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Formation of future teachers' ability to organise educational activities on the basis of pedagogical tasks

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Abstract

The purpose of this research is to determine the ability of future teachers to organise educational activities on the basis of pedagogical tasks. This research was designed in accordance with the quantitative research method. The study group of the research consists of 448 teacher candidates studying in education faculties of various universities in Kazakhstan in the 2021–2022 academic year. As the data collection tool of the research, the scale of the ability to organise educational activities on the basis of pedagogical tasks was developed by the researchers. As a result of the research, it has been determined that pre-service teachers' ability to organise educational activities on the basis of pedagogical tasks has a medium level of proficiency in the fields of pedagogical content knowledge and organising educational activities. It is seen that there is no significant difference regarding the ability of the teacher candidates participating in the research to organise educational activities on the basis of pedagogical tasks according to the variables of gender and the department they study in. However, it is seen that

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there is a significant difference regarding the ability of the teacher candidates participating in the research to organise educational activities on the basis of pedagogical tasks according to the class variable. The significant difference determined that it is in favour of pre-service teachers studying in the third and fourth year. In line with the results of the research, it has become necessary to increase the course content in teacher training programmes in order to improve the formation of teacher candidates' ability to organise educational activities on the basis of pedagogical tasks.

Keywords: Future teachers, pedagogical tasks, educational activities;

1. Introduction

Efforts to improve the teaching profession, which is one of the most important elements of the learning process, continue even today (Uzunboylu & Ozdamli, 2011). From this point of view, teachers, who are intellectual members of the society, should be trained in the best way in terms of both content knowledge and pedagogical competencies according to today's conditions. The fact that teachers are equipped with only field knowledge does not mean that today's education and training activities are carried out completely. In terms of their qualifications, teachers also need to develop their belief in the profession and their self (Tröbst et al., 2018).

1.1. Theoretical and conceptual framework

One of the approaches that will help teachers improve in learning practices is to establish a relationship between the methods teachers create in classrooms and the social environment in which the school is located (Crownover & Jones, 2018). A teacher continues his/her educational activities by considering all kinds of conditions, i.e., from classroom factors, the physical environment of the classroom to classroom management skills (Putnam & Borko, 2000). Fulfilling the goals aimed by the education system and creating an effective learning–teaching process are among the main views of teachers (Sickel & Friedrichsen, 2018). Application studies in each field are carried out based on certain theoretical concepts and principles (Marcelo & Yot-Dominguez, 2019).

In the field of education, the development and implementation of goals, programmes, equipment and teaching–learning process are based on pedagogical foundations combined with psychological principles, social ideals, value judgments and needs (Zeidler, 2002). At present, the understanding of teacher training focuses not only on the direct training of teachers by others, but also on their continuous self-development by systematically making sense of their individual experiences (Tanak, 2020). The reason behind this understanding is the need to increase the quality of teacher education and the need to ensure their professional development (Jackson, Rockoff, & Staiger, 2011; Sural and Dedebali, 2018).

Teachers should have the necessary teaching methods about how to teach as well as have good content knowledge (Chan & Hume, 2019; Gess-Newsome et al., 2019). The teacher should have a good relationship with the social environment and provide the necessary guidance to the students. According to the modern understanding of education, the main element of the learning process is the student, not the teacher. The task of the teacher is to guide students in increasing their cognitive activities (Henning, Dover, Dotson, & Agarwal-Rangath, 2018).

Teacher training programmes constitute an important part of the education system and therefore teacher education programmes are constantly examined (Zygmunt et al., 2018). The quality of teachers is tried to be increased in various ways and teacher educators are expected to encourage teachers to use effective teaching practices (Scheeler, Ruhl, & McAfee, 2004). However, the pre-service training of teachers loses its currency after a while. Therefore, it becomes difficult for teachers to carry out their profession properly with their existing knowledge (Yadav & Berges, 2019). For this reason, it is imperative for teachers to benefit from educational publications, professional seminars, in-service seminars, the Internet and all kinds of other opportunities, to follow the innovations and developments related to their profession, to renew their knowledge throughout their professional life, to educate themselves and to prepare the people of the age (Kadarisma, Senjayawati, & Amelia, 2019).

