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Improving Students' Academic Subscription Skills Using Web Technologies

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Abstract: The purpose of this research was to evaluate university students' attitudes toward improving academic participation skills using web technologies. This research was designed in the survey model, one of the quantitative research methods. The sample of the research consisted of 532 university students studying at various universities in Kazakhstan. Research data were collected with the attitude scale regarding the contribution of web technologies to academic success developed by the researchers. Weighted mean, standard deviation, independent variables T-test, and single-factor analysis of variance (ANOVA) were calculated. As a result of the research, it has been revealed that university students' attitudes towards the contribution of web technologies to academic success are high in the functionality and applicability sub-dimension and the overall scale. It was indicated that the attitudes of the university students participating in the research towards the contribution of web technologies to academic success differ significantly between male and female university students according to the gender variable. It was determined that the significant difference between male and female students was in favor of female students. When university students' attitudes towards the contribution of web technologies to academic success are evaluated according to the web technologies knowledge level variable, it is seen that there is a significant difference in favor of university students with a high level of knowledge of web technologies. No significant difference was detected in the attitudes of the university students participating in the research regarding the contribution of web technologies to academic success according to the variable of the class they study in. A significant difference was found in the attitudes of the university students participating in the research regarding the contribution of web technologies to academic success, depending on the faculty variable in which they study. It was determined that the significant difference was in favor of students studying at the faculty of health sciences.

Keywords: Academic success, attitudes, skills, university students, web technologies.

1 Introduction

Technology is the concept that includes all social and economic activities and organizations that envisage the transfer of technical knowledge to life [1]. In other words, technology is the application of scientific principles and innovations to solve problems and make life easier. One of the areas where technology is used, which has an important place for the future of societies, is education and training [2-3]. Choosing the appropriate tools and equipment for the subject affects students' level of understanding of the subject and the permanence of knowledge.

1.1. Theoretical and conceptual framework

Web-based learning is a content-rich teaching method in which the internet or intranet is used as an educational tool and enables research and access to information over the web [4]. Web-based learning is found easy by both teachers and

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students without relying on computer knowledge [5]. Teachers and learners view web-based teaching positively in terms of visualizing concepts, positive contributions to the classroom environment, and enabling higher-level learning [6-7]. Web-based learning is a teaching method that enables students to apply and develop existing knowledge by exposing them to information in cases where the traditional teaching method is insufficient, increases their skills in using information technologies, supports face-to-face education with web resources, and allows synchronous and asynchronous teaching [8].

Web-supported education is a suitable environment for multimedia applications that include elements such as text, graphics, moving pictures, sound, and video clips [9]. Thanks to multimedia applications, concepts can be presented more effectively. In addition to these audio and video tools, there are also communication tools such as "electronic letters, discussion lists and news groups" and chat rooms, video conferencing, etc. Interactive tools can be made available to individuals participating in training [10]. By creating interactive environments, individuals can be enabled to personally participate in learning activities, thus making the activities more enjoyable and of higher quality and learning taking place at a higher level offers opportunities to create a meaningful and interactive environment within a rich information source and facilitate information exchange [11]. With the web-supported problem-based learning environment, students will find themselves in the problem, and discover the solutions to the problem themselves, and thus more effective and permanent learning will occur. It is also thought that web-supported learning has a significant impact on academic success and academic participation of university students.

1.2. Related research

Dean [12] examined the effects of web-supported homework on student success, attitude, interest, critical thinking skills, and homework completion rates. As a result of the analysis of the data, it was revealed that web-supported homework had a positive effect on the success, attitude, interest, and critical thinking skills of the students participating in the study. Keasar et al. [13] conducted their study evaluating web-supported education with 1st and 2nd year university students studying biology in Israel. As a result of the analysis of the data, it was determined that web-supported teaching facilitates access to materials and individual learning. In their work, Caligaris et al. [29] aimed to show some didactic series designed to contribute to the education of students in terms of communicative competence and to present rubrics developed according to the established evaluation criteria; They designed assessment tools to analyze the degree of development of skills in students. As a result, the didactic series contributed to the development of social skills in students and revealed what can be done in different subjects of the engineering career.

