Developing a Digital Strategy for the Digitalization and Implementation of Remote and Combined Training in Restoration and Construction

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Abstract: three organizations have been involved in developing the digital strategy: Zalenieki Commercial and Craft School, Panevezys vocational education and training centre and Slovakia secondary vocational school of construction. Two experts from the Latvia University of Life Sciences and Technologies (hereafter – LBTU) were involved in the creation of the digital state. The digital strategy contains the description of the current situation in person and distance learning process, and previous experience in the use of e-learning systems. According to analysis of needs an action plan was drawn up by each school. The plan includes description of distance and blended learning in various modules, and further adult education. Schools have developed guidelines for the development of teaching materials for teachers. All principles were united by a common idea - an educational institution should have a unified student-friendly and future-oriented approach. Structure of e-learning platform was developed. The schools have chosen the most convenient structure based on the structure of the educational institution, or on another structure preferred by the teachers and the administration. In the digital strategy, an analysis of the needs in the digital sphere was conducted. In developing these needs in the digital sphere, the schools based on the results of the survey. During the survey, participants were asked to rate virtual image of the school, digital competencies, IT equipment of education institution and the ability to organize the learning process remotely. SWOT analysis was used to identify strengths, weaknesses, opportunities, and threats of each education institution. Despite the fact that distance learning in 2020 was an unplanned step, both teachers and students found both pros and cons in this process. Several IT tools and platforms have been mastered, but students do not have skills of self-directed learning, which could make the distance learning process more productive. The distance learning was the biggest challenge for profession teachers and students as to provide practical trainings of vocational subject online is very complicated or sometimes even impossible. The study aim is to introduce the creation of a digital strategy.

Keywords: digital strategies, blended learning, restoration, construction

Introduction

A digital strategy is a set of action plans to help achieve using technological resources the objectives set. Its design is not different from the system of a traditional strategy, but the main focus here is on the applicable digitalisation opportunities and their impact on processes and goals (The role of..., 2023).

The digital strategy contains the description of the current situation in person and distance learning process, and previous experience in the use of e-learning systems. Three organizations have been involved in developing the digital strategy: Zalenieki Commercial and Craft School from Latvia (Zaļenieku komerciālā un..., 2023), Panevezys Vocational Education and Training Centre from Lithuania (Vši Panevežio profesinio..., 2023), and Secondary Vocational School of Construction from Slovakia (SOS Technologii a remesiel, 2023). Two experts (Natalja Vronska and Jekaterina Smirnova) from the Latvia University of Life Sciences and Technologies (Latvia University of…, 2023) were involved in the creation of the digital state.

The first in person meeting of the Erasmus+ project "Smart School in restoration and construction industry" was held in Jelgava, at LBTU from August 25 to 27, 2021. Participants from three countries took part in it: Latvia - represented by Latvia University of Agriculture (now - Latvia University of Life Sciences and Technologies) and Zalenieki Commercial and Craft School; Lithuania – participants from Panevezys Vocational Education and Training Centre; Slovakia – representatives of Secondary Vocational School of Construction.

During the meeting, the partners introduced their educational institutions, as well as discussed about more important project guidelines, spoke about the stages and methodologies of developing a digital strategy; as well as took part in the training of teachers and administrative staff of partner schools, which was organized by LBTU. The training process was divided into two days and included the following topics: familiarization with the Moodle tool and its main functions, clarified what is an effective and meaningful virtual learning material. During the meeting, excursions were organized to the LBTU Technology and Knowledge Transfer Office (TEPEK, 2023) and the Scientific Institute of Plant Protection (Agrihorts, 2023).

During the first meeting, the first steps in the process of developing a digital strategy were made: the development of a digital strategy framework was started, and the seminar on the preparation of survey questionnaires for students, teachers, and entrepreneurs was organized. The project participants visited the Liepaja State Technical College (Liepājas Valsts tehnikums, 2023), where they could familiarize themselves with the good practice example of Moodle and the use of digital tools in distance learning in professional education.

<u>Several trainings</u> were organized for participants from Latvia, Lithuania and Slovakia. In the period from September 2021 to February 2022, participants were introduced to the following topics:
- digital marketing: branding and communication on digital platforms (Latvia);
- IT tools for creating digital learning materials: online IT tools (Lithuania);
- IT tools for creating digital learning materials: video and photo processing programs (Slovakia).

