www.ijemst.net

Investigation of Primary School Teachers' Student-Centered Teaching and Technology Integration Competencies

Dinara Naimanova
Abai Kazakh National Pedagogical University, Kazakhstan

Larissa Lebedeva
Abai Kazakh National Pedagogical University, Kazakhstan

Assel Akpayeva
Abai Kazakh National Pedagogical University, Kazakhstan

Zhupat Astambayeva
Abai Kazakh National Pedagogical University, Kazakhstan

Ekaterina Ryabova
Abai Kazakh National Pedagogical University, Kazakhstan

Kalbike Yessenova
Abai Kazakh National Pedagogical University, Kazakhstan

To cite this article:

Naimanova, D., Lebedeva, L., Akpayeva, A., Astambayeva, Z., Ryabova, E., & Yessenova, K. (2023). Investigation of primary school teachers' student-centered teaching and technology integration competencies. *International Journal of Education in Mathematics, Science, and Technology (IJEMST), 11*(6), 1386-1404. https://doi.org/10.46328/ijemst.3681

International Journal of Education in Mathematics, Science and Technology

2023, Vol. 11, No. 6, 1386-1404 https://doi.org/10.46328/ijemst.3681

Investigation of Primary School Teachers' Student-Centered Teaching and Technology Integration Competencies

Dinara Naimanova, Larissa Lebedeva, Assel Akpayeva, Zhupat Astambayeva, Ekaterina Ryabova, Kalbike Yessenova

Article Info

Article History

Received:
20 December 2022
Accepted:
24 August 2023

Keywords

Primary school
Teachers
Student-centered teaching
Technology integration
Teacher competencies

Abstract

In recent years, the relationship between teachers' technology competencies and integration and student-centered learning has come to the forefront. It is a clear reality that teachers with a student-centered education paradigm tend to use technology to support student-centered curriculum and should have some competencies in this regard. In this study, it was aimed to determine the relationships between student-centered education and technology integration competencies of primary school teachers in terms of some variables. The sample of the survey model research consists of 290 teachers working in different primary schools in Kazakhstan. In the study, student-centered education and technology integration competencies of teachers were described and then these variables were compared according to gender and professional seniority variables. "Competency Scale for Student-Centered Education and Teacher Technology Integration Scale" were used to collect the data. Descriptive statistics, independent groups t-test, one-way ANOVA and Regression analysis techniques were used to analyze the data. According to the results obtained, primary school teachers' efficacy levels for student-centered education are at the middle level and their technology integration efficacy levels are below the middle level. Teachers' efficacy levels related to student-centered education showed significant differences according to gender and professional seniority variables. However, primary school teachers' technology integration competencies did not differ according to gender and professional seniority variables. There is a moderate positive relationship between student-centered education and technology integration competencies of primary school teachers. Teachers' student-centered education competencies significantly predict their technology integration competencies.

Introduction

The question of how to ensure the highest quality teaching conditions for students at all grade levels has been extensively studied since the early 1960s, mainly from two main perspectives: Teacher-centeredness (Teacher-

Centered) and student-centeredness (Student-Centered). Student-centered education initially emerged from the writings of early progressive educators such as John Dewey, and later, in various forms, Jean Piaget, Lev Vygotsky, Jerome Bruner and Carl Rogers occasionally addressed the issue. The ideas were radical when first introduced, but the concept of Learner-Centered education resonated in educational circles where lecturing, tutoring and rote memorization were still the standard for quality education and led to a wealth of theory and research showing that students can succeed in all types of learning without a strong transmissive approach from the teacher (Bernard et al., 2019; Murphy., Eduljee & Croteau, 2021). Moffett and Wagner (1992) define student-centered education as a model in which students interact with each other in the classroom environment, students take an active role in the activities to be carried out, and teachers create an educational environment that makes student learning permanent. According to Unin and Bearing (2016), student-centered education is an important educational process that encourages students to take an active role in the learning process and draws attention to learning and understanding. Examples of other attempts to make teaching and learning more personalized and adaptive can be found in both past and current research literature. These include mastery learning (Bloom, 1968), Personalized Instructional System (Keller, 1968), various forms of peer teaching (Mazur, 1997), reciprocal learning (Huang & Yang, 2015), collaborative and cooperative learning, problem and project-based learning, and more recently the implementation of Intelligent Tutoring Systems (Huang & Shiu, 2012); however, student-centered learning is not limited to these.

In contemporary new approaches developed under the influence of constructivism (Boudourides, 1998), the content of curricula consists of situational analysis instead of dogmatic knowledge and their presentation is not in the form of transferring information to students who are passive recipients, but in the form of problem solving and interaction in which students actively participate (Akpınar & Gezer, 2010). This situation necessitates student-centered education in which the individual is at the center in the learning-teaching process. The SCL approach is the structuring of the educational process in a way to ensure individual participation at every stage for individuals who have the ability to think and communicate scientifically, have learned to learn, are productive, can access and use information, have adopted universal values, use technology effectively and self-actualize, taking into account individual characteristics (Amaniampong & Hartmann, 2023; Kheerajit et al., 2021; Kirstein, 2022; Marpa, 2021; Mascolo, 2009; Pratumsala & Nuangchalerm, 2023; Rosa et al., 2022; Zhang, 2023). According to Stevens (1996), the nature of learning is more important than teaching methods in student-centered education. According to this perspective, learning is a change that occurs in the brain when new knowledge is created and a new skill is acquired. Student-centered education aims to encourage lifelong learning, self-discipline and risk-taking for creativity in people of all ages (Zhussupbayev et al., 2023; Ospankulov, Zhumabayeva & Nurgaliyeva,, 2023; Nagima et al., 2023; Nurgaliyeva et al., 2023; Zhumash et al., 2021). In a student-centered educational environment, the teacher is more than a subject matter expert. In the SCL approach, the teacher is the individual who creates environments that facilitate students to take responsibility for learning and helps them to have real-world learning experiences (Avard, 2009; LoPresto & Slater, 2016; French & Burrows, 2017; Stevens, 1996; Thornburg, 1995). At the same time, the teacher's role as a facilitator and his/her communication with the student ensure that student experiences are carried to the learning process. In this sense, teachers have important responsibilities in the student-centered learning process. Although the approaches used in the teaching process, curricula, methods and techniques, and tools and equipment are important factors to improve teaching, all these

will not have the desired effect unless they are put into action with the teacher's lively personality. In this respect, it is of great importance that teachers have undergone a qualified pre-service training (Hirumi, 2002; Komninou & Papakostas, 2022; Neo & Neo, 2006).

