

TRANSFORMATION OF PRINTED TEACHING MATERIALS INTO DIGITAL FORM

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ABSTRACT

The study focuses on the identification of criteria for the transformation of printed teaching texts and materials into digital form. Based on the identified criteria, the goal is to upgrade the form of printed teaching texts, in accordance with the needs of education in the 21st century, into a digital form. In order to increase the level of competence of teacher students in the field of handling digital platforms, work with digital resources was included in a specific subject in their undergraduate preparation for higher education. The output of the study is a concrete demonstration of the transformation of printed content into digital form and the presentation of data of a group of students educated in the field of handling digital resources during their undergraduate training in a specific subject.

KEYWORDS

Education for the 21st century, digital learning materials, print learning materials, digitization, undergraduate training

1. INTRODUCTION

The preparation of a teacher for the implementation of a lesson with the involvement of ICT has its specifics, but it proceeds almost the same as the preparation for any other lesson and is undoubtedly an integral part of the education and training process. It is based on pedagogical documents, without a precisely defined form. According to Roubal [1], the teacher adjusts and adapts it using his own resources. Its length and intensity primarily depends on whether the teacher decides to incorporate some of the already created available methodological and educational materials, or to create new ones. In the first case, before the actual inclusion of the selected material, it is necessary to subject it to a rigorous critical analysis focusing on the content and didactic nature of the material, assessment of its suitability, appropriateness, adequacy, consideration of the scope of use, or the need for modification or addition [2]. In the second case, it is necessary to emphasize the difficulty of the process of creating one's own, didactically adequately adapted material, presented with the help of ICT, compared to editing materials created by someone else. According to Hlavatý [3], the collection and processing of information, stimuli, elements, the compilation and selection of engaging content, the selection of suitable technologies, or the incorporation of interactive elements are particularly demanding on expertise and time. Roubal [4] agrees with this opinion and adds that the above-average development of digitization and the gradual introduction of information and communication technologies into the pedagogical environment also brings with it the need to use digital teaching materials, such as: workbooks and sheets, open educational resources, electronic learning materials, digital libraries, educational portals, learning objects, multimedia learning resources, e-learning materials. Although it is a relatively time-consuming process, the return on this time investment tends to be relatively high in the future, since modified or newly created material, if it is modified or

compiled in accordance with all didactic principles and principles, the teacher is able to use it repeatedly in the teaching process, possibly with minor changes or additions [5]. The constant development of information and communication technologies - now common means used by students, their family members, but also teachers, in the form of tools designed for communication or processing, storing, making available information, continuously affects the private and public life of each individual to the same extent. A pedagogue wishing and calling for a change in the implementation of lessons in a classic, outdated form should therefore be able to realize the given fact and be able to work with it effectively [6]. When working with ICT in teaching, the teacher must be aware that the focus of the work should rest on the student, who should be able to subject the available resources to a critical evaluation after guidance and to respect and identify with the rules of safe handling of information, hardware, software [7]. Today, the student often has much greater skills in manipulating the computer than the teacher himself, which can be a great benefit, especially if the teacher will be able to incorporate the student's outputs into the learning resources in the future, whether in the form of photo documentation from the excursion, various other visual documentation, video, graph, table or project [8]. Undoubtedly, durability and the possibility of repeatedly connecting the created materials, continuous editing, easy sharing thanks to electronic distribution, economic efficiency, or space-saving storage can be considered a big positive[9].