McDaniel et al. [14] conducted their study on the effect of using web-supported interactive pedagogy on academic success with 114 university students. The data obtained was compared with the course grades of students who received traditional education the previous year. It was concluded that teaching with web-supported interactive pedagogy significantly increased student success. Paliç and Akdeniz [15] designed and evaluated a web-supported teaching material based on brain-based learning. As a result of the analysis of the data, a teaching material suitable for use in classes was designed. In the research of Jahangard et al. [28], participants' comments posted in a discussion forum were analyzed, and with the help of these comments, the existence of certain concepts and themes in students' views on computer use in educational environments was revealed. Suryani et al. [16] used web-assisted learning to improve students' self-efficacy in the Physics Planning Course. As a result of the research, they found that web-supported learning improved students' self-efficacy.

1.3. Purpose of the research

The purpose of this research was to evaluate university students' attitudes toward improving their academic participation skills using web technologies. For this purpose, answers were sought to the following questions.

1. What are the attitudes of university students towards improving their academic skills through web technologies?

2. Do university students' attitudes towards improving their academic skills through web technologies differ according to gender?

3. Do university students' attitudes towards improving their academic skills through web technologies differ according to the variable of web technologies knowledge level?

4. Do university students' attitudes towards improving their academic skills through web technologies differ depending on the class they study in?

5. Do university students' attitudes towards improving their academic skills through web technologies differ depending on the faculty they study at?

2 Methodology

Information about the research method is included in this section. In addition to the research method, the scale development process, sample group, evaluation of research data, and ethical principles are included in this section.

2.1. Research method

This research was designed in the survey model, one of the quantitative research methods. Survey research is a survey of participants' opinions or interests, skills, abilities, attitudes, etc. regarding a subject or event. These are generally studies conducted on relatively larger samples than other studies in which the characteristics of the study are determined [17]. In this research, the attitudes of the university students who constitute the sample group are revealed in the screening model.

2.2. Participants

The sample of the research consisted of students studying at various universities in Kazakhstan; students studying in the fall semester of the 2023-2024 academic year. The demographic characteristics of the university students participating in the research are given in Table 1.

Table 1: Demographic distribution of university students

Gender	**F**	**%**
Woman	290	54.5
Male	242	45.5
Web technologies knowledge level		
High	181	34.1
Middle	203	38.1
Low	148	27.8
Class		
1. Class	166	31.2
2. Class	127	23.9
3. Class	130	24.4
4. Class	109	20.5
Faculty		
Faculty of Education	152	28.6
Engineering faculty	195	36.7
Faculty of Health Sciences	185	34.7
Total	532	100

Table 1 shows the gender, web technologies knowledge level, grades, and faculty distributions of the university students who participated in the research. 54.5% of university students are women and 45.5% are men. When we look at the distribution of web technologies knowledge level among university students, it was determined that 34.1% of the students had high knowledge of web technologies, 38.1% had medium knowledge and 27.8% had low knowledge of web technologies. 31.2% of the university students participating in the research are studying in the 1st year, 23.9% are in the 2nd year, 24.4% are in the 3rd year and 20.5% are in the 4th year. Additionally, 28.6% of the students are studying at the faculty of education, 36.7% at the faculty of engineering, and 34.7% at the faculty of Health Sciences.

2.3. Data collection tools

Research data were collected with the attitude scale regarding the contribution of web technologies to academic success developed by the researchers. The items to be included in the scale were developed through the literature review carried out during the creation of the scale. In a 5-point Likert-type format, the degree of agreement of the teachers with the attitude statements was formed as "I Strongly Disagree (1), I Disagree (2), I Partially Agree (3), I Agree (4), I Completely Agree (5). Item score ranges in the scale are considered equal. The 39 items in the draft item pool were presented to 3 faculty members who work in the field of scale development at universities, to determine whether they were suitable items to reveal university students' attitudes towards the contribution of web technologies to academic success. In line with the opinions of faculty members, 6 items were removed from the scale and necessary adjustments were made to the remaining items.

In this way, the face and content validity of the scale was ensured. The pilot application of the scale was carried out in two stages. In the first stage, 42 students studying at universities were examined to see how the items in the scale were understood and answered by the students. Students answered the items in the scale consisting of 33 items and found the items understandable. In the second stage, 371 university students participated in the pilot application of the scale.

University students who participated in the pilot studies of the application were excluded from the sample group of the research.