With the student-centered education model, teacher-centered education, which is the product of the traditional understanding of education, has been replaced by an understanding of education in which the student actively participates in every stage of education under the leadership of the teacher. This understanding has also brought about a change in the role of the teacher in education (Emaliana, 2017). Since student-centered education is a different approach from teacher-centered education, it has an important place in teachers' professional priorities. There are many studies in the literature on the SCL approach and the role of the teacher (Avard, 2009; LoPresto & Slater, 2016; French & Burrows, 2017; Abel & Campbell, 2009; Berry & Sharp, 1999; Dimmock, 2002; Hannuma, Irvina, Leib & Farmerb, 2008; Lea, Stehanson & Tray, 2003; McCrystle, Murray & Pinheiro, 2010; Muganga & Ssenkusu, 2019; Murphy., Eduljee & Croteau, 2021; Salinas & Garr, 2009; Wang, Myers & Tahir, 2011; Ying, 2009). The role of the teacher in student-centered education differs from traditional teaching methods and assumes a role that effectively guides students' learning experiences. Some important points about the role of the teacher in student-centered education can be listed as follows (Neo & Neo, 2006; Thornburg, 1995):

- Guidance and Support: In student-centered education, teachers are guides who direct students' learning processes. By guiding students, they support their learning journey by providing content, materials and resources that are appropriate to their interests and abilities (Goodyear & Dudley, 2015).
- Individualization: In student-centered education, each student has unique abilities and needs. Teachers individualize and personalize content to suit students' different learning styles and learn at different speeds (Zhang et al., 2021).
- Increasing Interest and Motivation: In student-centered education, teachers choose learning materials and methods to increase students' interest and motivation. They make the learning process more attractive and meaningful with content appropriate to students' interests (Lee & Hannafin, 2016).
- Encouraging Student Participation: In student-centered education, teachers encourage students' active participation. They allow students to share their thoughts and opinions, participate in discussions and take active roles in projects (Koehler & Meech, 2022).
- Supporting Learner Autonomy: In learner-centered education, teachers promote the autonomy necessary for students to manage the learning process on their own. They give students responsibility and help them set their own learning goals (Klemenčič, 2017).
- Providing Feedback: In student-centered education, teachers provide regular and constructive feedback to students. This feedback supports students' learning processes by emphasizing their strengths and identifying areas for improvement (Spooner, 2015).
- Assessment and Progress Monitoring: In student-centered education, teachers use different assessment methods to monitor students' progress and achievements. These assessments are organized according to students' needs and progress levels (Stiggins, 1994).
- Collaboration and Differentiation: In student-centered education, teachers create a collaborative classroom environment and differentiate methods to support different groups of students. In this way, they ensure that each student is actively involved in the learning process (Jacobs & Renandya, 2019).

This role in student-centered education increases students' motivation to learn by encouraging them to actively participate and take responsibility. It helps students to develop themselves as more independent, self-confident and intellectually richer individuals (Lee & Hannafin, 2016). However, in student-centered education, it is also important for teachers to continuously update themselves in terms of development and guidance in accordance with student needs. Student-centered education and the use of technology can help students have more effective and personal learning experiences. However, the use of technology should be supported by careful planning, adaptation to student needs and appropriate guidance (Hirumi, 2002). Educators should continuously engage in training and development processes to increase students' learning potential by using technology effectively.

It is significant that teachers adopt a student-centered approach to education and guide their educational processes accordingly. It can be said that the role of the teacher in student-centered learning has changed and this role has transformed into designing the process and consulting during the process (Pedersen, 2003). The teacher, who traditionally directs, explains, responds and evaluates, encourages students' roles of planning, explaining and directing in active learning and speaks less. He/she also sets an example for the learner by researching and improving himself/herself. In student-centered education, the teacher focuses on systematic planning for the effective use of educational technology and equipment, planning for the effective use of educational technology equipment in the classroom and guides the design of the learning process (Motschnig-Pitrik & Holzinger, 2002; Muganga & Ssenkusu, 2019).

The teacher should know how to use technology effectively and guide students in using technology: In the rapidly developing technological society, students need to specialize in new areas of knowledge and skills, have the ability to analyze and make decisions, and learn to navigate in large masses of information. In this process, instead of a teacher-centered education approach, a learner-centered education approach should be implemented and students should gain new knowledge and skills of the 21st century (UNESCO, 2002). In the information and technology society, the indispensable cornerstone of education is the teacher, even though there are concerns that new educational technologies with multiple communication support and computers will eliminate the teacher. Computer and communication technologies do not diminish the value of the teacher; on the contrary, they require each teacher to be a multidimensional reference focus that is carried out with individual guidance. In learner-centered education, the teacher's role as content expert, information source and knowledge transfer has been replaced by that of facilitator, information guide, pathfinder and learner with students. Teachers need to acquire these new roles, knowledge and skills. Information and communication technology supports teachers and students in adapting to their new roles and as powerful tools in the transition to student-centered education (UNESCO, 2002)

While countries are trying to remove the primary barriers to technology integration through investments and strengthening the technological infrastructure in schools, researchers are setting teacher competencies and standards for the effective use of Information and Communication Technologies (ICT) in schools (Ilgaz & Usluel, 2011). The National Educational Technology Standards (NETS) (National Educational Technology Standards [NETS], 2017) and the standards set by the International Society for Technology in Education (ISTE, 2014) for teachers, students and administrators in the United States and the competencies set by the European Union's

Council and Commission on Education (European Commission, 2010) for the use of ICT in European countries are the main examples of these standards. Looking at these standards;

- Digital age literacy, the use of technology in accordance with legal, ethical and humanitarian values,
- Students' technology literacy,
- Preparation of technology-related learning environments by teachers,
- Integrating technology with the approaches recommended in the curriculum to maximize students' learning levels,
- Use of technology in combination with effective assessment and evaluation techniques,
- In large participatory groups with peers and families, it is seen that technology is used in communication and collaboration to enable students to learn.

However, technology integration in schools is not at the desired level, despite investments and standards being set both in our country and other countries (Hew & Brush, 2007; Keengwe, Onchwari & Wachira, 2008). For example, in the Teaching and Learning International Survey (TALIS) of teachers in OECD countries, only thirty-eight percent of teachers use technology as part of the teaching and learning process in the classroom (OECD, 2015). This rate is not at the desired level. Ertmer (2005) categorized barriers due to external influences such as technological resources, the school's technological infrastructure and school culture as primary barriers, and barriers due to internal influences such as teachers' attitudes and beliefs as secondary barriers. Ertmer and Ottenbreit-Leftwich (2013) also stated that teachers' pedagogical beliefs about technology integration affect their preferred technology use and teaching methods in teaching and learning processes. That is, teachers use ICT tools and applications based on their pedagogical beliefs (Liu, 2011; Tajibayeva et al., 2023). As can be understood from the definitions, teacher beliefs about the teaching and learning process play an important role in technology integration as they provide information about how ICTs are used in the classroom (Ertmer, 2005; Kim et al., 2013; Liu, 2011). Harper (2008) states that programs aimed at developing teachers' technological competence are an effective option for schools that want to integrate technology into their regular curriculum and increase the use of project-based, student-centered learning practices.

