclusion, digital sources, teaching and learning, validation, student empowerment and guiding the development of students' digital competences. In the Republic of Croatia, this framework has been adapted as a national *framework for digital competence of users in school,* which elaborates competences within the dimension of general digital literacy, application in education and upbringing, and school management (Kolić-Vehovec et al., 2020). The development of digital competences has become a key element of the professional profile of modern teachers, focusing on their ability to use technology to improve the teaching and learning process. Therefore, a tool has been developed through which teachers can assess their personal digital competence with the aim of more successful planning of professional development and further development of digital competence (Economou, 2023). In the context of the digital transformation of the Croatian education system, the development of teachers' digital competences has been recognized as a key factor for the meaningful integration of technology into the learning and teaching processes. According to the DigCompEd European Framework, these competences relate not only to technical literacy, but also to the ability to use technology critically and creatively in teaching, evaluation and professional engagement (Luo et al., 2025).

Modern research confirms that the development of teaching competences is a continuous process that requires lifelong learning and harmonization of pedagogical and didactic knowledge with technological possibilities. Recent data in Croatia (Dobrota et al., 2025) show that years of work experience are a significant predictor of attitudes

towards digital content: younger teachers perceived themselves as more competent and showed less need for additional guidance, while older teachers showed a greater need for structured support. International studies have also reported similar findings (Psyrras, Raptis i Mastrothanasis, 2026). Promotion to a higher rank is increasingly linked to the level of digital competence, with primary education teachers expected to become media literate mentors guiding students in the digital environment. Systematic research conducted in Croatia indicates that teachers perceive themselves as more competent on average in the areas of information literacy, communication and security, while lower levels of self-assessment are present in terms of digital content creation and problem solving (Pahljina-Reinić et al., 2020). A large study of the effects of the e-schools pilot project (2020), conducted on a representative sample of 1234 teachers, found that during the project, self-assessment of teachers' digital competences increased statistically significantly (Kolic-Vehovec et al., 2020). However, the same research warns of the discrepancy between the subjective sense of competence and the actual performance on tasks, with no equal degree of progress being recorded, which suggests the need for longer-term and more systematic training. In Croatia, promotion of teachers to higher ranks is increasingly closely linked to the development of digital competences through lifelong learning systems (Dobrota et al., 2025). Research shows that teachers seeking professional excellence are more inclined to participate in *online* communities of practitioners and to use digital educational content and teaching scenarios more frequently. The e-schools system enabled teachers to access specialized education and regional education centers, making digital competence an integral part of their professional identity and a prerequisite for promotion. However, workload and lack of time continue to be perceived as significant barriers to ICT integration (Kolić-Vehovec, Vuković and Mehić, 2020; Kolić-Vehovec et al., 2020). The analysis of the impact of demographic and professional factors on digital competences shows a strong link between years of work experience and the level of self-assessed skills. Recent international research shows that there is a direct link between the use of technology in education and teaching competences in the field of technological knowledge. It is emphasised that teachers who possess competences relevant to the profession and who have received appropriate education and training can independently produce the materials and plans needed for teaching using technology (Demirci and Güven, 2023). The same authors find that teachers' attitudes towards the use of technology are generally positive and that attitudes towards the use of technology do not show statistically significant differences in terms of teachers' gender, age or work experience.

In conclusion, teachers must be digitally competent to teach successfully in a digitised environment. Therefore, the authors (Edstrand and Sjöberg, 2023) introduce the concept of professional digital competence which they define as the teacher's ability to use ICT in an optimal way, which means exploiting its potential for teaching and learning processes. It can be said that digital competence, according to authors, combines critical selection and application of technology in the educational context.

Strengths and weaknesses of digital textbooks

Implementation of digital textbooks in primary education brings many functional advantages, but at the same time it also poses certain challenges that can affect the cognitive development of pupils and the organisation and implementation of the teaching process. The advantages of digital textbooks are primarily reflected in increasing student engagement and the possibility of individualizing the learning process. Compared to printed media, digital textbooks include interactivity and multimedia. An additional advantage of digital textbooks is the ability to adapt the content to individual needs and the pace of learning of each student. The special value of digital formats is reflected in working with students with developmental disabilities as they provide different forms of e-accessibility, such as adapting the font size and font type, inclusive visuals and converting text to speech. Such opportunities are compatible with the principles of universal learning design, which aim to ensure that educational content is available to all pupils irrespective of their individual abilities and needs. (Popova-Koskarova et al., 2024; CARNet, *Manual for the application and creation of e-schools teaching scenarios).*

There are more studies conducted outside Croatia showing the positive effects of information and communication technology on the learning process (Baytak, Tarman and Ayas, 2011; Delen and Bulut, 2011; Mayer, 2014), and the Pisa Survey conducted in 2018 in the Republic of Croatia shows the achievement of better results in reading, mathematical and natural literacy as soon as the child starts using digital technology (Markočić Dekanić et al., 2019). Integration of digital textbooks into primary education brings significant advantages over traditional printed publications, primarily due to the possibility of refreshing information systematically and updating data, as provided by *the Act on Textbooks and Other Educational Materials for Primary and Secondary School* (NN 116/18). Digital textbooks enable integration of video, audio and dynamic visualisations which helps reduce cognitive load in complex tasks and makes it easier to understand abstract phenomena (Popova-Koskarova et al., 2024; CARNet, 2018). The use of interactive diagrams, simulations and digital tools encourages students to play an active role in content research (Žuvić et al., 2016). Ivančić (2026) cites several other advantages of current digital textbooks in primary education such as accessibility, ease of use for students, teachers and parents, stronger methodological formatting, possibility of providing feedback to students, and integration of multimedia content.

Despite their technological advantages, scientific literature points to limitations and challenges associated with the use of digital textbooks. Among other things, Peras et al. (2023) states that successful use of digital textbooks depends on stable infrastructure and the availability of devices for each student. Lack of tablets or poor Internet connection can exacerbate educational inequalities among students of different socioeconomic status, and technical problems can significantly impede the fluidity of the curriculum. The effectiveness of the digital textbook in teaching depends directly on the teacher's methodological preparation. Lack of digital competences or resistance of teachers to technology can result in the digital textbook being used only as a digital copy of a printed book, thus losing its added value (CARNet, 2018).

Digital textbooks are a key factor in the digital transformation of the modern education system because they enable the integration of digital technologies into the teaching and learning process and contribute to the development of modern educational approaches. Given their increasingly important role in the teaching practice, it is important to analyse systematically their strengths as well as potential shortcomings and challenges related to their application. Classroom teachers play a key role in the digital transformation, as they are the first intermediaries between the child and the digital content in formal education. Primary education is a crucial period for the development of information literacy and critical thinking needed for its use, so it is necessary to examine the predictors of the frequency of using digital textbooks as a methodological factor of digital transformation.

Methodology

Research objective

The aim of the research was to examine the frequency of digital textbooks use in Croatian language teaching among classroom teachers and to determine whether years of service, promotion to a higher rank and the assessment of their digital competences influence the frequency of digital textbooks use.

Research problems

Problem 1

To examine whether the frequency of using digital textbooks in teaching the Croatian language can be predicted based on years of service, promotion to a higher rank and assessment of teachers' own digital competences.

(H1) teachers who assess their digital competences higher, who have been promoted to a higher rank and have more years of service are more likely to use digital textbooks in the teaching process.

Problem 2

Examine whether there is a statistically significant difference in the frequency of using digital textbooks by classroom teachers with regard to the platform on which the digital textbooks are designed and the relationship with the class in which they teach.

(H2) There is no significant difference in the frequency of using digital textbooks between classroom teachers with regard to the platform or grade in which they teach.

Problem 3

To examine the teachers' opinions on the advantages and disadvantages of digital textbooks they use in Croatian language teaching.

(H3) advantages the classroom teachers emphasize are the availability of content for motivating students to learn and the possibility of feedback to students in digital textbooks. Classroom teachers are more likely to highlight the lack of a personal computer in each student.

Sample

The survey was conducted on a sample of classroom teachers in the Republic of Croatia. Teachers from all counties participated in the survey, and the collection of data was carried out using a questionnaire via social networks. The participation of respondents was voluntary and anonymous.

Instrument

The original questionnaire in the Microsoft Forms tool was created for research purposes. The survey included questions on the socio-demographic characteristics of respondents and on the use of digital textbooks, digital competences and perception of their strengths and weaknesses. Prior to the main study, expert evaluation of the content validity of the instrument had been performed by specialists in the field of educational sciences using a consensus validation approach.

Results

301 classroom teachers from all counties of the Republic of Croatia participated in the survey. The main characteristics of the sample are shown in Table 1.

