Pedagogical Design and Basic Rules of UX Design when Creating a Digital Educational Product

Olga N. Boldyreva[1][a], Maria V. Suntsova [2][b] Lubov A. Staroverkina[1][c] Olga N. Abeeva[1][d] and Zhanna S. Kalustyants[5][e]

[1]Kalmyk State University named after B.B. Gorodovikov, 11, Pushkina str., Elista, Russia

[2]Kaluga State University named after K.E. Tsiolkovski, 26, Stepana Razina str., Kaluga, Russia

[5] Federal State Budgetary Educational Institution of Higher Education "North Caucasian Institute of Mining and Metallurgy (State Technological University, RSO-Alania, Vladikavkaz, Nikolaeva str., 44

Keywords: pedagogical design, UX design, digital pedagogical product, Russian as a foreign language, electronic courses, digital environment.

Abstract: Effective use of the digital educational environment presupposes the competence of employees of an organization engaged in educational activities in solving professional tasks using information and communication technologies (ICT), as well as the availability of support services for the use of new technologies. Providing support for the use of ICT is the function of the founder of an organization engaged in educational activities. It is important to know about the design process of the educational course itself: its content, purpose and objectives, methods, techniques and tools used – all this requires special attention. The article examines the issue of implementing pedagogical design in the practice of teaching Russian as a foreign language (RFL). The use of computer teaching tools (in this particular case, the creation of the online platform RKI-DIS at the Kalmyk State University named after B.B. Gorodovikov) is considered as an effective source for optimizing classes in RFL. The author proves the relevance of this work and also describes the process of creating a digital product in accordance with pedagogical design procedures. The article proposes to consider the basic requirements for digital educational products, pedagogical design, as well as the basic rules of UX design when creating a digital educational product for foreign students. These developments can be used not only in the process of teaching Russian as a foreign language, but also in any university department, as well as in schools. In Russia, the process of developing digital pedagogy is just beginning, so this article is relevant and undoubtedly novel.

1 INTRODUCTION

Instructional design is a relatively young scientific discipline. The learning environment is established depending on the specific tasks and problem-solving processes.

This article discusses the problem of the interface of an online platform developed for training foreign citizens, which is effective in achieving the results of educational activities. This study provides a theoretical analysis of existing UX design guidelines applied to the creation of educational systems, as well as research papers that evaluate user experience (UX) in design. We are considering the use of the developed online platform using pedagogical design and UX design at the Faculty of Pre-University Preparation and Education of Foreign Citizens of Kalmyk State University named after B.B. Gorodovikov, where about two hundred citizens from different countries of the world study annually. The purpose of the article is to consider the basic rules of UX design when creating a digital educational product, in particular the RKI-DIS online platform. The result presented in the article is the creation of a

[a] https://orcid.org/0000-0001-5590-0098
[b] https://orcid.org/0000-0002-4288-6677
[c] https://orcid.org/0009-0003-0343-7566
[d] https://orcid.org/0000-0001-8833-8177
[e] https://orcid.org/0009-0007-6315-4110

digital product in the form of the RKI-DIS educational platform using pedagogical and UX designs when working with foreign citizens. The purpose of this article is to conduct a theoretical analysis of the features of user experience (UX) when designing the online educational platform RKI-DIS. As part of the overall goal, the following research objectives were set:

1. Analyze the definition of "instructional design" and UX design.
2. Describe the user experience (UX) when designing the RKI-DIS online platform.
3. Analyze the features of UX design when developing an educational system, and also develop a model of an online educational course.