2. ICT AND THE EDUCATIONAL PROCESS

One of the forms of processing printed teaching materials into digital form is a website. In the 21st century, the century of technical progress and social networks, creating a high-quality, engaging website, dynamically responding to the stimuli and needs of society, is probably as difficult as being able to make it visible after its publication and later constantly update it or manage it functionally [10]. Perhaps that is also why its creation was initially narrowly specified for experienced experts, who have the necessary modern material and software equipment. Today, not only viewing information shared on the Internet in various graphic forms, but also publishing it, can become a routine activity of each one of us [11]. There is not one, but a large number of different publications dedicated to this issue, offering various instructions, methods, topics, with the help of which even a less experienced individual can create such a website, which makes available to its visitors content of a different nature in high graphic editing [12]. However, the degree of their topicality remains questionable, if we take into account the daily increasing new knowledge in the field of science and technology, the constant creation of new programs by programmers, or the rapid development of the Internet. Implementing work with ICT in teaching requires a certain skill on the part of the teacher. However, if he has it, he can design a class that is engaging for the student, inspiring for the colleague and innovative in its complexity [13]. But he must also take into account that working with a computer, browsing various websites, viewing videos, photos, sharing information, communicating on social networks is something that almost every student can master these days. Even something that normally fills more than 50% of his free time. Some of them can even create and run their own YouTube channel, website, blog, etc., most often used to promote themselves or a certain hobby [14]. If the teacher takes all of this into account and is able to offer the student knowledge in the subject that he teaches in a form that the student is practically used to and which is more than close to him, it can be counted on that the rate of their adoption will also be higher [15]. At the same time, by introducing ICT elements into teaching, the educational impact on the student will be greatly improved - unknown knowledge will be presented to the student in a form close to the tools chosen by the teacher, which will enable him to learn it more easily. But their choice must not be a matter of chance. The pedagogue should choose them mainly on the basis of what goal he wants to achieve by involving them in teaching [16]. Not all educators have mastered working with the various available programs, so they cannot even include it in teaching. They often do not even know about ICT elements that they could include in the process of education and training, not to

mention that only few of them are able to create their own ICT tool, which would be equally functional and helpful. At the same time, most schools have the necessary technical equipment for working with them [17]. There are several browsers making available to Internet users a huge number of different themed websites. Therefore, even finding one that could be used in teaching would definitely not be a big problem. Most students would probably appreciate the effort of a teacher who would make the presentation of the curriculum special by manipulating an ICT aid, perhaps even more so if he took the effort to create it himself [18]. Even a person untrained in the field can create a website by using various instructions, but if it is to be a website that will be used when working with students in the educational process, he must not only be proficient in computer manipulation, but also master didactic principles and principles. Therefore, before starting its creation, it is important to thoroughly think everything through, prepare materials, and plan [19].

2.1. Possibilities and Limits of Creating a Website for the Needs of Education

There are about as many website samples and templates available as there are real websites. The elements it will contain must be adapted to the content and nature of the entire page. There are several basic ones that serve to better orient visitors, which should be available on every existing and functioning website. If an Internet user opens a page that makes him feel unsure, confused or lost, he will very quickly leave it and look for another one. Therefore, every website should offer as clear a user interface as possible and should be easy to handle [20]. The transparency of the page is best ensured by its compiler if the main vertical or horizontal navigation bar directly directs the user to the content he is looking for [21]. The most important thing is the main content of the website, which should be created and finished in such a way that it is in accordance with the purpose and nature of the site. It is logical that the graphic design and quality of individual pages, which are influenced not only by the author's ideas, knowledge, skills, but also by the overall focus of the website, will be different. Behind each page stands a certain person who created it with a specific goal. The target adapted its content, which either became his personal presentation of himself, favourite activity, animal, or anything else in the form of a personal page, or promotion of his business in the form of a company or e-commerce page. HTML computer code is used to create most web pages. It is a hyperlink written using Hypertext Markup Language. But before the web creator starts working with it, it is necessary for him to adopt several main principles that should be in accordance with the purpose of the published page. There are websites available on the Internet today that offer the possibility of creating a new website online, so that the creation of pages in the form of HTML is replaced by the creation and publication on a web server. In this way, even a person who does not know programming can quickly design his own website, without having to work with graphic editors, HTML and FTP editors. Each user will be provided with several designs, templates, fonts, animations without having to leave the currently viewed page, thanks to which he is able to publish a finished and functional website within a few hours. However, certain limitations in the framework of creation, or the impossibility of completely adapting the website's visuals to the needs and ideas of its creator, can become a problem [22]. It is assumed that most pages will contain at least one text field after their publication, since each author mainly presents his thoughts, ideas, observations to the audience using it. None of the creators create a website randomly, but with a certain goal, that is, they can roughly estimate who will fall into the category of its followers and subscribers. The chosen font style should therefore be easy to read, its size should be adequate. If the text field will be named with a title, it should be highly visible and clearly distinguishable from the rest of the text [23]. Therefore, in addition to flawless grammatical execution, the text should also be adequately adapted in terms of style, size, and colour, primarily to the visual background, but also to the requirements of the visitors [24]. The way it works and the appearance of the web format when resizing in the browser window affect pixels. Their correct configuration can bring web users closer to its content in high resolution even on a small screen, for example a mobile phone