At baseline, the distribution format of the analysed variables was examined to determine their deviation from normal distribution. Six variables were used for research purposes, and their basic characteristics are presented below. Descriptive indicators of continuous variables are presented in Table 2. The first variable, the frequency of using digital textbooks in Croatian language instruction, was checked with the question "How often do you use digital textbooks in Croatian language instruction?" and there were six possible answers: 1 – *I do not use digital textbooks*, 2 – *once a month*, 3 – *two to three times a month*, 4 – *once a week*, 5 – *two to three times a week* and 6 – *every day*. The second variable, digital competences, was checked with the question "Assess the degree of your digital competences." and there were four possible answers: 1 – *I have exceptionally good digital competences*, 2 – *I have good digital competences*, 3 – *my digital competences are poor* and 4 – *I am not digitally competent/competent*. In order for a higher score to mean better competence in calculating the average on this variable, the variable was overridden before data processing in reverse order, i.e., 1 meaning *I am not digitally competent/competent*, and 4 meaning *I have exceptionally good digital competences* and accordingly the change was made at other stages. The third variable, years of service has four degrees and is, like the fourth progression variable, also of four degrees, already partially elaborated and described in the pattern structure. The remaining two variables have nominal meanings and are shown only in Table 1: the platform used and the grade in which instruction is given.

Table 1
Pattern structure

		F	%			F	%
gender	female	294	97.7	years of work experience	up to 10	46	15.3
	male	7	2.3		11-20	73	24.3
county	Zagrebačka	18	6.0		21 to 30	107	35.5
	Sisačko-moslavačka	7	2.3		more than 30	75	24.9
	Karlovačka	11	3.7	grade the teacher currently teaches	grade 1	92	30.6
	Varaždinska	11	3.7		grade 2	57	18.9
	Koprivničko-križevačka	3	1.0		grade 3	62	20.6
	Bjelovarsko-bilogorska	9	3.0		grade 4	57	18.9
	Primorsko-goranska	21	7.0		combination of 2 or more grades	33	11.0
	Krapinsko-zagorska	9	3.0	promotion to a higher rank	has not been promoted	197	65.4
	Ličko-senjska	2	0.7		teacher mentor	55	18.3
	Virovitičko-podravska	8	2.7		teacher advisor	46	15.3
	Požeško-slavonska	4	1.3		teacher excellent advisor	3	1.0
	Brodsko-posavska	12	4.0	printed textbook used	Alfa textbooks	79	26.2
	Zadarska	9	3.0		Profil Klett textbooks	94	31.2
	Osječko-baranjska	15	5.0		Školska knjiga textbooks	112	37.2
	Šibensko-kninska	10	3.3		2 or more publishers	16	5.3
	Vukovarsko-srijemska	4	1.3	digital textbook used	not a single one	8	2.7
	Splitsko-dalmatinska	40	13.3		mozaWeb	70	23.3
	Istarska	8	2.7		IZZI	125	41.5
	Dubrovačko-neretvanska	18	6.0		e-sfera	148	49.2
	Međimurska	9	3.0		mozaBook	69	22.9
	Grad Zagreb	73	24.3				

Table 2
Descriptive statistics of continuous variables

	M	SD	C	D	MIN	MAX	KS	skew.	Kurt.
frequency of using digital textbooks in HJ teaching	5.0	1.24	5	6	1	6	0.29 * *	–1.48	1.75
digital competences	3.2	0.51	3	3	2	4	0.40 * *	0.23	0.36
internship	2.7	1.01	3	3	1	4	0.22 * *	–0.28	–1.00
promotion	1.5	0.79	1	1	1	4	0.40 * *	1.21	0.12

LEGEND: M – arithmetic mean, SD – Standard deviation, C – Central value (median), D – dominant value (mode), MIN – minimum score, MAX – maximum score, KS – Kolmogorov-Smirnov test value when testing the normality of distribution, skew. – curvature of distribution, Kurt. – splitting of distribution

The results obtained from the continuous variables show that all variables are statistically significantly different from the normal distribution, but nevertheless, the curvature and flatness of distribution are far from the limit values and the number of subjects is sufficient for the processing to continue using parametric statistical analyses.

In order to examine whether, based on years of service, promotion to a higher rank and estimated level of digital competences, the frequency of using digital textbooks in teaching the Croatian language (problem 1) can be predicted, a multiple linear regression analysis was performed using the Enter method. Variables years of service and promotion to a higher rank were originally collected in the form of categories, but for the purpose of conducting regression analysis they were treated as ordinal numerical variables. Such an approach enabled the inclusion of these variables in the regression model and the examination of their contribution to explaining the frequency of use of digital textbooks in teaching the Croatian language. Before carrying out the multiple linear regression analysis, the assumptions for its use were verified. Correlation analysis showed the existence of a correlation between the criterion variable and one of the predictors, i.e. estimated digital competencies ($R = .186$, $p = .001$). The independence of errors was verified by the Durbin-Watson coefficient, with a value of 1.94, indicating a lack of autocorrelation of residuals. Multi-linearity was not a problem as the tolerance values were higher than .10 (0.819 – 0,919) and THE VIF values were lower than 10 (1.088 – 1.221). The diagnosis of colinearity further showed that the conditionality index did not exceed a critical value of 30 (CI = 20.15). Therefore, the assumptions for multiple linear regression analysis were met. The regression model was statistically significant, $F (3.297) = 3.82$, $p = .010$. A total of 3.7% of the variance in the frequency of using digital textbooks ($R^2 = .037$) was explained, while the adjusted coefficient of determination was .027. The results obtained suggest that the set of predictors makes a statistically significant but relatively small contribution to explaining the frequency of use of digital textbooks (Table 3).

The analysis of individual regression coefficients showed that the estimated level of digital competences is the only statistically significant predictor of the frequency of

Table 3
Results of multiple regression analysis for predicting the frequency of use of digital textbooks in Croatian language teaching (N = 301)

Predictor	B	SE	β	t	p	95% CI for B
Constant	3.376	0.570	—	5.927	<.001	[2.255, 4.496]
Years of work in the profession	0.014	0.078	.012	0.186	.852	[— 0.138, 0.167]
Career advancement	0.076	0.094	.048	0.805	.421	[— 0.109, 0.261]
Digital competences	0.456	0.149	.187	3.066	.002	[0.163, 0.749]

LEGEND: R = .193, R^2 = .037, adjusted R^2 = .027, F (3. 297) = 3.82, p = .010, Durbin-Watson = 1.94.

digital textbooks (β = .187, t = 3.07, p = .002). The positive direction of the relationship indicates that teachers who assess their digital competences higher often use digital textbooks in teaching the Croatian language. Years of service (β = .012, t = 0.19, p = .852) and promotion to higher ranks (β = .048, t = 0.81, p = .421) did not prove to be statistically significant predictors of the frequency of using digital textbooks.

The hypothesis is partially confirmed. Of the three predictors examined, only digital competences proved to be a significant predictor of the frequency of using digital textbooks in Croatian language teaching. Years of service and promotion to higher ranks did not significantly contribute to explaining the frequency of using digital textbooks. Although the regression model was statistically significant, the variance explained was relatively small, suggesting the existence of additional factors influencing the use of digital textbooks in teaching.

In order to answer another research problem, i.e. to check whether there is a statistically significant difference in the frequency of using classroom teachers' digital textbooks with regard to the platform on which digital textbooks were designed and the relationship with the class in which they teach, we tested the difference between independent groups and the correlation coefficient. For the purpose of analysing the frequency of use of digital textbooks with regard to the platform on which they are designed, the processing was carried out only on those respondents who used only one digital textbook: e-sfera (N = 82), IZZI (N = 72) or mozaBook (N = 21). Due to the reduced number of subjects, a simple variance analysis was not used, but a non-parametric equivalent, the Kruskall-Wallis test was used instead. The reduced number of subjects no longer allowed the use of parametric statistics regardless of the Kolmogorov-Smirnov test and low curvature and flattening measures. For the part of the problem relating to the grade in which teachers teach classes, those teachers who teach in mixed classes were omitted and the total number of subjects who entered the study in this part is 268. And here, in order to reduce the number of subjects, a non-parametric, Spearman coefficient of correlation was used. The results showed that there was a statistically significant difference (Z (2) = 7.80; p < .05) in the frequency of using classroom teachers' digital textbooks with regard to the platform on which the digital textbooks were designed. Separate Mann Whitney tests were conducted to determine which pairs have a statistically significant difference (Table 4).

Table 4
Mann Whitney in a test for various digital textbooks and their frequency of use

	e-sfera	mozaBook
IZZI	–2.19 *	–2.36 *
e-sfera		–0.94

LEGEND: * - statistically significant with 5% risk

The results obtained show that there is a statistically significant difference in the frequency of using digital textbooks for users of IZZI textbooks and e-sphera ($Z = –2.19$; $p < .05$) and mozaBook ($Z = –2,36$; $p < .05$), while e-sfera and mozaBook differ ($Z = –0.94$; $p > .05$) statistically significantly. To determine the direction of the differences obtained, Figure 1 shows the median and the arithmetic mean for the frequency of using digital textbooks of these three groups of platforms.