2 MATERIALS AND METHODS

In Russia, the topic of "instructional design" has been studied by many scientists, for example, associate professors of the Nizhny Tagil State Pedagogical Institute (Russia, Nizhny Tagil) N.V. Buzhinskaya, E.S. Vaseva, D.F. Teregulov, associate professors of the Moscow City Pedagogical University (Russia, Moscow) A. N. Ioffe, R.V. Komarov and others. According to B.E. Starichenko, PhD, Professor of the Ural Humanitarian Institute, Pedagogical (Russia, Yekaterinburg) design plays an important role in ensuring more effective, efficient and high-quality education.This is especially important in digital learning, where interaction between students, teachers and content is carried out not personally, but through information and communication technologies. Teachers planning to create digital educational products in the future should understand that this process requires a lot of time, as well as financial and human resources. A high-quality digital product will be created only with detailed, well-planned work at each stage of pedagogical design.

Scientists E.D. Patarakin, V.I. Toktarova, L.A. Kallioma, R. Sarkisyan, O.N. Tolstobokov, N.A. Vorobyova, S.V. Oboeva, M.I. Bernadiner and others in their works actively explored the issues of the effectiveness of information and communication technologies in the theory and practice of Russian as a foreign language. For example, PhD, Professor of the Moscow City Pedagogical University (Russia, Moscow) E.D. Patarakin, exploring the innovative content of training, determined the properties of computer teaching aids, including: interactivity, multimedia, mobility, adaptability, functionality and others. PhD, Professor of the Mari State University (Russia, Yoshkar-Ola) V.I. Toktarova believes that in design the most important role belongs to the choice of teaching methods, and in development - to the preparation of a script for educational material.

In Europe, research into instructional design in educational technology emerged in the 1950s but has expanded since the 1970s. Digital education is now the norm in the West. For example, British scientists R. Bodily, H. Leary, R. E West in 2019 made an attempt to summarize the results of research in the field of instructional design. The authors analyzed 41,969 articles published since 2007 and showed that instructional design is a truly international field of study, but there are few connections between studies within the field. The top five countries in terms of number of publications are the US, Taiwan, UK, Australia and Turkey. The most popular models in foreign educational design research include ADDIE, ARCS, Gagne & Briggs, 4C/ID and Dick & Carey.

The novelty of the research we presented lies in the fact that the above-mentioned authors of scientific works did not consider the use of UX design in the development of an online platform for teaching Russian as a foreign language to foreign citizens.

The tool that allows you to most effectively solve your goals and objectives is interactive pedagogical technologies using modern technical means. The use of computer technologies in the modern educational environment makes it possible to effectively form new relationships between participants in the educational process, and the digital product is integrated into the traditional classroom system, making the activities of the teacher and foreign students interactive. When talking about our experience, we mean teaching Russian as a foreign language. We used the following methodological principles: 1. Inductive and deductive methods; 2. Illustrativeness; 3. Consistency, connection of a new topic with the previous one; 4. The principle of presenting material from simple to complex; 5. Clarity of instructions for foreign listeners; 6. Inadmissibility of overloading with illustrations and text material; 7. Standards of fonts, colors, composition of material arrangement on the screen; 8. Compliance with the curriculum of Russian as a foreign language.

3 RESULTS

The study of user experience (UX) when designing the RKI-DIS online platform allowed us to draw the following conclusions:

- UX design is a key component of successful websites and digital products;

- an optimally designed user interface of the program from a UX point of view is an inseparable part of any educational product;

- analysis of the features of UX design when developing an educational platform allowed the authors of this article to reveal that, along with a list of standard components, advanced trends in web design are also taken into account when designing websites. These trends include minimalist web design, which is used to design the content of an online course.

- the analysis also made it possible to develop a model of an online educational platform.

The user interface model functions through the influence of UX design on the usability of an online platform. There is room for further research into the effectiveness of the developed model's influence on achieving the results of the educational process.