When the literature is examined, it is seen that there is an increase in studies examining the relationships between teachers' technology competencies and integration and student-centered learning (Ertmer & Ottenbreit-Leftwich, 2010; Ertmer et al., 2012; Kim et al., 2013; Mertala, 2017). In these studies, teachers with a student-centered education paradigm tend to use technology to support student-centered curriculum, while teachers who believe in teacher-centered education tend to use computers to support teacher-centered practices (Andrew, 2007; Backfisch et al., 2021; Cheung et al., 2020). Becker (2000) states that for successful technology integration, three basic conditions must be met: 1) teacher access to technology, 2) Being adequately prepared 3) Having personal beliefs in line with the student-centered education approach. It is seen that student-centered or constructivist approaches are more successful in technology integration (Kim et al., 2013). In this success, the importance of teachers' characteristics, knowledge, skills and attitudes about technology and student-centered education is undeniably important. In this context, this study aims to examine the competencies of primary school teachers on student-centered education and technology integration.

Method

This study was conducted over a period of six months in 2022-2023. It is a survey-type study aiming to determine the competency levels of teachers working in primary schools in Kazakhstan on student-centered education and technology integration and the relationship between these levels. This study describes the current situation. The population of the study consisted of teachers working in primary schools in Kazakhstan.

The sample of the study comprises of 280 teachers selected by simple random method. Of these teachers, 165 were female and 115 were male. Of the participant teachers, 73 had a professional seniority of 0-5 years, 42 had a professional seniority of 4-10 years, 101 had a professional seniority of 11-15 years and 64 had a professional seniority of 16 years or more. In the study, teachers were reached by using appropriate communication tools with the online form tool and the research measurement tools were applied.

Data Collection Tools

In this study, which aims to examine the competencies of teachers on student-centered education and technology integration, the teachers participating in the research were asked questions consisting of three forms. First of all, the questionnaire form was based on the researchers' personal information. In this questionnaire form, there are questions based on learning the participants' gender, age, educational status, institution of employment, professional seniority, type of employment, whether they have a computer and whether they have an internet connection. This information was considered as an independent variable in the study.

As the first of these scales, the researcher used the "Teachers' Competence Scale on Student-Centered Education" developed by Yeşilyurt (2012) and adapted into Kazakh by the researchers to determine the competencies of primary school teachers on student-centered education. The teacher efficacy scale consists of 58 items and the items are scored as "completely agree" (5), "agree" (4), partially agree (3), "disagree" (2) and "strongly disagree" (1) using a five-point Likert-type rating scale. A high average score on the scale means a high level of teacher efficacy in student-centered learning. The validity of the scale was determined by factor analysis, item-total correlations and item discrimination. Accordingly, the factor loadings of the items ranged between .315 and .741. According to the results obtained, the fact that the factor loading values of the scale are .30 and above indicates that the factor analysis validity is high. Because the limit value of the factor loading values of the items can be reduced to .30.

In addition, the variance of 7 factors with eigenvalues above 1.25 explained 45.948% of the total variance. Explained variance of 30% and above is considered to be a sufficient criterion for scale development studies in behavioral sciences. According to the results of the factor analysis, it was determined that the items in the scale were gathered in 7 factors and these factors were as follows: Student-Related Propositions, Teaching Process-Related Propositions, Learning-Related Propositions, Teacher-Related Propositions, Assessment-Related Propositions, Thinking-Related Propositions and Activism-Related Propositions. The reliability of the scale was determined by internal consistency level analysis and two-half test reliability. The internal consistency level of

the scale ranged between .574 and .878 for all factors and the Cronbach Alpha coefficient value was .940.

As a third form, the "Teachers' technology integration self-efficacy scale" developed by Wang, Ertmer, and Newby (2004) was used. The scale consists of two factors and a total of 19 items. Exploratory factor analysis performed on the Kazakh form of the scale revealed a unidimensional structure. The scale consists of 5-point Likert-type questions. The participants were asked to mark one of the numbered intervals as "(1) Strongly disagree, (2) Disagree, (3) Undecided, (4) Agree, (5) Strongly agree" (5-1=4; 4/5=0,80). Accordingly, the range of 1,00-1,79 was determined as "Strongly Disagree Level", 1,80-2,59 as "Disagree Level", 2,60-3,39 as "Undecided Level", 3,40-4,19 as "Agree Level", and 4,20-5,00 as "Strongly Agree Level". With the determination of these levels, it is aimed to interpret the average scores calculated in the analysis of the scale. The EFA (Exploratory Factor Analysis) and CFA (Confirmatory Factor Analysis) required for the validity studies of this scale were conducted and it was reported that sufficient and appropriate values were obtained. The Cronbach's Alpha internal consistency coefficient calculated by the researchers for the reliability of the scale is 0.87.

Data Analysis Techniques

SPSS 26.0 program was used in this study in which it was aimed to analyze the competency levels of the teachers participating in the research on student-centered education and technology integration according to various demographic variables. Descriptive statistical information such as arithmetic mean and standard deviation were used to calculate teachers' competency levels in student-centered education and technology integration. Frequency and percentage methods were used to analyze the demographic information about the participants. Before the analyses required to answer the sub-problems in the study, normality assumptions of the data were checked. These checks were made according to the total score of the scale for each variable. In this context, kurtosis and skewness values of the data group, normality tests (Kolmogorov-Smirnov), Histogram Graph, Q-Q Plot Graph and Box Plot Graph were examined.

According to the normality control in gender and professional seniority variables, it was determined that the z score obtained by dividing the kurtosis-skewness coefficients by their standard errors was between ±1.96. Accordingly, the data are normally distributed for these variables (). In normality tests, which is another normality assumption check, $p > 0.05$ was found in the specified variables according to the significance level of $p = 0.05$ and is accepted as an indicator of normal distribution (). In addition, it was also observed that the Histogram, Q-Q Plot and Box Plot Graphs showed a normal distribution. For this reason, it was decided to use parametric tests in the analyzes with these variables. After the controls, in accordance with the sub-problems of the study, independent samples t-test, which is one of the parametric tests, was used between two groups; One Way ANOVA test was used when comparing more than 2 groups.

Findings

Descriptive findings regarding primary school teachers' competencies in student-centered education are given in Table 1.