1.2. Related research

When the studies in the field are examined, it is seen that there are many studies that deal with the formation of pre-service teachers' competencies on the basis of pedagogical tasks (Loughran, Mulhall & Berry, 2004; Bastian, Henry, Pan & Lys, 2016). When these studies are examined, in some of the studies, pedagogical content knowledge was handled as a whole and examined together with all its components (Lee & Luft, 2008), and in some of the studies, the subject-specific nature of pedagogical content knowledge for one or more subjects was investigated (Davidowitz & Rollnick, 2011).

When the researches on the development of pedagogical content knowledge of teachers and teacher candidates and its effect on educational activities are examined, it is seen that there are studies on teacher candidates studying in different departments and teachers teaching in different branches. It is seen that some studies aim to measure the pedagogical content knowledge of pre-service science teachers and teachers (Drechsler & Van Driel, 2008; Lankford, 2010; Mavhunga & Rollnick, 2013; Rollnick & Davidowitz, 2015). In some studies, it is seen that pre-service mathematics teachers and teachers' pedagogical content knowledge is measured and suggestions are made to increase their efficiency in educational activities in this direction (Staley, 2004; Gullberg, Kellner, Attorps, Thorén, & Tärneberg, 2008; McCray & Chen, 2012).

Capraro, Capraro, Parker, Kulm, and Raulerson (2005) investigated the role of mathematics content knowledge in the pedagogical content knowledge development process of prospective teachers. In this study, the connection between mathematical content knowledge and pedagogical knowledge was tried to be outlined in the process of pedagogical content knowledge development. Baker and Chick (2006) examined the pedagogical content knowledge of two primary school teachers. In their studies, they used questionnaires and interviews containing questions about mathematics and mathematics teaching. The obtained data were analysed under the framework of pedagogical content knowledge. As a result of the study, it was determined that the pedagogical content knowledge of the two teachers was at different levels. They also stated that the pedagogical content knowledge framework used was suitable for determining teachers' pedagogical content knowledge.

Penso (2002) determined the pedagogical content knowledge of 40 biology teacher candidates within the scope of teaching practice. The study focused on pre-service teachers' knowledge of student

difficulties and possible sources of these difficulties. In the study, it was concluded that the pre-service teachers considered student deficiencies as the main reason for learning difficulties and a small part of them thought the teacher as the reason for the difficulties.

1.3. Purpose of the research

The purpose of this research is to determine the ability of future teachers to organise educational activities on the basis of pedagogical tasks. In accordance with this purpose, the following sub-objectives have been established:

1. What is the ability of future teachers to organise educational activities on the basis of pedagogical tasks?
2. Does the ability of future teachers to organise educational activities on the basis of pedagogical tasks differ according to the gender variable?
3. Does the ability of future teachers to organise educational activities on the basis of pedagogical tasks differ according to the class variable?
4. Does the ability of future teachers to organise educational activities on the basis of pedagogical tasks differ according to the variable of the department they study in?

2. Methods and Materials

2.1. Research method

This research was designed in accordance with the quantitative research method. In this study, the survey research was applied as a qualitative research method. The opinions of the participants on a subject or their interests, skills, abilities, attitudes etc. were obtained. The studies in which the characteristics of the students are determined and the existing situation is described are called survey studies. In survey studies, the abilities, skills and attitudes of certain populations are examined (Schwarz & Strack, 1991). In this direction, the ability of future teachers to organise educational activities on the basis of pedagogical tasks has been discussed in accordance with the survey model.

2.2. Participants

The study group of the research consists of 448 teacher candidates studying in education faculties of various universities in Kazakhstan in the 202–2022 academic year. The pre-service teachers who participated in the research stated that they were willing to participate in the research. Information on the demographic characteristics of the teacher candidates participating in the research is included in the results section of the research.