4 DISCUSSION

In e-learning, the most commonly used instructional design model is called ADDIE. This model consists of five main stages, the first letters of which in English form an abbreviation, ADDIE:

1. Analyze
2. Design
3. Development
4. Implementation
5. Evaluation

Let's look at each of these stages in more detail:

1. Preliminary planning, analysis and identification of the current situation and opportunities.

At this stage, it is necessary to analyze the content of the educational material. One should determine for which audience this development is planned. What knowledge and skills do they already have in this area? What methods should be used to activate cognitive activity? Next, we determine the digital environment that will ensure the best achievement of our planned results, and possible options for evaluating student academic achievements.

Another point that should be taken into account is the amount of information. There should be so much of it that students can comfortably assimilate it.

2. Designing a course on paper and detailing it.

At this stage, the course content is detailed by topics and tasks, pedagogical methods and technologies to be used, assessment methods are determined, the course structure is built (Patarakin, 2020). It is important to remember that when planning distance learning, it is necessary to use different strategies. The content of traditional training courses cannot be accepted without changes. It is necessary to change the content, interaction, teaching methods and techniques, students' expectations and the assessment process. For example, the content should be visually improved, more attention should be paid to interaction, group work should be encouraged, both teachers and course creators should be attentive to potential technical problems. In terms of learning, the system should take into account the obvious differences between the «traditional» and «digital» educational environment.

3. Development of educational materials and their integration into the course.

At this stage, all training materials, assignments and project topics, as well as evaluation materials are prepared. Final loading of the course into the LMS (Learning Management System) (Starichenko, 2021).

What is important at this stage?

Content: It is important to determine the learning goals and plan the course based on these goals. Another point that should be taken into account is the amount of information. There should be so much of it that students can comfortably assimilate it.

Educational approaches and media: it is important to carefully choose in advance the pedagogical methods and techniques that will be used in the process. Choosing the means of information transmission that are most suitable for the type of content, as well as choosing the most appropriate content delivery option, will ensure the effectiveness of training. To submit content, you should use a sufficient amount of visual materials instead of large texts, animation, video.

Digital environment: The digital environment is the place where content is served and interaction takes place, so it should be planned with extreme care. The planning of the learning environment is based on a thorough analysis of the existing technological infrastructure and other technical issues, such as the analysis of existing communication facilities, learning management systems and the possible speed of Internet access. Planning should be based on the effective use of available tools, and the necessary measures should be taken to eliminate any potential problems.

4. Implementation.

A very important stage at which you observe how students actually interact with your development: where questions and difficulties arise, and where the methods and means chosen by you justify the trust placed in them.

At the implementation stage, improvements in the content or replacement of any elements are possible, the main thing is that the final version of the developed digital product, whether it is a whole course or a separate exercise, helps students in mastering new knowledge, skills and abilities.

5. Assessment of the course.

At this stage, a comprehensive evaluation of the digital product is underway. Developers and teachers answer the question: Have students achieved the planned learning outcomes? And also, is it possible to improve the course in the future?

Let's consider the basic rules of UX design when creating a digital educational product.

User experience design is the experience that a user gets while interacting with a digital product.

UX design is the influence on the feelings and behavior of users by creating and mutually coordinating elements that affect the user's experience when interacting with a specific program or website (Kallioma, 2017). To make it more clear, we will apply this concept not to the digital environment, but, for example, to the design of the courtyard territory. The architect of the city designed and laid the sidewalks. However, residents have laid additional paths because it is more convenient. It turns out that the architect did not take care of the convenience of the residents in advance, about their experience as a user. To avoid such disagreements, the creator of a digital product should pay due attention to the user's experience of interacting with the product.

UI-design – User interface design – user interface – in this case we are talking about the appearance of a digital product. The simpler and clearer the interface you have developed, the easier it is for a student to perform a targeted action. In other words:

UX design in pedagogy is the path that a student takes from point A to point B inside a digital product to achieve learning outcomes. UI design is a visualization of this path.

The concept of UX design is related to UI design. These concepts are united by the word "design". Speaking of graphic design, the person involved in it specializes in creating graphics, logos, drawings. But when we talk about a web design specialist, we mean a specialist who not only knows how to design the appearance of an application or website, but also a person who knows how to think, structure the content of the planned product, who knows the principles and laws of building a digital environment, an environment as convenient and simple as possible for the future user.

