

Exploring usability principles for educational online courses: a case study on an open platform for online education

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Abstract. This article delves into the crucial issue of effectively implementing usability principles in educational internet resources. By engaging with the latest research in the field, we investigate the influential factors shaping the outcomes of online education. Through a comprehensive analysis, we identify and examine six well-established criteria of usability design: Information Quality, System Navigation, System Learnability, Visual Design, Instructional Assessment, and System Interactivity. Additionally, we propose the existence of a seventh criterion termed Responsiveness. To shed light on the practical application of usability principles, we focus on the open platform "Higher School Mathematics Teacher" as a case study. Through a survey administered to 203 respondents, comprising both teachers and students, we sought to gather their valuable perspectives as the initial users of the platform. The insights gained from this study provide guidance for the implementation of usability criteria on the platform, particularly during the development of online courses. The findings strongly suggest that all seven subcategories of usability are pivotal in the design of online courses on the platform. This research contributes to the ongoing discourse on usability implementation in educational technology, offering valuable insights for developers, educators, and researchers alike. By recognizing the significance of these criteria, educational internet resources can be enhanced to create more engaging, accessible, and effective learning environments¹.

Keywords: criteria of usability design, online education, online course, implementing the usability principles, educational internet resources, usability design criteria, Higher School Mathematics Teacher, teachers' perspective, students' perspective, learning environment

¹This is an extended and revised version of the paper presented at the 1st Symposium on Advances in Educational Technology [33].

1. Introduction

1.1. Problem statement

The development of online courses holds immense potential for fostering a sustainable future through education. In today's market, a diverse array of online courses cater to individuals of all ages, covering a wide range of subjects and complexities. While the content of these courses may vary, there are common principles and practices governing the development and operation of educational internet resources. Among these, the concept of usability emerges as a crucial consideration. Usability refers to the user-friendliness, comprehensibility, and intuitiveness of a website or platform. The ease with which users can navigate, access relevant content, and retrieve information contributes significantly to the success of distance education initiatives. Therefore, investigating usability issues in educational software holds paramount importance.

1.2. Literature review

In the quest to identify factors influencing the outcomes of online education, researchers have increasingly turned their attention to the interface of educational platforms. Pioneering the concept of usability, Nielsen [20] introduced heuristic evaluation as a methodology for studying software usability. The "Nielsen protocol" comprises ten heuristics, developed for the software:

1. The user can detect the system status;
2. The system uses the terminology, which is convenient for the user;
3. Free system manageability, support of removal function (undo) and repetition function (redo);
4. Consistency and standards;
5. Error prevention and warning the user about further problems;
6. Load minimization on the user's memory;
7. Flexibility and efficiency of the usage;
8. Aesthetic and minimal design;
9. The system has to offer the user a constructive solution to the issues that arise;
10. Presence of reference information in the system.

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Building upon this foundation, Benson et al. [5] expanded the heuristics to fifteen, tailoring them specifically for e-learning contexts. Srivastava, Chandra and Lam [26] emphasized the importance of focusing on learning outcomes, rather than solely catering to user interests, when designing e-learning systems. They highlighted the need for attractive and user-friendly interfaces that empower learners to construct their own educational strategies. Integrating usability heuristics with educational considerations, Squires and Preece [25] emphasized the paramount significance of reliability in the development of e-learning systems. Asarbaksh and Sandars [4] underscored the importance of usefulness and usability in the development and implementation of online education technologies.

While discussing and delineating six usability design criteria, Alshehri, Rutter and Smith [2] formulated and investigated these criteria in terms of their significance for students. These criteria encompass Information Quality (IQ), System Navigation (SN), System Learnability (SL), Visual Design (VD), Instructional Assessment (IA), and System Interactivity (SI).

