



Maria Leshchenko

Poland

Yuliana Lavrysh

Ukraine

Natalia Kononets

Ukraine

Framework for Assessment the Quality of Digital Learning Resources for Personalized Learning Intensification

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Abstract

The paper presents the framework for the assessment of digital educational resources for students who are engaged in autonomous personalized learning. Through a questionnaire and personal observations, we identified the necessity to equip students with skills and knowledge on resources quality assessment in terms of digital competence advancement. We adapted the framework that includes four components: pedagogical, technological, didactic and academic and expanded their content. Having analyzed the students' narratives on their resources application experience, questionnaires answers and results of the personal assessment process, we observed the positive dynamic in mastering the skills of resources quality assessment after the implementation of the framework into the learning process. We suggest the algorithm of the framework implementation.

Keywords: *personalized learning, digital learning resources, digital competence, language learning, instruction design*

Introduction

The development of digital educational technologies contributes to the transformation of the traditional teacher's role as a unique source of information and transmitter of knowledge. In today's society, overloaded with information,

traditional centralized learning instructions do not meet the needs of students who seek to determine the personal purpose of learning and construct personal educational environment. Technologies, as a means of independent learning stimulation, offer unlimited opportunities for the realization of students' aspirations for self-education. The combination of the processes of globalization and digitalization of education contributes to the creation of the learning environment with the synergy of traditional learning and technologies.

The result of the combination is the emergence of a sustainable system of continuing advanced education, the main value of which is the personal needs of a student. Scientists identify the following conceptual aspects of the educational digitalization: didactic (development of new educational standards); technological (quality and availability of digital resources); methodological (development of blended forms of teaching with priority on personalized autonomy). Recognizing the fact that the formation of students' ability to self-development and lifelong learning is the leading task of higher education, we consider the use of digital educational technologies as an effective resource for the practical advancement of self-directed and self-initiated learning skills.

Analyzing the experience of Polish and Ukrainian educational practices, we have identified key trends in the educational digitalization: creating conditions for the development of digital critical competence and media literacy of the population; ensuring free access for everyone to digital educational resources according to their educational needs; introduction of distance education; development of modern digital teaching aids; promoting personalization and autonomy of the learning process through the creation of individual modular programs taking into account specific capabilities and needs; development of methodological support for the effective implementation of technologies and criteria for assessing the quality of digital tools; increasing the level of digital competence of in-service teachers; ensuring the development of national digital networks of education and science.

Theoretical background

Scientists identify the following advantages of using digital resources in terms of personalized learning (Castellano, Mynard, Rubesch, 2011):

- variability of information and resources to optimize the search for information and meet the educational needs of each student;
- input of information in different multimedia modes: video, audio format, hypertext;

- interactivity of digital resources;
- activation of inner motivation to study by adapting resources to the interests and level of the educational background of students;
- objective immediate assessment;
- development of critical and creative thinking systems;
- space-time unlimited access to resources;
- creating conditions for simultaneous work in groups;
- creation of a virtual authentic linguistic and cultural environment for the development of communication competence;
- development of digital critical competence and skills in assessing the quality of digital resources.

In addition to the mentioned above, digital technologies provide students not only with much wider access to resources but also accessibility to autonomous personalized learning (Reinders, White, 2011). According to Sefton-Green (2019), the variety and accessibility of Internet resources, networking services and educational software intensify students' search and desire to learn new issues and self-development. In this context, Benson and Chik (2010) suggest that technologies offer the potential for autonomous personalized learning, especially in the context of "globalized online spaces" (Benson, Chik, 2010, p. 63). However, teaching strategies with technologies are different from those used in the classroom, so teachers also need to master their digital skills.

Modern students were born in the digital era and teachers should make an effort to build a real partnership in the digitalization of the educational process. It requires carefully planned and thoughtful action by the teacher from the first day of school education, when relevant strategies are developed to inform students about the different ways they can choose to learn how to identify and use quality digital content.

Taking into account students' perceptions of autonomous self-initiated learning through digital technologies, researchers found out that the role of teachers changed, and students perceived them as learning management counsellors, advising on learning strategies, creating an atmosphere that encourages and supports autonomous learning, recommending resources and encouraging the active use of these resources (Fang, Zhang, 2012). Furnborough (2012) claims that among the various roles of teachers, students are more interested in the role of a counsellor in providing resources and learning strategies than the assistance in planning, monitoring, and evaluation processes due to students' lack of information about possible learning resources and opportunities or ability to use resources effectively (Gamble et al., 2012). This conclusion is confirmed by the results of

Godwin-Jones's research (2019), in which the researcher pays attention to students' complaints that they do not understand the learning potential of technological resources, feel lost in the diversity of technological resources. Thus, providing students with support in promoting independent personalized learning, teachers should focus on information about resources, encourage the active use of technological resources and assist in the development of the ability to use resources effectively for future successful self-realization.