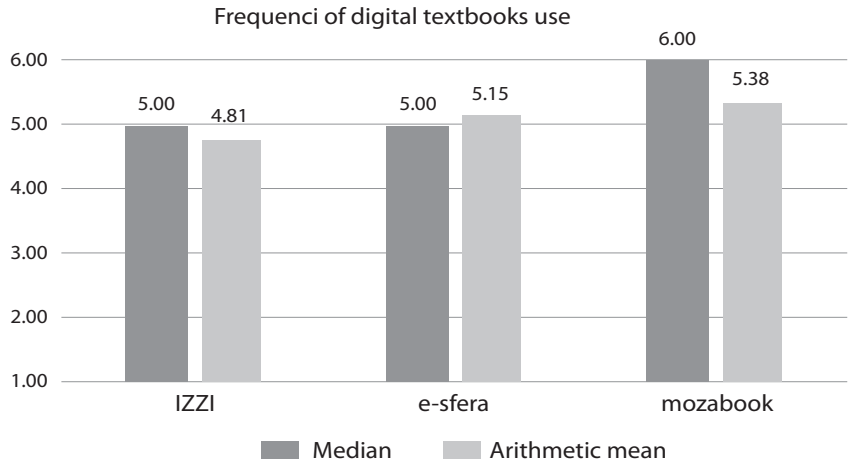


Figure 1. Median frequency of use of digital textbooks depending on platform type

The results provide information that the use of digital textbooks by USERS of IZZI textbooks is lower than that of users of e-sphere and *mozaBook*. Thus, the first part of the (H2) hypothesis was not confirmed because we assumed that there would be no difference in the frequency of using digital textbooks with regard to the platform on which they were designed. The second part of the problem confirmed our hypothesis because the Spearman coefficient of correlation ($R (268) = –.06$; $p > .05$) showed that there is no statistically significant correlation between the frequency of using classroom teacher digital textbooks and the grade in which the teacher teaches.

In the survey, 211 respondents answered an open question about the assessment of the advantages of digital textbooks they use for teaching the Croatian language classes. A textbook used in the most represented school subject with the highest number of weekly lessons in primary education and the most comprehensive content was selected. The respondents could have listed more advantages. The responses are grouped into several categories and are shown in Table 5.

Table 5.
Respondents' responses to the benefits of digital textbooks

Variable	N
interesting	63
availability	34
it's all in one place	24
motivation	22
simplicity	16
diversity	16
vigilance	17
interactivity	13
visibility	11
dynamism	10
quick access to content	10
they are excellent for distance learning	10

Legend: N – number of respondents

In addition, five to nine individual responses represent the following responses: the availability of videos; quizzes and audible readers can be projected on a large screen; they are excellent for repetition, and the speed of feedback. Less than five times, teachers also listed the following advantages: easy to navigate; links; develop creativity and innovation; are practical, accessible and clear; have a wide selection of content; students acquire content faster; interesting knowledge check; have PPT; tasks are stimulating; quality worksheets are available in *Word* format; good content connectivity; different lesson dynamics, and modern and efficient.

The third (H3) hypothesis can be considered to be partially confirmed as motivation, as one of the advantages, ranks fourth. More than motivation, teachers list interest, accessibility and unification of content as advantages of digital textbooks.

In the survey, 182 respondents answered an open question about assessing the shortcomings of digital textbooks in Croatian language instruction. Of these, 44 respondents wrote that there were no shortcomings. This means that out of 301 respondents, 138 reported a disadvantage of a digital textbook, which is 45.85%. A significant number of responses focus on the lack of technical equipment of schools or pupils (poor internet connection – 19 responses and students do not have tablets – 7 responses). Other answers focus on the content of digital textbooks and range from one reference to a maximum of three references to the same shortcoming. The teachers' answers are as follows: lack of language content; tasks should be more demanding; content is similar; there is no teacher replacement; lack of content for repetition (3); content represented by icons is not available; students may have vision problems; students spend too much time on a computer; need a larger font; lack of videos; poor audio reader (2); lack of content to express and create; material is missing; some tasks are not elaborated; they should not prevail over classical textbooks; content is not clearly presented; access to content is complicated; digital textbooks are not required

for Croatian; everything should be in one place; content for media culture is missing; quizzes must have more correlations; work group is not supported; content cannot be changed; demanding textbook activation; staff is not appropriate; some answers are incorrect; not for junior students; not everything is methodologically appropriate; audiofiles must be better, and they do not follow the textbook pages (1). Citing the shortcomings of digital textbooks, it can be said that the (H3) hypothesis has not been confirmed since a large number of teachers have not stated that one of the important shortcomings is the lack of a personal computer in each student.

Discussion and conclusion

This paper examined the frequency of the use of digital textbooks in Croatian language teaching among classroom teachers and the contribution of years of service, promotion to higher ranks and the assessment of their digital competences to explaining the variability of their use. In addition, the differences in the frequency of using digital textbooks were analysed with regard to the platform on which they were designed, as well as teacher assessments of the advantages and disadvantages of their application in teaching the Croatian language.

The results of the study showed that the first hypothesis was partially confirmed. Although it was assumed that the frequency of using digital textbooks in teaching the Croatian language would be higher for teachers with a longer career, promotion to a higher rank and a higher assessment of their own digital competences, it was determined that the only significant predictor was the assessment of digital competences. In other words, teachers who assess their digital competences higher often use digital textbooks in teaching the Croatian language. Such a result points to the importance of a subjective sense of competence and security when using digital textbooks as a methodological factor of digital transformation. Teachers who assess that they have the necessary knowledge and skills are more likely to include digital textbooks in the daily teaching process. On the other hand, the absence of a significant contribution of years of service suggests that the length of professional experience does not in itself determine the willingness to use digital textbooks. This confirms the assumption that the digital transformation of education gradually goes beyond traditional generations' divisions among teachers. Similarly, the fact that promotion to higher ranks is not linked to the more frequent use of digital textbooks may suggest that formal promotion to higher ranks does not necessarily involve the systematic development of competences for the application of digital educational content in teaching. Although the regression model was statistically significant, a relatively small proportion of the explained variance points to the existence of additional factors influencing the frequency of use of digital textbooks. Organisational and contextual factors can be assumed to play an important role, such as the availability of ICT infrastructure, technical support, the availability of devices to students, school incentives for the use of digital content, previous teacher experiences and their attitudes towards digital technologies. Future research should

therefore cover a wider set of predictors to explain more fully the patterns of use of digital textbooks in teaching.

The findings suggest that the features of digital platforms themselves can play an important role in their more frequent application. Differences in the user interface, the availability of interactive content, the possibilities of adapting to teaching needs, the quality of multimedia elements or technical functionality may influence the teacher's decision on how much a particular digital textbook will integrate into the teaching process. Although this study did not include an analysis of specific characteristics of individual platforms, the results obtained indicate the need for their more detailed examination. On the other hand, there is no statistically significant correlation between the frequency of use of digital textbooks and the grade in which teachers teach. This finding confirms the assumption that digital textbooks are used equally in all classes of classroom instruction and suggests that the developmental and curricular specificities of a particular grade do not represent a limiting factor in their application. Such a result can also be interpreted by the fact that digital textbooks are nowadays designed to follow the content and methodological requirements of all levels of education.

In view of the analysis of the advantages and disadvantages of the digital textbooks cited by the teachers, the most frequently cited advantages are that they are interesting, accessible, the content is unified (all in one place), and the content of textbooks is designed in a way to affect the motivation of the pupils. They mostly frequently mentioned disadvantage is the inadequate technical equipment of the school, although a large number of respondents further replied that there were no disadvantages. The analysis of the shortcomings reported by teachers leads to the conclusion that teachers focus mainly on technical shortcomings and less on those relating to the content. This confirms that the successful integration of digital textbooks depends not only on the readiness of the teacher, but also on the material and organisational conditions in which the teaching takes place. All of the above, along with the fact that eight out of 301 respondents replied that they do not use digital textbooks in the teaching process, shows that teachers nowadays use digital textbooks in primary education. The frequency of their use does not depend on years of service or promotion to higher ranks, and digital textbooks are used by teachers regardless of which printed textbooks they use in the teaching process. Teachers in the 21st century in the Republic of Croatia emphasize a larger quantity of advantages than shortcomings of using digital textbooks, but on the basis of open-ended questions it can be established that they are aware of the shortcomings. Research results showing that teachers highlight the technical aspect as a shortcoming in most cases suggest that textbooks generally meet the professional expectations of teachers.

Digital textbooks have become an indispensable element in the teaching process. Therefore, a stronger involvement in the consideration of the advantages and disadvantages of digital textbooks of all scientific disciplines studying them and their implementation in the teaching process would be advisable. To this end (evaluation of

quality, technical and methodological design of digital textbooks in primary education), a comprehensive and thorough categorical apparatus for methodological analysis of digital textbooks was established (Ivančić, 2026). Given the administrative position of the digital textbook as a compulsory teaching tool, it is concluded that the digital textbook is an indispensable methodological factor for the digital transformation of the education system.

Research limitations

This study has several limitations that need to be taken into account when interpreting the results obtained. First of all, the sample was formed using the convenience sampling method, and the questionnaire was distributed through professional groups on social networks intended for classroom teachers and other educators. Although such an approach allows for the inclusion of participants from different parts of the Republic of Croatia and facilitates access to geographically dispersed population, it was not possible to independently verify the professional status of each individual participant. In order to alleviate this limitation, the aim of the survey and the criteria for participation were clearly stated at the beginning of the questionnaire, i.e., that the survey was intended for teachers of classroom instruction employed in primary schools in the Republic of Croatia. In addition, relevant sociodemographic data (workplace, years of service and counties of employment) were collected, which enabled verification of the suitability of the sample. The analysis of responses revealed no illogical patterns or patterns indicating participation of persons outside the target population. Furthermore, the results are based on participants' self-assessments, which may be linked to the presence of socially desirable responses and subjective assessments of their own views and experiences. To minimise this, the questionnaire was anonymous. Due to these limitations, the results obtained cannot be generalised to the entire population of classroom teachers in the Republic of Croatia.

