Education Mind

EDUCATION MIND
2024, VOL 3, NO 1, 81-88
DOI: 10.58583/Pedapub.EM2408

Research Article

Open Access

Investigation of pre-service teachers' technological pedagogical content knowledge and teaching skills for learning disabilities

Volkan Kukul [1], Niyazi Şişik [2]

[1] Department of Instructional Technologies, Amasya University, Amasya, Turkey; [2] Ministry of National Education, Amasya, Turkey

ARTICLE HISTORY

Received: 24.03.2024
Accepted: 14.05.2024

KEYWORDS

Pre-service teachers
TPACK
Learning disabilities

CORRESPONDENCE

Volkan Kukul,
volkan.kukul@amasya.edu.tr

ABSTRACT

The aim of this study is to examine two skills that pre-service teachers should have in terms of different variables. One of these variables is their awareness of learning disabilities and the other is TPACK skills. In this study in which these two skills were examined, relational survey model, one of the quantitative research methods, was used. 236 pre-service teachers participated in the study and TPACK skills of pre-service teachers were found to be at a good level and can be developed, while teaching skills for learning difficulties were found to be at a low level and in absolute need of improvement. It was seen that there was a significant positive relationship between TPACK skills of pre-service teachers and their teaching skills for learning disabilities.

Introduction

In recent years, studies on learning have frequently focused on students' learning difficulties. This condition, called learning disability or specific learning disability (Yiğiter, 2005), is seen as one of the most important reasons for school failure (Özkardeş, 2013). This term was first defined by Samuel Kirk in 1962 (Başar & Göncü, 2018). Kirk defined children in need of special education as; "An exceptional child is a child who deviates from the normal or average child in 1) mental characteristics, 2) sensory abilities, 3) neuromuscular or physical characteristics, 4) social or emotional behaviors, 5) communication abilities, or 6) multiple disabilities that require changes in school practices or special education to develop their services to maximum capacity" (Gallagher, 1974). Specific Learning Disability is defined as the child's difficulty in acquiring and using the ability to read-write, mathematics, arithmetic skills, speaking, listening and reasoning (MoNE, 2014; cited in Arabacı, 2018). The Ministry of National Education (2006) defines individuals with learning disabilities as "individuals in need of special education and support education services due to difficulties in listening, speaking, reading, writing, spelling, concentrating attention or performing mathematical operations that occur in one or more of the information retrieval processes necessary to understand and use language in written or spoken form". According to the American Psychiatric Association's classification, specific learning disabilities are divided into four; reading disorder (dyslexia), math learning disorder (dyscalculia), written expression disorder (dysgraphia) and finally learning disorders not otherwise specified. The individual may suffer from one or more of these types of disorders. In Turkey, the rate of

students diagnosed with specific learning disabilities among students receiving special education is determined as 3% (MoNE, 2014; as cited in Melekoğlu, 2017).

The problems experienced by individuals with learning disabilities are identified when they start school and fall behind their peers academically (Uçgun, 2003). Especially in the process of starting primary school, classroom teachers realize that the methods they apply to other students do not work for some students. With the realization of this situation, the process of diagnosing the student is initiated with the cooperation of the classroom teacher and the school counselor (Öğülmüş, Açıkgöz, & Okur, 2021). It is important to identify individuals with learning disabilities early in the education process (Demir, 2005). In this context, teachers have a great role in recognizing students with specific learning disabilities and taking necessary measures (Doğan, 2012). In the Special Education Services Regulation (MoNE, 2018), the education of individuals with special needs is defined as "full-time education with their peers or part-time education in special education classes by providing supportive education services to these individuals in order to ensure that they interact with other individuals at all types and levels and realize their educational goals at the highest level". Teachers' opinions and knowledge on this subject are important in terms of both diagnosing the student and guiding them correctly (Fırat & Koçak, 2018).

