

## Development of readiness of future teachers of preschool organisations to innovative activity

**Taiteliyeva Laura** <sup>\*1</sup>, Abai Kazakh National Pedagogical University, Department of preschool education and social pedagogy, 050010, Dostyk ave., 13, Almaty, Kazakhstan, <https://orcid.org/0000-0002-5593-0980>

**Zhubandykova Akgul** <sup>2</sup>, Kazakh National Women's Teacher Training University, Department of Pedagogical Sciences, 99 Aiteke bi str., 50000, Almaty, Kazakhstan <https://orcid.org/0000-0003-4545-2599>

**Kymbat Balazhanova** <sup>3</sup> Kazakh National Women's Teacher Training University, Department of Pedagogical Pedagogy and psychology Sciences, 99 Aiteke bi str., 50000, Almaty, Kazakhstan <https://orcid.org/0000-0003-3597-0165>

**Turdaliyeva Sholpan** <sup>4</sup> Taraz Regional University named after M.Kh. Dulati., Department of psychology sciences,, 080000, st.Suleymavova 7a, Taraz, Kazakhstan, <https://orcid.org/0000-0001-7296-5221>

**Salimbayeva Sholpan** <sup>5</sup>, Taraz Regional University named after M.Kh. Dulati., Candidate of pedagogical sciences, 080000, st.Suleymavova, Taraz, Kazakhstan, <https://orcid.org/0000-0001-5742-1357>

**Baizhanova Saule** <sup>6</sup> Kostanay Regional University named after A.Baitursynov, Department of pedagogical sciences, Baitursynov Street 47, Kostanai, Kazakhstan <https://orcid.org/0000-0002-6517-0655>

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### Abstract

The purpose of this research is to determine the technological pedagogical content knowledge competencies related to the development of the readiness of future teachers of preschool organisations for innovative activities. This study was carried out in accordance with the phenomenology pattern, one of the qualitative research methods. The study group of the research consists of 25 students studying in the departments of preschool teaching at various universities in Kazakhstan in the 2021–2022 academic year. Research data were collected with a semi-structured interview form developed by the researchers. As a result of the research, the vast majority of preschool teacher candidates stated that they found technology knowledge sufficient to improve their readiness for innovative activities. The majority of preschool teacher candidates participating in the research stated that they found their content knowledge sufficient to improve their readiness for innovative activities. The majority of preschool teacher candidates participating in the research stated that they found their pedagogical knowledge and technological pedagogical content knowledge partially sufficient in improving their readiness for innovative activities. As a result of the research, the necessity of expanding the education curriculum and giving educational conferences in universities in order to increase the technological pedagogical content knowledge of preschool teacher candidates has arisen.

Keywords: Preschool organisations, preschool teachers, technological pedagogical content knowledge;

\* ADDRESS FOR CORRESPONDENCE: Taiteliyeva Laura, Abai Kazakh National Pedagogical University, Department of preschool education and social pedagogy, 050010, Dostyk ave., 13, Almaty, Kazakhstan,

E-mail address: [laura8788@mail.ru](mailto:laura8788@mail.ru)

## 1. Introduction

It is seen that the technological, economic, social and political developments in the 21st century have led to a change in the qualities expected from people. However, changes are expected in the competencies, knowledge and skills of individuals and education systems are also affected accordingly. The ability of individuals and societies to keep up with the changing age conditions can be ensured by being educated in accordance with science and technology, which is always one step ahead. Societies, which set their goal as raising individuals suitable for the information society, need to have the authority to use technology in the education system at a sufficient level in order to have a say in science and in the globalising world.

### 1.1. Theoretical and conceptual framework

Today, the education system is constantly renewed and various arrangements are made for both students and teachers. The main purpose of these studies is to adapt to the technology era we live in together with the developing technology. In this context, both students and teachers play an important role. In our country, as in other countries, the starting point of these studies is teachers. With the use of technology in schools, teachers who can choose the most appropriate tool and material for students have come to the fore (Meng & Sam, 2013; Nordin, Davis, & Ariffin, 2013; Schmid, Brianza, & Petko, 2021). Teachers and teacher candidates are people who use technology at school and in classrooms (Baek, Jung, & Kim, 2008). Educators have started to develop the concept of technological pedagogical content knowledge by adding technological knowledge to pedagogical content knowledge (Angeli & Valanides, 2009; Valtonen et al., 2019).