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Prediktori učestalosti korištenja digitalnoga udžbenika kao metodičkoga čimbenika digitalne transformacije

Sažetak

U radu se istražuje učestalost korištenja digitalnih udžbenika za nastavni predmet Hrvatski jezik u primarnome obrazovanju. Cilj je istraživanja bio utvrditi utječu li godine radnoga staža, stupanj napredovanja u zvanju i procjene osobnih digitalnih kompetencija na upotrebu digitalnih udžbenika. Ispitane su i razlike u učestalosti korištenja s obzirom na platformu digitalnih udžbenika i razred u kojem učitelji poučavaju te su analizirana mišljenja učitelja o prednostima i nedostatcima njihove primjene. Rezultati pokazuju da su digitalne kompetencije jedini značajan prediktor učestalosti korištenja digitalnih udžbenika, dok godine rada u struci i stupanj napredovanja u zvanju nisu bili značajni. Utvrđene su razlike u učestalosti korištenja s obzirom na platformu na kojoj su digitalni udžbenici oblikovani. Nije utvrđena povezanost između učestalosti korištenja i razreda u kojem učitelji poučavaju. Kao najvažnije prednosti učitelji ističu zanimljivost, dostupnost, objedinjenost sadržaja i pozitivan utjecaj na motivaciju učenika. Najčešće istaknuti nedostatak odnosi se na nedovoljnu tehničku opremljenost škola. Zaključno, rezultati ukazuju da digitalni udžbenik predstavlja važan metodički čimbenik digitalne transformacije obrazovnoga sustava.

Ključne riječi: *digitalne kompetencije; Hrvatski jezik; prednosti i nedostatci digitalnih udžbenika; primarno obrazovanje*

Uvod

U suvremenome društvu obilježenom kontinuiranim tehnološkim napretkom digitalizacija postaje integralna sastavnica svih područja ljudskoga djelovanja, uključujući i obrazovni sustav. Digitalna transformacija obrazovanja ne podrazumijeva isključivo opremanja škola tehnološkom infrastrukturom te primjenu digitalnih obrazovnih programa i alata, već uključuje i promjene u metodičkim pristupima koji će biti usklađeni s potrebama učenika u suvremenome društvenom i tehnološkom kontekstu. U navedenome okviru digitalni udžbenik nadilazi svoju pojavnost digitalizirane inačice tiskanoga izdanja te se razvija u složeno tehnološko nastavno sredstvo koje omogućuje interaktivnost,

multimedijalnost i prilagodbu individualnim obrazovnim potrebama učenika. Digitalni udžbenik određuje se kao metodički artikuliran izvora znanja, usklađen s kurikulom i namijenjen edukativnom procesu, strukturiran s pomoću digitalne tehnologije s uključenim multimedijskim i interaktivnim elementima (Ivančić, 2026).

U Republici Hrvatskoj udžbenik je zakonski određen kao nastavno sredstvo usklađeno s *Pravilnikom o udžbeničkom standardu te članovima stručnih povjerenstava za procjenu udžbenika i drugih obrazovnih materijala* (NN, 9/2019-196) namijenjeno višegodišnjoj upotrebi, a koje može biti objavljeno u obliku knjige ili u drugom obliku (elektronički udžbenik ili njegov dio) (*Zakon o udžbenicima i drugim obrazovnim materijalima za osnovnu i srednju školu*, NN 116/2018 – 2288).

Sustavno uvođenje digitalnih sadržaja u hrvatski obrazovni sustav započelo je projektom „e-Škole" (2015. – 2022.), koji je postavio temelje digitalno zrelih škola procesom opremanja učionica i razvojem digitalnih obrazovnih sadržaja (DOS) namijenjenih nastavnicima i učenicima od 5. razreda osnovne škole do 4. razreda gimnazija. Navedeni sadržaji dostupni su bez ograničenja posredstvom platforme Edutorij na mrežnoj stranici https://edutorij.carnet.hr/e-skole/digitalni-obrazovni-sadrzaj. S ponešto ograničenim sadržajem pronalazi se još i mrežna stranica e-lektire (https://lektire.skole.hr/#) čiji su sadržaji namijenjeni učenicima osnovnih i srednjih škola, a odnose se samo na lektirne naslove. Digitalne udžbenike prema prethodno navedenom određenju za primarno obrazovanje razvili su hrvatski nakladnici na platformama koje su inicijalno oblikovane s tom namjerom ili su unajmljene već postojeće. Ti su digitalni udžbenici odobreni za upotrebu u nastavnome procesu Republike Hrvatske i koriste se u hrvatskim školama od školske godine 2018./2019.

Teorijski okvir

Digitalni udžbenici: određenje i obilježja

Općenito, udžbenik se smatra nastavnim pomagalom oblikovanim za potrebe poučavanja i učenja, koje informacije prezentira na strukturiran način usklađen s kurikulom i obrazovnim standardima. Mnogi ga znanstvenici smatraju izvorom znanja (Malić, 1986; Hummel, 1998) te ističu njegovu značajnu ulogu u obrazovnom procesu (Neuner, Edmondson, Mikk, Haycrofz, Sheldon, Hutchinson i Torres prema Andraka, 2020). Suvremena znanstvena literatura osobitu pozornost posvećuje razlikovanju digitalnih inačica tiskanih udžbenika od digitalnih udžbenika obogaćenih interaktivnim i multimedijskim elementima. Potonji se ne ograničavaju na reprodukciju sadržaja u digitalnom formatu, već predstavljaju kompleksna nastavna sredstva koja omogućuju aktivnu interakciju učenika (korisnika) sa sadržajem te pružaju povratnu informacija o učeničkim aktivnostima i odgovorima. Tehničke značajke platformi na kojima su oblikovani omogućuju i niz dodatnih vrlo značajnih funkcionalnosti poput zapisivanja i pohrane bilježaka, mogućnost spremanja zapisa, prilagodbe sadržaja učenicima s teškoćama u učenju, adaptivnosti te mogućnosti prilagodbe vizualnih elemenata, uključujući povećavanje veličine slova i promjenu boje pozadine (Ivančić, 2023).

Digitalni se udžbenici razlikuju od tiskanih udžbenika s obzirom na interaktivnost koja se ostvaruje u obliku interaktivnih zadataka. Takvi sadržaji omogućuju učeniku aktivno sudjelovanje u procesu učenja i preuzimanje aktivne uloge u tom procesu (Brnić i sur., 2024). Istodobno, učiteljima se omogućuje obogaćivanje nastavnih sadržaja te integracija sadržaja koji nisu dostupni u tiskanim inačicama udžbenika. Nadalje, digitalne udžbenike obilježava multimedijalnost i mogućnost dinamičke vizualizacije sadržaja. Za razliku od statičnih prikaza karakterističnih za tiskane udžbenike, digitalni formati integriraju videozapise, animacije i simulacije. Dinamičke vizualizacije olakšavaju razumijevanje apstraktnih fenomena te pridonose smanjenju kognitivnoga opterećenja tijekom rješavanja zahtjevnijih zadataka (Mayer, 2014; Degner, Moser i Lewalter, 2021; Brnić i sur., 2024). Jedno od važnih obilježja digitalnih udžbenika jest i automatizirana povratna informacija. Suvremeni računalni sustavi omogućuju učenicima (korisnicima) trenutačnu provjeru točnosti odgovora i pružanje smjernica za daljnji rad (Rezat, 2021). Dodatno, digitalni udžbenici omogućuju prilagodbu sadržaja potrebama svakoga pojedinog učenika. Ona se ostvaruje ponudom zadataka različitih razina složenosti i različitih pristupa ostvarivanju ishoda učenja stoga su izvrsno nastavno sredstvo koje omogućuje uvažavanje individualnih sposobnosti, osobnih interesa i tempa učenja svakoga učenika (Sayed i sur., 2022; Brnić et al., 2024).

Unatoč brojnim prednostima digitalnih udžbenika u odnosu na tiskane inačice, znanstvena literatura upozorava i na određena ograničenja njihove primjene. Učinkovito korištenje digitalnih udžbenika pretpostavlja razvijene digitalne kompetencije korisnika, odgovarajuće računalne vještine te dostupnost stabilne tehnološke infrastrukture. Osim toga, njihova obrazovna učinkovitost u velikoj mjeri ovisi o metodičkim kompetencijama učitelja i njegovoj sposobnosti integracije digitalnih tehnologija u nastavni proces (Anichini i sur., 2017).