After the pilot application, the skewness and kurtosis values of the data set obtained from the scale were examined. The skewness value was found to be 0.032 and the kurtosis value was 0.093. Looking at the descriptive statistics values, it can be said that the data show a normal distribution. In addition, the Kaiser-Meyer-Olkin (KMO) sample adequacy criterion test and the Bartlett test of Sphericity were conducted at this time. KMO value was found to be 0.940. Bartlett's test result in the analysis was calculated as = 6593.72 ($p < 0.001$).

Accordingly, it was decided to perform parametric tests on the data set. According to these results, it can be said that the data is suitable for factor analysis. After evaluating the suitability of the data for factor analysis, the phase of obtaining the factors was started. Eigenvalues statistics are used in deciding how many factors the scale will consist of. Plot and percentage of total variances method measures were used. In determining the number of factors, factors with eigenvalues greater than 1 were generally taken into consideration. In the first analysis made with 33 items, it was revealed that the scale was explained by 2 factors with an eigenvalue greater than 1. When the slope accumulation graph is examined, the number indicated by the point where the slope starts to slide shows us the factor number.

In this regard, factors with eigenvalues greater than 1 were evaluated and the two-factor structure of the scale was supported. After determining that the scale would consist of three factors, in the rotation phase, the rotated factor matrix was created and the loading values of the items on each factor were examined. Load values of 0.50 and above for the items in each factor in the scale are considered appropriate values. As a result of this analysis, items 5, 10, 13, and 26 were removed from the scale. The rotated factor matrix was created again and after the process continued in a few steps, the 29-item structure of the scale was revealed.

The total variance explained for the scale consisting of 29 items with 2 factors is 61.881%. In the next stage, the factors were named. The first factor of the attitude scale regarding the contribution of web technologies to academic success is called functionality, and the second factor is called applicability. There are 16 items in the functionality factor and 13 items in the applicability factor. After performing exploratory factor analysis with the SPSS 25.0 statistical program confirmatory factor analysis was carried out with the SPSS Amos 25.0 statistical program.

At this stage, the goodness of fit index of the data set was checked. To reveal the fit of the model, $\chi 2$ / df (Chi-Square / Degree of Freedom), NNFI (Non-Normed Fit Index), RMSEA (Root) mean Square Error of Approximation) values are accepted as criteria. Hooper et al. [27] use a goodness-of-fit index below 5 for χ 2 / df value; They determined that values above 0.80 for NNFI and below .080 for RMSEA were criteria indicating good fit. As a result of the analysis of the data obtained from the scale, $\chi 2$ / df = 1.879 ($p = .000$), NNFI = 0.95 and RMSEA = .058. The data obtained from the scale reveal that the goodness of fit indices of the scale indicates a good fit of the model. In this respect, it is possible to say that the structure used as an explanatory factor has been confirmed.

For the reliability analysis of the final version of the scale, the reliability coefficient of the scores obtained from the attitude scale regarding the contribution of web technologies to academic success applied to 504 teachers was calculated with Cronbach's Alpha. A score of 0.889 was calculated for the items in the first factor and 0.895 for the items in the second factor. The alpha coefficient was calculated as 0.863 for all dimensions of the scale, including 29 items. These scores reveal that the reliability of the scale is high. The scale was prepared in 5-point Likert form. On a scale with equal item score ranges, "Totally Agree" is 5 points (4.21 - 5.00), "I Agree" is 4 points (3.41 - 4.20), "Partly Agree" is 3 points (2.61 - 3.40), "I Disagree" is 2 points (1.81). - 2.60) and "Strongly Disagree" was rated as 1 point (1.00 - 1.80).

2.4. Data collection process

Research data was collected online via Google Forms. During the development phase of the scale, it was determined that the completion time was approximately 20-25 minutes. Data was collected by delivering the attitude scale regarding the contribution of web technologies to the academic success of students online. The process of collecting all data took approximately 7 weeks.

2.5. Compliance with Ethics

Ethical principles were taken into consideration in all phases of the research, especially the university students who participated in the research, and all phases of scale development and scale application. In all scale studies conducted with all students, a research ethics declaration form was delivered to the students. Information regarding the importance of the research, its purpose, and the confidentiality of the data was presented in the ethical declaration form. In addition, students participating in the research were asked to fill out the voluntary participation declaration section in the ethics declaration form and deliver it to the researchers along with the scale. In the stages of writing the research, the principles of research ethics were followed. The authors declared that they have no conflict of interest.