or tablet, which will allow working with the web not only on a computer set. The appearance of the website is what tends to impress the visitor's senses first and, later, has the most intense impact during browsing. Perhaps this is also the reason why, in some cases, we come across websites that are too stylistically expressive, abounding in a lot of elements, or colour scales of backgrounds or texts [25]. This does not mean that the creator of the page should not use colour or image templates when creating it, but that their use should be thoughtful, harmonious and gentle. In connection with the above, we often encounter a mistaken perception of the stylistically conservative direction of the web as a reflection of its boringly designed content, not as a manifestation of its author's ability to create a classically clean style [26]. The use of white as a background colour, in case of correct completion with colour scales of headings, subheadings, text fields, panels, margins, is still today considered the most effective means of web visibility and achieving its high efficiency [27]. Most often, web designers try to tie together a large number of different effects and styles, which ultimately divides the page and makes it cluttered. At the same time, the use and modification of a simpler page design, with the use of a maximum of three types of fonts and the placement of navigation elements on each subpage in the same place, does not require the use of special programs or a great degree of skill, and often becomes more attractive and sought-after for the visitor. It is also necessary to pay attention to the placement of the so-called of empty areas that can be applied to the entire website or only to its individual parts. However, their incorporation must not be meaningless. With the right implication, they become an important and irreplaceable creative element. If they were completely absent from the created page, the resulting published website could look chaotic and cluttered without them. If the page lacks blank areas, text fields become very difficult to read because of how much the text is crammed into them [28]. The creator can place several text fields on the website. It is advisable that they be shorter and more concise, separated by headings, subheadings, visual material, videos, or divided into several pages of the same website, connected by "next" and "back" buttons [29]. Before publishing itself, it is also a good idea to subject the site to a phase of grammatical proofreading of the content, preferably carried out by an expert, but also to check the overall size of images, HTML files, multimedia files, hypertext links enabling the transition from one place on the web to another, as well as from one page to another. It will be possible to modify the site after the publication of the website and only after noticing certain shortcomings, but such modifications will not benefit its publicity in any way [30]. In most cases, websites can be updated almost immediately without much effort. It is, without a doubt, an essential and integral part of them, much more important than the creation and publication of the page itself. Therefore, the website creator should not consider updating the page as an obligation, but a necessity, because his followers will constantly expect and demand regular data renewal, in accordance with the nature of the page and the current needs of the company. In the same way that it is important that the published content goes through regular updates, it is also important that the appearance of the page goes through it, as trends in the virtual world are subject to inexorably fast changes. The style that the author of the page decided to use when publishing it will probably be seen as outdated in a few months. It is therefore advisable to change the appearance of the site every six months. It doesn't have to be radical changes, even minimal modifications count. [31]. The creation of a time schedule for updating specific knowledge published on the web in the span of days, weeks, months, years can help the creator of the page to do this. It can also be interesting to insert a link "to the next update", which tells the visitor that the content just published will be completed or modified in the future. Personally, we consider the so-called as one of the most effective forms of attracting visitors and creating and maintaining their interest in the website. server map, a space within the page that allows you to view all its parts in one place, from which it is also possible to go to any of them, thanks to hyperlinks. Server maps can be created in different ways, in different formats and styles - for a better idea: the main areas of the site can be depicted as a series of road signs along the road in graphic format. In any form, however, they must be easily accessible, and the hyperlinks used in them should not only be fully functional, but also clearly visible. In combination with a properly created navigation panel, the website visitor

