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Study Results of the e-Learning Readiness of Mongolian Students

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***Abstract*—*While the pandemic has increased the use of e-learning in education, access varies by location. In order to determine what kind of policy support is needed to support e-learning in the future, it was found that the readiness of students for e-learning is at average level. The purpose of this study is the correlation between the e-learning readiness and technical skills, the ability to communicate with the teacher, the ability to communicate with colleagues, and the communication skills of our country's high school students using an international survey questionnaire. Research analysis were done using SPSS. According to the study results, the location of the schools, the age and gender of the students do not affect the e-learning readiness. However, the fact that the student has his own computer and has sufficient Internet access affects the readiness of e-learning. According to the correlation analysis, technical competence, communication competence with the teacher, communication competence with colleagues, and communication competence are positively related to each other. Also, a survey of students' e-readiness was taken from the teacher, and a discrepancy was observed between the students and the teachers.*

Keywords—factor loading, regression, validity, e-learning

I. INTRODUCTION

Due to the pandemic situation, there is an urgent need to study the readiness of students for e-learning. Therefore, it is still an important topic to collect data within the framework of four comprehensive competencies: students' technical competence, communication competence with the teacher, communication competence with colleagues, communication competence, their impact on the readiness of e-learning and their correlation.

In our country, there is a lot of research on the access to e-learning, participation, and the availability of equipment. However, there are few studies on the availability of e-learning and the factors affecting it. Therefore, we are aiming to study the readiness of e-learning and the factors affecting it at the multivariate level using international research methods. Also, what are the effects of students' learning environment, equipment, Internet access and availability on students' e-learning readiness? Also, do teachers and students evaluate the readiness of e-learning differently?

II. METHODOLOGY AND RESULTS

A. Questionnaire and sampling

Students' readiness for e-learning was studied in 4 factors with 19 questions (Yu, T., & Richardson, J. C., 2015 [6]): technical competence (6-questions), communication competence with the teacher (5-questions), communication competence with colleagues (4-questions), communication competence (4-questions). Questions are scaled using the Likert scale (1-Strongly Disagree, 2-Disagree, 3-Neither agree nor disagree, 4-Agree, 5-Strongly Agree). The results of reliability and factor analysis of these questions are shown in Table 1.

TABLE I. STUDENT E-LEARNING QUESTIONNAIRE

Variable	**Coding**	**Questions**	**Factor loading**	**Cronbach**
Technical competence	TC1	I feel confident when I use	0.711	0.885

		computer technology to complete a task.		
	TC2	I am able to use various computer technology	0.810	
	TC3	Using a computer is easy for me.	0.833	
	TC4	I can explain advantages of learning with computer technology	0.768	
	TC5	I can use computer technology while learning.	0.816	
	TC6	For me, using computer technology makes me more motivated to participate in learning activities.	0.645	
Communication competence with teacher	CCT1	I ask questions my teacher online.	0.810	0.886
	CCT2	I have online discussions with my teacher.	0.787	
	CCT3	I ask my teacher for help if necessary.	0.778	
	CCT4	If you are unable to participate in e-learning due to any accident, you will inform your teacher immediately.	0.722	
	CCT5	I express my opinion respectfully.	0.740	
Communication competence with colleagues	CCC1	I expand my social circle through e-learning.	0.795	0.847
	CCC2	I pay attention to the social activities of other students.	0.774	
	CCC3	I acquire different social communication skills depending on the situation.	0.695	
	CCC4	I make online social relationship with classmates.	0.673	
Communication competence	CC1	I find it easy to express my thoughts in writing.	0.823	0.825
	CC1	I enjoy sharing ideas of others.	0.678	
	CC2	When I express my ideas in writing, other people understand what I mean.	0.834	
	CC3	I offer constructive and active feedback to others even I don't agree with them.	0.669	