Recognizing the increasing prevalence of mobile devices among users, it is important to account for their impact on usability. Mobile device usage constitutes a substantial portion of website visits, with 58% of visits attributed to mobile devices, according to statistics [10]. Additionally, 35% of users of the “Higher School Mathematics Teacher” platform [14] access it via mobile devices, as observed through Google Analytics [12]. Given this trend, it becomes essential to introduce an additional criterion, termed Responsiveness (RS), which reflects usability for visitors accessing educational web systems through mobile devices. The relevance of this criterion is further validated through empirical research.

This article aims to analyze the approaches adopted by online course developers in implementing usability principles, with a specific focus on the “Higher School Mathematics Teacher” open platform for online education. By examining the implementation of usability criteria, this study contributes to the ongoing discourse on optimizing educational web systems to enhance user experience and learning outcomes.

2. Methods

This research employed a comprehensive analysis of relevant resources to identify and define the seven usability criteria for educational platforms [1–5, 10, 16–18, 20, 24–26, 28, 32]. Through a systematic examination of the literature, these criteria were identified, providing a foundation for the subsequent investigation and analysis conducted in this study.

2.1. The criterion of Information Quality

The criterion of Information Quality encompasses various aspects such as accuracy, relevance, completeness, and currency of the information presented on the educational platform. The effectiveness of this criterion largely depends on the competence and expertise of the tutor responsible for creating and maintaining the online course.

To ensure high information quality, the educational platform should provide tutors with necessary tools and features. These tools enable tutors to conveniently post and edit various types of content, including text, graphics, animations, videos, and audio. Additionally, the platform should support the publication of documents in standard formats such as presentations,

mathematical expressions, and PDF documents. A detailed analysis and description of the tools available for posting an online course can be found in the work by Vlasenko et al. [32].

2.2. The criterion of System Navigation

The criterion of System Navigation focuses on the organization of navigation elements within the educational platform, aiming to provide users with fast and convenient navigation through its sections. This criterion encompasses simplicity, navigation options, link reliability, clarity in the sequence of actions, and ease of accessibility.

The technical implementation of the navigation system relies on interactive elements such as buttons or hypertext links. These elements have a distinct interface design, differentiating them from the main content and interface. Typically, navigation elements possess interactive characteristics that visually respond to user actions, such as changing style when the cursor hovers over them or upon clicking. To enhance clarity, tooltips can be added to provide the name or a brief description of the section to which the element refers.

Navigation elements can be grouped based on their structural characteristics, resulting in main and additional menus, a structural map, or a sitemap. The main menu, usually positioned at the top and bottom of the interface, attracts user attention and provides links to the main sections of the educational platform [3]. The structural map encompasses a hierarchical representation of references to sections, subsections, and content, enabling users to navigate to any page within the hierarchy.

To facilitate navigation, the use of navigation chains, often referred to as “breadcrumbs”, is recommended. These visual elements display the hierarchical structure of top-level pages, allowing users to navigate backward or upward within the platform [1]. Breadcrumbs are particularly useful when dealing with a large number of nested pages.

The reliability of links plays a crucial role in navigation, ensuring that navigation elements do not lead to non-existent content or sections. To maintain reliability, planned verifications of the navigation structure can be conducted using specialized software (e.g., Screaming Frog SEO Spider Tool, Netpeak Spider, SiteAnalyzer) or through manual testing.

Enhanced navigation can be achieved by implementing a search system within the educational platform. This search system assists users in quickly locating the desired content based on their search queries. Search elements can be displayed at the top of the interface and additionally in a sidebar or at the bottom, facilitating ease of access to the search functionality.

2.3. The criterion of System Learnability

The criterion of System Learnability focuses on the simplicity and speed of learning within the educational platform. Similar to the criterion of Information Quality, the competence of the online course developer plays a crucial role in achieving learnability. This criterion encompasses aspects such as learning simplicity, predictability of links, the ability to learn without prior preparation, accurate formulation of instructions, and the availability of sufficient online assistance.

To ensure System Learnability, the tutor or course developer must establish clear learning goals and objectives for the online course. They need to design a structured learning program

aligned with these goals, develop appropriate content, forms, and methods of knowledge assessment, define assessment criteria, describe task completion requirements, and provide ongoing monitoring and support throughout the learning process. This support can be in the form of individual or group online consultations, enabling effective communication between the tutor and course participants.