2.3. Data collection tools

As the data collection tool of the research, the scale of the ability to organise educational activities on the basis of pedagogical tasks was developed by the researchers. In the development phase of the scale, first of all, a literature review was conducted and a 28-item pool was created. Then, the items in

the item pool were presented to the experts for their opinion. After receiving the opinions of six experts, the items that were approved to be used in the scale with the joint decision of all experts were arranged to be used in the pilot application of the scale. The draft scale was applied to a total of 365 teacher candidates, 148 female and 217 male, studying in the education faculty, primary school science and primary school mathematics teaching. Then, the reliability and construct validity of the scale were examined. As a result of the construct validity and reliability analyses of the scale, it was decided that the 16-item, 2 sub-dimension form would be appropriate. The first sub-dimension was named as 'pedagogical content knowledge'. This sub-dimension consisted of 12 items and the Cronbach alpha reliability coefficient was determined to be 0.86. The second sub-dimension was named as 'ability to organise educational activities'. This sub-dimension consisted of 4 items and the Cronbach alpha reliability coefficient was determined to be 0.85. Alpha reliability coefficient of the whole scale was found to be 0.81. The exploratory factor analysis of the scale was performed using the SPSS 20.0 programme. As a result of the Kaiser–Meyer–Olkin (KMO) coefficient and Bartlett's sphericity test calculations, the KMO value was found to be 0.762 and the Bartlett test result was found to be (0.000) <0.05. Eigenvalue and variance ratios of the data set found suitable for factor analysis were calculated. In the exploratory factor analysis, where the cumulative distribution was found to be 91,805, 2 factors with an eigenvalue >1 were determined. Confirmatory factor analysis of the scale was calculated with SPSS Amos 25.0 programme. The model of fit coefficients, which are frequently defined according to the results of the AMOS analysis, were found as follows: CMIN/df = 1.876, CFI = .834, GFI = .839, TLI = .876 and RMSA = .058. Suitability of the model was determined according to the above-mentioned coefficients, and the structure of the scale of ability to organise educational activities based on pedagogical tasks consisting of 2 sub-dimensions and 16 items was statistically verified. The scale was prepared on a 5-point Likert-type scale. It was in the range of 'strongly agree', 'agree', 'somewhat agree', 'disagree' and 'strongly disagree'. Assuming that the item score ranges are equal, 5.00–4.20 = strongly agree, 4.19–3.40 = agree, 3.39–2.60 = somewhat agree, 2.59–1.80 = disagree and 1.79–1 0.00 = strongly disagree. The scale used in the research is shown in Appendix 1.

2.4. Data collection process

At the stage of collecting the research data, the pre-service teachers who voluntarily agreed to participate in the research were given the scale of organising educational activities based on pedagogical tasks via Google Form. The pre-service teachers answered the scale and returned it to the researchers. It took approximately 3 weeks for all of the pre-service teachers in the study group to answer the scale and return it to the researchers.

2.5. Data collection analysis

SPSS 20.0 programme was used in the analysis of the data obtained after the scale of ability to organise educational activities on the basis of pedagogical tasks was applied to the study group of the research. The Kolmogorov–Smirnov normality test was calculated before data analysis of the scale. Since $p > 0.05$ was found as a result of the test, it was determined that the data set showed a normal distribution. In this direction, parametric tests were applied. In the results section, there are tables with frequency, percentage, standard deviation, weighted average and *t*-test results.

3. Results

Table 1 contains information about the demographic characteristics of the pre-service teachers participating in the research.