Razvoj, oblici i primjena digitalnih udžbenika u Republici Hrvatskoj

„Digitalna pismenost predstavlja jednu od ključnih kompetencija suvremenoga obrazovanja, a udžbenik kao središnji nastavni materijal u školskom kontekstu može imati važnu ulogu u njezinu razvoju." (Avdić i Košutić, 2026) Razvoj digitalnih udžbenika u Republici Hrvatskoj u posljednjem je desetljeću neraskidivo povezan sa sustavnim naporima digitalne transformacije obrazovanja, primarno u okviru projekta „e-Škole: Uspostava sustava razvoja digitalno zrelih škola" koji je provodila Hrvatska akademska i istraživačka mreža (CARNET). Dva su oblika odobrenih digitalnih udžbenika za upotrebu u nastavnome procesu primarnoga obrazovanja: digitalni obrazovni sadržaj (DOS) i PDF tiskanoga udžbenika obogaćen digitalnim sadržajem. Oni se razlikuju prema dostupnosti: sadržaj se može prikazivati na stranici udžbenika ili se prikazuje na novoj mrežnoj stranici, jedan po jedan (Ivančić, 2026). Primjena digitalnih udžbenika u Republici Hrvatskoj u znanstvenim okvirima ispitivana je posljednjih desetak godina. Više istraživanja potvrđuje da se učitelji koriste digitalnim udžbenicima u nastavnom procesu (Pović, i sur., 2015; Budinski i Kolar

Billege, 2016; Čanić, 2017; Valenta i Dumančić, 2019; Kolar Billege i Ivančić, 2022), ali manje od međunarodnih prosjeka (Markočić Dekanić, i sur., 2025) te se pozitivan aspekt povezuje s učiteljskim razmišljanjima o digitalnom sadržaju udžbenika (Jukić Matijević i Glasnović Gracin, 2025).

Zaključno, razvoj digitalnih udžbenika u Hrvatskoj evoluirao je od primarnoga fokusa na hardversku opremljenost prema razvoju kompleksnih digitalno-tehnoloških sustava (Jandrić, 2015), pri čemu je ključni izazov i dalje integracija tih sadržaja u svakodnevnu metodičku praksu primarnoga obrazovanja.

Digitalne kompetencije i profesionalno napredovanje učitelja

Europski okvir digitalnih kompetencija za edukatore (Redecker, 2017) uspostavio je zajednički model za poučavatelje na svim razinama. Model donosi 22 ključne kompetencije podijeljene u šest područja koja obuhvaćaju profesionalnu uključenost, digitalne izvore, poučavanje i učenje, vrednovanje, osnaživanje učenika i usmjeravanje razvoja digitalnih kompetencija učenika. U Republici Hrvatskoj taj je okvir prilagođen kao nacionalni *Okvir za digitalnu kompetenciju korisnika u školi,* koji razrađuje kompetencije u okviru dimenzije opće digitalne pismenosti, primjene u odgoju i obrazovanju te upravljanja školom (Kolić-Vehovec i sur., 2020). Razvoj digitalnih kompetencija postao je ključni element profesionalnoga profila suvremenih učitelja, pri čemu se naglasak stavlja na njihovu sposobnost korištenja tehnologije za unaprjeđenje procesa poučavanja i učenja. Stoga je razvijen alat s pomoću kojega učitelji mogu procijeniti osobnu digitalnu kompetenciju s ciljem uspješnijega planiranja stručne edukacije i daljnjega razvoja digitalne kompetencije (Economou, 2023). U kontekstu digitalne transformacije hrvatskoga obrazovnog sustava, razvoj digitalnih kompetencija nastavnika prepoznat je kao ključni čimbenik za smislenu integraciju tehnologije u procese učenja i poučavanja. Prema europskom okviru DigCompEdu, te se kompetencije ne odnose samo na tehničku pismenost, već na sposobnost kritičke i kreativne uporabe tehnologije u poučavanju, vrednovanju i profesionalnom angažmanu (Luo i sur., 2025).

Suvremena istraživanja potvrđuju da je razvoj učiteljskih kompetencija kontinuiran proces koji zahtijeva cjeloživotno učenje i usklađivanje pedagoško-didaktičkih znanja s tehnološkim mogućnostima. Recentni podatci u Hrvatskoj (Dobrota i sur., 2025) pokazuju da su godine radnoga iskustva značajan prediktor stavova prema digitalnim sadržajima: mlađi učitelji procijenili su se kompetentnijima i iskazali manje potrebe za dodatnim uputama, dok su stariji iskazali veću potrebu za strukturiranom podrškom. Slične rezultate pokazuju i inozemna istraživanja (Psyrras, Raptis i Mastrothanasis, 2026). Profesionalno napredovanje u zvanju sve je češće povezano s razinom digitalne osposobljenosti, pri čemu se od učitelja u primarnom obrazovanju očekuje da postanu medijski pismeni mentori koji vode učenike u digitalnome okružju. Sustavna istraživanja provedena u Hrvatskoj ukazuju na to da se nastavnici u prosjeku procjenjuju kompetentnijima u područjima informacijske pismenosti, komunikacije i sigurnosti, dok su niže razine samoprocjene prisutne u pogledu kreiranja digitalnoga sadržaja i rješavanja problema

(Pahljina-Reinić i sur., 2020). Veliko istraživanje učinaka pokusnoga projekta „e-Škole" (2020), provedeno na reprezentativnom uzorku od 1234 nastavnika, utvrdilo je da su tijekom trajanja projekta samoprocjene digitalnih kompetencija statistički značajno porasle (Kolić-Vehovec i sur., 2020). Ipak, isto istraživanje upozorava na raskorak između subjektivnoga osjećaja kompetentnosti i stvarne izvedbe na zadatcima, pri čemu nije zabilježen jednak stupanj napretka što sugerira potrebu za dugoročnijim i sustavnijim usavršavanjem. Profesionalno napredovanje učitelja u Hrvatskoj sve je uže povezano s razvojem digitalnih kompetencija u sustavima cjeloživotnoga učenja (Dobrota i sur., 2025). Istraživanja pokazuju da su nastavnici koji teže profesionalnoj izvrsnosti skloniji sudjelovanju u *online* zajednicama praktičara te češćem korištenju digitalnih obrazovnih sadržaja i scenarija poučavanja. Sustav „e-Škole" omogućio je nastavnicima pristup specijaliziranim edukacijama i regionalnim obrazovnim centrima čime je digitalna osposobljenost postala integralni dio njihova profesionalnoga identiteta i preduvjet za napredovanje. Međutim, radno opterećenje i nedostatak vremena i dalje se percipiraju kao značajne prepreke za integraciju informacijsko-komunikacijske tehnologije (Kolić-Vehovec, Vuković i Mehić, 2020; Kolić-Vehovec i sur., 2020). Analiza utjecaja demografskih i profesionalnih čimbenika na digitalne kompetencije ukazuje na snažnu povezanost između godina radnoga iskustva i razine samoprocijenjenih vještina. Novija međunarodna istraživanja pokazuju da postoji izravna povezanost između korištenja tehnologije u obrazovanju i učiteljskih kompetencija u području tehnološkoga znanja. Naglašava se da učitelji koji posjeduju kompetencije bitne za struku i koji su prošli odgovarajuće edukacije i usavršavanja mogu samostalno proizvoditi materijale i planove potrebne za nastavu uz pomoć tehnologije (Demirci i Güven, 2023). Isti autori utvrđuju da su stavovi učitelja prema korištenju tehnologije općenito pozitivni te da stavovi prema korištenju tehnologije ne pokazuju statistički značajne razlike s obzirom na spol, dob ili radni staž učitelja.

Zaključno, za uspješno poučavanja u digitaliziranom okružju učitelji moraju i sami biti digitalno kompetentni. Stoga autori (Edstrand i Sjöberg, 2023) uvode pojam profesionalne digitalne kompetencije koji određuju kao sposobnost učitelja da se koristi informacijsko-komunikacijskom tehnologijom na optimalan način što znači iskorištavanje njezinoga potencijala za procese poučavanja i učenja. Može se reći da digitalna kompetencija, prema autorima, objedinjuje kritički odabir i primjenu tehnologije u obrazovanome kontekstu.

Prednosti i nedostatci digitalnih udžbenika

Implementacija digitalnih udžbenika u primarnome obrazovanju donosi brojne funkcionalne prednosti, ali istodobno otvara i određene izazove koji mogu utjecati na kognitivni razvoj učenika te organizaciju i provedbu nastavnoga procesa. Prednosti digitalnih udžbenika ponajprije se očituju u povećanju angažiranosti učenika i mogućnostima individualizacije procesa učenja. U usporedbi s tiskanim medijima, digitalni udžbenici uključuju interaktivnost i multimediju. Dodatna prednost digitalnih

udžbenika odnosi se na mogućnost prilagodbe sadržaja individualnim potrebama i tempu učenja svakog učenika. Posebna se vrijednost digitalnih formata očituje u radu s učenicima s teškoćama u razvoju jer omogućuju različite oblike e-pristupačnosti, poput prilagodbe veličine slova i vrste fonta, inkluzivnih vizualnih prikaza te pretvorbe teksta u govor. Takve mogućnosti usklađene su s načelima univerzalnoga dizajna za učenje, čiji je cilj osigurati dostupnost obrazovnih sadržaja svim učenicima neovisno o njihovim individualnim sposobnostima i potrebama (Popova-Koskarova i sur., 2024; CARNet, *Priručnik za primjenu i izradu e-Škole scenarija poučavanja).*