Fig 1. Technical Competence

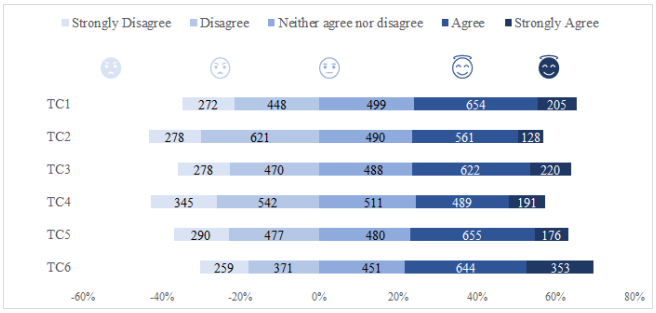

Fig. 2. Communication Competence with Teacher

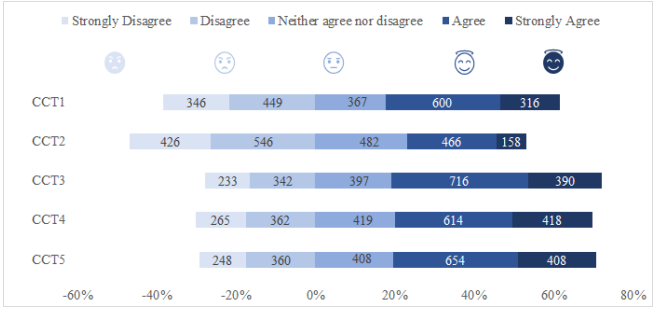

Fig. 3. Communication Competence with Colleagues

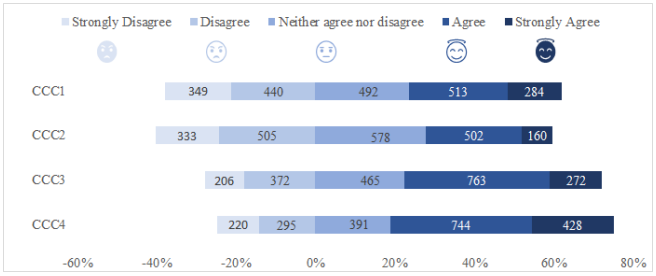

Fig. 4. Communication Competence

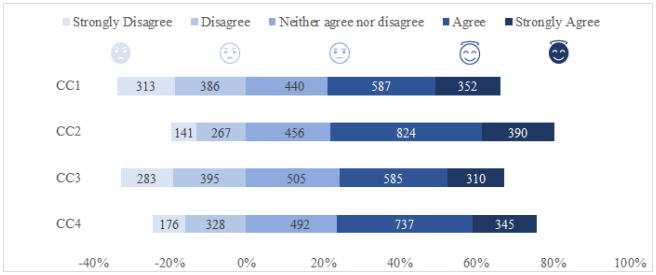

Fig. 1. – Fig. 4. show the frequency of the responses. According to the data of the answers, students' willingness to learn increases significantly if they use computers in terms of technical competence. Also, as for communication competence with the teachers, the ability to ask the teacher for help when necessary is the highest, while the ability to create electronic communication with classmates and actively give feedback online even if does not agree.

III. Study Results

The purpose of this study is to investigate the effect of E-Learning readiness of high school students, including technical skills, teacher communication competence, communication competence with colleagues, and communication competences. For this purpose, SPSS statistics software was used to analyze the following steps. The reliability of the survey questionnaire was determined by the Cronbach alpha test. The relationship between the 4 factors was analyzed by Pearson correlation. Students' readiness for e-learning was analyzed by t-test and ANOVA by comparing the school's location, property type, students' age, gender, grade, equipment, internet access, and computer.

TABLE II. Students' E-Learning Readiness (Gender, School Ownership, Computer)

		Mean	Standard dev	Mean difference	t value
Gender	Male	3.078	0.814	-0.06	-1.686
	Female	3.137	0.761		
Ownership	State	3.115	0.781	0.03	0.546
	Private	3.083	0.823		
Owning a computer	Yes	3.251	0.781	0.17	4.095***
	No	3.077	0.781		
Total		3.112	0.785		

***p<0.001, **p<0.01, *p<0.05

Students' readiness for e-learning was studied by school location, age, grade, equipment type and Internet access. Table 4 shows, the school location, age and class have no effect on e-learning readiness, while Internet access increases the readiness. Moreover, e-learning readiness of the students with laptops is higher than those with mobile phones.

TABLE III. Students' E-Learning Readiness (School Location, Age, Equipment, Internet Access)

		Mean	Standard deviation	F value
Location	Capital	3.103	0.751	1.186
	Aimag center	3.128	0.786	
	Sum	3.052	0.827	
Age	14	3.223	0.784	0.752
	15	3.097	0.784	
	16	3.113	0.807	
	17	3.123	0.760	
	18	2.970	0.816	
Grades	Grade 10	3.104	0.791	1.179
	Grade 11	3.084	0.797	
	Grade 12	3.151	0.763	
Equipment	PC	3.297	0.805	4.410**
	Notebook	3.304	0.780	
	Tablet	3.350	0.782	
	Mobile phone	3.093	0.782	
Internet access	Very poor	2.827	0.922	10.407***
	Poor	2.956	0.846	
	Fair	3.048	0.770	
	Good	3.147	0.748	
	Excellent	3.304	0.796	

***p<0.001, **p<0.01, *p<0.05

When considering the relationship between 4 factors affecting students' readiness for e-learning by Pearson correlation, all of them have a strong positive correlation. This means that when one factor is high, other factors are also high.