2.4. The criterion of Visual Design

In addition to the quality of textual, graphic, and multimedia information, the educational platform must possess aesthetic appeal and a well-organized placement of interface elements [28], ensuring users can adequately perceive the provided information. The criterion of Visual Design is an integral part of evaluating the interface of any information system. It encompasses aspects such as readability, design aesthetics, the quality of template structure and typography, and the logical sequencing of information on the educational platform.

To achieve design aesthetics, general principles of interface creation are applied. A standardized template is chosen for displaying information blocks, typically consisting of a header, footer, sidebar, and main content area. The educational platform's logo or name is prominently displayed at the top of the interface. Typography plays a crucial role in determining the visual appearance of text, including the selection of fonts, styles for headings, subheadings, and main body text [16]. The choice of colors is another important aspect, with a specific color range (using RGB model coding) being determined. Generally, light colors are used for the background, dark colors for the main content, and additional colors for structural elements and links. To ensure usability and clarity, an appropriate balance between graphics and text is recommended, with a proportional ratio ranging from 3:1 to 1:1 [17].

2.5. The criterion of Instructional Assessment

The criterion of Instructional Assessment focuses on the effectiveness of assessment tools, their user-friendliness, alignment with educational objectives, comprehensibility for learners, and the provision of informative feedback.

To implement this criterion on the educational platform, various assessment and self-assessment tools are integrated, including tests, surveys, task submission features, feedback forms, and gradebooks. Cloud services such as Google Forms, FormDesigner, Typeform, and MyQuiz can be utilized to support these assessment methods [18]. Alternatively, a custom assessment subsystem can be developed using programming languages and frontend frameworks such as React.js, Angular, jQuery, or Node.js. In this scenario, data is stored on the server in a database, and access is managed through an authorization mechanism with user role-based permissions.

2.6. The criterion of System Interactivity

The criterion of System Interactivity focuses on the quality of interaction among participants in the educational process. This criterion encompasses the effectiveness of communication tools and the implementation of tutor-student and student-student interactions. Modern internet services are integrated into the educational platform to facilitate these interactions.

Text-based communication utilizes various channels such as emails, web forums, messaging applications (Telegram, Viber, WhatsApp), and social networking sites (Facebook, Twitter, LinkedIn). Often, multiple services are used in combination to meet different communication needs. Organizational messages are typically sent through emails or push notifications. Visual communication is facilitated through video conferencing systems like Zoom, Microsoft Teams, and Google Meet. File exchange can be done using cloud storage platforms (Dropbox, OneDrive, Google Drive, iCloud), emails, and messaging applications. However, email services have file size limits and restrictions on certain file types (e.g., archives, executable files), making them less convenient for file sharing. Messaging applications have the drawback of storing files on participants' devices rather than on a central server, which poses risks of loss if devices are changed, damaged, or files accidentally deleted. Cloud storage solutions offer the most reliable and convenient method for file exchange. The criterion of System Interactivity hinges on selecting the optimal combination of these communication services and integrating them seamlessly into the educational platform.

2.7. The criterion of Responsiveness

The criterion of Responsiveness focuses on the quality of displaying the educational platform's aesthetic interface on mobile devices with varying resolutions. Given the increasing number of mobile device users, this criterion holds significant importance. It encompasses the responsiveness of layout, images, media, menus, and navigation elements.

To ensure a responsive design, techniques involving the use of Cascading Style Sheets (CSS) for device-specific stylization are employed. This allows for multiple visualizations of the interface tailored to different screen resolutions. In some cases, separate subdomains on the internet may host different interface variations to support responsiveness. However, this approach is not optimal as it requires modifying all interface variants whenever there are changes or expansions in platform functionality.