Research also confirms that students use the technological resources that their teachers used in class. Moreover, teachers' guidance on the use of digital resources for learning is crucial in assisting students in the transition from the use of technology as a means of entertainment to their use as learning tools. Leshchenko et.al. (2020) identified different ways in which teachers can promote self-directed learning: provide students with conceptual information that enhances their awareness of the learning process and metacognitive concepts; provide methodological information about digital resources, strategies and their involvement in the experiment and identify what works for them and what does not; provide students with psychological support for effective management.

Research focus

The results of the analysis of the source allow us to state that it is important not only to focus on what teachers can do with technology in the classroom but also to explore how to maximize the didactic potential of technology for learning by increasing the quality of independent use of learning technologies by students. With this in mind, we outlined two objectives of our study:

- demonstrate and substantiate the application of the framework of digital resources quality assessment for the intensification of personalized learning;
- share the experience and verify the framework effect on students' skills of resources assessment skills as well as personalized learning skills.

Methodology of Research

Since the objective of the study was to develop a comprehensive and measurable framework with a dual focus on digital resources evaluation skills and fostering personalized autonomous learning, we applied multi-phase active qualitative research methodology. The methodology included a literature review, identification of criteria for digital resources evaluation, defining key skills for personalized learning implementation, development of the framework, testing of the framework

while developing the skills of personalized learning. The study overlaid academic and practical methodological resources to meet the objectives of the research. We adopted participatory qualitative research tools because we implied to develop the framework and immediately test it while teaching to evaluate the quality of the resources.

Data collection tools

The creation and testing of the framework required a collective decision on the main criteria and dimensions. With this in mind, we employed such tool as online focus groups discussions (FGD) which cause greater actionable insights..... We organized the following focus groups: teachers-experts (to work out dimensions of personalized learning), students majoring in IT (to develop criteria for digital resources evaluation), students with the positive experience of self-directed learning (to share and single out ways of correlation of students' educational needs and resources requirements). Another tool was online surveys and worksheets in Google Forms format aimed at the formative assessment, collecting the information about students' perception, level of skills formation and its dynamics during the studying. In order to collect objective and full information about the results of the research, we conducted a post-experimental interview with students and teachers.

Data analysis tools

As the nature of our study is qualitative and descriptive, we adopted such data analysis tools as content analysis for literature information analysis and responses from interviewers to identify explicit and latent structures in texts; keywords-in-context analysis of information from focus groups and students' narratives on the successful experience of personalized learning through digital resources; assessment rubrics for demonstration the results of students' academic achievements on the selection of digital resources. All discussions were audio-recorded and e- transcribed through on-line resource Transcriber. Coding of the narratives and interview responses was done using RDQA coding software. For the FGD and students' narratives we identified the following codes concepts: autonomous learning skills, personalized learning skills, learner-centeredness, digital resources/platforms, content quality, feedback, operation modes, learning strategy, needs identification, career expectations, time-management, self-organization, self-directed learning anxiety. We analyzed the frequency of the codes, their negative and positive connotations.

Procedure

The procedure of the experiment included some stages: questionnaire for students concerning the experience of autonomous personalized learning employing digital resources and problems students encounter with; pre-experimental online survey for students focused on the level of students' skills of digital resources assessment; organization of FGD aimed at developing the framework for digital resources quality assessment; teaching with the framework and testing it; post-experimental skills formation assessment and final interview with participants.

Participants

Students and teachers from three universities took part in the study: National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute", Ukraine (n=22), Poltava University of Economics and Trade, Ukraine (n=17), Jan Kochanowski University in Kielce, Poland (n=25). Students were from the Master degree programs as they had an experience of self-directed study, the basic background of the professional subjects, so they could easily determine their educational needs and opportunities. Moreover, those students knew future employers' requirements and could identify what additional knowledge and skills were necessary to master to meet those requirements. Students' and teachers' participation was voluntary; all interviews records were anonymous.

Results and Discussion

Learning through digital learning resources differs from traditional learning in that human interactions become indirect. In this new environment, where the student finds himself alone in front of the device, careful attention to the quality of digital content is especially important. However, this quality is not always guaranteed. Digital educational resources are produced in a variety of settings, many of which do not include quality control procedures or pedagogical recommendations. Thus, the authors often do not follow the principles of design development, which were established in the fields of instructional design, educational psychology and pedagogy. Besides, there is no single international body or council for standardizing, evaluating or establishing criteria for evaluating the quality of resources. Digital learning resources often lack the regulation of content validity and reliability. In this context, we anticipate that the development and use of evaluation tools will help potential users identify high-quality resources.