Table 1. Descriptive Findings related to Primary School Teachers' Student-centered Education Competencies

	N	Minimum	Maximum	Mean	Std. Deviation
Student	280	1.00	5.00	3.11	1.19
Teaching Process	280	1.00	5.00	2.89	1.12
Learning	280	2.00	5.00	3.90	0.76
Teacher	280	1.00	5.00	3.88	0.98
Evaluation	280	1.00	5.00	3.30	1.13
Thinking	280	1.00	5.00	3.80	1.04
Activism	280	1.00	5.00	3.31	1.11
Student Centered Total	280	1.00	5.00	3.46	0.73

In general, it is seen that the mean of primary school teachers' efficacy for student-centered education is at the level of (=3.46). When the sub-dimensions of teachers' competencies for student-centered education are examined, it is seen that the mean of the student sub-dimension (= 3.11); the mean of the teaching process sub-dimension (=2.89); the mean of the learning sub-dimension (=3.90); the mean of the teacher sub-dimension (=3.88); the mean of the evaluation sub-dimension (=3.38); the mean of the thinking sub-dimension (=3.80) and the mean of the activity sub-dimension (=3.31). These findings show that teachers' competencies related to student-centered education are at a medium level.

Descriptive findings regarding primary school teachers' technology integration competencies are given in Table 2.

Table 2. Descriptive Findings related to Primary School Teachers' Technology Integration Competencies

	N	Minimum	Maximum	Mean	Std. Deviation
Technological integration	280	1	5	2.90	1.07

In general, it is seen that the mean of primary school teachers' competencies regarding technology integration is at the level of (=2.90). This finding shows that teachers' technology integration competencies are below the middle level. Teachers were grouped according to their gender and t-test was used to examine whether there was a significant difference between the groups in their competencies related to student-centered education. Analysis results and descriptive findings are given in Table 3.

Table 3. Comparison of Primary School Teachers' Student-centered Education Competencies according to Gender Variable

	Gender	N	Mean	Std. Deviation	t	P
Student	Female	165	3.35	1.08	4.12	0.00
	Male	115	2.77	1.25		
Teaching Process	Female	165	3.12	1.05	4.29	0.00
	Male	115	2.56	1.13		

	Gender	N	Mean	Std. Deviation	t	P
Learning	Female	165	3.95	0.73	1.26	0.21
	Male	115	3.83	0.80		
Teacher	Female	165	3.98	0.94	1.99	0.05
	Male	115	3.74	1.03		
Evaluation	Female	165	3.47	1.13	3.06	0.00
	Male	115	3.05	1.09		
Thinking	Female	165	3.89	1.01	1.82	0.07
	Male	115	3.66	1.08		
Activism	Female	165	3.45	1.12	2.50	0.01
	Male	115	3.11	1.08		
Student Centered Total	Female	165	3.60	0.71	4.12	0.00
	Male	115	3.25	0.70		

According to the results of the analysis in Table 3, in the 7 sub-dimensions of the competence scale in student-centered education in terms of gender, 4.12 t-values were calculated in the student dimension, 4.29 t-values in the learning process dimension, 1.26 t-values in the learning dimension, 1.99 t-values in the teacher dimension, 3.06 t-values in the evaluation dimension, 1.82 t-values in the thinking dimension, 2.50 t-values in the activity dimension and finally 4.12 t-values in the whole scale. According to these findings, a significant difference was found in terms of student, learning process, teacher's roles, evaluation, being active and having student-centered competence as a whole in the competence scale in student-centered education according to gender ($p<0.05$). According to the averages of the groups, female primary school teachers obtained higher averages in these dimensions and in terms of student-centered education competence as a whole.

Teachers were grouped according to their gender and t-test was used to examine whether there was a significant difference in technology integration competencies between the groups. Analysis results and descriptive findings are given in Table 4.

Table 4. Comparison of Primary School Teachers' Technology Integration Competencies according to Gender Variable

		N	Mean	Std. Deviation	t	P
Technological integration competence	Female	165	2.95	1.10	0.78	0.44
	Male	115	2.84	1.04		

According to the results of the analysis in Table 4, a t value of 0.78 was calculated according to the analysis performed in terms of gender in the technology integration competency scale. According to this finding, no significant difference was found in terms of having technology integration competence according to gender ($p>0.05$). According to the averages of the groups, it is seen that both male and female teachers have partially low level of technology integration competence.

Teachers were grouped according to their seniority in their positions and the F test was used to examine whether there was a significant difference between the groups in their competencies related to student-centered education. The results of the analysis and descriptive findings are given in Table 5.

Table 5. Comparison of Primary School Teachers' Student-centered Education Competencies according to Professional Seniority Variable

		N	Mean	Std. Deviation	F	P
Student	0-4	73	3.12	1.22	0.35	0.79
	5-10	42	3.10	1.28		
	11-15	101	3.04	1.17		
	16 years and over	64	3.23	1.12		
Teaching Process	0-4	73	2.90	1.09	0.50	0.68
	5-10	42	2.71	1.24		
	11-15	101	2.89	1.13		
	16 years and over	64	2.98	1.05		
Learning	0-4	73	4.10	0.65	3.33	0.02
	5-10	42	4.02	0.72		
	11-15	101	3.81	0.87		
	16 years and over	64	3.75	0.69		
Teacher	0-4	73	3.99	1.01	0.84	0.47
	5-10	42	3.98	0.98		
	11-15	101	3.84	1.03		
	16 years and over	64	3.75	0.89		
Evaluation	0-4	73	3.30	1.09	4.83	0.00
	5-10	42	3.83	1.08		
	11-15	101	3.26	1.24		
	16 years and over	64	3.00	0.93		
Thinking	0-4	73	3.92	1.09	0.64	0.59
	5-10	42	3.86	1.07		
	11-15	101	3.74	1.08		
	16 years and over	64	3.70	0.90		
Activism	0-4	73	3.30	1.06	3.65	0.01
	5-10	42	3.69	1.22		
	11-15	101	3.37	1.16		
	16 years and over	64	2.98	0.93		
Student Centered Total	0-4	73	3.52	0.67	1.31	0.27
	5-10	42	3.60	0.83		
	11-15	101	3.42	0.80		
	16 years and over	64	3.34	0.56		

According to the results of the analysis in Table 5, in the 7 sub-dimensions of the scale of competence in student-centered education, 0.35 F values were calculated in the student dimension, 0.50 F values in the learning process dimension, 3.33 F values in the learning dimension, 0.85 F values in the teacher dimension, 4.83 F values in the evaluation dimension, 0.64 F values in the thinking dimension, 3.65 F values in the activity dimension and finally 1.31 F values in the whole scale. According to these findings, a significant difference was found in the learning, evaluation and being active dimensions of the competence scale in student-centered education according to professional seniority ($p<0.05$). According to Scheffe test analysis, teachers with a professional seniority between 5 and 15 years provide more active and effective learning environments in student-centered education compared to their colleagues with low professional seniority and more than 16 years.