By utilizing CSS stylization, the template for presenting information blocks is adjusted, while interface elements take on a different appearance on mobile devices, tablets, and computers. Text size, headings, subheadings, links, buttons, image dimensions, and other interface elements are adapted in accordance with this criterion. Modern programming frameworks like Bootstrap, Angular, React, and Node.js can be leveraged to implement Responsiveness effectively [24].

3. Results

The present study aimed to assess the usability and simplicity of online courses on educational platforms from the perspective of higher school teachers and students. A survey was conducted, consisting of two parts. The first part gathered information about the respondents, including their sex, age, status (teacher or student), prior experience with online courses and educational platforms, and their aims for online education. This data was collected to provide descriptive statistics of the research sample and to select the educational online platforms for analysis.

The second part of the survey focused on assessing the relative importance of usability categories and subcategories, as well as obtaining category ratings from the users. This section comprised a total of 35 elements, which were divided into seven parts. Participants were asked

to assign a ranking from 1 to 7 to each category, indicating its impact on platform usability, with 1 representing the highest importance. Subcategories were evaluated using a 3-point scale, where “-1” indicated a negative effect on the criterion, “0” indicated no effect, and “+1” indicated a positive effect.

The survey was conducted by the tutors of the educational online platform “Higher School Mathematics Teacher” in various higher schools. A total of 246 participants took part in the survey, including 85 teachers and 161 students from Donbas State Engineering Academy, Volodymyr Dahl East Ukrainian National University, Kryvyi Rih State Pedagogical University, and Donbas National Academy of Civil Engineering and Architecture. It is worth noting that 43 participants (18 teachers and 25 students, constituting 17.4% of the respondents) reported no prior experience with online education. Therefore, the final number of respondents included in the analysis was 203, comprising 67 teachers and 136 students.

Table 1 provides a breakdown of the respondents according to their age and sex.

Table 1

Division of respondents according to their age and sex.

Characteristics	Teacher		Students		Total	
	number	%	number	%	number	%
<i>sex</i>						
male respondents	35	52.2	84	61.8	119	58.6
female respondents	32	48.8	52	38.2	84	41.4
<i>age</i>						
under 30	3	4.5	136	100	139	68.5
31-50	42	62.7	0	0	42	20.7
over 50	22	32.8	0	0	22	10.8

According to the survey results presented in table 2, the primary educational platform utilized by the majority of respondents (70.9%) for online courses in higher schools was the distance learning system Moodle. Additionally, respondents reported using other platforms such as Prometheus [23], EdEra [27], The Open University [7], edX [9], Coursera [6], and Intuit [19] for their educational needs. Participants were given the option to name multiple educational resources they utilized.

Regarding the aim of education, the majority of respondents (68.9%) indicated their goal as current education. Furthermore, 23.8% aimed to develop their skills, 3.1% sought to acquire additional skills, and 4.2% pursued personal development.

Next, let us delve into the categories and subcategories from the second part of the survey. The importance of these defined categories and subcategories for users, their usability, and ratings will be examined.

Category 1 – System Navigation (SN), subcategories:

- 1.1 Ease of navigation
- 1.2 Navigation support
- 1.3 Reference reliability
- 1.4 Understandability of action sequence
- 1.5 Ease of access

Table 2
Online platforms where respondents studied.

Characteristics	Teacher		Students		Total	
	number	%	number	%	number	%
Moodle-based LMS	14	20.9	130	95.6	144	70.9
Prometheus	8	11.9	2	1.5	10	4.9
EdEra	16	23.9	-	-	16	7.9
The Open University	4	6.0	1	0.7	5	2.5
Edx	4	6.0	2	1.5	6	3.0
Coursera	18	26.9	-	-	18	8.9
Intuit	7	10.5	5	3.7	12	5.9
Other platforms	4	6.0	3	2.2	7	3.5

Category 2 – Information Quality (IQ), subcategories:

- 2.1 Ease of education
- 2.2 Reference predictability
- 2.3 Education without any initial preparations
- 2.4 Formulation clarity
- 2.5 Sufficient online assistance

Category 3 – Visual Design (VD), subcategories:

