

USABILITY ANALYSIS OF THE MOODLE SYSTEM

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Abstract

Moodle is generally accepted for online learning support. The paper investigates the usability of the Moodle system among Hungarian higher education students using the System Usability Scale (SUS) instrument. The results show that the majority of the students rated the usability of Moodle as appropriate. Usability results also correlate with the evaluation of the Moodle features. Collaboration and notification are marked for development. The main implication of the study is that by extending SUS to other university information systems, a comprehensive evaluation of them is available to improve quality.

1 Introduction

Digitalization and virtualization characterize the 21st century, including education. Online and blended learning development has a long and slow history [1], but the COVID-19 lockdown forced its extensive application. That was not a smooth process, and it emphasized common shortcomings in technical and IT preparedness [2] [2] [4].

The aspects of ergonomics have been pushed into the background while looking for instant satisfactory solutions. Although a reorganization in education could be observed after the lockdown period with the re-appreciation of personal contacts [5], the online world has stayed with us. It has obvious cost benefits [6] and allows better scheduling in many situations. The experience gained with the software solutions and the informal student feedback raises the need for a deeper analysis concerning ergonomics and usability aspects.

The paper focuses on the Moodle system, which is a broadly used software and information system at universities. Moodle (Modular Object-Oriented Dynamic Learning Environment) is a popular course management system (CMS) worldwide. Still, according to its features, it can be considered a learning management system (LMS) that supports complete digital education [7] and blended approaches [8]. It has several functions, such as sharing learning materials and collaborating during the learning process. Of course, successfully implementing the system to improve digitalized education requires efforts in infrastructure, content development, and human aspects [9]. Nevertheless, success can be measured through user satisfaction and their perceptions.

The study uses the System Usability Scale (SUS) instrument developed by Brooke [10] in 1986. Although it is an 'old tool' and is mentioned as a 'quick and dirty' way of usability evaluation, it is a proven tool in many fields of assessment [11], including academic systems [12] [13]. The instrument accepted is software development and testing, focusing on the usability of information systems but not limited to it.

The study aims to map the general opinions about the Moodle system among students as primary users. A secondary objective is to test the SUS instrument for Moodle and check its validity.

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2 Research design

2.1 Research goal and method

A voluntary online survey was designed to collect data among Hungarian higher education students. The goal of the study is to calculate the SUS Score for the individual responses and to check the distribution of the scores. That allows conclusions about the level of student satisfaction with the system and highlights the need for improvement.

The survey questions included the Hungarian translation of the System Usability Scale question adopted from [10]. Each question included the name of the Moodle system. Additionally, a 5-point scale evaluation of some Moodle features entitled as available in the Moodle documentation [14]:

- Interface design
- Course page structure
- See-at-a-glance timeline
- Collaborative tools and activities
- File management
- Text editor
- Notifications
- Track progress
- Quiz, test
- Login

SU Score is calculated as defined by [10]. The survey used a 5-point scale between 1 and 5, which was transformed from 0 to 4. In the case of odd-numbered questions, the score contribution is the scale position minus 1, while even-numbered questions' contribution is 5 minus the scale position. The sum of the scores is multiplied by 2.5. Categories were created based on the individual results, which were used as a grouping factor for variance analysis of the features. The variance analysis hypothesizes that the respondents with higher SU Scores are more satisfied with the Moodle features than those with lower SU Scores.

2.2 Research sample and limitations

The survey was distributed among students at various Hungarian universities between March and April of 2024. During the data collection period, 134 responses were received. The response rate cannot be checked because of the different communication channels used (web-page notification, Moodle, and Neptun messages). Grouping factors were not applied in this study, except for the categories of the SU Score. A limitation of the research is that the sample composition cannot represent the whole of higher education or any profession. At the same time, the sample size allows for a pilot study and checks the usability of the method. The reliability analysis confirmed the usability of the SUS instrument (Cronbach Alpha=0.831 for the 10 questions).

3 Results and discussion

3.1 SU Score and scale item results

The mean value of the SU Scores is 85.04 out of 100, and the median value is 87.50. 45.5% of the respondents have an SU Score of 90 or above. The distribution of the scores is left-skewed (Skewness=-1.274, Kurtosis=1.937). The results show that the majority of Moodle users are satisfied with the system and find it well usable. At the same time, an SU Score under 60 is characteristic of 5.2% of the respondents.

The SUS questions and the descriptive statistics are summarized in Table 1. The mean values are presented based on the 5-point scale assessment before calculating the SU Score. The negative skewness of each normal question and the positive values of each reversed question confirm that the usability of Moodle is evaluated as good in all respects.