It is clear that teachers' use of information and communication technologies in the classroom has a significant impact on the education of teacher candidates (Sahin, 2011). Literature data show that pre-service teachers who have gained their technological skills at a high level are more willing to use technology in their classrooms (Tondeur, Scherer, Siddiq, & Baran, 2020). In addition, it has been reported that pre-service teachers who have received information and communication technologies education have a stronger self-efficacy regarding computer use (Lee, Teo, & Chen, 2008).

Technology knowledge is knowledge about various technologies, ranging from low technologies, such as pen and paper, to digital technologies, such as the Internet, digital video, smart boards and software programmes. Area information is the knowledge about the main subject learned and taught (Mishra & Koehler, 2006). Pedagogical knowledge covers knowledge in student learning, lesson plan preparation, assessment and classroom management. Technological pedagogical content knowledge is the knowledge that teachers need to integrate technology with their teaching in any content area (Mishra & Koehler, 2006). It emphasises that teachers should have the ability to intuitively understand the complex interaction between three basic knowledge components (content knowledge, pedagogical knowledge and technological knowledge) while teaching content using appropriate pedagogical methods and technologies (Schmidt et al., 2009).

In technological pedagogical content knowledge, teacher knowledge has three main components: content knowledge, pedagogy and technology knowledge. There are also interactions between the equally important components, which are presented as pedagogical content knowledge and technological content knowledge (technological pedagogical knowledge and technological pedagogical content knowledge) (Koehler, Mishra & Yahya, 2007).

### 1.2. Related research

Developments in technology and new applications have made the use of technology an important part of education. Technology has brought new methods and approaches to education and training activities. Many studies have emphasised that teachers should improve their content knowledge by including technology and gain teaching skills with technology (Niess, 2005). In the research carried out

by Archambault and Crippen (2009), the proficiency levels of 596 teachers who teach online were investigated in terms of technological pedagogical content knowledge. In the study, it was revealed that although the participants' pedagogical field and pedagogical content knowledge were high, they had less self-confidence as a result of the addition of technological knowledge to this information.

Lloyd (2013) applied an information communication technologies education programme to a group of elementary school students from the University of Australia in order to integrate information and communication technologies into learning-teaching environments and to reorganise the learning environment in the classroom, and evaluated the data obtained in terms of technological pedagogical content knowledge. As a result of the study, pre-service teachers generally showed a high level of proficiency and had a highly positive tendency to integrate ICT into their future classrooms.

Graham et al. (2009) developed a scale consisting of 30 items and 2 open-ended questions, which they called 'Teachers' technological pedagogical content knowledge self-confidence', to determine science teachers' technological pedagogical content knowledge and self-confidence levels. According to the data obtained from the pre-test and post-test, which were obtained from the scale in which they emphasised the four components they named as technological knowledge, technological content knowledge, technological pedagogical knowledge and technological pedagogical content knowledge, it was concluded that there was a significant difference in the technological, pedagogical, and content knowledge self-confidence of the teachers at the end of the training programme they were subjected to.

Studies by Abbitt (2011) revealed that, although pre-service teachers easily use technology for different purposes in their daily lives, they cannot use technology so easily and comfortably in the teaching-learning process. In their study, Chai, Koh, and Tsai (2011, p. 65) studied to predict the effectiveness of the programme given in order to improve the technological pedagogical content knowledge levels of teacher candidates in Singapore and how the components of technological knowledge, pedagogical knowledge and communication knowledge affect pre-service teachers' technological pedagogical content knowledge levels.

In their study, Maeng, Mulvey, Smetana, and Bell (2013) tried to define the advanced technology inquiry teaching of secondary school science teachers and their developing technological pedagogical content knowledge. Guzey and Roehring (2009) had teachers make some in-service practices related to their technology-containing lesson plans and their thoughts about the environments in which technology is applied, in order to monitor the development of their technological pedagogical content knowledge. However, Jimoyiannis (2010) concluded that student characteristics and access to technology also play a role in the development of technological pedagogical content knowledge. He found that authentic learning carried out in real classroom environments is essential for the development of technological pedagogical content knowledge along with in-service training.

### *1.3. Purpose of the research*

The purpose of this research is to determine the technological pedagogical content knowledge competencies related to the development of the readiness of future teachers of preschool organisations for innovative activities. For this purpose, the following sub-objectives have been determined:

1. What are the opinions of preschool teacher candidates about technology knowledge in improving their readiness for innovative activities?
2. What are the opinions of preschool teacher candidates regarding their content knowledge in improving their readiness for innovative activities?
3. What are the views of preschool teacher candidates on their pedagogical knowledge in improving their readiness for innovative activities?

4. What are the views of preschool teacher candidates on technological pedagogical content knowledge in improving their readiness for innovative activities?