- 3.1 Readability
- 3.2 Design aesthetics
- 3.3 Layout information content
- 3.4 Presentation structure
- 3.5 General course consistency

Category 4 – System Learnability (SL), subcategories:

- 4.1 Information correctness
- 4.2 Information conformity
- 4.3 Information completeness
- 4.4 Ease of information understanding
- 4.5 Information timeliness

Category 5 – Instructional Assessment (IA), subcategories:

- 5.1 Evaluation tools efficiency
- 5.2 Ease of using evaluation tools
- 5.3 Reality of achieving learning objectives
- 5.4 Accessibility for material understanding
- 5.5 Feedback Information content

Category 6 – System Interactivity (SI), subcategories:

- 6.1 Efficiency of communication tools
- 6.2 Implementation of communication between the tutor and student
- 6.3 Possibility of communication student-student
- 6.4 Interaction organization
- 6.5 Feedback speed

Category 7 – Responsiveness (RS), subcategories:

- 7.1 Flexible layouts (website layout that will dynamically resize to any width)
- 7.2 Flexible images (scalable images)
- 7.3 Flexible media (scalable images, video, and other formats)
- 7.4 Flexible menu
- 7.5 Flexible navigation

The respondents were asked to evaluate the online courses based on 7 usability criteria, using a scale ranging from 1 to 7, where 1 indicated the highest importance and 7 indicated the lowest importance. The average values for each usability criterion were calculated for all the online courses. The evaluation results of the usability criteria provided by the respondents are presented in table 3. Additionally, figure 1 displays the average ratings of the criteria’s significance for all the selected online courses.

Table 3
Respondents’ evaluation of online education systems according to Usability design criteria.

Systems of online education	Criteria						
	IQ	SN	SL	VD	IA	SI	RS
Systems of distant education based on Moodle	1.31	2.3	3.17	3.99	6.11	6.87	4.56
Prometheus	1.18	1.87	2.95	4.02	5.89	6.76	4.81
EdEra	1.04	2.12	3.01	3.68	6.03	6.94	5.12
The Open University	1.24	1.97	2.76	4.17	5.84	6.63	5.26
Edx	1.11	2.07	3.24	4.31	6.24	6.80	5.08
Coursera	2.13	3.14	1.05	3.79	5.26	6.48	4.74
Intuit	2.41	1.27	3.15	4.02	4.87	6.81	4.86

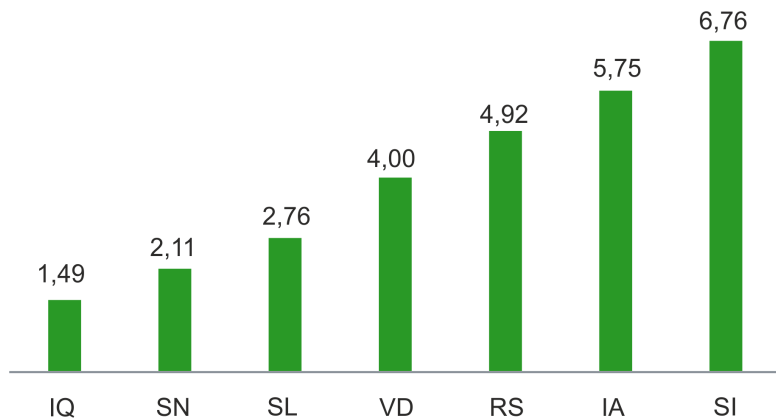


Figure 1: The distribution of places categories from 1st to 7th depending on their impact on the usability of the platform (where 1 is the most important).

The analysis of the results confirmed our assumption regarding the need to consider an additional criterion. The respondents indicated that the criterion of Responsiveness is of greater importance compared to the criteria of Instructional Assessment and System Interactivity.

We offer to consider the evaluation results of the importance of usability subcategory in table 4.

Table 4

Respondents' assessment of the usability subcategory importance.