Table 1. Descriptive statistics of SUS questions

SUS question	Mean	Std. Deviation	Skewness	Kurtosis
I think that I would like to use Moodle frequently.	3.99	0.969	-0.839	0.262
I found Moodle unnecessarily complex.	1.6	0.859	1.732	3.343
I thought Moodle was easy to use.	4.36	0.789	-1.665	4.146
I think that I would need the support of a technical person to be able to use Moodle.	1.23	0.671	3.487	12.941
I found the various functions in Moodle were well integrated.	3.98	0.905	-0.821	0.654
I thought there was too much inconsistency in Moodle.	1.79	0.935	1.16	1.046
I would imagine that most people would learn to use Moodle very quickly.	4.54	0.711	-2.008	5.473
I found Moodle very cumbersome to use.	1.29	0.573	2.094	4.511
I felt very confident using Moodle.	4.44	0.827	-2.031	5.319
I needed to learn a lot of things before I could get going with Moodle.	1.38	0.691	2.378	7.257

Based on the mean values, the students found the Moodle system easy to use, well-integrated, and understandable. The respondents noted that they would like to use Moodle frequently. At the same time, the relatively high standard deviation emphasizes that there is no entire agreement about the questions. However, 8,2% of the respondents marked 1 or 2 (lowest agreement) for this question, which suggests Moodle can adequately fulfill its purpose, but further efforts are needed to improve the acceptance of the system, which does not appear to be due to a lack of usability.

3.2 Moodle feature assessment

The assessment of the selected feature shows moderate to high values (Figure 1). The students are most satisfied with the Quiz tools, login procedure, and course page structure. Interface design also received a high value. The lowest value belongs to the notifications. It is to be noted that the standard deviations (Table 2) of the assessments are higher than in the case of the SUS analysis, suggesting more scattered opinions.

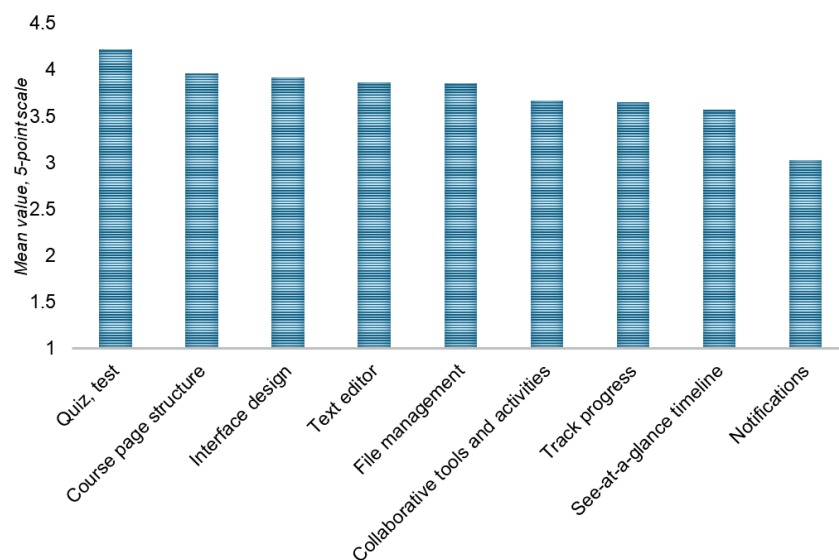


Figure 1. Assessment of Moodle features (5-point scale; higher values show higher satisfaction)

Table 2. Descriptive statistics of Moodle features assessment

Item	Mean	Std. Deviation	Skewness	Kurtosis
Quiz, test	4.22	0.912	-1.168	1.224
Login	4.20	1.053	-1.315	1.092
Course page structure	3.96	0.98	-1.029	0.988
Interface design	3.92	1.157	-1.138	0.616
Text editor	3.87	0.953	-0.535	-0.13
File management	3.86	1.056	-0.879	0.323
Collaborative tools and activities	3.67	1.024	-0.581	0.037
Track progress	3.65	1.165	-0.527	-0.642
See-at-a-glance timeline	3.57	1.217	-0.337	-1.079
Notifications	3.03	1.274	0.187	-0.977

The results suggest that the students are satisfied with the basic functions, and they are less satisfied with collaborative and integrative options. Since Moodle is not exclusively used for learning management at Hungarian universities and students must manage similar tasks in other information systems, redundant and superfluous feelings may be caused. That is particularly confusing when there is a lack of consistent approach across a university or even across faculties and courses. Assuming that the acceptance of the system can be improved if students gain more practice with Moodle and a unified process is available for managing learning materials and information, the high standard deviations of the feature assessment must be considered a warning sign.

According to the features, it should be remembered that Moodle is a free, open-source software, usually installed and managed by the university. The version selection, the surface design, and the optional features installed depend on local decisions. However, the basic functions and processes are the same; the user experience may be different. A detailed comparison of the university Moodle systems could provide information about the best practices.

3.3 Results of the variance analysis

The perception of the Moodle system features and usefulness may be different due to several factors, including gender, age, former experience, or something else. The present study highlights the relationship between the SU Scores and the feature evaluation results. The respondents were classified into four groups based on their SU Scores:

- between 40 (minimum value in the sample) and 60 (8 students)
- between 60.1 and 80 (26 students)
- between 80.1 and 90 (39 students)
- and between 90,1 and 100 (61 students)

Figure 2 shows the differences in the mean values by the SU Score categories. A simple pattern can be observed: the SU Score of the student correlates with satisfaction with the features of the system. That is also confirmed by a variance analysis using the non-parametric Kruskal-Wallis H test performed by the IBM SPSS software (Table 3).