## 2. Method and materials

### 2.1. Research method

This study was carried out in accordance with the phenomenology pattern, one of the qualitative research methods. Phenomenology is both a philosophical movement and a qualitative research method. In the phenomenological approach, individuals' experiences, perceptions and meanings related to a phenomenon are tried to be determined. He also stated that with this method, what the 'phenomenon' is and how it can be comprehended will be questioned and examined. Phenomenological studies and the information they collect provide extremely useful and rich information in the literature, based on both definition and dimensions of the focused phenomenon, the meanings that the participants experienced, felt and created with this phenomenon and while forming a theory based on these (Gill, 2014). In this direction, the views of preschool teachers were evaluated in accordance with the phenomenology pattern.

### 2.2. Participants

The study group of the research consists of 25 students studying in the departments of preschool teaching at various universities in Kazakhstan in the 2021–2022 academic year. In qualitative research, it has been determined that the number of samples that the researcher will use in his study should consist of at least 20–30 people in order to present an accurate and detailed theory (West, 2001). Based on this, it was deemed appropriate that the sample group of the study consisted of 25 students. All of the preschool teacher candidates consist of senior students. The study group of the research was formed on a completely voluntary basis, and 18 preschool teacher candidates participating in the research were female and 7 were male.

### 2.3. Data collection tools

Research data were collected with a semi-structured interview form developed by the researchers. While creating the semi-structured interview form, a literature review was conducted. Then, practices and methods regarding the readiness of preschool teacher candidates for innovative activities were examined. The semi-structured interview form prepared in this direction was presented to two field experts and they were asked to evaluate its suitability in terms of content and format. The clarity of the questions was tested by applying the form, which was corrected in line with expert opinions, to two preschool teacher candidates. The semi-structured interview form was finalised and made ready for application. The semi-structured interview form used in the research is given in Table 1.

**Table 1**

*Semi-Structured Interview form Prepared for Teacher Candidates Participating in the Research*

Demographic features
Your gender:
Questions about technological pedagogical content knowledge for preschool teacher candidates
1. What are your views on your technology knowledge in improving your readiness for innovative activities? Very enough ( )    Enough ( )    Partially Sufficient ( )    Insufficient ( )    Very Insufficient ( ) Give your opinion:.....
2. What are your views on your field knowledge in improving your readiness for innovative activities?

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Very enough ( )    Enough ( )    Partially Sufficient ( )    Insufficient ( )    Very Insufficient ( )

Give your opinion:.....

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3. What are your views on your pedagogical knowledge in improving your readiness for innovative activities?

Very enough ( )    Enough ( )    Partially Sufficient ( )    Insufficient ( )    Very Insufficient ( )

Give your opinion:.....

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4. What are your views on your technological pedagogical knowledge in improving your readiness for innovative activities?

Very enough ( )    Enough ( )    Partially Sufficient ( )    Insufficient ( )    Very Insufficient ( )

Give your opinion:.....

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In Table 1, there is a semi-structured interview form prepared to measure the technological pedagogical content knowledge of preschool teacher candidates participating in the research. The semi-structured interview form consists of four questions. Each question was divided into 5-point Likert degrees and left open to express the opinions of preschool teacher candidates.

#### 2.4. Data collection process

The semi-structured interview form developed to collect the research data was filled by the preschool teacher candidates participating in the research during face-to-face interviews. In the face-to-face interviews, information about the ethical principles of the research and the process of conducting the research was given to the pre-service teachers. The interviews were conducted one-on-one and in a quiet environment within the university. It took approximately 2 weeks to complete the interviews with all teacher candidates.

#### 2.5. Data collection analysis

Content analysis method was used in the analysis of the research data. Content analysis requires a more detailed examination of the collected data and reaching the concepts, categories and themes that explain this data. Content analysis focuses on collected data; codes are extracted from the events and facts that are frequently repeated in the data set or that the participant emphasises heavily. One can go to categories from codes and to themes from categories. Briefly, data (codes) that are found to be similar and related to each other are interpreted by bringing them together within the framework of certain concepts (categories) and themes (Merriam & Grenier, 2019).

### 3. Results

In Table 2, the views of preschool teacher candidates participating in the research on technology knowledge in improving their readiness for innovative activities were evaluated.