On March 29 and April 29, 2022, LBTU experts organized training for participants on digital hygiene, copyright, ergonomics, data security and network etiquette.

<u>The next meeting</u> was held at Lithuania, in Panevezys Vocational Education and Training Centre from April 20 to 22, 2022. The participants visited the international construction exhibition "Resta 2022" in the Lithuanian Exhibition and Congress Centre "Litexpo" (RESTA, 2022). At the exhibition it was possible to get acquainted with digital construction innovations, renewable energy resources and their application in private houses and renovation projects, possibilities of renovation of private houses and apartment buildings. Also, the activities implemented during the project and the results achieved were reviewed and summarized, as well as the upcoming activities of the project were planned and discussed.

Participants visited educational centres in Panevezys: STEAM Centre (Steam, 2023) and RoboLabs (RoboLabas, 2023), where students can familiarize themselves with the laws of nature, technology, engineering, mathematics and the latest inventions; they can experiment and create. Attractive educational activities help children and young people to be interested in complex sciences from an early age and then to choose related studies and careers, and the STEAM Centre will also provide opportunities for teachers to improve their qualifications.

<u>The next meeting</u> was held at Zalenieki Commercial and Craft school, where the conference "Craft. Digitization. Challenges" was organized to introduce smart solutions for the implementation of the learning process, developed e-learning materials. Guest lectures were organized on 1) virtual reality and artificial intelligence in the organization of distance learning, 2) restoration and reuse of resources, 3) opportunities provided by technology and knowledge in restoration processes. Jelgava Local Municipality held a transnational project meeting - work on project activities and overview of results.

The digital strategy consists of general information as well as mission, vision, values, strategic priorities, target audience and uniqueness of organization, strategic priorities in digitalization are defined, and examples of good practices are described here. The LBTU e-learning environment Moodle is taken as the basis (LBTU e-course categories, 2023). In the digital strategy are described results of VET (Vocational Education and Training) program revision. According to analysis of needs an action plan was drawn up by each organization. The plan includes plan and description of distance and blended learning in different VET programs, various modules, and further adult education. In the digital strategy were summarized common principles for creation of virtual training materials. Schools have developed guidelines for the development of teaching materials for teachers. All principles were united by a common idea - an educational institution should have a unified student-friendly and future-oriented approach. Structure of e-learning platform was developed. The schools have chosen the most convenient structure based on the structure of the educational institution, or on another structure preferred by the

teachers and the administration. In the digital strategy, an analysis of the needs in the digital sphere was conducted. In developing these needs in the digital sphere, the schools based on the results of the survey. SWOT analysis was used to identify strengths, weaknesses, opportunities, and threats of each education institution. In the digital strategy the algorithm (as an infographic) for students' preparation for distance, self-directed or blended learning and a reminder of what must be considered during distance, self-directed or blended learning was created (Digital strategies - examples..., 2022).

The study aim is to introduce the creation of a digital strategy.

Methodology

Zalenieki Commercial and Craft School (Latvia): surveying adults - school teachers and employers (number of respondents - 14), as well as surveying students of educational programs included in the project (number of respondents - 38). Secondary Vocational School of Construction (Slovakia) distributed questionnaires to a representative sample of students of 3rd and 4th years (number of respondents - 16). With the teachers answers of 12 teachers of professional subjects were analysed and with partner companies the school received answers from 5 providers of practical training. In Panevezys Vocational Education and Training Centre (Lithuania) the questionnaires were distributed between Panevezys Vocational Education and Training Centre students, teachers and stakeholders. 118 students and 34 teachers had answered to the electronic questionnaires.

During the survey, participants were asked to rate virtual image of the school, IT equipment of education institution and the ability to organize the learning process remotely. The results of the survey were summarized, analysed and considered when developing a digital development plan. SWOT analysis was used to identify strengths, weaknesses, opportunities, and threats of each education institution.

Data processing methods: 1) Mann – Whitney test (the null hypothesis - there is no statistically significant difference between the answers of students and teachers); 2) Chi-square test (the null hypothesis: the frequency oz respondent answers is the same). Statistical data were analysed with SPSS computer program.