can then reach any part of it with a maximum of three clicks of the computer mouse. The server map can have any name for added impact. But it is more important that it is accessible after one click of the computer mouse in any part of the web [32]. In the event that the teacher wants to make the lesson special by including work with a certain website that he did not create, it is necessary for him to thoroughly study it and know its content, which is directly related to the ability to navigate it well and, above all, to know which of its parts will be able to engage and enrich not only the overall course of the lesson, but also the student's knowledge. He cannot include it in the process randomly, he must be sure in which phase of the lesson its involvement will be most appropriate and what goal the manipulation with it is to fulfill [33]. Working with a website created by the teacher himself is difficult in the phase of its compilation before publication, but from the point of view of the possibility of its constant change, finishing, updating and working with it, it is all the easier, because the teacher-compiler himself influences its form and selects the information made available [34]. The development of website concepts is constantly progressing. From the beginnings of publishing simple texts supplemented with images, it has moved to publishing diverse contents renovated with various multimedia. Today, the web creator has the opportunity to include a sound track, digital audio files, digital videos, analog videos, videos created using a web camera, animations in its published form [35]. In order to create a good website, it will never be enough to only master the HTML language or any other program that enables the creation of the web, even if at a high level. If we focus on a historically oriented page, its nature will always require the creator's ability to connect text fields with various visual elements, so that the viewer's awareness of the historical fact can be strengthened through direct observation [36]. There are quite a few historically tuned websites available on the Internet. However, the degree of their originality, plausibility, topicality, and truthfulness is different. It is possible to look for pages with a very similar thematic focus, often even identical, but also, on the contrary, very different, since history itself gives researchers a lot of stimuli for its investigation, grasping and interpretation. Each newly created website falling into this category can significantly enrich not only the individual who comes across it while browsing the Internet, but also the student manipulating it under the guidance of a teacher in the process of education and training [37].

2.2. Digital Teaching Material in the Form of a Website for the Subject of History

Suppressing the primary function of information and communication technologies, which make available various forms of digital information, be it sound, image, graphic or text, is not possible. As tools facilitating the work of obtaining, processing, storing and presenting information of various kinds, they also enable writing, drawing, illustrating, editing, reading, recording, photographing, playing, printing, sharing [38]. They can also direct the relationship between teacher and student to mutual cooperation during the lessons. In such a relationship, the teacher is situated in the role of a tutor and at the same time an advisor - coordinator, with broader powers for the application of an autonomous approach, verification of the student's knowledge, formative diagnosis, work in groups, but also individual work [39]. As a concrete example of transformed print content related to regional history within the history subject, a website available from 4/27/2022 at the following link: <https://odievanie-webjet-sk.webnode.sk/> from the author of the study can be cited. Since its first publication, it has been edited and supplemented several times. Even in the future, it cannot be ruled out that it will be updated, supplemented with content, or edited in cooperation with other educators dealing with the given issue. Each part of it and the overall content focus is adapted to the level of cognitive processes of a primary school pupil. The individual sections seamlessly follow each other and are a transformation of knowledge about Princess Oldenburg's clothing from archival and book-type print materials.



Figure 1. Introduction section.

INTRODUCTION SECTION – presents the created website to the visitor. This section contains basic instructions that must be respected when working with the site individually and within the classroom. In the event that an individual who is interested in its content has visited the page, he can move around it at will. However, if a teacher includes some part of the page in his own lesson, he should think carefully about the purpose of this activity, so that he can choose a specific part of the page appropriately. A smooth transition between sections is made possible by the sidebar offering: Introduction, Be sure to study this, You must at least look here, It won't hurt you to think, And here you can learn something more, Contact.