Table 1
Demographic characteristics of the teacher candidates

Gender	F	%
Female	193	43.1
Male	255	56.9
Total	448	one hundred
Department of Education		
Elementary mathematics teaching	209	46.7
Primary school science teaching	239	53.3
Total	448	one hundred
Their Class of Education		
1st and 2nd year	207	46.2
3rd and 4th year	241	53.8
Total	448	100

In Table 1, the demographic distributions of pre-service teachers participating in the research are given according to gender, the department they study in and the year of study. 43.1% of the teacher candidates are female and 56.9% are male. While 46.7% of the pre-service teachers study in the primary school mathematics teaching department, 53.3% of them study in the primary school science teaching department. 46.2% of the teacher candidates are studying in the 1st and 2nd year, while 53.8% are in the 3rd and 4th year. A total of 448 teacher candidates participated in the research.

In Table 2, the sub-dimensions of the pre-service teachers' ability to organise educational activities on the basis of pedagogical tasks and the average and standard deviations of the overall scale are given.

Table 2
Scale and sub-dimensions of the ability to organise educational activities on the basis of pedagogical tasks

	x	**SS**
Pedagogical content knowledge sub-dimension	3.31	0.862
Ability to organise educational activities sub-dimension	3.14	0.897
Overall Scale	3.26	0.815

In Table 2, it has been determined that the pre-service teachers participating in the research have moderate proficiency in the scale of ability to organise educational activities on the basis of

pedagogical tasks, in the pedagogical content knowledge sub-dimension (*x*=3.31) and in the sub-dimension of the ability to organise educational activities (*x*=3.14). It has been determined that the pre-service teachers participating in the research have medium level of competence (*x*=3.26) regarding the scale of their ability to organise educational activities on the basis of pedagogical tasks.

In Table 3, the distribution of the pre-service teachers' ability to organise educational activities on the basis of pedagogical tasks according to the gender variable *t*-test results is given.

Table 3
T-test results of the teacher candidates by gender variable

Gender	N	*x*	SS	F	*p*
Woman	193	3.29	0.782	11,509	0.327
Male	255	3.24	0.715		

When Table 3 is examined, it is seen that there is no significant difference regarding the ability of the teacher candidates participating in the research to organise educational activities on the basis of pedagogical tasks (F=11,509, *p*>0.05) according to the gender variable.

In Table 4, the *t*-test results of the distribution of the pre-service teachers' ability to organise educational activities on the basis of pedagogical tasks according to the variable of the department they studied in are given.

Table 4
T-test results according to the variable of the department of education of the pre-service teachers

Section	N	*x*	SS	F	*p*
Elementary mathematics teaching	209	3.25	0.669	12,628	0.201
Primary school science teaching	239	3.27	0.621		

When Table 4 is examined, it is seen that there is no significant difference regarding the ability of the teacher candidates participating in the research to organise educational activities on the basis of pedagogical tasks (F=12.628, *p*>0.05) according to the variable of the department they study in.

In Table 5, the *t*-test results of the distribution of the pre-service teachers' ability to organise educational activities on the basis of pedagogical tasks, according to the class variable, are given.

Table 5
T-test results according to the class variable of the teacher candidates

Class	N	*x*	SS	F	*p*
1st and 2nd Class	207	3.08	0.587	24,483	0,000*
3rd and 4th Grade	241	3.41	0.831		

When Table 5 is examined, it is seen that there is a significant difference regarding the ability of the pre-service teachers participating in the research to organise educational activities on the basis of pedagogical tasks (F=24,483, *p*=0.000, p<0.005) according to the class variable. The significant difference determined that it is in favour of pre-service teachers studying in the third and fourth year.

4. Discussion

It has been determined that the pre-service teachers participating in the research have moderate proficiency in the scale of organising educational activities on the basis of pedagogical tasks; the sub-dimensions of pedagogical content knowledge and the ability to organise educational activities; and the overall scale. It is seen that there is no significant difference regarding the ability of the teacher candidates participating in the research to organise educational activities on the basis of pedagogical tasks according to the gender variable. It is seen that there is no significant difference regarding the ability of the teacher candidates participating in the research to organise educational activities on the basis of pedagogical tasks according to the variable of the department they study in. However, it is seen that there is a significant difference regarding the ability of the teacher candidates participating in the research to organise educational activities on the basis of pedagogical tasks according to the class variable. The significant difference determined that it is in favour of pre-service teachers studying in the third and fourth year.