Results and Discussion

Zalenieki Commercial and Craft School survey results

Answering questions about virtual image of the school - Web page, IG & FB, in the adult group the following results were obtained: 64% *like and following*, 29% *think it needs to be improved*, 7% *have not seen*. The following answers were received to the same question in a group of students: 55% *like and following*, 21% *think it needs to be improved*, 24% *have not seen*.

The authors consider that a large percentage of students did not visit the homepage and/or social media page. This percentage can be reduced by subtly obliging students to visit the school's pages, for example, by posting information to help complete assignments or creating contests on social networks. But the overall indicator of this question is good.

Top 3 responses received to a question "What kind of training would be most useful for you to develop digital competences?" among adults were as follows: 1) mentoring, 2) workplace learning, 3) peer learning & participation in master classes, seminars.

Answering the question about IT equipment, infrastructure in the school, among adults the following results were obtained: 14% are very satisfied, 40% satisfied, 32% basically satisfied, 14% dissatisfied. Students about IT equipment, infrastructure in the school answered as follows: 16% are very satisfied, 38% satisfied, 38% basically satisfied, 8% dissatisfied.

The Zalenieki Commercial and Craft School IT infrastructure is well equipped technically for both stationary and mobile work. The main task can be considered the maintenance of this infrastructure in a condition that meets the needs of the school.

The research authors consider that both teachers and students indicated that they would like newer computers. Perhaps the involvement of IT technologies in teaching is hampered by the lack of knowledge of teachers: the answers to the previous question show that teachers would like to gain

additional knowledge on certain IT topics. Basic knowledge of students can be developed in computer science lessons. To develop the basic knowledge of teachers, lifelong learning programs provided training courses can be used or such courses can be organized in the school.

The research question was: Could be part of training in a profession taught digitally or blended? Comparison of differences between two independent samples on this research question was statistically analysed using Mann-Whitney test.

Since the obtained p-value = 0.439 is higher than the significance level of $\alpha = 0.05$, the null hypothesis can't be rejected; there is no statistically significant difference between the answers of students and teachers.

The frequency of the respondent answers on the research question was statistically analysed using chi-square test (Table 1).

Table 1

Chi-square test statistics (training in a profession taught digitally or blended)

	Answers	
	teachers	students
Chi-Square	10.286	12.737
Df	1	1
Asymp.sig.	0.001	0.000

Since the p-value (obtained in the sample of teachers) = 0.001 is lower than the significance level of $\alpha = 0.05$, and the p-value (obtained in the sample of students) = 0.000 is lower than the significance level of $\alpha = 0.05$, the null hypothesis can be rejected. Thus, it can be concluded that the frequencies of respondents' answers are different. Statistically significant prevalence was for the answer *digitally or blended* in the sample Teachers (6.0) and in the sample Students (11.0).

Secondary Vocational School of Construction survey results

Answering questions about virtual image of the school - most of teachers like it, only 16.7% answered that the visual needs to be improved. 62.5% students think that the virtual image of the school needs to be improved, 25% like it and 12.5% students do not visit the school's web page or social media accounts at all.

The frequency of the respondent answers about the research question was statistically analysed using chi-square test (Table 2).

Table 2

Chi-square test statistics (virtual image of the school)

	Answers	
	teachers	students
Chi-Square	3.571	19.500
Df	1	2
Asymp.sig.	0.059	0.000

Since the p-value (teachers) = 0.059 is higher than the significance level of $\alpha = 0.05$, the null hypothesis can't be rejected - the frequency of respondents' (teachers) answers is the same. But the p-value (students) = 0.000 is lower than the significance level of $\alpha = 0.05$, the null hypothesis can be rejected. Thus, can be concluded that the frequency of respondents' (students) answers is different. Statistically significant prevalence was for the answer *the virtual image of the school needs to be improved* (14.0).

Based on the questions about rating digital skills it is possible to say that students consider themselves rather skilful in using digital tools on the Internet. They evaluated themselves the best in the category of searching information on the Internet and online communication.

Almost all asked teachers commented that they use IT tools in preparation of lessons and in lessons themselves. 83.3% of teachers expressed that part of training in a profession taught could be realized digitally or blended. Most of the students (68.8%) stated that they use digital tools in preparation for lessons or during their classes. 75% of asked students think that part of training in their profession cannot be realized digitally or blended.