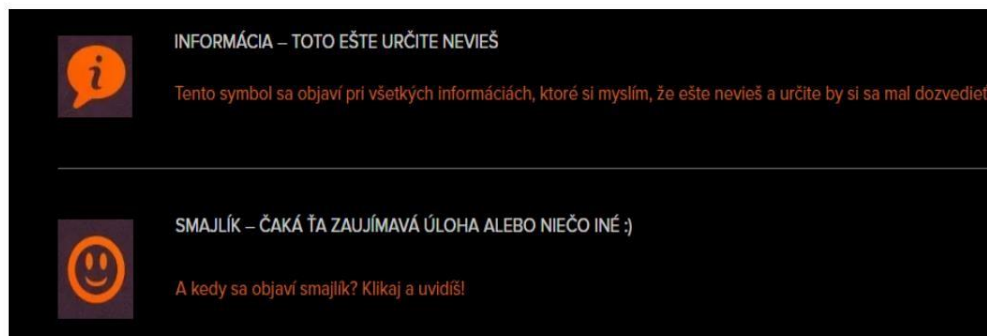


Figure 2. Information symbols.

In the introduction section, there is also a warning about two basic symbols that the visitor of the site will definitely encounter if he works with it. This is an "information" symbol, drawing attention to the teaching text, and a "smiley" symbol, drawing attention to the possibility of implementing a project, task, or answering a question.



Figure 3. Section Be sure to study this.

BE SURE TO STUDY THIS SECTION – offers the visitor a brief overview of the development of women's clothing from the middle and upper social classes during the 19th century. The primary task of this text is to attract attention to such an extent that the site visitor, a student in a school environment, acquires the desire to work with the site and get to know its entire content. By scrolling to the very end of this section, the viewer will be prompted to study something from the section It Won't Hurt You to Think. It can be accessed by simply clicking on the link highlighted in orange directly in the text. Under this link there is also a list of the most recently added articles, usually three. It is possible to choose one of them and click on it.



Figure 4. Section You have to at least look here.

THE SECTION YOU HAVE TO AT LEAST LOOK HERE – is a section offering additional tasks and assignments to the studied material. In this section, it is possible to analyze the offered photos, develop a project according to the assignment, come up with the name of your own project, or even develop a short online test.



Figure 5. Section It won't hurt you to think.

THE THINKING SECTION WILL NOT HARM YOU - concentrates all didactic material that can be used in real pedagogical practice. In the individual articles of this section, topics are prepared that can be directly implied in the history lesson. The teacher must carefully study the articles before engaging in teaching. Some of them also offer a directional button. After clicking on it, the site visitor will be redirected to another section. In some cases, multiple directional buttons are offered. In that case, it will depend on the individual preferences of the viewer which one he chooses. The analysis of Natalia Oldenburgova's clothes, elaborated in this work, is contained in the article titled Analyzing Natalia Oldenburgova's photographs.



Figure 6. Section A here you will learn something more.

SECTION AND HERE YOU WILL LEARN SOMETHING MORE – offers a list of recommended books related to the given issue, for the possibility, in case of interest, of studying the necessary information in detail.

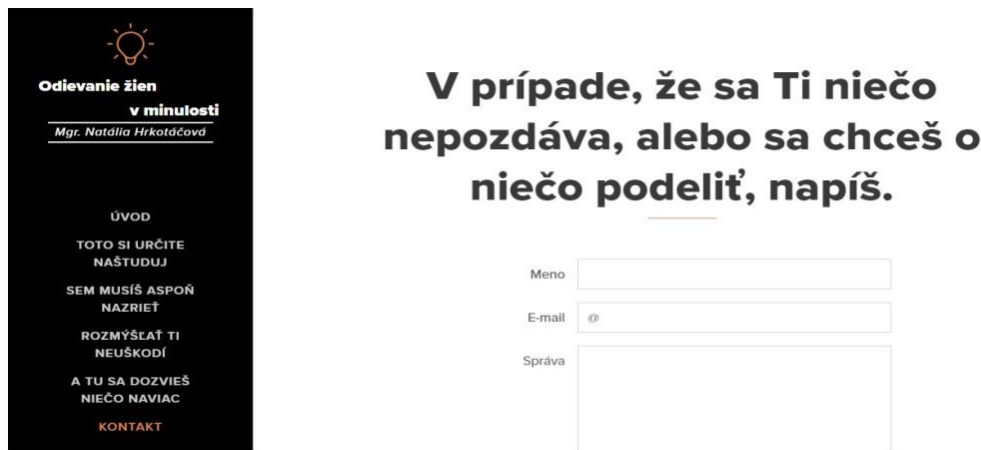


Figure 7. Contact section.