Više je istraživanja u izvanhrvatskome kontekstu koja pokazuju pozitivne učinke informacijsko-komunikacijske tehnologije na proces učenja (Baytak, Tarman i Ayas, 2011; Delen i Bulut, 2011; Mayer, 2014), a Pisa istraživanje provedeno 2018. godine u Republici Hrvatskoj pokazuje postizanje boljih rezultata u čitalačkoj, matematičkoj i prirodoslovnoj pismenosti što dijete ranije započne s uporabom digitalne tehnologije (Markočić Dekanić i sur., 2019). Integracija digitalnih udžbenika u primarno obrazovanje donosi značajne prednosti u odnosu na tradicionalna tiskana izdanja, prvenstveno zbog mogućnosti sustavnoga osvježavanja informacija i aktualiziranja podataka, kako je predviđeno *Zakonom o udžbenicima i drugim obrazovnim materijalima za osnovnu i srednju školu* (NN 116/18). Digitalni udžbenici omogućuju integraciju videozapisa, audiozapisa i dinamičkih vizualizacija što pomaže u smanjenju kognitivnoga opterećenja kod složenih zadataka i olakšava razumijevanje apstraktnih fenomena (Popova-Koskarova i sur., 2024; CARNet, 2018). Korištenje interaktivnih dijagrama, simulacija i digitalnih alata potiče učenike na aktivnu ulogu u istraživanju sadržaja (Žuvić i sur., 2016). Ivančić (2026) navodi još nekoliko prednosti aktualnih digitalnih udžbenika u primarnome obrazovanju kao što su dostupnost, jednostavnost korištenja za učenika, učitelja, ali i roditelja, snažnija metodička oblikovanost, mogućnost povratne informacije učeniku, integracija multimedijskih sadržaja.

Unatoč njihovim tehnološkim prednostima, znanstvena literatura ukazuje na ograničenja i izazove povezane s primjenom digitalnih udžbenika. Između ostaloga, Peras i sur. (2023) navode da uspješno korištenje digitalnih udžbenika ovisi o stabilnoj infrastrukturi i dostupnosti uređaja za svakog učenika. Nedostatak tableta ili loša internetska veza mogu produbiti obrazovne nejednakosti među učenicima različitoga socioekonomskog statusa, a tehnički problemi mogu značajno ometati fluidnost nastavnoga sata. Učinkovitost digitalnoga udžbenika u poučavanju izravno ovisi o metodičkoj pripremljenosti učitelja. Nedostatak digitalnih kompetencija ili otpor učitelja prema tehnologiji mogu rezultirati time da se digitalni udžbenik koristi samo kao digitalna kopija tiskane knjige, čime se gubi njegova dodana vrijednost (CARNet, 2018).

Digitalni udžbenici predstavljaju jedan od ključnih čimbenika digitalne transformacije suvremenoga obrazovnog sustava jer omogućuju integraciju digitalnih tehnologija u proces poučavanja i učenja te pridonose razvoju suvremenih obrazovnih pristupa. S obzirom na njihovu sve značajniju ulogu u nastavnoj praksi, važno je sustavno analizirati njihove prednosti, ali i potencijalne nedostatke i izazove povezane s njihovom

primjenom. Učitelji razredne nastave imaju ključnu ulogu u digitalnoj transformaciji jer su prvi posrednici između djeteta i digitalnoga sadržaja u formalnom obrazovanju. Primarno obrazovanje ključno je razdoblje za razvoj informacijske pismenosti i kritičkoga razmišljanja potrebnoga za njezinu upotrebu, stoga je nužno ispitati prediktore učestalosti korištenja digitalnih udžbenika kao metodičkoga čimbenika digitalne transformacije.

Metodologija

Cilj istraživanja

Cilj istraživanja bio je ispitati učestalost korištenja digitalnih udžbenika u nastavi Hrvatskoga jezika među učiteljima razredne nastave te utvrditi utječu li godine rada u struci, stupanj napredovanja u zvanju i procjene vlastitih digitalnih kompetencija na učestalost korištenja digitalnih udžbenika.

Istraživački problemi

1. problem

Ispitati može li se učestalost korištenja digitalnih udžbenika u nastavi Hrvatskoga jezika predvidjeti na temelju godina rada u struci, napredovanja u zvanju i procjene vlastitih digitalnih kompetencija učitelja.

(H1) Učitelji koji procjenjuju svoje digitalne kompetencije višima, koji imaju viši stupanj napredovanja u zvanju i imaju duži staž češće se koriste digitalnim udžbenicima u nastavome procesu.

2. problem

Ispitati postoji li statistički značajna razlika u učestalosti korištenja digitalnih udžbenika učitelja razredne nastave s obzirom na platformu na kojoj su digitalni udžbenici oblikovani i povezanost s razredom u kojem poučavaju.

(H2) Ne postoji značajna razlika u učestalosti korištenja digitalnih udžbenika među učiteljima razredne nastave s obzirom na platformu ili razred u kojem poučavaju.

3. problem

Ispitati mišljenje učitelja o prednostima i nedostatcima digitalnih udžbenika za razrednu nastavu u predmetu Hrvatski jezik po kojima poučavaju u nastavi.

(H3) Učitelji razredne nastave kao prednost češće ističu postojanje sadržaja za motiviranje učenika na učenje i mogućnost povratne informacije učenicima u digitalnim udžbenicima. Učitelji razredne nastave kao nedostatke češće ističu to što svaki učenik nema osobno računalo.

Uzorak

Istraživanje je provedeno na prigodnom uzorku učitelja razredne nastave u Republici Hrvatskoj. U istraživanju su sudjelovali učitelji iz svih županija, a prikupljanje podataka provedeno je anketnim upitnikom posredstvom društvenih mreža. Sudjelovanje ispitanika bilo je dobrovoljno i anonimno.

Instrument

Za potrebe istraživanja izrađen je izvorni anketni upitnik u alatu *Microsoft Forms*. Upitnik je obuhvaćao pitanja o sociodemografskim obilježjima ispitanika te o korištenju digitalnih udžbenika, digitalnim kompetencijama i percepciji njihovih prednosti i nedostataka. Prije glavnoga istraživanja stručnu procjenu sadržajne valjanosti instrumenta proveli su stručnjaci iz područja obrazovnih znanosti (konsenzusna validacija).

Rezultati

U istraživanju je sudjelovao 301 učitelj razredne nastave iz svih županija Republike Hrvatske. Osnovna obilježja uzorka prikazana su u Tablici 1.

Tablica 1

Na početku je ispitan oblik distribucija analiziranih varijabli kako bi se utvrdilo njihovo odstupanje od normalne distribucije. Za potrebe istraživanja korišteno je šest varijabli, a u nastavku se prikazuju njihova osnovna obilježja. Deskriptivni pokazatelji kontinuiranih varijabli prikazani su u Tablici 2. Prva varijabla, učestalost korištenja digitalnih udžbenika u nastavi Hrvatskoga jezika provjeravana je pitanjem „Koliko se često koristite digitalnim udžbenicima u nastavi Hrvatskoga jezika?" i bilo je šest mogućih odgovora: 1 – *ne koristim se digitalnim udžbenicima*, 2 – *jednom mjesečno*, 3 – *dva do tri puta mjesečno*, 4 – *jednom tjedno*, 5 – *dva do tri puta tjedno* i 6 – *svaki dan*. Druga varijabla, digitalne kompetencije provjeravana je pitanjem „Procijenite stupanj svojih digitalnih kompetencija" i bila su četiri moguća odgovora: 1 – *posjedujem iznimno dobre digitalne kompetencije*, 2 – *posjedujem dobre digitalne kompetencije*, 3 – *moje su digitalne kompetencije loše* i 4 – *nisam digitalno kompetentna/kompetentan*. Kako bi viši rezultat značio bolju kompetentnost pri računanju prosjeka na ovoj varijabli, varijabla je prije obrade podataka prekodirana obrnutim redoslijedom odnosno 1 dobiva značenje *nisam digitalno kompetentna/kompetentan*, a 4 *posjedujem iznimno dobre digitalne kompetencije* te je sukladno tome promjena izvršena i na ostalim stupnjevima. Treća je varijabla staža koja ima četiri stupnja te je ona kao i četvrta varijabla napredovanja, također od četiri stupnja, već djelomično razrađena i opisana u strukturi uzorka. Preostale dvije varijable imaju nominalna značenja te su prikazane isključivo u Tablici 1: korištena platforma i razred u kojem se izvodi nastava.

Tablica 2

Dobiveni rezultati kontinuiranih varijabli pokazuju da se sve varijable statistički značajno razlikuju od normalne raspodjele, no bez obzira na to, zakrivljenost i spljoštenost distribucija daleko su od graničnih vrijednosti te je broj ispitanika dovoljan da se obrada i dalje može napraviti korištenjem parametrijskih statističkih analiza.