**Table 2**

*Preschool Teacher Candidates' Views on Technology Knowledge in Improving Their Readiness for Innovative Activities*

Category	Teachers' opinions	F	%
Very enough	Ability to learn technology quickly	3	12
	Using different technological tools		
	Having sufficient opportunities to work with different technologies		
Enough	Spending time with technological equipment	13	52
	Using technology in education		
Partially sufficient	Have the necessary technical skills to use technology	3	12
	Using technology partially in life		

<b>Insufficient</b>	Partially following technological developments	4	16
	Ability to partially integrate technology into education		
	Inability to solve technological infrastructure problems		
	Inability to have technological tools		
<b>Very insufficient</b>	Inability to follow technological developments	2	8
	Lack of ability to use technology in education		
	Being very inadequate in producing technological solutions		
	Being very inexperienced in using different technologies		

In Table 2, the views of preschool teacher candidates participating in the research on technology knowledge in improving their readiness for innovative activities are categorised. 12% of the preschool teacher candidates stated that they found their technology knowledge very sufficient, 52% sufficient, 12% partially sufficient, 16% insufficient and 8% very insufficient in improving their readiness for innovative activities.

In Table 3, the opinions of preschool teacher candidates participating in the research on their field knowledge in improving their readiness for innovative activities are evaluated.

**Table 3**

*Opinions of Preschool Teacher Candidates on Content Knowledge in Improving Their Readiness for Innovative Activities*

Category	Teachers' opinions	F	%
<b>Very enough</b>	It is very sufficient to have knowledge about the field.	4	16
	It is very sufficient to use different ways of thinking about the field.		
	It is very sufficient to use different methods in the field.		
<b>Enough</b>	Adequate in organising the educational environment	14	56
	Sufficient to carry out educational activities		
	Sufficient to work collaboratively with family		
<b>Partially sufficient</b>	Partially sufficient in choosing and using materials	3	12
	Partially adequate in assessing children's development		
	Partially sufficient in generating alternative solutions		
<b>Insufficient</b>	Inadequate in following the innovations in the field	3	12
	Inadequate in having effective communication skills		
	Insufficient in generating new ideas about the field		
<b>Very insufficient</b>	Very inadequate in evaluating educational programmes	1	4
	Very inefficient in creating original products		

In Table 3, the views of preschool teacher candidates participating in the research on their field knowledge in improving their readiness for innovative activities are categorised. 16% of the preschool teacher candidates stated that they found their content knowledge very sufficient, 56% sufficient, 12% partially sufficient, 12% insufficient and 4% very insufficient in improving their readiness for innovative activities.

In Table 4, the views of preschool teacher candidates participating in the research on their pedagogical knowledge in improving their readiness for innovative activities are evaluated.

**Table 4**

*Opinions of Preschool Teacher Candidates on their Pedagogical Knowledge in Improving Their Readiness for Innovative Activities*

Category	Teachers' opinions	F	%
<b>Very enough</b>	Very good at measuring students' learning	3	12
	Very proficient in using different materials and methods		

<b>Enough</b>	It is very sufficient to change the teaching method depending on the students' understanding.	3	12
	Sufficient in applying the teaching method to different students		
<b>Partially sufficient</b>	Adequate in planning the education appropriate to the level of the students.	15	60
	Proficient in classroom management		
<b>Insufficient</b>	Partially sufficient in applying teaching methods and approaches	2	8
	Partially sufficient in following pedagogical competences		
<b>Very insufficient</b>	Partially sufficient in choosing the right method and material	2	8
	Inadequate in classroom management		
	Insufficient in attracting the attention and attention of students		
	Insufficient in teacher–parent cooperation		
	Very inadequate in assessing students' performance in the classroom.		
	Very inadequate in measuring students' conceptual knowledge.		

In Table 4, the views of preschool teacher candidates participating in the research on their pedagogical knowledge in improving their readiness for innovative activities are categorised. 12% of preschool teacher candidates stated that they found their pedagogical knowledge very sufficient, 12% sufficient, 60% partially sufficient, 8% insufficient and 8% very insufficient in improving their readiness for innovative activities.

In Table 5, the opinions of preschool teacher candidates participating in the research on technological pedagogical content knowledge in improving their readiness for innovative activities are evaluated.

**Table 5**

*Opinions of Preschool Teacher Candidates on Technological Pedagogical Content Knowledge in Improving Their Readiness for Innovative Activities*

Category	Teachers' opinions	F	%
<b>Very enough</b>	They are very proficient in the subject to be taught, the method of teaching and the choice of technologies to be used in the classroom to enhance what students have learned.	2	8
	Very proficient at combining subject knowledge, technology and teaching approaches appropriately.		
<b>Enough</b>	Sufficient in choosing the appropriate technology to enrich the course content.	4	16
	Proficient in choosing contemporary technologies and strategies that enable better teaching of the subject.		
<b>Partially sufficient</b>	Partially adequate in terms of using the strategies that combine content knowledge, technology and teaching approaches in the classroom.	11	44
	Partially sufficient in the use of technology in education		
<b>Insufficient</b>	Partially adequate in choosing technologies that will improve teaching approaches	6	24
	Inadequate in lecturing by appropriately integrating field, formation and technology knowledge		
<b>Very insufficient</b>	Inadequate to lead colleagues in the integration of field, formation and technology knowledge	2	8
	Insufficient ability to explain a subject with different teaching strategies and technologies.		
	Very inadequate in combining subject knowledge, technology and teaching approaches appropriately.		
	Very inadequate in integrating course content with appropriate technology and teaching principles/methods.		