All of the above is used when we are talking about the development of a digital educational product, a website, a distance learning system or a separate simulator. In order to make it convenient for students to use this product in the future, the teacher needs to think through all the technical aspects in advance: the number of pages, tabs, the amount of graphic or video information, ways of switching from section to section, feedback and much more.

There are a large number of manuals on teaching UX /UI design, in each of them the authors advise future developers how to design a digital environment in the best way. Let's focus on the universal rules of user interaction.

Fitts' law states: "The time to reach a goal is a function of the distance to the goal and its size. Make the elements that you want so that they can be easily selected large, and place them closer to the users" (Sarkisyan, 2022).

Hick's law. The time required to make a decision increases with the number and complexity of choices. The more options there are, the longer you will think about these decisions and make them. Simplify the choice for the user by breaking down complex tasks into smaller stages.

Jacob's law. Users spend most of their time on other sites. This means that users prefer your site to work the same way as all the other sites they already know. You can simplify the learning process for users by providing familiar design patterns.

The law of similarity. The human eye tends to perceive similar elements in a design as a complete picture, form or group, even if these elements are separated. Make sure that links and navigation systems are visually different from ordinary text elements and have a single style (Toktarova, Mikheeva, 2020).

Miller's law. An ordinary person can only store 7 (plus or minus 2) items in your working memory. Partitioning into blocks is an effective method of presenting groups of content in a controlled way. Organize the content into groups of 5-9 pieces.

The effect of the serial position. Users tend to remember the first and last items in the series best. When determining the order of study of educational materials by the user, the most complex materials should be arranged according to this rule (Tolstobokov, 2020).

Aesthetically pleasing design. Users often perceive it as a more user-friendly design (Ioffe, Komarov, 2019). It can make users more tolerant of minor user interaction issues.

It should be borne in mind that both the form and the functioning of a digital product should work together. If there is a conflict between the interface and the user experience, users lose patience and choose other solutions for themselves. On the Internet, users leave very quickly.

The «three clicks» rule assumes that users will be disappointed in tasks that require more than three full clicks to complete. It means that the user needs to make three mouse clicks to find the necessary information. The big problem with the «three clicks» rule is that it has not been confirmed by data in any published studies to date. And this rule can be considered as a recommendation. Indeed, if a student spends a lot of time searching for information in a digital environment, he will most likely lose interest in it.

You should start with a drawing of your future digital product. Start with the location of modular blocks, which will then contain text or graphic information. Draw every page of your future digital product, consult with colleagues and students, their advice can make your work easier.

Think about how the menu will be located, or it will be absent, because you plan to independently guide your students in stages within the framework of a given educational topic, in this case, take care of the convenient location of the necessary buttons for navigation.

Buttons are one of those tools that is designed for user interaction with the site. The functionality of a simple button is very large: this includes a forward-backward transition, a hypertext transition, a call for additional information, the ability to send a message in a dialog box, search, and much more. The graphic design of the button also matters. Keep the same style. If a lot of buttons are supposed to be placed on the page, try not to let their graphic design distract from the content of the page.

When working with text, get rid of unnecessary words. Therefore, do not be afraid to shorten the training material that you intended to place on the digital product page. Leave the most important thing. Format the text to make it easy to read. If there is a list, then it is better to mark it. Titles for headings should be clear and concise. The location of graphic elements, animations, media content, interactive exercises should not depend on the need to fill in an empty space, but on the specific educational task that you intend to solve at this stage of the student's interaction with a digital product. Before proceeding directly to work on creating a digital product at a computer, put yourself in the student's place and ask: «Will it be convenient for me to use this product?», «Will the experience of interacting with this educational product be interesting and useful for students?» If your answers are positive, then you can create a digital product. However, after the development and creation of a digital product, it needs to be tested, to identify shortcomings, errors, possibly technical malfunctions. To analyze the results obtained during testing. Fix them. If you have developed a training website, then you need to register it in search engines and seo optimization. If this is a computer program, and you would like to consolidate your authorship, then you should contact the registration organizations and go through the appropriate procedure.