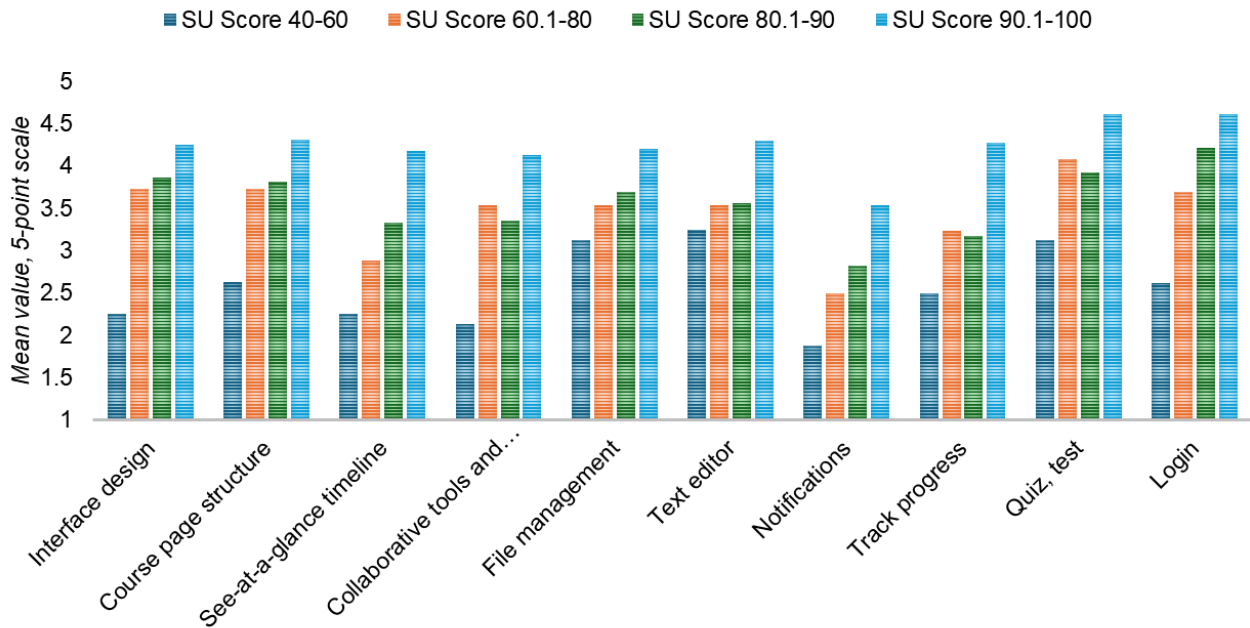


Figure 2. Assessment of Moodle features by SU Score categories (5-point scale)

Table 3. Variance analysis results

Item	Kruskal-Wallis H	d_f	Asymp. Sig.
Interface design	23.727	3	<.001
Course page structure	30.456	3	<.001
See-at-a-glance timeline	35.000	3	<.001
Collaborative tools and activities	32.891	3	<.001
File management	20.685	3	<.001
Text editor	25.442	3	<.001
Notifications	20.814	3	<.001
Track progress	35.839	3	<.001
Quiz, test	30.376	3	<.001
Login	35.715	3	<.001

The analysis confirmed the hypothesis that SU Scores correlate with the assessment of the Moodle features. The Kruskal-Wallis H test is significant at 99% for each item.

4 Conclusions

The results confirm that Moodle was an appropriate selection for learning management support in the sense that the students are satisfied with it and they keep the software usable. Some features, according to progress monitoring and collaboration, are undervalued. The reason for that may be their low use and low level of integration with other processes, but it requires further investigation. The results can be interpreted as collaboration tools in Moodle, which means hidden opportunities, but the exploitation needs a comprehensive review of the related processes.

An encouraging experience of the survey is that the majority of the respondents are satisfied with the usability of the Moodle system and its features. About half of the students have SU Scores above 90 out of 100, and scores under 60 were found in only a few cases. Of course, managing their dissatisfaction is still indispensable, but due to the mostly confident users, both the students and the universities can build their strategies on the opportunities of the system.

Although the study cannot be considered representative of Hungarian higher education, the analysis method and the results allow some remarkable methodological conclusions. The System Usability Scale assessment is a quick but actually not dirty tool, which is in line with the conclusions of [11]. The high internal consistency of the questions was proven in several studies for different information systems that confirm the instrument's applicability to higher education systems. The uniform question structure offers stable and comparable results for decision-makers when identifying critical improvement needs. It would be worth systematically extending the application for the Neptun (study management system), email system, and social media communication among students. Moreover, the SUS instrument can be helpful in exploring opinions about enterprise management systems that the staff uses. The results may be integrated into the quality management reports of the university and the study programs as well.

According to the subject of the study, improving the acceptance and usability of the Moodle system requires further research. The SUS method can give a quick overview but is not ready to explore the influencing factors. The two main directions of future research are comparing university practices and regulations to find the best solutions; and developing a model for measuring the driving forces and the influencing factors of system acceptance.

Finally, it must be noted that Moodle is just a tool for improving learning success through a stable and easy-to-use information base. If higher-level objectives are not clear, efforts are wasted.

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