CONTACT SECTION – the expected future update of the site also requires feedback from its visitors, especially for possible elimination of its shortcomings. At the same time, this section makes available the possibility of easy contact for web viewers who would like to know and contribute to its editing or addition.

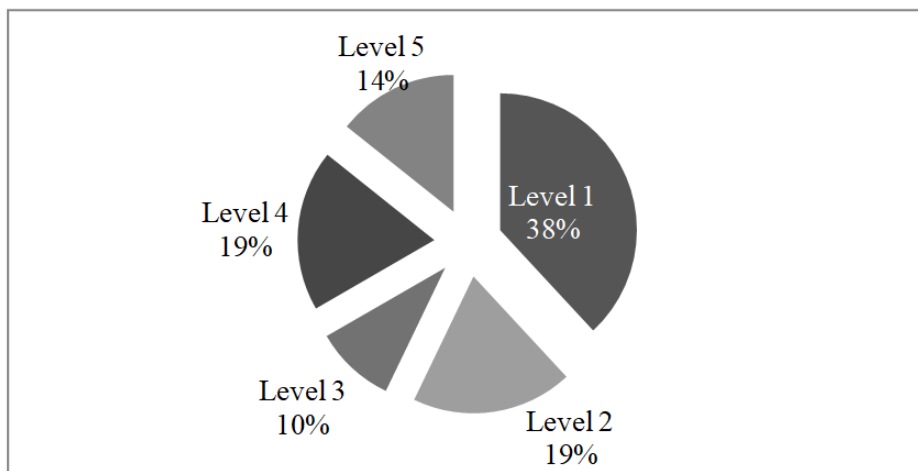
3. INCREASING THE DIGITAL SKILLS OF TEACHING STUDENTS WITHIN THEIR UNDERGRADUATE TRAINING

The continuous introduction of the most modern information and communication technologies into individual areas of education, especially into the process of upbringing and education, the training of teachers for the possibility of their active implementation in the teaching process, the creation of e-learning content, can be considered as one of the key factors in increasing the level of education in the Slovak Republic. Since we call today's society "information", based on the basic aspects of the civilized literacy of today's individual, one of the goals of a modern school can undoubtedly be considered to be the effort to teach a student teacher, as part of his undergraduate training, to effectively use and manipulate information and communication technologies in his future active practice. Among other things, it is also possible in this way to make the process of training a student teacher more efficient, who as a result should be able to use ICT effectively not only for their own study and preparation, but also in the daily learning process and the performance of the profession itself [40]. Students of teaching professions should be trained in several areas as part of their undergraduate training: moral, ethical, human qualities of personality, professional competence. An irreplaceable role in the whole process is played by the personality of the educator, who is expected not only to have a high professional level, but also to be able to respond to the constantly changing and constantly developing process of the permanent search for knowledge. In the whole process, the educator's personality is also important, as he is forced to accept and subsequently reflect changes in the content of study programs [41]. Certain skills, abilities, habits, i.e. competences acquired in the process of preparation for the teaching profession, also understood as a necessary prerequisite for handling various situations in the performance of the profession, need to be developed in educational practice. In it, the pedagogue should appear not only as one who plans, knows, organizes, determines, manages, decides, evaluates, but also as an inspiring, stimulating, helping, facilitating individual, creating suitable conditions for the overall development and cultivation of the student's personality [42]. According to Kasáčová, the undergraduate training taking place at the university level should be oriented towards the development of competencies in three basic