However, some studies have shown that teachers' level of training on specific learning disabilities is insufficient. Teachers stated that they encountered some problems in the implementation of education programs, classroom management and classroom communication (Birol & Zor, 2018). Similarly, Çoğaltay and Çetin (2020) concluded that teachers' knowledge about specific learning disabilities is incomplete or incorrect. Teachers also stated that they felt incomplete in guiding individuals with special learning disabilities and stated that they did not receive adequate training on this issue (Çoğaltay & Çetin, 2020). In another study, it was concluded that teachers' definitions of specific learning disabilities were superficial, and it was stated that very few of them could emphasize the areas of learning difficulties (Fırat & Koçak, 2018). In another study conducted with pre-service classroom teachers, it was observed that pre-service teachers had moderate knowledge about specific learning disabilities. As a result of the research, it was suggested that the number of courses on specific learning disabilities should be increased and the opportunity for practice courses should be provided to pre-service teachers (Arabacı, 2018). In the studies conducted on the identification of students with specific learning disabilities, it was recommended to provide in-service training to teachers on this issue, and it was recommended to develop new methods and strategies on identification and intervention (Öğülmüş et al., 2021, Görgün & Melekoğlu, 2019, Sağır & Bozgün, 2018).

Turnbull and his colleagues (2007) have analyzed the educational evaluation process of students in four dimensions: screening, pre-sending, sending and detailed evaluation. In the screening phase, also known as initial identification, students who have difficulty in meeting the basic requirements of educational life, who lag behind their peers and who need support are identified (Kargın, 2007). The pre-referral process involves the teacher's evaluation of the educational environment and processes, and their organization according to the needs of the student (Turnbull, et al., 2007). If the interventions made in the pre-sending process do not contribute to the student's development, the student is referred to relevant organizations for a more detailed examination (Öğülmüş, et al., 2021). This stage is called the referral process. Unlike other processes, the detailed evaluation process includes a formal evaluation. At this stage, the evaluation is carried out by Guidance Research Centers using standardized tests (Çuhadar, 2017). In order to carry out these processes in a healthy way, experts such as counselors, classroom teachers, special education teachers and child psychologists take part. Among these experts, the

role of classroom teachers is undoubtedly of great importance (Çuhadar, 2017). However, some studies have revealed that classroom teachers experience various difficulties in the pre-sending process (Çuhadar, 2017).

In today's world, the ability to use technology has affected education and training environments as in many areas. Teachers, who are among the most important stakeholders of education and training environments, have also been affected by this development of technology. Teachers and Pre-Service teachers are expected to have appropriate skills and competencies in the face of rapidly changing and developing world conditions. One of the skills that teachers should possess is pedagogical content knowledge (PCK). The pedagogical content knowledge (PCK) model put forward by Shulman (1986) in his research on teacher education is defined as teachers' competencies about how to teach a subject. According to Shulman, PCK is having the knowledge of using the most understandable methods, analogies, examples, etc. in order to learn the subject matter (Özgen, Narlı, & Alkan, 2013). Being able to create and implement activities and learning environments by utilizing today's technologies in order to facilitate students' learning (Öztürk, 2013) and being able to coordinate them into subject-oriented activities is called Technological Pedagogical Content Knowledge (TPACK) (Öztürk, 2013). The teacher's technological competence plays an important role in contributing to more active and fun lessons and providing more permanent learning (Yıldırım, Alagöz, & Uysal, 2022). In this context, pre-service teachers' knowledge of how to integrate technology into educational processes in their fields is an important factor in the development of effective classroom practices for students with specific learning difficulties in future generations. From this point of view, the aim of this study is to examine pre-service teachers' level of technological pedagogical content knowledge and their awareness of learning disabilities.

Method

Within the scope of the research, relational survey model, one of the quantitative research methods, was used as a design. In this context, pre-service teachers' technological pedagogical content knowledge levels and learning difficulties awareness levels were examined in terms of different variables.

Participants

The participants of the study were pre-service teachers selected by convenient sampling method. This sampling method is used to reach the participants more easily and speed up the data collection process (Ekiz, 2009). A total of 236 pre-service teachers studying in different departments participated in the study. The distribution of pre-service teachers according to their departments is given in Table 1.