By grouping teachers according to their seniority in their positions, the F test was used to examine whether there was a significant difference in technology integration competencies between the groups. The results of the analysis and descriptive findings are given in Table 6.

Table 6. Comparison of Primary School Teachers' Technology Integration Competencies according to Professional Seniority Variable

		N	**Mean**	**Std. Deviation**	**F**	**P**
Technological integration competence	0-4	73	3.00	1.106	0.52	0.67
	5-10	42	3.00	1.148		
	11-15	101	2.84	1.093		
	16 years and over	64	2.83	0.969		

According to the results of the analysis in Table 6, an F value of 0.52 was calculated according to the analysis performed in terms of the professional seniority variable in the technology integration competency scale. According to this finding, no significant difference was found in terms of having technology integration competence according to professional seniority ($p>0.05$). The results of the regression analysis conducted to reveal the prediction level of primary school teachers' student-centered education competencies on technology integration competencies are presented in Table 7.

Table 7. The Level of Primary School Teachers' Student-centered Education Competencies predicting their Technology Integration Competencies

		Unstandardized Coefficients		**Standardized Coefficients**	**t**	**Sig.**
Model		Beta	Std. Error	Beta		
1	(Constant)	0.82	0.29		2.86	0.005
	Student Centered Total	0.60	0.08	0.41	7.45	0.000
$F=55.45$; $R= 0.408$; $R^2=0.166$; $p<0.05$						

When the analysis results are examined, it is seen that the teacher efficacy variable related to student-centered education has a significant relationship with technology integration ($R = .41$, $p<0.05$). This predictor variable

explains 17% of the total variance related to technology integration competence. In other words, it is seen that teacher efficacy related to student-centered education is a significant predictor of technology integration ($F= 55.45$, $p<0.05$).

Discussion

In this study, the competency levels of primary school teachers on student-centered education and technology integration were examined on a comparative and relational basis in terms of some variables. According to the findings of the study, the competencies of primary school teachers regarding student-centered education were generally found to be at a medium level. According to the analyses, the participant teachers' perceptions of competence regarding the roles of teachers and students in student-centered education and the phenomenon of learning were found to be high.

However, in terms of making the student-centered learning process effective and being active in this approach, the participants considered themselves partially inadequate. Likewise, Akpınar and Gezer's (2010), Grossman et al.'s (1999) and Kain's (2003) studies revealed that although teachers adopt student-centered education as an idea, in practice they continue teacher-centered education in many ways. Similarly, So and Kim (2009) revealed that teachers are pedagogically inadequate in actual practice. According to Slavin (1994), in a student-centered education environment, the teacher is seen as a facilitator of learning, a helper, a friend or a consultant who can be consulted in case of any need, by getting rid of his/her roles such as disciplinarian and distributor of information in the classroom, which he/she has been accustomed to in traditional teaching for years. Demonstrates attitudes and behaviors that facilitate cooperation and interaction in the classroom. They actively create opportunities and environments that will make the items to be learned meaningful and interesting for students. However, we observe that teachers trained in traditional teaching processes have problems in actively realizing the parameters of student-centered education.

In another variable of the study, primary school teachers' competencies in student-centered education were examined comparatively according to gender and professional seniority variables. According to the findings, female primary school teachers exhibit higher competencies towards student-centered education than their male colleagues. These findings are similar to the findings of studies conducted by Kara (2021), Margrett and Marsiske (2002), Sieverding and Koch (2009). According to Kara (2021), pre-service teachers' attitudes towards teaching profession and their competencies towards innovative learning differed in favor of female pre-service teachers. According to this finding, it can be said that it is due to the idea that women consider themselves more suitable for the teaching profession, especially in terms of adapting to new learning approaches. In terms of professional seniority, teachers with a professional seniority between 6-15 years were found to have high student-centered education competencies compared to their colleagues with very low and very high professional seniority.

The findings of this study on professional seniority are similar to the results of Niess, Suharwoto, Lee, and Sadri (2006). In this study, it was stated that novice teachers with low pedagogical competencies were weaker in making connections between new paradigms, pedagogy and content. Lee and Tsai (2010) also found that novice teachers

were unable to distinguish between pedagogical knowledge and pedagogical content knowledge. Similarly, Chai et al. (2011) also found that novice teachers did not perceive that content knowledge and the application of new student-centered methods were significantly linked. Moreover, the fact that novice teachers do not perceive themselves as adequate in terms of content knowledge, pedagogy and student-centered education should make us think about the pre-service training they received.

Another variable of the study is the technology integration competencies of primary school teachers. According to the findings of the study, it was seen that the technology integration competencies of the participant teachers were generally below average. As a matter of fact, Archambault and Crippen (2009) found in their study that although teachers have high level pedagogy, content and pedagogical content knowledge, they are less confident in adding and integrating technological knowledge to this knowledge. According to the findings of this study, the technology integration competencies of the participant teachers did not differ according to gender and professional seniority variables. Similarly, in Jang and Tsai's (2012) study on primary school teachers, no difference was found between male and female teachers' technology integration and TPACK competencies. However, in Koh, Chai, and Tsai's (2010) study, male pre-service teachers had higher technology knowledge than female pre-service teachers. These researchers claim that female teachers need more support in the field of technology knowledge in general. In this context, it is recommended to conduct qualitative and mixed model research on gender and technology integration in the future.

The last variable addressed in the study was the relationship between teachers' student-centered education competencies and technology integration competencies. According to regression analyses, participant teachers' competencies in student-centered education positively and highly affect their technology integration. Indeed, Chai, Koh, Tsai, and Tan (2011) found that there is a significant relationship between TPACK and pre-service teachers' ability to use information and communication technologies. Angeli and Valanides (2009) stated that with the widespread use of technology in educational environments, education will evolve from a teacher-centered teaching approach to a student-centered teaching approach. Wheeler (2000) stated that the role of the teacher will undergo changes with the widespread use of technology in learning environments. In this context, it can be said that teachers will increase their potential to realize student-centered learning from traditional approaches. With the increase in teachers' technology competence, we can assume that they will have significant contributions in terms of using new materials in student-centered teaching environments, enriching activities in classroom work, increasing student motivation and efficiency of teaching.