Kako bi se ispitalo može li se na temelju godina rada u struci, napredovanja u zvanju i procijenjenoj razini digitalnih kompetencija predvidjeti učestalost korištenja digitalnih udžbenika u nastavi Hrvatskoga jezika (1. problem), provedena je multipla linearna

regresijska analiza metodom Enter. Varijable godine rada u struci i napredovanje u zvanju izvorno su bile prikupljene u obliku kategorija, no za potrebe provedbe regresijske analize tretirane su kao ordinalne numeričke varijable. Takav pristup omogućio je uključivanje navedenih varijabli u regresijski model te ispitivanje njihova doprinosa objašnjenju učestalosti korištenja digitalnih udžbenika u nastavi Hrvatskoga jezika. Prije provedbe multiple linearne regresijske analize provjerene su pretpostavke za njezinu primjenu. Analiza korelacija pokazala je postojanje povezanosti između kriterijske varijable i jednoga od prediktora, odnosno procijenjenih digitalnih kompetencija ($r = ,186$, $p = ,001$). Neovisnost pogrešaka provjerena je Durbin-Watsonovim koeficijentom, pri čemu je dobivena vrijednost od 1,94, što upućuje na nepostojanje autokorelacije reziduala. Multikolinearnost nije predstavljala problem jer su vrijednosti tolerancije bile veće od ,10 (0,819 – 0,919), a VIF vrijednosti manje od 10 (1,088 – 1,221). Dijagnostika kolinearnosti dodatno je pokazala da indeks uvjetovanosti nije prelazio kritičnu vrijednost 30 (CI = 20,15). Stoga su zadovoljene pretpostavke za provedbu multiple linearne regresijske analize. Regresijski model pokazao se statistički značajnim, $F(3,297) = 3,82$, $p = ,010$. Ukupno je objašnjeno 3,7 % varijance učestalosti korištenja digitalnih udžbenika ($R^2 = ,037$), dok je prilagođeni koeficijent determinacije iznosio ,027. Dobiveni rezultati upućuju na to da skup prediktora ostvaruje statistički značajan, ali relativno malen doprinos objašnjenju učestalosti korištenja digitalnih udžbenika (Tablica 3.).

Tablica 3

Analiza pojedinačnih regresijskih koeficijenata pokazala je da je procijenjena razina digitalnih kompetencija jedini statistički značajan prediktor učestalosti korištenja digitalnih udžbenika ($\beta = ,187$, $t = 3,07$, $p = ,002$). Pozitivan smjer odnosa ukazuje na to da učitelji koji svoje digitalne kompetencije procjenjuju višima češće koriste digitalne udžbenike u nastavi Hrvatskoga jezika. Godine rada u struci ($\beta = ,012$, $t = 0,19$, $p = ,852$) i napredovanje u zvanju ($\beta = ,048$, $t = 0,81$, $p = ,421$) nisu se pokazali statistički značajnim prediktorima učestalosti korištenja digitalnih udžbenika.

Hipoteza je djelomično potvrđena. Od tri ispitivana prediktora jedino su se digitalne kompetencije pokazale značajnim prediktorom učestalosti korištenja digitalnih udžbenika u nastavi Hrvatskoga jezika. Godine rada u struci i napredovanje u zvanju nisu značajno doprinosili objašnjenju učestalosti korištenja digitalnih udžbenika. Iako je regresijski model bio statistički značajan, objašnjena varijanca bila je relativno mala, što upućuje na postojanje dodatnih čimbenika koji utječu na korištenje digitalnih udžbenika u nastavi.

Kako bismo odgovorili na drugi istraživački problem, odnosno provjerili postoji li statistički značajna razlika u učestalosti korištenja digitalnih udžbenika učitelja razredne nastave s obzirom na platformu na kojoj su digitalni udžbenici oblikovani i povezanost s razredom u kojem poučavaju, koristili smo testiranje razlike između nezavisnih skupina i koeficijent korelacije. Za potrebe analize učestalosti korištenja digitalnih

udžbenika s obzirom na platformu na kojoj su oblikovani, obrada je provedena samo na onim ispitanicima koji su koristili isključivo jedan digitalni udžbenik: e-sfera (N = 82), IZZI (N = 72) i *mozaBook* (N = 21). Zbog smanjenoga broja ispitanika nije korištena jednostavna analiza varijance nego neparametrijski ekvivalent, Kruskall-Wallisov test. Smanjeni broj ispitanika više nije dozvoljavao upotrebu parametrijske statistike bez obzira na Kolmogorov-Smirnov test i niske mjere zakrivljenosti i spljoštenosti. Kod dijela problema koji se odnosi na razred u kojem učitelji izvode nastavu izostavljeni su oni učitelji koji izvode nastavu u mješovitim razredima te je ukupan broj ispitanika koji je ušao u obradu u ovome dijelu 268. I ovdje je zbog smanjenoga broja ispitanika korišten neparametrijski, Spearmanov koeficijent korelacije. Rezultati su pokazali su da postoji statistički značajna razlika ($Z(2) = 7{,}80$; $p < {,}05$) u učestalosti korištenja digitalnih udžbenika učitelja razredne nastave s obzirom na platformu na kojoj su digitalni udžbenici oblikovani. Kako bismo utvrdili između kojih parova postoji statistički značajna razlika, provedeni su zasebni Mann Whitney U testovi (Tablica 4.).

Tablica 4

Dobiveni rezultati pokazuju da postoji statistički značajna razlika u učestalosti korištenja digitalnih udžbenika za korisnike IZZI udžbenika i e-sfere ($Z = -2{,}19$; $p < {,}05$) te *mozaBooka* ($Z = -2{,}36$; $p < {,}05$) dok se e-sfera i *mozaBook* ne razlikuju ($Z = -0{,}94$; $p > {,}05$) statistički značajno. Kako bismo utvrdili u kojem smjeru idu dobivene razlike, na Slici 1 prikazani su medijani i aritmetičke sredine za učestalost korištenja digitalnih udžbenika ove tri skupine platformi.

Slika 1

Rezultati donose informaciju da je korištenje digitalnih udžbenika kod korisnika IZZI udžbenika niže od onoga kod korisnika e-sfere i *mozaBooka*. Time prvi dio hipoteze (H2) nije potvrđen jer smo pretpostavili da neće biti razlike u učestalosti korištenja digitalnih udžbenika s obzirom na platformu na kojoj su oblikovani. Drugi dio problema potvrdio je našu hipotezu jer smo Spearmanovim koeficijentom korelacije ($r(268) = -{,}06$; $p > {,}05$) pokazali da nema statistički značajne povezanosti učestalosti korištenja digitalnih udžbenika učitelja razredne nastave s razredom u kojem učitelj poučava.

U istraživanju je 211 ispitanika odgovorilo na otvoreno pitanje o procjeni prednosti digitalnih udžbenika hrvatskoga jezika po kojem izvode nastavu. Odabran je udžbenik najzastupljenijega nastavnog predmeta s najvećom satnicom u primarnom obrazovanju te najopsežnijega sadržaja. Ispitanici su mogli navesti više prednosti. Odgovori su objedinjeni u nekoliko kategorija i vidljivi su u Tablici 5.

Tablica 5

Nadalje, s pet do devet pojedinačnih odgovora zastupljeni su sljedeći odgovori: postojanje videozapisa, kvizova i zvučne čitanke, mogu se projicirati na velikom platnu, izvrsni su za PIV, brzina povratne informacije. Manje od pet puta učitelji su navodili

i sljedeće prednosti: lako snalaženje, poveznice, razvijaju kreativnost i inovativnost, praktični su, pristupačni su i jasni, imaju velik izbor sadržaja, učenici brže usvajaju sadržaje, zanimljiva je provjera znanja, imaju PPT, zadatci su poticajni, kvalitetni su nastavni listići u *Wordu*, dobra je povezanost sadržaja, drukčija je dinamika sata, moderni su i efikasni.

Može se smatrati da je treća hipoteza (H3) djelomično potvrđena jer je motiviranost, kao jedna od prednosti, rangirana na četvrto mjesto navedenih prednosti. Više od motiviranosti učitelji kao prednost digitalnih udžbenika navode zanimljivost, dostupnost i objedinjenost.

U istraživanju je 182 ispitanika odgovorilo na otvoreno pitanje o procjeni nedostataka digitalnih udžbenika u nastavi Hrvatskoga jezika. Od toga je broja 44 ispitanika napisalo da nema nedostataka. To znači da je od 301 ispitanika njih 138 iskazalo neki nedostatak digitalnoga udžbenika što iznosi 45,85 %. Značajan broj odgovora usmjeren je na nedostatak tehničke opremljenosti škola ili učenika (loša internetska veza – 19 odgovora i učenici nemaju tablete – 7 odgovora). Ostali odgovori usmjereni su na sadržaj digitalnih udžbenika i zastupljeni su od jednoga spominjanja do maksimalno tri spominjanja istoga nedostatka. Odgovori učitelja su kako slijedi: nedostatak jezičnih sadržaja, zadatci trebaju biti zahtjevniji, sadržaji su slični, nema zamjene za učitelja, nedostaje sadržaja za ponavljanje i vježbanje (3), sadržaji predočeni ikonama nisu dostupni, učenici mogu imati problema s vidom, učenici provode previše vremena uz računalo, potreban je veći font, nedostaje videozapisa, loša je zvučna čitanka (2), nedostaje sadržaja za izražavanje i stvaranje, nedostaje materijala, neki zadatci nisu razrađeni, ne bi smjeli imati prevlast pred klasičnim udžbenikom, sadržaj je nepregledan, kompliciran je pristup sadržajima, digitalni udžbenici nisu potrebni za hrvatski jezik, sve treba biti na jednom mjestu, nedostaje sadržaja za medijsku kulturu, kvizovi moraju imati više korelacije, ne može se raditi u skupinama, sadržaj se ne može mijenjati, zahtjevna aktivacija udžbenika, crtovlje nije primjereno, neka su rješenja pogrešna, nije za mlađe učenike, nije sve metodički korektno, zvučni zapisi moraju biti bolji, ne prate stranice udžbenika (1). U navođenju nedostataka digitalnih udžbenika može se reći kako hipoteza (H3) nije potvrđena budući da se učitelji nisu u većem broju izjasnili da je jedan od bitnih nedostataka to što svaki učenik nema osobno računalo.