The research authors consider that is a huge difference in opinions of teachers and students towards distance learning in practical education. Focus in the future should be more on students' experience. More tools for their feedback should be implemented with the process of education adapting to their needs.

Panevezys Vocational Education and Training Centre survey results

Answering questions about virtual image of the school most of teachers (70.59%) *like it and actively visit and follow*, only 6.78% answered that *the visual needs to be improved*. 48.3% students *like it*, 19.49% students think that the *virtual image of the school needs to be improved* and 32.2% students *had not seen* the school website and accounts on social networks.

The research authors consider that the main task is to push the student to visit the page for the first time. It is much easier to motivate a student to visit a school page by necessity, not by desire. The school can publish the necessary documents, addresses, contacts, changes: what will force the student to go to the page to get information. Once the first steps have been taken, the work may continue to generate interest.

About the ability to organize the learning process remotely: most of teachers (82.35%) answered that *the part of training in a profession taught digitally or blended*, only 17.65% answered that *don't taught digitally or blended*. 97.46% students think that *the part of training in a profession can learn digitally or blended*, only 2.54% answered that *can't learn digitally or blended*.

The frequency of the respondents' answers about the research question was statistically analysed using chi-square test (Table 3).

Table 3

Chi-square test statistics (training in a profession taught digitally or blended)

	Answers	
	teachers	**students**
Chi-Square	14.235	106.305
Df	1	1
Asymp.sig.	0.000	0.000

Since the p-value (teachers) = 0.000 is lower than the significance level of $\alpha = 0.05$, and the p-value (students) = 0.000 is lower than the significance level of $\alpha = 0.05$, the null hypothesis can be rejected. Thus, can be concluded that the frequency of respondents' answers is different. Statistically significant prevalence was for the answer *digitally or blended* in the sample Teachers (11.0) and in the sample Students (56.0).

The research authors consider that in general, responses from teachers and students indicate their willingness to prepare materials and participate in remote or blended learning.

Self-directed learning is a process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes (Knowles, 1975).

If a student can motivate himself / herself to learn, plan, analyse and evaluate his/ her learning results, he/ she has good self-directed learning skills (Veenman et al. 2004).

Learners need to be able to evaluate their own knowledge and skills compared to the demands of different tasks and problems and either employ their existing knowledge and skills needed to complete the tasks or solve the problems, or acquire new knowledge and skills based on the demands of the situation (Oswald et al., 2003).

SWOT analysis of <u>Zalenieki Commercial and Craft School</u> shows the digital strengths and weaknesses, possible improvements and factors that can negatively affect digital development (Table 4).

Table 4

Zalenieki Commercial and Craft School SWOT analysis

Strengths:	**Weaknesses:**
- Implemented educational programs can be adapted to the digital environment - remotely and in combination. - Educators have free access to modern digital devices to support the work process. - In the learning process, educators have started to use the latest technologies, Internet resources and e-environment to support learners to acquire learning information independently. - The most active teachers regularly attend qualification courses in the field of IT. - The school has started systematic work on the development of the school's digital e-environment.	- New IT technologies and e-environments could be used more in the learning process. - Insufficient level of digital competence skills of teachers and students - Relatively low overall motivation of students and teachers in the use of IT technologies - Partially negative attitude of teachers towards digitization in education
Opportunities:	**Threats:**
- To improve the digital skills of teachers and students - Measures to unite the team to increase motivation to work and achieve goals - Digitize the acquisition of learning content to provide an opportunity to learn part of the learning process remotely. - Upgrade social networking pages and websites to promote the school. - Regularly develop school IT equipment	- Increasing the average age of teachers - Teachers' "burnout" and resignation - As the use of digital devices increases, the quality of the Internet may decline. - Decrease in funding - Changing situations in the country and in the world

From the SWOT analysis it follows that the most urgent need of <u>Secondary Vocational School of Construction</u> are improvement of virtual image of the school, improvement of digital competences of students and teachers, enlargement of technical equipment of the school and also extension of online learning materials as well as searching for sources to finance these needs (Table 5).