When a teacher uses information technology to create new learning opportunities, this is digital pedagogy, and when the usual way of working is simply transferred to a computer, this is the use of computers in traditional teaching (Toktarova, Semenova, Shpak, 2021). For example, the traditional pedagogical method using a computer: the student is given the task to open the Microsoft Word editor, create a table and fill in the first column with nouns and the second with verbs. Digital pedagogy arises when a student is tasked with finding information on the Internet, critically evaluating it, developing a script and shooting a 45-second video on a topic such as «emotional intelligence» (Vorobyeva, Oboeva, Bernadiner, 2020). In this task, you will learn how to formulate a request, search for an answer, select material, formulate text taking into account the target group, speak in front of the camera, record and edit videos (Sarkisyan, 2019).

The transition to digital pedagogy methods is inevitable and therefore a problem arises - digitalization of education is possible not only through the use of digital technologies, but precisely through the use of digital pedagogy methods (Kallioma, 2018).

We often talk about digital pedagogy in relation to higher education, because in secondary and primary schools, due to the greater conservatism of this level of education, we can talk more about online learning - about the use of online technologies in education (Buzhinskaya, Vaseva, Teregulov, 2018).

Nowadays, terms such as digital educator, digital student and online professor are increasingly used. There is a redistribution, a change in the roles of the teacher and students, and there is more interaction. It is expected that the interaction will become even more active in the future.

5 CONCLUSION

Work on the development and creation of a digital educational product requires a lot of time and effort, it is difficult for one teacher to cope with such a wide range of activities, both from the methodological and technical side. Of course, today there are many designers for creating websites, exercises, distance courses that greatly facilitate this process, but it is better when such activities are carried out by a team of like-minded people, specialists of different profiles.

When designing the RKI-DIS learning platform and delivering e-learning using UX design principles, we encourage course developers to demonstrate the specific benefits of the course to international students from the beginning (from the very first lesson, when presenting it); to present to students the purpose, objectives and educational results formulated on the basis of learning experience), to rely on the laws of Fitts and Hick when creating and using an electronic course and educational materials (to increase the number of options and time), to apply Jacob's law (to provide familiar design patterns) to reduce the cognitive load of students (when working with texts, when building a system of exercises and tasks, when creating presentations, infographics, posters and other multimedia materials), use the effect of a serial position, i.e. Users usually remember the first and last elements of the series best, so more complex materials should be organized according to this rule.

Taking into account the principles of UX design will help increase the effectiveness of training foreign citizens, and the creation of a remote platform allows you to publish high-quality educational materials, the development of which takes into account user experience.

REFERENCES

Buzhinskaya, N.V., Vaseva, E.S., Teregulov, D.F., 2022. Features of pedagogical design of a distance course [Osobennosti pedagogicheskogo dizajna distancionnogo kursa].Vocational education in Russia and abroad. pp. 44-51.

Ioffe, A. N., Komarov, R. V., 2019. Pedagogical design: blocks and modules [Pedagogicheskij dizajn: bloki i moduli].*Educational policy.* No. 3 (79). pp. 88-99.

Starichenko, B. E., 2020. Digitalization of education: Illusions and expectations [Cifrovizaciya obrazovaniya: illyuzii i ozhidaniya]. *Pedagogical education in Russia.* No. 3. pp. 49-58.

Patarakin, E.D., 2017. Pedagogical design of joint network activity of subjects of education [Pedagogicheskij dizajn sovmestnoj setevoj deyatel'nosti sub"ektov obrazovaniya]: abstract of dis.... Doctor of Pedagogical Sciences: 13.00.01 / Patarakin Evgeny Dmitrievich; [Place of defense: Moscow city. ped. un-t]. - Moscow, 38 p.