With this in mind, we launched our study and the first stage was to find out students' knowledge and skills on digital resources assessment for application as a tool for personalized learning. We suggest students completing online worksheets with two tasks: rank the criteria for the digital resources quality assessment from the most important (1) to the least important (17) or leave without a number those that are not considered as criteria at all; after that, we proposed students two resources of different quality level and ask students to choose which one was the most appropriate for personalized learning. In table 1, we suggest the results of students' choices before and after the experiment. We marked with numbers only those criteria that were identified by the majority of students (>25%).

Table 1. Students' list of criteria ranking

Criteria	Students' choice before the study (rank of the criteria / students %)	Students' choice after the study (rank of the criteria / students %)
Material/content reliability	1 (87%)	1(89%)
Well-developed and understanding structure	3 (54%)	10(44%)
Interactivity, elements of gamification	2(63%)	15(42%)
Flexibility and adaptability to background level	8(34%)	8(55%)
Instruction formulation	5(51%)	6(57%)
Content simplification	4(44%)	0
Learning strategies	0	11(32%)
Problem-solving tasks presence	0	7(38%)
Interactions between learners	0	14(33%)
Clarity of the assessment procedure	6 (56%)	10(43%%)
Authenticity of content and tasks	0	2(73%)
Quality of browsing between the elements	7(43%)	9(29%)
Clear objectives of the resource	0	3(57%)
Correspondence of a resource objectives and your personal goals	0	4(77%)
Objectivity and helpfulness of feedback	9 (47%)	5(84%)
Intellectual stimulating	0	12(43%)
Users-friendly interface	10 (48%)	13(38%)

Analyzing and comparing students' answers we would like to mention that before the experiment some criteria were left without attention because students did not understand them or did not consider as applicable to the digital resource.

The most significant criteria remained information reliability, however, after the experiment students marked the importance of authenticity. It should be noted that students paid attention to objectives correspondence, whereas background correspondence was ranked as 8 before and after the study. Problem-solving tasks and learning strategies were left without ranking before, although students paid attention to the quality of instruction and feedback. After the study, a pedagogical component became more significant for the resource quality assessment and notified learning strategies and authenticity of tasks. Less attention was paid to the interaction between users and elements of gamification as students understood the didactic potential of the resources and its influence on the results of learning. For example, the variety of tasks for the training of one skill or searching the topic from different points are more important than the number of winning points. Students also expressed their growing requirements to the feedback: an explanation of mistakes, referencing to other sources or experts, stimulation of further learning.

While completing the second task on resource assessment before the study, students wrote that "... the resources are useful if I the content is given in simplified and interactive way"; "Simple instruction and immediate feedback are very important". During the final post-study interview and according to the content analysis, we found out that students became more mindful about choosing the resources justifying their choice with structured content, learner-centeredness, active mental engagement, a match between the audience, content and objectives, helpful feedback, authenticity of tasks. Therefore, as students claimed due to the application of the developed framework, it was a simulative transformation of the entertainment tool to the learning tool.

The result of the FGD was the development of the framework. We adapted a tool for evaluating digital resources developed by Mhouti1, Nasseh, Erradi (2013). The tool combines four key components of a digital learning resource: academic content, pedagogical, didactic and technological components. In the context of the research objectives, this tool was adapted and some sub-components were changed or added: interactivity or quality of feedback (to the pedagogical component), focus on the development of independent personalized learning skills (to the didactic component), structural and functional interdisciplinary unity of educational material (to the academic component).

The aspect of the quality of academic content depends on the quality of the information presented in the digital learning resource. The following criteria were selected to determine the quality of academic content:

- criterion of reliability, accuracy, reliability and security of information messages;

- criterion of relevance, authenticity, usefulness and compliance with the interests, age and needs of the user;
- structural and functional interdisciplinary unity of educational material, which contributes to the unification of knowledge and correlates with the principle of authenticity, because in real life students must solve interdisciplinary problems Training in solving interdisciplinary problematic tasks activates scientific and cognitive activities, promotes further scientific activities, which ensures the continuity and consistency of the results of personalized learning.