Usability subcategories	Average estimate
1.1 Ease of navigation	0.91
1.2 Navigation support	0.72
1.3 Reference reliability	0.64
1.4 Understandability of sequence of actions	0.78
1.5 Ease of getting access	0.81
2.1 Ease of education	0.88
2.2 Reference predictability	0.42
2.3 Education without any initial preparations	0.56
2.4 Formulation clarity	0.71
2.5 Sufficient online assistance	0.65
3.1 Readability	0.57
3.2 Design aesthetics	0.74
3.3 Layout information content	0.63
3.4 Presentation structure	0.59
3.5 General course consistency	0.47
4.1 Information correctness	0.81
4.2 Information conformity	0.67
4.3 Information completeness	0.52
4.4 Ease of information understanding	0.87
4.5 Information timeliness	0.62
5.1 Evaluation tools efficiency	0.42
5.2 Ease of using evaluation tools	0.37
5.3 Reality of achieving learning objectives	0.93
5.4 Accessibility for material understanding	0.86
5.5 Feedback information content	0.72
6.1 Efficiency of communication tools	0.62
6.2 Implementation of communication between the tutor and student	0.71
6.3 Possibility of communication student - student	0.69
6.4 Interaction organization	0.53
6.5 Feedback speed	0.74
7.1 Layout flexibility	0.85
7.2 Image scaling	0.78
7.3 Media scaling	0.81
7.4 Menu flexibility	0.67
7.5 Navigation flexibility	0.91

Based on the evaluation results of the importance of usability subcategories in table 4, it can be concluded that all the subcategories are considered important by the respondents. This conclusion is supported by the fact that none of the subcategories received a negative average rating, indicating that they are all perceived as contributing to the overall usability of the educational platforms. The positive ratings suggest that the respondents recognize the significance of each subcategory in enhancing the usability of online courses.

4. Discussion

While researching the usability of educational platforms, scientists marked site usability as an important element of developing educational platforms.

Inductive Content Analysis Method helped to determine the direction of implementing usability criteria on the platform “Higher School Mathematics Teacher”. We agree with Alshehri, Rutter and Smith [2] that the most important criterion of usability design is Information Quality that describes the correspondence of the information in the system to learners’ needs. We have also considered point of view of Nielsen and Loranger [21], who point out that the efficiency of any application work and its attractiveness for the user depend on the search engine and navigation, downloading speed, menu design. In the authors’ opinion, the focus on the user, their needs, and requests have to be principal. This idea is agreed with the conclusion provided by Hodakov and Boskin [15] in which they believe that the adaptive user interface is the main criterion of computer system attractiveness. Such interface reflects the capability of a simple software product or a complicated program technical complex to adapt to the user’s needs, consider their psychophysical characteristics and abilities, dynamic change, support the consolidation of common actions to solve the given task.

The ranking results are presented in the diagram (figure 1).

While analyzing categories and subcategories we paid attention to the research by Dringus and Cohen [8] who defined 13 heuristic categories that influence the usability of the educational environment on the Internet. They include visibility, functionality, aesthetics, feedback and assistance, mistake prevention, memory, course management, interactivity, flexibility, consistency, efficiency, mitigation, contraction, and accessibility. While researching the criteria of evaluating the usability of the electronic educational system, Fang and Holsapple [11] highlighted system navigation, performance system, visual design, information quality, instructive assessment, and system interactivity. Following the results of their research, information quality is the most important criterion; navigation in the system of electronic education takes the second place. Instructive assessment and system interactivity are the least important design categories that influence the usability evaluation of the electronic educational system. In order to consider the concept of the platform “Higher School Mathematics Teacher” [14], according to which we have to take into account the wish of different age audience of online courses, we followed the recommendations by Hasan [13] who studied the usability of educational websites from university students’ perspective. The scientist defined that the content and navigation are the first and second desirable design categories that have to be considered during the usability evaluation of websites for educational programs while organization and architecture are the least important categories.

Research conclusions reached by Vlasenko et al. [29, 30, 31] and the analysis of the results of teachers’ and students’ survey allowed determining the direction of implementing usability criteria on the platform “Higher School Mathematics Teacher” [14].