When the researches in the field are examined, it is seen that the studies mostly focus on the technological pedagogical content knowledge of teachers and teacher candidates (Archambault & Crippen, 2009; So & Kim, 2009; Nathan, 2009; Jordan, 2011). Jang and Tsai (2012) revealed in their study that primary school mathematics and science teachers' pedagogical content knowledge did not show a significant difference according to the gender variable. Tuncer and Dikmen (2018) examined the effect of gender on techno-pedagogical content knowledge in their study. As a result of the research, it was determined that gender was not a dominant variable. Timur and Cetin (2015) examined the TPACK levels of science and technology teachers in terms of various variables. The technological pedagogical content knowledge scale was applied to 158 science and technology teachers. According to the results of the study, no significant difference was found between the department they graduated from, their gender, professional experience and their technological pedagogical content knowledge levels. In his study, Taskaya (2012) examined the characteristics that a qualified teacher should have, according to the opinions of pre-service teachers. In the research, the personal characteristic that a qualified teacher should have is to be understanding, and among the professional characteristics, the teacher should treat all his/her students equally. Among the features related to professional development, the teacher's ability to continuously improve, have sufficient field knowledge among professional competencies, have good communication with the students and to have good classroom management skills are the most specified.

5. Conclusion

In the information age we live in, education programmes should be supported and strengthened in this direction in order to develop the skills that individuals should have and need. Then, it should be ensured that the awareness of the teachers and teacher candidates who will take part in this education and training should be increased and they should be equipped with these skills and become competent. In this direction, in this research, it is aimed to determine the ability of future teachers to organise educational activities on the basis of pedagogical tasks. As a result of the research; it has been determined that the pre-service teachers' ability to organise educational activities on the basis of pedagogical tasks has a medium level of proficiency in the fields of pedagogical content knowledge and organising educational activities. It is seen that there is no significant difference regarding the ability of the teacher candidates participating in the research to organise educational activities on the basis of pedagogical tasks according to the variables of gender and the department they study in. However, it is seen that there is a significant difference regarding the ability of the teacher candidates participating in the research to organise educational activities on the basis of pedagogical tasks according to the class variable. The significant difference determined that it is in favour of pre-service teachers studying in the third and fourth year.

6. Recommendations

Based on the results of the study, the following recommendations are suggested:

1. In order to improve the formation of teacher candidates' ability to organise educational activities on the basis of pedagogical tasks, the content of courses in teacher training programmes should be increased.
2. Seminars should be organised at universities in order to support the formation of teacher candidates' ability to organise educational activities on the basis of pedagogical tasks.
3. The level of teachers' ability to organise educational activities on the basis of their pedagogical duties should be determined and supported by in-service training programmes.

Appendix 1. Scale of abilities to organise educational activities on the basis of pedagogical tasks

Scale of abilities to organise educational activities on the basis of pedagogical tasks	Absolutely I agree	I agree	I somewhat agree	I do not agree	I strongly disagree
Pedagogical content knowledge sub-dimension					
Teaching methods according to student level I think I can determine.					
I think I can evaluate student learning in the classroom.					
I think I can provide student motivation.					
I think I can communicate effectively with students.					
I think that I can plan the teaching in accordance with student achievements.					

I think that I can meet the wishes, expectations and needs of the students.					
I think that I can make changes(s) in my teaching style according to the different learning styles of the students.					
I think I have enough knowledge about my field.					
I think that I know the subjects I will teach comprehensively.					
I think I am knowledgeable about the concepts, principles, generalisations and laws in my field.					
I think that I follow the current developments in my field.					
I think I follow up-to-date resources (e.g., books, magazines…) and events in my field.					
Ability to organise educational activities sub-dimension					
I think I can plan educational activities taking into account student needs.					
I think that I can organise educational activities on different courses and subjects.					
I find myself capable of organising educational activities.					
I find myself sufficient in organising educational activities.					

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