Assessing the quality of the pedagogical component is of paramount importance. Assessment of an educational resource involves the study of its purpose, objectives, teaching strategies and assessment. The main criteria are:

- instructions for tasks, which determines the degree of students' understanding of the content of information messages. The degree of comprehension is influenced by simplification or adaptation of the content or level of language, explanation of abbreviations, availability of a short description of the resource, use of visual presentation of information;
- quality of the resource structure: whether the structure of the digital learning resource corresponds to the expediency of its use in the pedagogical context: logic of organization, mode of browsing between the elements;
- quality of learning strategies, based on techniques, methods, approaches and various learning models for learning styles differentiation. The main subordinate criteria for evaluating pedagogical strategies are: clearly defined learning objectives; the degree of differentiation of strategies and tasks according to learning styles (encourages teacher intervention, provides opportunities for cooperative, problem-based learning, etc.), promotion of students' active involvement through the option of a survey; encouragement of students' creativity and group interaction; development of critical thinking;
- interactivity, or quality of feedback for self-monitoring of results, tracking the dynamics of the learning process;
- assessment tools.

The next criterion is the didactic aspect of quality with the following key criteria:

- authenticity of educational activities: tasks should reflect real-life or professional problems that a student may face outside the classroom;
- the relevance of the content of the digital educational resource to the purpose and target audience;
- focus on the development of autonomous personalized learning skills.

The last criterion determines the technical quality of the digital learning resource that is assessed by the following criteria:

- design and organization of the visual product;
- clear interface to simplify viewing;
- technological innovation and multimedia tools.

To illustrate the tool for assessing the quality of digital educational resources, we have developed the scheme shown in Figure 1.

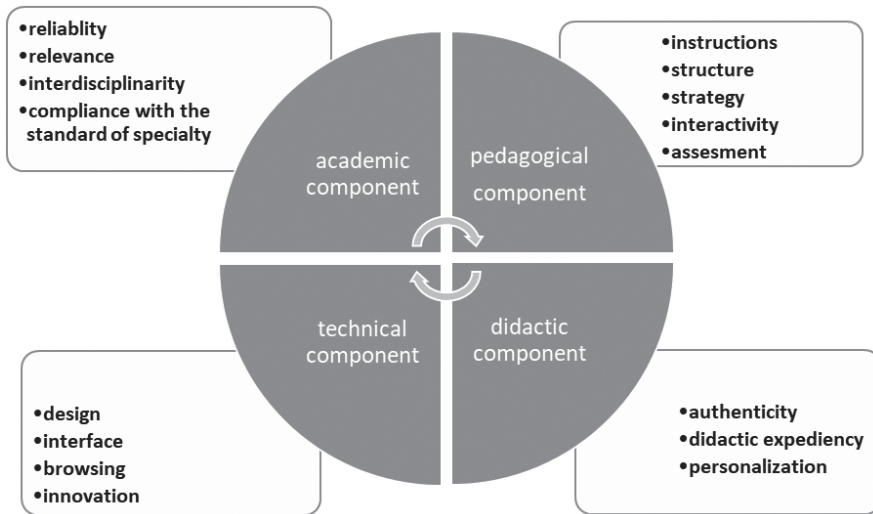


Figure 1. Digital educational resource quality assessment framework

If teachers make all the decisions about the use of a particular digital resource, then students do not have the opportunity to become independent. However, with too much freedom to choose, students are distracted and unable to focus on one goal and choose the most useful resource. Providing options is one way to help them learn to navigate and evaluate resources. Besides, variability provides the personalization of learning. We offer the following procedure of the framework introduction:

1. Demonstrate a high-quality digital tool, point its benefits and practice its use in the classroom. Offer support and suggestions on adapting the tool for personal needs and interests.
2. Applying testing software or during personal interviews with students explaining them how to identify their needs and find resources to satisfy those needs.

3. Conduct discussions and debates on digital educational technologies and its quality using the framework.
4. Conduct reflective discussions about the experience of working with resources in which students exchange views, links, experiences, analyze the advantages and limitations.

This algorithm facilitates a critical analysis of the digital tool, generates considerations about its advantages and disadvantages in terms of needs. Students with a high degree of autonomy can find digital tools without the support of a teacher. The teacher makes several suggestions, and students explore how to use them. They then critically analyze the tool and decide if it was useful.

Conclusions

The most obvious finding to emerge from this study is that the digital educational environment is a set of conditions and opportunities for autonomous personalized learning. The key idea of supplementing the educational space with technologies is to implement innovative pedagogical strategies and improve educational pathways to foster the perception and awareness of educational information, as well as the development of metacognitive abilities such as reflection and critical thinking. Thus, learning and technology must complement each other. The framework for digital resources assessment expands students' opportunities to continue their study at any time matching their needs with high-quality resources despite the limitations of the university. It also influences students' motivation by creating a situation of success in learning and personalization of the educational process. The motivating factor is also the quality and timely feedback that digital learning technologies provide to each student directly in the process of performing educational tasks. Further research should focus on determining the beneficial ways of connection the pedagogy with digital instruction design to equip teachers with skills of digital educational competence.

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