Table 5

Secondary Vocational School of Construction SWOT analysis

Strengths:	**Weaknesses**:
- History and tradition of school, good promotion of school. - Qualified pedagogical staff, good equipment of didactic technologies. - Sufficiently equipped premises and technical equipment of school. - Good employment of absolvents. - Cooperation with foreign schools.	- Lack of online students' books and learning materials for students - Energy intensity of operation of school and workshops - Lack of the most modern digital technology - Weak motivation of teachers for further education in the area of digitalization

Opportunities:	Threats:
• Options to realize reskilling courses and training • Cooperation with Chamber of Commerce, professional organizations, construction companies and guilds at competitions and at reskilling of employees • Option to engage with grant programs of EU	• Declining population curse in Slovakia and in the region • Growing competition of other vocational school including private schools • Declining quality of candidate for a study • Weak financial and morale evaluation of pedagogical staff

From <u>Panevezys Vocational Education and Training Centre</u> SWOT analysis (Table 6) in the digitization of an educational institution follows that that the current situation is stable and even development is visible: contracts are concluded with new partners, the state is more interested in vocational schools, teachers and students master and apply new technologies in study process.

Table 6

Panevezys vocational education and training centre SWOT analysis

Strengths:	Weaknesses:
• General education and vocational training classrooms are equipped with IT equipment. • Good image and recognition of PPRC in the regional community. • Attracting additional funds for project activities, continuing education of adults, activities of educational farms. • The supply of professions meets the needs of the regional labour market.	• Insufficient foreign language and digital skills of employees. • Website of PPRC not mobile friendly. • Lacking of common visualization, publicity and branding of PPRC • Sceptical point of view of teachers towards the necessity of usage of digital methods in educational process.
Opportunities:	Threats:
• Take advantage of new EU funding opportunities. • Increasing state attention to vocational training, reduction of unemployment, career development of students. • Participation of social partners in the activities of PPRC. • Rapid IT and technology change. • Growing demand for skilled labour in the labour market. • Development of international relations with foreign social partners in pursuit of international experience. • Following of up to date needs of young generation on social media. Usage of popular apps. • Continuous development of teachers' digital skills and share of good practices of digital methods used in educational process.	• The aging contingent of teachers and the shortage of young teachers. • Insufficient funding of PPRC from the national budget and lack of posts. • Optimization of vocational training institutions without considering the interests of the community. • Rapid change in IT and technology (risk of failures and lack of resources). Data protection risks. • Deteriorating social situation and demographic trends of a part of the society. The growing number of students with special needs.

The switch from presence to distance learning was a great challenge for the educational system in Europe. All schools faced a real challenge in 2020, when it became impossible to continue full-time education and the vocational training process took place remotely. Educational institutions urgently needed to look for possible solutions and tools for organizing distance learning. Despite the fact that distance learning was an unplanned step, both teachers and students found both pros and cons in this

process. As the years go by, some schools are considering remote learning opportunities as part of the regular education process.

Conclusions

- Several IT tools and platforms have been mastered, but no common approach has been found, so it is difficult for students to navigate the teaching materials and each teacher's approach to e-learning environment solutions. Each teacher searches and uses the IT tools they deem appropriate to organize the distance learning process, so a good solution is to use the Moodle platform, where there are identical e-learning environment solutions.
- The biggest challenge for distance learning was for profession teachers and students as to provide practical online trainings of vocational subject is very complicated or sometimes even impossible, but both teachers (p-value (Latvia) = 0.001, p-value (Lithuania) = 0.000) and students (p-value (Latvia) = 0.000, p-value (Lithuania) = 0.000) are ready to work digitally or blended.
- It is necessary to improve and modernize the digital image of the school, especially towards students (p-value (Slovakia) =0.000), so it would be more attractive and they would be more interested in visiting the school's web page and its social media accounts.
- The digital strategy is valid and will be implemented in real educational institutions in the coming years. After the implementation of all plans and investments, digital strategy will be used to validate and evaluate the implemented changes, which will help to better evaluate the result. This means that the digital strategy can be used not only to plan for future changes and innovations, but also as a guideline for checking what has been done and what remains to be worked on.
- Both the framework for creating strategies and the examples of ready-made strategies created by schools can be used by other educational institutions to develop their own digital strategies, since it is very difficult to find clear information about the plan and steps for developing a digital strategy. In addition, ready-made examples greatly facilitate the completion of the framework and the interpretation of the required information. Expert comments will help to find strengths and weaknesses in digital strategies and understand the main focuses.

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