2.6. Data analysis

Analysis of the research data was done with the SPSS 25.0 statistical program. Kolmogorow-Smirnov normality test result ($p<0.05$) reveals that the data set has a normal distribution. Accordingly, parametric tests were applied to the data set. Weighted mean, standard deviation, independent variables T-test, and single-factor analysis of variance (ANOVA) were calculated.

3 Results

In this part of the research, the data obtained from the attitude scale regarding the contribution of web technologies to academic success were evaluated.

Table 2: Weighted averages and standard deviations of the attitude scale regarding the contribution of web technologies to academic success

Scale	***M***	**SD**
Factor 1: Functionality	3.68	0.810
Factor 2: Applicability	3.91	0.848
Attitude scale regarding the contribution of web technologies to academic success	3.78	0.832

In Table 2, the sub-dimensions of the attitude scale regarding the contribution of web technologies to academic success and the weighted averages and standard deviations for the overall scale are given. A weighted average of functionality sub-dimension (M=3.68, SD=0.810), applicability sub-dimension (M=3.91, SD=0.848), and attitude scale regarding the contribution of web technologies to academic success (M=3.78, SD=0.832) and standard deviations were calculated. The findings reveal that university students' attitudes towards the contribution of web technologies to academic success are high.

Table 3: University students' attitude scale regarding the contribution of web technologies to academic success according to gender variable, independent variables T-test results

Web technologies knowledge level	**N**	***M***	**SS**	**F**	**P**
High	181	4.17	0.881	14,291	,000
Middle	203	3.62	0.642		
Low	148	3.52	0.605		

Table 3, the independent variables T-test results of the attitude scale regarding the contribution of web technologies to the academic success of the university students participating in the research are given according to gender variable. As a result of the independent variables T-test, it was determined that students' attitudes towards the contribution of web technologies to academic success showed a significant difference according to the gender variable ($F = 14.554$, $P < 0.5$). It was determined that the significant difference between male and female students was in favor of female students.

Table 4: One-way ANOVA results of university students' attitude scale regarding the contribution of web technologies to academic success according to the web technologies knowledge level variable

Web technologies knowledge level	**N**	***M***	**SS**	**F**	**P**
High	181	4.17	0.881	14,291	,000
Middle	203	3.62	0.642		
Low	148	3.52	0.605		

Table 4 shows the one-way analysis of variance ANOVA results of the attitude scale regarding the contribution of web technologies to academic success according to the web technologies knowledge level variable of the university students participating in the research. As a result of one-way analysis of variance ANOVA, it was determined that university students' attitudes towards the contribution of web technologies to academic success showed a significant difference according to the web technologies knowledge level variable ($F=14.291$, $P<0.5$). It was determined that the significant difference was in favor of university students with a high level of knowledge of web technologies.

Table 5: One-way analysis of variance ANOVA results of the attitude scale of university students regarding the contribution of web technologies to academic success according to the variable of the class they study in

Class	**N**	***M***	**SS**	**F**	**P**
1. Class	166	3.71	0.640	4,503	,209
2. Class	127	3.69	0.665		
3. Class	130	3.85	0.610		
4. Class	109	3.81	0.617		

Table 5 shows the one-way analysis of variance ANOVA results of the attitude scale regarding the contribution of web technologies to the academic success of the university students participating in the research, according to the variable of the class they study in. As a result of one-way analysis of variance ANOVA, it was determined that university students' attitudes towards the contribution of web technologies to academic success did not show a significant difference according to the variable of the class they studied in (F=4.503, P>0.5).

Table 6: One-way analysis of variance ANOVA results of the attitude scale of university students regarding the contribution of web technologies to academic success according to the faculty variable

Faculty	**N**	***M***	**SS**	**F**	**P**
Faculty of Education	152	3.57	0.605	11,207	,000
Engineering Faculty	195	3.69	0.611		
Faculty of Health Sciences	185	4.05	0.899		

Table 6 shows the one-way analysis of variance ANOVA results of the attitude scale regarding the contribution of web technologies to academic success, according to the faculty variable of the university students participating in the research. As a result of a one-way analysis of variance ANOVA, it was determined that university students' attitudes towards the contribution of web technologies to academic success showed a significant difference according to the faculty variable ($F = 11.207$, $P < 0.5$). It was determined that the significant difference was in favor of students studying at the faculty of health sciences.