dimensions: a) personnel; b) professional; c) ethical. It is implemented on two levels: theoretical and practical. Theoretical training focuses on the acquisition and development of abilities, skills, and knowledge in the field of pedagogical, psychological and professional disciplines [43]. Practical, i.e. professional training, has the character of a residential or exit internship, which is mandatory to complete in order to complete the studies, to thoroughly prepare the student for inclusion in the educational reality [44]. As a result, the profile of the graduate should be a combination of personal and professional qualities of a teacher in the development phase of his professional maturation. Educators are automatically expected to incorporate the latest technologies, or to design and implement teaching strategies leading to the most effective learning possible for everyone, even for specific individuals. It is technologies that bring with them, including positives that facilitate functioning in the "age of digitization", both threats and challenges [45]. The undergraduate training of teacher students is carried out at the University of Constantine the Philosopher in Nitra through the study fields: Preschool and elementary pedagogy and Teaching for primary education. In the academic year 2023/2024, we incorporated work with ICT into the content of the subjects: Creation of teaching materials for teaching the Slovak language and literature and Basic grammar skills. In addition to working with printed forms of teaching materials, students had the opportunity to become familiar with digital platforms, methods of transforming printed content into digital form, limits and creation of their own platforms and websites. In an effort to determine the impact of such a teaching method on the digital competences of the students of the mentioned programs within the seminar groups, we carried out a measurement and comparison of input and output information and data literacy using the Europass measurement tool. The basic starting point was a thorough, well-thought-out, targeted selection of the sample set. It did not seem appropriate to make a random selection of individual students and also to "distribute" complete study groups for research purposes. Adequacy of the research sample was ensured by prioritizing the selection of compact groups of students - specific study groups, corresponding to the selection criteria: identical field of study, identical degree and semester of study, identical subject. The research sample was a combination of 77 students of the 1st year of the master's study program Teaching for Primary Education, with students of the 2nd year of the bachelor's study program Preschool and elementary pedagogy. Thanks to the europass research tool - an online test created by the European Union for the possibility of verifying the level of digital competences, it was possible to define digital competences for each student in 6 levels (level 1-6) and in five categories: Information and data literacy; Communication and collaboration; Creation of digital content; Troubleshooting; Security. After the development of 10 basic closed items by a specific student, from the area of all five categories, the system generated the necessary number of additional closed items, for the possibility of evaluating all five categories and defining the resulting level of the student's digital competences in each category separately and then in total. By evaluating all items, the system automatically assigned a level to the student's abilities in individual categories and comprehensively. Entrance testing of individual seminar groups of students took place at the beginning of the summer semester of the academic year 2023/2024. In all categories, students covered lower levels and showed poor results. They also achieved a particularly low entry level in the category Creation of digital content. Next, we present as an illustration the input data of the seminar group in the number of 21 students in the mentioned component.

Table 1. Input data of seminar group no. 1 in the Digital Content Creation component.

| Levels | Absolute frequency | Relative frequency | Relative frequency in % |
|---------|--------------------|--------------------|-------------------------|
| Level 1 | 8 | 0,38 | 38,10 |
| Level 2 | 4 | 0,19 | 19,05 |
| Level 3 | 2 | 0,10 | 9,52 |
| Level 4 | 4 | 0,19 | 19,05 |
| Level 5 | 3 | 0,14 | 14,29 |
| Level 6 | 0 | 0 | 0 |
| In all | 21 | 1 | 100 |



Graph 1. Input data of seminar group no. 1 in the Digital Content Creation component.