Diskusija i zaključak

U ovome se radu ispitivala učestalost korištenja digitalnih udžbenika u nastavi Hrvatskoga jezika među učiteljima razredne nastave te doprinos godina rada u struci, stupnja napredovanja u zvanju i procjene vlastitih digitalnih kompetencija objašnjenju varijabiliteta njihove uporabe. Dodatno, analizirale su se razlike u učestalosti korištenja digitalnih udžbenika s obzirom na platformu na kojoj su oblikovani te učiteljske procjene prednosti i nedostataka njihove primjene u nastavi Hrvatskoga jezika.

Rezultati istraživanja pokazali su da je prva hipoteza djelomično potvrđena. Iako se pretpostavljalo da će učestalost korištenja digitalnih udžbenika u nastavi Hrvatskoga

jezika biti veća među učiteljima s duljim radnim stažem, višim stupnjem napredovanja u zvanju i višom procjenom vlastitih digitalnih kompetencija, značajnim prediktorom pokazala se isključivo procjena digitalnih kompetencija. Drugim riječima, učitelji koji svoje digitalne kompetencije procjenjuju višima češće koriste digitalne udžbenike u nastavi Hrvatskoga jezika. Takav rezultat upućuje na važnost subjektivnoga osjećaja osposobljenosti i sigurnosti pri korištenju digitalnih udžbenika kao metodičkoga čimbenika digitalne transformacije. Učitelji koji procjenjuju da raspolažu potrebnim znanjima i vještinama vjerojatnije će digitalne udžbenike uključivati u svakodnevni nastavni proces. S druge strane, izostanak značajnoga doprinosa godina rada u struci sugerira da duljina profesionalnoga iskustva sama po sebi ne određuje spremnost na korištenje digitalnih udžbenika. Time se potvrđuje pretpostavka da digitalna transformacija obrazovanja postupno nadilazi tradicionalne generacijske podjele među učiteljima. Jednako tako, činjenica da napredovanje u zvanju nije povezano s češćim korištenjem digitalnih udžbenika može upućivati na to da formalno profesionalno napredovanje nužno ne uključuje sustavno razvijanje kompetencija za primjenu digitalnih obrazovnih sadržaja u nastavi. Iako je regresijski model bio statistički značajan, relativno mali udio objašnjene varijance upućuje na postojanje dodatnih čimbenika koji utječu na učestalost korištenja digitalnih udžbenika. Moguće je pretpostaviti da važnu ulogu imaju organizacijski i kontekstualni čimbenici, poput dostupnosti informacijsko-komunikacijske infrastrukture, tehničke podrške, dostupnosti uređaja učenicima, školskoga poticanja upotrebe digitalnih sadržaja, prethodnih iskustava učitelja te njihovih stavova prema digitalnim tehnologijama. Buduća bi istraživanja stoga trebala obuhvatiti širi skup prediktora kako bi se cjelovitije objasnili obrasci korištenja digitalnih udžbenika u nastavi.

Dobiveni nalazi sugeriraju da obilježja samih digitalnih platformi mogu imati važnu ulogu u njihovoj učestalijoj primjeni. Razlike u korisničkom sučelju, dostupnosti interaktivnih sadržaja, mogućnostima prilagodbe nastavnim potrebama, kvaliteti multimedijskih elemenata ili tehničkoj funkcionalnosti mogu utjecati na učiteljevu odluku o tome koliko će određeni digitalni udžbenik integrirati u nastavni proces. Iako ovim istraživanjem nije obuhvaćena analiza specifičnih karakteristika pojedinih platformi, dobiveni rezultati ukazuju na potrebu njihova detaljnijega ispitivanja. Suprotno tomu, nije utvrđena statistički značajna povezanost između učestalosti korištenja digitalnih udžbenika i razreda u kojem učitelji poučavaju. Ovaj nalaz potvrđuje pretpostavku da se digitalni udžbenici koriste podjednako u svim razredima razredne nastave te sugerira da razvojne i kurikulne specifičnosti pojedinoga razreda ne predstavljaju ograničavajući čimbenik njihove primjene. Takav rezultat može se tumačiti i činjenicom da su digitalni udžbenici danas osmišljeni tako da prate sadržajne i metodičke zahtjeve svih stupnjeva obrazovanja.

S obzirom na analizu prednosti i nedostataka digitalnih udžbenika koje su učitelji naveli najviše ih kao prednost navodi zanimljivost, dostupnost, objedinjenost (sve na

jednom mjestu) te kako sadržaj tako oblikovanih udžbenika utječe na motiviranost učenika. Kao nedostatak najviše navode smanjenu tehničku opremljenost škole, iako je velik broj ispitanika dodatno odgovorio da nema nedostataka. Analizom nedostataka koje navode učitelji dolazi se do zaključka da su učitelji usmjereni uglavnom na tehničke nedostatke, a manje na one sadržajne. Time se potvrđuje da uspješna integracija digitalnih udžbenika ne ovisi isključivo o spremnosti učitelja, nego i o materijalnim i organizacijskim uvjetima u kojima se nastava odvija. Sve navedeno, uz podatak da je od 301 ispitanika njih osam odgovorilo da se ne koriste digitalnim udžbenicima u nastavnome procesu, pokazuje da se danas učitelji koriste digitalnim udžbenicima u primarnome obrazovanju. Udio njihova korištenja nije uvjetovan godinama staža ili napredovanjem u zvanju, a digitalnim se udžbenicima koriste učitelji neovisno kojim se tiskanim udžbenicima koriste u procesu poučavanja. Učitelji Republike Hrvatske u 21. stoljeću ističu kvantitativno više prednosti nego nedostataka uporabe digitalnih udžbenika, ali se na temelju pitanja otvorenoga tipa može ustanoviti da su svjesni nedostataka. Rezultati istraživanja koji pokazuju da učitelji kao nedostatke u većini ističu tehnički aspekt, ukazuju da su udžbenici sadržajno uglavnom zadovoljili stručna očekivanja učitelja.

Digitalni udžbenici postali su neizostavni element u procesu poučavanja. Stoga bi bilo uputno snažnije uključivanje u razmatranje prednosti i nedostataka digitalnih udžbenika svih znanstvenih disciplina koje proučavaju njih i njihovu primjenu u nastavnom procesu. S tim je ciljem (evaluacije kvalitete, tehničkoga i metodičkoga oblikovanja digitalnih udžbenika u primarnom obrazovanju) uspostavljen sveobuhvatan i temeljit kategorijalni aparat za metodičku analizu digitalnih udžbenika (Ivančić, 2026). S obzirom na administrativnu poziciju digitalnoga udžbenika kao obveznoga nastavnog sredstva zaključuje se da je digitalni udžbenik nezaobilazan metodički čimbenik digitalne transformacije obrazovnoga sustava.

Ograničenja istraživanja

Ovo istraživanje ima nekoliko ograničenja koja je potrebno uzeti u obzir pri interpretaciji dobivenih rezultata. Prije svega, uzorak je formiran primjenom prigodnoga načina uzorkovanja, a upitnik je distribuiran putem profesionalnih grupa na društvenim mrežama namijenjenih učiteljima razredne nastave i drugim odgojno-obrazovnim djelatnicima. Iako takav pristup omogućuje obuhvaćanje sudionika iz različitih dijelova Republike Hrvatske te olakšava pristup geografski disperziranoj populaciji, nije bilo moguće neovisno verificirati profesionalni status svakog pojedinog sudionika. Kako bi se navedeno ograničenje ublažilo, na početku upitnika jasno su navedeni cilj istraživanja i kriteriji za sudjelovanje, odnosno da je istraživanje namijenjeno učiteljima razredne nastave zaposlenima u osnovnim školama Republike Hrvatske. Dodatno, prikupljeni su relevantni sociodemografski podatci (radno mjesto, godine radnoga iskustva i županija zaposlenja), koji su omogućili provjeru prikladnosti uzorka. Analizom odgovora nisu

uočene nelogičnosti ni obrasci koji bi upućivali na sudjelovanje osoba izvan ciljane populacije. Nadalje, rezultati se temelje na samoprocjenama sudionika, što može biti povezano s pristranošću društveno poželjnih odgovora i subjektivnim procjenama vlastitih stavova i iskustava. Zbog navedenih ograničenja dobivene nalaze nije moguće generalizirati na cjelokupnu populaciju učitelja razredne nastave u Republici Hrvatskoj.

Napomena

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