Toktarova, V. I., Mikheeva, D. A., 2021. Pedagogical design and digital design: principles, models, tools [Pedagogicheskij dizajn i cifrovoe proektirovanie: principy, modeli, instrumenty]. Priority directions of psychological and pedagogical activity in the modern educational environment: collection of materials of the All-Russian Scientific and Practical Conference. Yoshkar-Ola. pp. 61-67.

Bodily, R., Leary, H., West, R. E., 2019. Research trends in instructional design and technology journals. *British Journal of Educational Technology*. Vol. 50, No. 1. P. 64-79.

Goksu, I. et al., 2017. Content Analysis of Research Trends in Instructional Design Models: 19992014. *Journal of Learning Design.* Vol. 10, No. 2. P. 85-109.

Carney, L., 2022. Web design trends and statistics 2022 – putting users first. Available from: https://www.websitebuilderexpert.com/designing-websites/web-design-trends-2020/

Nielsen, J., 2020. Ten usability heuristics for user interface design. Available from: https://www.nngroup.com/articles/ten-usability-heuristics/

Patarakin, E.D., 2020. Pedagogical design of joint network activity of subjects of education…pp. 28

Starichenko, B. E., 2021. Digitalization of education…pp.51

Kallioma, L.A., 2017. Inclusive media environment as a component of the information and communication universe [Inklyuzivnaya mediasreda kak sostavlyayushchaya infomacionno-kommunikativnogo universuma]. Media. Information. Communication. Moscow. No. 21. pp. 59.

Sarkisyan, R., 2022. Designing an electronic course in the moodle distance learning system based on the principles of lx-design (using the example of a Russian language course developed for Almaty university of humanities and economics students) [Proektirovanie elektronnogo kursa v sdo moodle s oporoj na principy lx-dizajna (na primere kursa russkogo yazyka, razrabotannogo dlya studentov AGEU)]. *Bulletin of the Armenian State University of Economics,* pp. 200-201.

Toktarova, V. I., Mikheeva, D. A., 2020. Pedagogical design and digital design…pp.65

Tolstobokov, O.N., 2020. Modern methods and technologies of distance learning [Sovremennye metody i tekhnologii distancionnogo obucheniya. Electronic resource]. Moscow. URL: https://izd-mn.com/PDF/37MNNPM20.pdf (accessed: 09/26/2023).

Ioffe, A. N., Komarov, R. V., 2019. Pedagogical design: blocks and modules [Pedagogicheskij dizajn: bloki i moduli].*Educational policy.* No. 3 (79). pp. 88-99.

Toktarova, V. I., Semenova, D. A., Shpak, A.E., 2021. Digital storytelling: synergy of pedagogical and end-to-end technologies [Cifrovoj storitelling: sinergiya pedagogicheskih i skvoznyh tekhnologij]. Priority directions of psychological and pedagogical activity in the modern educational environment: collection of

materials of the All-Russian Scientific and Practical Conference. Yoshkar-Ola. pp. 67-73.
Vorobyeva, N. A., Oboeva, S. V., Bernadiner, M. I., 2020. The use of pedagogical design technologies in the conditions of digitalization of education[Ispol'zovanie tekhnologij pedagogicheskogo dizajna v usloviyah cifrovizacii obrazovaniya]. Bulletin of the Moscow City Pedagogical University. Series: Informatics and informatization of education. No. 1 (S1). pp. 34-37.
Sarkisyan, R., 2019. Designing an electronic course in the moodle distance…pp.210
Kallioma, L.A., 2018. Inclusive media environment…pp.60
Buzhinskaya, N.V., Vaseva, E.S., Teregulov, D.F., 2018. Features of pedagogical design…pp.46