In conclusion, it is crucial to make use of technology to provide student-centered learning in educational environments. As a matter of fact, technology can provide the necessary environments to prepare and maintain these environments. In-service trainings given to teachers on student-centered learning and technology integration can be increased. Teachers' progress in implementing technology integration and student-centered education can be monitored regularly. Finally, it is recommended that the course contents in primary school teacher training programs and the relationships between courses should be updated in terms of student-centered education competencies in order to enable prospective teachers to teach effectively in their fields by integrating appropriate technology with appropriate pedagogy, especially in pre-service undergraduate education.

References

Abel, E. M. & Campbell, M. (2009). Student-centered learning in an advanced social work practice course: outcomes of a mixed methods investigation. *Social Work Education*, 28, 3-17.

Akpınar, B., & Gezer, B. (2010). Öğrenen merkezli yeni eğitim yaklaşımlarının öğrenme-öğretme sürecine yansımaları. *Dicle Üniversitesi Ziya Gökalp Eğitim Fakültesi Dergisi*, 14, 1-12.

Amaniampong, A. & Hartmann, M. D. (2023). Factors Affecting Technology Integration in Colleges of Education. *International Journal of Studies in Education and Science (IJSES), 4*(2), 176-194. https://doi.org/10.46328/ijres.69

Andrew, L. (2007). Comparison of teacher educators' instructional methods with the constructivist ideal. *The Teacher Educator, 42*(3), 157–184.

Angeli, C., & Valanides, N. (2009). Epistemological and methodological issues for the conceptualization, development, and assessment of ICT–TPCK: Advances in technological pedagogical content knowledge (TPCK). *Computers & education*, *52*(1), 154-168.

Archambault, L., & Crippen, K. (2009). Examining TPACK Among K-12 Online Distance Educators in the United States. *Contemporary Issues in Technology and Teacher Education, 9*(1).71-88.

Avard, M. (2009). Student-centered learning in an earth science, preservice, teacher-education course. *Journal of College Science Teaching, 38*(6), 24-29.

Backfisch, I., Lachner, A., Stürmer, K., & Scheiter, K. (2021). Variability of teachers' technology integration in the classroom: A matter of utility!. *Computers & Education*, 166, 104159.

Becker, H. J. (2000). Findings from the teaching, learning and computing survey: Is Larry Cuban right? http://epaa.asu.edu/ojs/article/view/442/565. 13.01.2023

Bernard, R. M., Borokhovski, E., Schmid, R. F., Waddington, D. I., & Pickup, D. I. (2019). Twenty-first century adaptive teaching and individualized learning operationalized as specific blends of student-centered instructional events: A systematic review and meta-analysis. *Campbell Systematic Reviews, 15*(1-2), e1017. https://doi.org/10.1002/cl2.1017

Bery J. & Sharp J. (1999). Developing student-centered learning in mathematics through co-operation, reflection and discussion. *Teaching in Higher Education*, 13562517, 4, 1.

Bloom, B. S. (1968). Learning for Mastery. Instruction and Curriculum. Regional Education Laboratory for the Carolinas and Virginia, Topical Papers and Reprints, Number 1. *Evaluation comment, 1*(2), n2.

Boudourides, M. A. (1998). Constructivism and education. Online: Retrieved on 15 June-2022, at URL: http://www.math.upatras.gr/~mboudour/articles/constr.html.

Chai, C.S., Koh, J.H.L., Tsai, C.C. & L.L.W. Tan. (2011). Modeling primary school pre-service teachers' technological pedagogical content knowledge (TPACK) for meaningful learning with information and communication technology (ICT). *Computers & Education*, 57, 1184-1193.

Cheng, S. L., Lu, L., Xie, K., & Vongkulluksn, V. W. (2020). Understanding teacher technology integration from expectancy-value perspectives. *Teaching and Teacher Education*, 91, 103062.

Dimmock, C. (2002). School design: a classificatory framework for a 21st-century approach to school improvement. *School Effectiveness and School Improvement, 13*(2), 137-162.

Emaliana, I. (2017). Teacher-centered or student-centered learning approach to promote learning?. *Journal Sosial*

Humaniora (JSH), 10(2), 59-70.

Ertmer, P. A. (2005). Teacher pedagogical beliefs: The final frontier in our quest for technology integration? *Educational Technology Research And Development, 53*(4), 25-39.

Ertmer, P. A., & Ottenbreit-Leftwich, A. T. (2010). Teacher technology change: How knowledge, confidence, beliefs, and culture intersect. *Journal of research on Technology in Education, 42*(3), 255-284.

French, D. A., & Burrows, A. C. (2017). Inquiring astronomy: Incorporating student-centered pedagogical techniques in an introductory college science course. *Journal of College Science Teaching, 46*(4), 24-32

Goodyear, V., & Dudley, D. (2015). "I'ma facilitator of learning!" Understanding what teachers and students do within student-centered physical education models. *Quest, 67*(3), 274-289

Grossman, P. L., Smagorinsky, P., & Valencia, S. (1999). Appropriating conceptual and pedagogical tools for teaching English: A conceptual framework for studying professional development (Report no. 12011). Albany, N.Y.: National Research Center On English Learning and Achievement. https://doi.org/10.1086/444230

Hannuma, W.H., Irvina, M.J., Leib, P.W., & Farmerb, T.W. (2008). Effectiveness of using learner centered principles on student retention in distance education courses in rural schools. *Distance Education, 29*(3), 211–229.

Harper, D. (2008). Vision to action: Adding student leadership to your technology plan. Generation Yes. Retrieved from http://genyes.org/media/programs/how_to_include_students_in_tech_pl an.pdf at 10.01.2023

Hew, K. F., & Brush, T. (2007). Integrating technology into k-12 teaching and learning: current knowledge gaps and recommendations for future research. *Educational Technology Research and Development, 55*(3), 223-252.

Hirumi, A. (2002). Student-centered, technology-rich learning environments (SCenTRLE): Operationalizing constructivist approaches to teaching and learning. *Journal of Technology and Teacher Education, 10*(4), 497-537.

Huang, C. T., & Yang, S. C. (2015). Effects of online reciprocal teaching on reading strategies, comprehension, self-efficacy, and motivation. *Journal of Educational Computing Research, 52*(3), 381-407.

Huang, S. L., & Shiu, J. H. (2012). A user-centric adaptive learning system for e-learning 2.0. *Journal of Educational Technology & Society, 15*(3), 214-225.

Ilgaz, H., & Usluel, Y. (2011). Öğretim sürecine BİT entegrasyonu açısından öğretmen yeterlikleri ve mesleki gelişim. *Journal of Educational Sciences & Practices, 10*(19).

International Society for Technology in Education (ISTE). (2008). Essential conditions: Necessary conditions to effectively leverage technology for learning. https://www.iste.org/docs/pdfs/20-14_ISTE_Standards-T_PDF.pdf

Jacobs, G. M., & Renandya, W. A. (2019). *Student centered cooperative learning: Linking concepts in education to promote student learning*. Springer.