In Table 5, the views of preschool teacher candidates participating in the research on technological pedagogical content knowledge in improving their readiness for innovative activities are categorised. 8% of preschool teacher candidates stated that they found their technological pedagogical content knowledge to be very sufficient, 16% sufficient, 44% partially sufficient, 24% insufficient and 8% very insufficient in improving their readiness for innovative activities.

#### **4. Discussion**

The majority of preschool teacher candidates participating in the research stated that they found technology knowledge sufficient to improve their readiness for innovative activities. Ihmeideh (2009) examined the attitudes and practices of preschool teachers regarding the use of computer technologies in reading and writing classes. According to the results obtained in the study, it was determined that preschool teachers approached technology attitudes and practices rather moderately. In their research, Lindahl and Folkesson (2012) examined preschool teacher candidates' views on integrating information technologies into classrooms and applying these developments. As a result of the research, it was determined that some of the teachers expressed positive opinions about integrating technology into education. Erdemir, Bakirci, and Eyduran (2009), in their study titled 'Determination of Pre-service Teachers' Self-Confidence in Using Technology in Education', stated that while pre-service teachers consider themselves competent in using search engines and preparing simple materials for teaching purposes, they cannot prepare complex and multipurpose teaching devices.

The majority of preschool teacher candidates participating in the research stated that they found their content knowledge sufficient to improve their readiness for innovative activities. In the study conducted by Kök, Ciftci, and Ayik (2011) with preschool teacher candidates, it was determined that students' perceptions of competence regarding communication, creativity and aesthetic special field competences were at high levels.

The majority of preschool teacher candidates participating in the research stated that they found their pedagogical knowledge partially sufficient in improving their readiness for innovative activities. In their study, Lee and Tsai (2010) determined that inexperienced teachers could not distinguish between pedagogical knowledge and pedagogical content knowledge, while experienced teachers had low self-confidence in terms of technological pedagogical content knowledge.

The majority of preschool teacher candidates participating in the research stated that they found their technological pedagogical content knowledge partially sufficient in improving their readiness for innovative activities. In the study conducted by Liang, Chai, Koh, Yan, and Tsai (2013) with the participation of Taiwanese preschool teacher, preschool teachers' technological pedagogical content knowledge was examined. In the research, it was concluded that teachers with more professional experience show more resistance to technology-integrated teaching environments.

#### **5. Conclusion**

In recent years, it has been observed that technology has been integrated into education, although it is seen that there are different views and applications about what knowledge the teachers should have. In the age we live in, technology knowledge, content knowledge, pedagogical knowledge and technological pedagogical content knowledge are among the characteristics that teachers should have. Developing the readiness of future teachers of preschool organisations for innovative activities is only possible if preschool teacher candidates have technological pedagogical content knowledge. Therefore, in this research, it is aimed to determine the technological pedagogical content knowledge competencies of the future teachers of preschool organisations regarding the development of their readiness for innovative activities. As a result of the research, the vast majority of preschool teacher candidates stated that they found technology knowledge sufficient to improve their readiness for innovative activities. The majority of preschool teacher candidates participating in the research stated



that they found their content knowledge sufficient to improve their readiness for innovative activities. The majority of preschool teacher candidates participating in the research stated that they found their pedagogical knowledge and technological pedagogical content knowledge partially sufficient in improving their readiness for innovative activities.

## 6. Recommendations

In line with the results obtained from the research, the following suggestions have been developed to improve the readiness of preschool teacher candidates for innovative activities.

1. In order to improve the readiness of preschool teacher candidates for innovative activities, the content of the curriculum in universities should be increased in order to increase their technology knowledge.
2. In order to improve the readiness of preschool teacher candidates for innovative activities, the content of the curriculum in universities should be increased in order to increase their field knowledge and pedagogical knowledge.
3. In order to increase the technological pedagogical content knowledge of preschool teacher candidates, the education curriculum should be expanded and education conferences should be held.

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