4 Discussions

The results obtained from the research reveal that university students' attitudes towards the contribution of web technologies to academic success are high in the functionality and applicability sub-dimension and the overall scale. When the research conducted in the field was examined, in parallel with the results of this research, studies were found showing that web technologies have a positive effect on students' academic success [18-20].

It is seen that the attitudes of the university students participating in the research towards the contribution of web technologies to academic success differ significantly between male and female university students according to the gender variable. It was determined that the significant difference between male and female students was in favor of female students. Similarly, the research conducted in the field reveals that the satisfaction levels regarding the communication opportunities and usefulness provided by the web-supported learning environment are in favor of women [21].

When university students' attitudes towards the contribution of web technologies to academic success are evaluated according to the web technologies knowledge level variable, it is seen that there is a significant difference in favor of university students with a high level of knowledge of web technologies. In their study, Kao et al. [22] reached a conclusion that supports the findings of this study. As a result of the research, it was concluded that those with good internet usage levels had higher academic success. Brinkerhoff and Koroghlanian [23] examined the computer skills of university students and their attitudes towards Internet-based education, a type of distance education. It has been determined that students who have used the Internet before have more positive attitudes.

No significant difference was detected in the attitudes of the university students participating in the research regarding the contribution of web technologies to academic success according to the variable of the class they study in. Ateş and Altun [24] also revealed in their study that university students' attitudes towards web-based education did not change depending on the class they studied in.

A significant difference was found in the attitudes of the university students participating in the research regarding the contribution of web technologies to academic success, depending on the faculty variable in which they study. It was determined that the significant difference was in favor of students studying at the faculty of health sciences. When the research conducted in the field of health sciences is examined, the positive aspects of web-based learning have been emphasized by students. In their research on nursing students, Kaveevivitchai et al. [25] revealed that students were more satisfied with web-based education than face-to-face education. Cain et al. [26] also stated in their research conducted at the faculty of pharmacy that students reported that web-based learning was valuable for their academic success.

5 Conclusions

It is possible to say that there have been changes in education systems from past to present in line with the needs of the age. Especially with the widespread use of technology in education, a new understanding of education has emerged. The use of web technologies in educational environments appears as an indispensable element at all levels of education,

from primary education to higher education. In addition, the number of studies on improving students' academic participation skills using web technologies is increasing day by day. This study aimed to evaluate the attitudes of university students towards the development of academic participation skills using web technologies.

As a result of the research, it has been revealed that university students' attitudes towards the contribution of web technologies to academic success are high in the functionality and applicability sub-dimension and the overall scale. It is seen that the attitudes of the university students participating in the research towards the contribution of web technologies to academic success differ significantly between male and female university students according to the gender variable. It was determined that the significant difference between male and female students was in favor of female students. When university students' attitudes towards the contribution of web technologies to academic success are evaluated according to the web technologies knowledge level variable, it is seen that there is a significant difference in favor of university students with a high level of knowledge of web technologies.

No significant difference was detected in the attitudes of the university students participating in the research regarding the contribution of web technologies to academic success according to the variable of the class they study in. A significant difference was found in the attitudes of the university students participating in the research regarding the contribution of web technologies to academic success, depending on the faculty variable in which they study. It was determined that the significant difference was in favor of students studying at the faculty of health sciences.

6 Recommendations

The following recommendations were developed in line with the results obtained from the research.

1. It is seen that women have more positive attitudes than men regarding the attitudes of university students participating in research regarding the contribution of web technologies to academic success. In this case, it is necessary to intensify the course contents regarding the use of web technologies for all students in universities.
2. It is seen that students with a high level of knowledge of web technologies have high attitudes towards the contribution of web technologies to academic success. Additional developmental programs should be organized at universities for students with moderate or low levels of knowledge of web technologies.
3. Web-supported applications of the programs implemented in the faculties where university students' study, whose attitudes towards the contribution of web technologies to academic success are low, need to be increased.

Conflicts of Interest Statement

The authors certify that they have NO affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

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