Jang, S.J. & Tsai, M.F. (2012). Exploring the TPACK of Taiwanese elementary mathematics and science teachers with respect to use of interactive whiteboards. *Computers & Education*, 59, 327-338.

Kain, D.J. (2003). Teacher-centered versus student-centered: Balancing constraint and theory in the composition classroom. *Duke University Press, 3*(1), 104-108.

Kara, S. (2021). An Investigation of Technological Pedagogical and Content Knowledge (TPACK) Competencies

of Pre-Service Visual Arts Teachers. *International Journal of Technology in Education (IJTE), 4*(3), 527-541. https://doi.org/10.46328/ijte.184

Keengwe, J., Onchwari, G., & Wachira, P. (2008). Computer technology integration and student learning: Barriers and promise. *Journal of Science Education and Technology, 17*(6), 560-565.

Keller, F. S. (1968). Good-bye, teacher... *Journal of applied behavior analysis, 1*(1), 79.

Kheerajit, C., Paisarnsombat, S., Rampai, N. & Sompong, N. (2021). Development of Integrated Media for Promoting of Thai Cuisine to Global Market. *International Journal on Engineering, Science and Technology (IJonEST), 3*(2), 113-118.

Kim, C. M., Kim, M. K. K., Lee, C., Spector, J. M. & DeMeester, K. (2013). Teacher beliefs and technology integration. *Teaching and Teacher Education*, 29, 76-85.

Kirstein, K. (2022). Applied Artificial Intelligence: Teaching Information Technology Students How to Utilize Commercially Available AI Tools. In C.L. Zeman & H. Akcay (Eds.), *Proceedings of ILSET 2022--International Conference on Life Sciences, Engineering and Technology* (pp. 22-28), Los Angeles, USA. ISTES Organization.

Klemenčič, M. (2017). From student engagement to student agency: Conceptual considerations of European policies on student-centered learning in higher education. *Higher Education Policy*, 30, 69-85.

Koehler, A. A., & Meech, S. (2022). Ungrading learner participation in a student-centered learning experience. *TechTrends, 66*(1), 78-89.

Koh, J., Chai, C. S., & Tsai, C. C. (2010). Examining the technological pedagogical content knowledge of Singapore preservice teachers with a large-scale survey. *Journal of Computer Assisted Learning*, 26, 563-573

Komninou, I. & Papakostas, C. (2022). Integration of Digital Technology and Educational Planning for Teaching and Learning Religion in Higher Education Institutions. In M. Shelley & I. Sahin (Eds.*), Studies on Education, Science, and Technology 2021* (pp. 59-80). ISTES Organization.

Lea S., Stehanson D. & Tray J. (2003). Higher education students' attitudes to student-centered learning: beyond 'educational bulimia'? *Studies in Higher Education*, 28, 321-334.

Lee, E., & Hannafin, M. J. (2016). A design framework for enhancing engagement in student-centered learning: Own it, learn it, and share it. *Educational Technology Research And Development*, 64, 707-734.

Lee, M. H. & Tsai, C. C. (2010). Exploring teachers' perceived self-efficacy and technological pedagogical content knowledge with respect to educational use of the World Wide Web. Instructional Science: *An International Journal of the Learning Sciences, 38*(1), 1-21.

Liu, S. H. (2011). Factors related to pedagogical beliefs of teachers and technology integration. *Computers & Education*, 56, 1012–1022.

LoPresto, M.C., & Slater, T.F. (2016). A new comparison of active learning strategies to traditional lectures for teaching college astronomy. *Journal of Astronomy and Earth Science Education, 3*(1), 59-76.

Margrett, J. A., & Marsiske, M. (2002). Gender differences in older adults' everyday cognitive collaboration. *International Journal of Behavioral Development, 26*(1), 45–59.

Marpa, E. P. (2021). Technology in the Teaching of Mathematics: An Analysis of Teachers' Attitudes during the COVID-19 Pandemic. *International Journal on Studies in Education (IJonSE), 3*(2), 92-102.

Mascolo, M. F. (2009). Beyond student-centered and teacher-centered pedagogy: Teaching and learning as guided

participation. *Pedagogy and the Human Sciences, 1*(1), 3-27

Mazur, E. (1997). Peer instruction: Getting students to think in class. In Redish E. F., & Rigden J. S. (Eds.), *The Changing Role of Physics Departments in Modern Universities*, Part Two: Sample Classes (pp. 981–988). Woodbury NY: American Institute of Physics.

McCrystle, S.W., Murray, L. M. & Pinheiro, S. O. (2010). Designing a learner-centered geriatrics curriculum for multilevel medical learners. *Education and Training, 58*(1), 142-151.

Mertala, P. (2017). The nature and foundations of preschool educators' positive ICT pedagogical beliefs. *Computers in Human Behavior*, 69, 197-206

Moffett, J., & Wagner, B. J. (1992). *Student-centered language arts, K-12 Portsmouth*. NH: Boynton / Cook Publishers Heinemann.

Motschnig-Pitrik, R., & Holzinger, A. (2002). Student-centered teaching meets new media: Concept and case study. *Journal of Educational Technology & Society, 5*(4), 160-172.

Muganga, L., & Ssenkusu, P. (2019). Teacher-centered vs. student-centered: An examination of student teachers' perceptions about pedagogical practices at Uganda's Makerere University. *Cultural and Pedagogical Inquiry, 11*(2), 16-40.

Murphy, L., Eduljee, N. B., & Croteau, K. (2021). Teacher-centered versus student-centered teaching: Preferences and differences across academic majors. *Journal of Effective Teaching In Higher Education, 4*(1), 18-39.

Nagima, B., Saniya, N., Gulden, Y., Saule, Z., Aisulu, S., & Nazigul, M. (2022). Influence of Special Learning Technology on the Effectiveness of Pedagogical Ethics Formation in Future Teachers. *Journal of Education and E-Learning Research, 10*(1), 1-6. https://doi.org/10.20448/jeelr.v10i1.4313

Nurgaliyeva, S., Iztleuova, Z., Maigeldiyeva, S., Zhussupova, Z., Saduakas, G., & Omarova, G. (2023). Examining the relationships between teachers' job satisfaction and technological competencies. *International Journal of Education in Mathematics, Science, and Technology (IJEMST), 11*(4), 898-912. https://doi.org/10.46328/ijemst.3375

Neo, M. & Neo, K. (2006). *Multimedia learning: A new paradigm in education*. http://www.icte.org/T01iLibrary/T01i103.PDF

NETS (2017). *The national educational technology standarts*.10.12.2022 http://courses.edtechleaders.org/documents/NETSAdminTeachers.pdf

Niess, M. L., Suharwoto, G., Lee, K., & Sadri, P. (2006). Guiding in-service mathematics teachers in developing TPCK. *Paper presented at the American Education Research Association Annual Conference*, San Francisco, CA.