First of all, we found out how we can implement the criterion *Information Quality* (IQ) that describes the information correspondence in the system to learners’ needs and the criterion *System Learnability* (SL) that characterizes education simplicity and rapidity. The quality of these criteria depends on the tutor’s competence that creates and supports the online course. In order to create high-quality content following the criteria IQ and SL, the tutors of the platform

“Higher School Mathematics Teacher” [14] are given a possibility to use software tools to format the text, insert graphics, video- and audio information, insert links, formulas, tests, surveys. Panchenko, Vakaliuk and Vlasenko [22], Vlasenko et al. [32] described the application use during the development of the educational online platform.

System Navigation, a critical criterion reflecting the quality of navigational tools, is realized through the integration of main and additional menus present on every page, allowing users to easily navigate to their desired sections. A “breadcrumb” navigation feature visually represents the hierarchical structure of top-level pages, aiding users in traversing the platform’s extensive content. In-text links within the educational material further enhance ease of navigation.

Visual Design, emphasizing the aesthetics of the educational system’s presentation, is achieved through a carefully selected color scheme and typographical considerations. The chosen RGB color model coding encompasses light colors for the body and dark colors for the main content, while additional colors are used for structural elements and links. The platform’s interface encompasses header, footer, sidebar, and content layout elements, all designed to align with the platform’s information content. Typography is employed to ensure optimal readability, employing distinct styles for headings, subheadings, and main text.

The criterion of *Instructional Assessment* centers around the simplicity and efficiency of evaluation tools. Feedback forms, testing subsystems, surveys, and file downloading features are incorporated to fulfill this criterion, facilitating both educational and general inquiries.

System Interactivity, another significant criterion, is addressed through the inclusion of a user forum on the platform. This feature promotes interaction among students, teachers, and peers, fostering a collaborative educational environment.

The criterion of *Responsiveness*, emphasizing the quality and aesthetic display of the system on various mobile devices with different resolutions, is accomplished through interface presentation methods utilizing CSS stylization. Elements such as menus and sidebars are tailored to specific mobile device capabilities, while text size, headings, subheadings, links, buttons, and image sizes are adapted to meet this criterion.

Localization and customization further contribute to usability. The platform enables content customization based on specific requests, additional activities, and materials. The “Teachers’ forum” serves as a valuable resource for tutors to monitor and promptly respond to discussions and user feedback, actively incorporating suggestions into course development. The development of new courses is also based on studying requests and wishes made by platform users.

5. Conclusions

The increasing demand for distance education in the contemporary Internet education market has underscored the significance of researching usability issues in educational software. Addressing the usability requirements of online courses has become a critical area of focus.

Employing the Inductive Content Analysis Method, we conducted an extensive review of existing research to establish the foundational basis for usability design. This method facilitated the identification of pertinent usability criteria for the educational platform, while also highlighting the need to consider criteria driven by the pervasive use of mobile devices.

To substantiate our hypotheses, we administered surveys to teachers and students utilizing online courses. The survey analysis encompassed two key aspects: obtaining descriptive statistics on online course users and assessing the relative importance of usability evaluation categories for educational platforms. This comprehensive approach to the survey yielded valuable insights into the preferences of online course users, which must be duly considered during the platform's development.

Consequently, based on the research findings, we propose the inclusion of the criterion of Responsiveness, which pertains to the usability of mobile devices in online education. Hence, considering the collective results of research and surveys, we present the following order of usability criteria in descending order of importance:

1. Information Quality (IQ);
2. System Navigation (SN);
3. System Learnability (SL);
4. Visual Design (VD);
5. Responsiveness (RS);
6. Instructional Assessment (IA)
7. System Interactivity (SI).

Future research endeavors will focus on analyzing the usability criteria of the educational online platform "Higher School Mathematics Teacher". Through this ongoing exploration, we aim to refine and enhance the platform's usability and user experience.

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