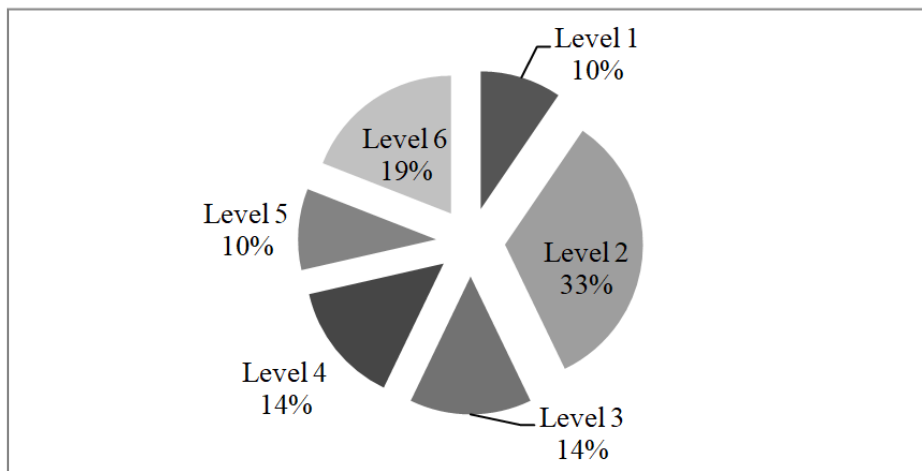
4. CONCLUSIONS

Modernization of the educational process is currently a necessity, especially in connection with the implementation of the reform of the content and form of education. As part of the concept "Education for the 21st century" in the Slovak Republic, in the field of education, emphasis is placed not only on education in cycles, connecting individual subjects, strengthening intersubject relationships, but also on increasing the level of information and data literacy of students and teachers. Modernization undoubtedly lies in the complexity of innovation in the content of education, methods, forms of educational work of the teacher and the school, the material and technical side of teaching, and therefore the manipulation of digital forms of teaching materials can clearly be considered as its form. Despite the large number of them available, the teacher also has the possibility of their own conception and subsequent creation. For this, however, it is necessary for him to know the principles of assembly and master the technique of creation. Adoption should occur in the process of undergraduate training. With an emphasis on teaching in the 21st century, the effort is to encourage not only students in their undergraduate training, but also current teachers to use digital teaching materials and digital textbooks when teaching at individual types of schools [46]. Information and communication technologies have gone through a process of great development since their inception. The 20th century can be considered the period of perhaps the greatest boom. In his 80s and 90s, it was precisely computers that caused the biggest breakthrough in the new understanding of society as an information society.

Technology is improving day by day and new innovations are constantly appearing. Under the influence of the changes at the end of the last millennium, the Slovak Republic became completely open to global influences and civilizational trends with the subsequent rapid development of the informatization of society [47]. Undoubtedly, educators must also be prepared to handle technology in practice. It is therefore essential that they have skills and abilities in the field of incorporating and working with ICT in teaching. In an effort to increase the low entry level of students in terms of their digital literacy, the content of the courses Creation of teaching materials for teaching the Slovak language and literature and Basic grammar skills during the semester was supplemented, in addition to printed forms of teaching materials, with manipulation of digital forms of teaching materials, work with digital content, mastering the creation of digital content using various platforms and programs. The selection of teaching material and the training of teaching methods was subject to data analysis, on the basis of which components were included in the seminar lessons of the tested groups of students, the application of which should be able to increase the level of output data comprehensively and in individual categories. In order to verify the efficiency of the process, we also implemented output testing. The entire research sample as part of the exit testing, which was carried out on May 7, 2024, consisted of an identical group of 77 students, just like in the entrance testing. Next, we present the output data in the Digital Content Creation component of the same seminar group as in the entrance testing data, in the same number – 21 students.

Table 2. Output data of seminar group no. 1 in the Digital Content Creation component.

| Levels | Absolute frequency | Relative frequency | Relative frequency in % |
|---------|--------------------|--------------------|-------------------------|
| Level 1 | 2 | 0,10 | 9,52 |
| Level 2 | 7 | 0,33 | 33,33 |
| Level 3 | 3 | 0,14 | 14,29 |
| Level 4 | 3 | 0,14 | 14,29 |
| Level 5 | 2 | 0,10 | 9,52 |
| Level 6 | 4 | 0,19 | 19,05 |
| In all | 21 | 1 | 100 |



Graph 2. Output data of seminar group no. 1 in the Digital Content Creation component.

The output data from the point of view of the acquired level of digital competences showed a significantly higher level of information and data literacy of students overall and in individual components. Output testing took place in an unchanged manner, using the same Europass research tool. It is clear from the acquired data that the incorporation and adoption of work with digital teaching materials was able to increase the level of digital competences of teacher students and thus make their undergraduate training more efficient. The ability to manipulate ICT components in the educational process can be considered one of the basic pillars of education. It is therefore necessary to educate students in this area as part of their undergraduate training.

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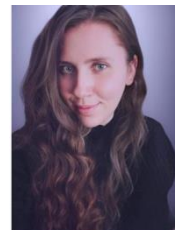
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