TABLE IV. Relations Between Factors

	Technical competence	Communication competence with the teacher	Communication competence with colleagues	Communication competence
	1	.418**	.458**	.372**
Communication competence with the teacher	.418**	1	.594**	.485**
Communication competence with colleagues	.458**	.594**	1	.524**
Communication	.372**	.485**	.524**	1

competence				

A. Comparative Results

The students' e-learning readiness survey was collected twice from the teachers who teach the students, participated in the study, with the same type of questions. A total of 412 teachers participated in the study. Table 6 shows the results of Mann-Whitney U test for significant differences between teachers and students.

TABLE V. COMPARATIVE RESULTS

		Mean	**Standard deviation**	**Mean rank**	**P**
Technical competence	Teacher	3.156	0.966	1352.18	0.001**
	Student	2.984	0.839	1224.96	
	Total	3.013	0.948		
Communication competence with the teacher	Teacher	3.328	1.067	1346.54	0.002**
	Student	3.127	0.872	1226.08	
	Total	3.161	1.039		
Communication competence with colleagues	Teacher	3.299	1.020	1349.91	0.001**
	Student	3.119	0.875	1225.41	
	Total	3.149	0.999		
Communication competence	Teacher	3.291	0.992	1239.31	0.836
	Student	3.280	0.779	1247.33	
	Total	3.282	0.960		
Students' e-learning readiness	Teacher	3.278	0.784	1372.41	0.000**
	Student	3.113	0.666	1220.95	
	Total	3.140	0.769		

IV. CONCLUSION

This study aims to investigate students' e-learning readiness using an international survey questionnaire. For this purpose, we aim to show the relationship between the 4 influencing factors and the difference between the study results of the teacher and student. The following conclusions are made:

- The readiness of students for e-learning is at an average level, and there was no difference depending on the location of the school, the type of ownership, the age of the student, gender, and the grade levels. In other words, our students' readiness for e-learning is generally at an average level.
- Having one's own computer and enough internet access has a positive effect on the e-learning readiness.
- More than 90% of students participate in e-learning from their mobile phones. However, it was seen that students participating using mobile phones are at a lower level of readiness for e-learning than students participating using laptops.
- There is a strong positive correlation for 4 factors, which means that by improving one of the factors, it is possible to have a positive effect on other factors and e-learning readiness. Also, while teachers and students have the same opinion on communication skills, they differ on other factors and students' readiness for e-learning. In other words, teachers evaluate students' readiness for e-learning at a higher level than students.

REFERENCES

[1] Anthony J.Nitko., Susan M. Brookhart., (2011) Educational Assessment of Students

[2] Chimgee. D., Bolor. A., Enerel. A., (2018) SPSS – Statistics of Social Science

[3] Dr. Harun CIGDEM., Dr. Mustafa OZTURK (2016)., Critical Components Of Online Learning Readiness And Their Relationships With Learner Achievement. Turkish Online Journal of Distance Education-TOJDE April 2016 ISSN 1302-6488 Volume: 17 Number: 2 Article 8

[4] Jamiyansharav. B., Makhgal. G., (2017) Introduction to Probability Statistics

[5] langtest.jp, Correlation. https://langtest.jp/shiny/cor/

[6] Miyejav, I., Dorj, B., Oirov, T., (2022), Examining the relability and validity of a Mongolian version of the student online learning readiness instrument using exploratory and confirmatory factor analysis. Journal of University Teaching & Learning Practice, 19(5).
https://ro.uow.edu.au/jutlp/vol19/iss5/05/

[7] spss-tutorials.com, Overview SPSS Factor Analysis Tutorials. https://www.spss-tutorials.com/spss-factor-analysis-tutorials/

[8] www.typeform.com, Likert Scale Surveys-Definitions, Examples & How-tos | Typeform. https://www.typeform.com/surveys/likert-scale-questionnaires/

[9] Yu, T., & Richardson, J. C. (2015). An exploratory factor analysis and reliability analysis of the Student Online Learning Readiness (SOLR) instrument. Online Learning, 19(5), 120–141.
http://dx.doi.org/10.24059/olj.v19i5.593