Ospankulov, Y., Zhumabayeva, A., & Nurgaliyeva, S. (2023). The impact of folk games on primary school students. *Journal of Education and E-Learning Research, 10*(2), 125–131. https://doi.org/10.20448/jeelr.v10i2.4473

OECD (2015). TALIS 2013 Results: Teaching in Focus Brief No. 12- *Teaching with Technology*, OECD Publishing, Paris

Pedersen, S., & Liu, M. (2003). Teachers' beliefs about issues in the implementation of a student-centered learning environment. *Educational Technology Research and Development, 51*(2), 57-76.

Pratumsala, K. & Nuangchalerm, P. (2023). Enhancing Scientific Literacy of Lower Secondary Students through

Technological Pedagogical and Content Knowledge Framework. *International Journal on Social and Education Sciences (IJonSES), 5*(2), 263-274. https://doi.org/10.46328/ijonses.499

Rosa, M. A., Peres, D. P. M., & Peres, R. (2022). Geometrical Optimization in the SoftAge. *International Journal on Engineering, Science and Technology (IJonEST),* 4(2), 138-142.

Salinas, M. F. & Garr, J. (2009). Effect of learner-centered education on the academic outcomes of minority groups. *Journal of instructional Psychology, 36*(3), 226-237.

Sieverding, M. &Koch, S.C. (2009). Self-Evaluation of computer competence: How gender matters. *Computers & Education, 52*(3), 696-701

Slavin, R. E. (1994). *Educational Psychology: Theory and Practice*, (Fourth Edition), Massachusetts: Allyn and Bacon.

So, H. J., & Kim, B. (2009). Learning about problem based learning: Student teachers integrating technology, pedagogy and content knowledge. *Australasian Journal of Educational Technology, 25*(1), 101-116.

Spooner, E. (2015). *Interactive student centered learning: A cooperative approach to learning*. Rowman & Littlefield.

Stevens, M. L. (1996). *Transitioning from content centered instruction to student centered learning*, PhD Thesis. Oregon State University, Oregon.

Stiggins, R. J. (1994). *Student-centered classroom assessment*. New York: Merrill.

Tajibayeva, Z., Nurgaliyeva, S., Aubakirova, K., Ladzina, N., Shaushekova, B., Yespolova, G., & Taurbekova, A. (2023). Investigation of the psychological, pedagogical and technological adaptation levels of repatriated university students. *International Journal of Education in Mathematics, Science, and Technology (IJEMST), 11*(3), 755-774. https://doi.org/10.46328/ijemst.3336

Thornburg, D. (1995). Student-centered learning. *Electronic Learning, 14*(7), 18–19

Unin, N. & Bearing, P. (2016). Brainstorming as a way to approach student-centered learning in the ESL classroom. *Procedia- Social and Behavioral Sciences*, 605-612. https://doi.org/10.1016/j.sbspro.2016.05.450

Wang, L., Ertmer, P. A., & Newby, T. J. (2004). Increasing preservice teachers' self-efficacy beliefs for technology integration. *Journal of Research on Technology in Education, 36*(3), 231-250

Wang, L., Myers, D. L. & Yanes, M. J. (2010). Creating Student-Centered Learning Experience through the Assistance of High-End Technology in Physical Education: A Case Study. *Journal of Instructional Psychology, 37*(4), 352-356.

Wheeler, S. (2000). The role of the teacher in the use of ICT. In *Keynote Speech delivered to the National Czech Teachers Conference*. University of Western Bohemia, Czech Republic. Learning Technology Research.

Yeşilyurt, E. (2012). Development of the scale of teacher candidates' competency on constructivist learning: study of reliability and validity. *Uluslararası Avrasya Sosyal Bilimler Dergisi, 3*(7), 29-45.

Ying, S. (2009). How Can Chinese English Teachers Meet the Challenge of Creating a Learner-Centered, Communicative, Inter cultural Classroom to Achieve Optimal Student Learning Outcomes? *Canadian Social Science* ISSN 1712-8056, 5, 6.

Zhang, L., Basham, J. D., Carter Jr, R. A., & Zhang, J. (2021). Exploring Factors associated with the implementation of student-centered instructional practices in US classrooms. *Teaching and Teacher Education*, 99, 103273

Zhang, Z. (2023). Introducing Assistive Technology (AT) to Pre-Service Teachers: Observations and Experiences. *International Journal on Studies in Education (IJonSE), 5*(2), 120-129. https://doi.org/10.46328/ijonse.136

Zhussupbayev, S., Nurgaliyeva, S., Shayakhmet, N., Otepova, G., Karimova, A., Matayev, B., & Bak, H. (2023). The effect of using computer assisted instruction method in history lessons on students' success and attitudes. *International Journal of Education in Mathematics, Science, and Technology (IJEMST), 11*(2), 426-441. https://doi.org/10.46328/ijemst.3136

Zhumash, Z., Zhumabaeva, A., Nurgaliyeva, S., Saduakas, G., Lebedeva, L. A., & Zhoraeva, S. B. (2021). Professional teaching competence in preservice primary school teachers: Structure, criteria and levels. *World Journal on Educational Technology: Current Issues, 13*(2), 261–271. https://doi.org/10.18844/wjet.v13i2.5699

Author Information

Dinara Naimanova
https://orcid.org/0009-0002-9319-1442
Abai Kazakh National Pedagogical University
Dostyk ave., 13, Almaty
Republic of Kazakhstan
Contact e-mail: *mrs.naimanova@gmail.com*

Larissa Lebedeva
https://orcid.org/0000-0003-4685-141X
Abai Kazakh National Pedagogical University
Dostyk ave., 13, Almaty
Republic of Kazakhstan

Assel Akpayeva
https://orcid.org/0000-0002-4675-3177
Abai Kazakh National Pedagogical University
Dostyk ave., 13, Almaty
Republic of Kazakhstan

Zhupat Astambayeva
https://orcid.org/0000-0002-4911-9614
Abai Kazakh National Pedagogical University,
Dostyk ave., 13, Almaty,
Republic of Kazakhstan

Ekaterina Ryabova
https://orcid.org/0000-0003-4634-2690
Abai Kazakh National Pedagogical University
Dostyk ave., 13, Almaty
Republic of Kazakhstan

Kalbike Yessenova
https://orcid.org/0000-0001-7402-3625
Abai Kazakh National Pedagogical University
Dostyk ave., 13, Almaty
Republic of Kazakhstan