Table 1 Distribution of pre-service teachers according to departments

	f	%
Physical Education Teacher Education	33	14.0
English Language Teaching	43	18.2
Primary School Teaching	37	15.7
Turkish Language Teaching	33	14.0
Elementary Mathematics Teacher Education	44	18.6
Preschool Education	46	19.5
Total	236	100.0

According to Table 1, 46 (19.5%) of the participants are studying in the Department of Preschool Teaching, 44 (18.6%) in the Department of Elementary Mathematics Teaching, 43 (18.2%) in the

Department of English Language Teaching, 37 (15.7%) in the Department of Classroom Teaching, 33 (14%) in the Department of Turkish Language Teaching and 33 (14%) in the Department of Physical Education Teaching.

Data collection tools

The scale developed by Schmid, Brianza, and Petko (2020) and consisting of 28 items and 7 factors was used to measure the TPACK skills of pre-service teachers. The scale was adapted into Turkish for use in the study and the 28-item 7-factor structure was preserved in the Turkish form. The total variance explained by the Turkish form of the scale was 74% and Cronbach alpha coefficient was calculated as .86.

The Learning Difficulties Teaching Skills Scale developed by Korkut, Keskin, and Can (2016) was used to determine the learning disabilities teaching skills of pre-service teachers. The scale consists of 22 items and 5 factors. The total variance explained by the scale was 59.5% and the internal consistency coefficient was calculated as .90.

Findings

First of all, in order to decide on the tests to be conducted, it was examined whether the data showed a normal distribution. For the analysis of the quantitative data of the study, it was checked whether the data met the parametric test assumptions in order to decide which of the parametric or nonparametric tests to analyze the data with. One of the parametric test assumptions is sample size (Delice, 2010). In the literature, it is emphasized that the sample size of the groups should be at least 30 in order to apply parametric tests (Kraska-Miller, 2013). Since the sample sizes of the groups in this study are above 30, they meet this assumption. Another assumption of parametric tests is that the data should be normally distributed (Delice, 2010; Kraska-Miller, 2013). One of the commonly used methods to determine whether the data are normally distributed is the skewness coefficient. According to some researchers, the fact that this coefficient is in the range of ±1 is interpreted as no significant deviation from normal distribution (Başol, 2015; Çokluk, Şekercioğlu, & Büyüköztürk, 2012; Büyüköztürk, 2007), while some researchers emphasize that this value may be in the range of ±2 (George & Mallery, 2003). Accordingly, it is seen that both the TPACK scale and the Learning Disability Teaching Skill scale scores show a normal distribution. The kurtosis and skewness values of the data are given in Table 2.

Table 2 Kurtosis and skewness values of the data

		Statistic	Std. Error
OG	Skewness	-.699	.158
	Kurtosis	-.184	.316
TPACK	Skewness	-.302	.158
	Kurtosis	-.560	.316

As the data were normally distributed, parametric analyses were started. First of all, TPACK skills and Learning Disability Teaching Skill levels of pre-service teachers were examined, and the findings are given in Table 3.

Table 3 Pre-service teachers' TPACK and learning disabilities teaching skills levels

	N	Minimum	Maximum	X	Sd
TPACK	236	73	140	116.14	15.858
OG	236	31	50	44.46	4.565

When Table 3 is examined, it is seen that the average of the total scores of the pre-service teachers from the TPACK scale is 116.14, and their Learning Disabilities Teaching Skills level is 44.46. Considering that the maximum score they can get from the TPACK scale is 140, it can be said that pre-service teachers' TPACK levels are good but can be improved. When evaluated in terms of their awareness of learning difficulties, it is seen that the maximum score they can get from the scale is 110, but the total mean score of the pre-service teachers is low.

One way ANOVA analysis was applied to examine whether pre-service teachers' TPACK and Learning Disabilities scores differed according to the departments. The mean scores of pre-service teachers from TPACK scale according to their departments are given in Table 4.

Table 4 Distribution of TPACK scores of pre-service teachers according to departments

	N	X	Sd
Physical Education Teacher Education	33	117.79	16.223
English Language Teaching	43	119.30	14.846
Classroom Teaching	37	117.32	16.966
Turkish Language Teaching	33	122.85	15.969
Elementary Mathematics Teacher Education	44	111.98	12.785
Preschool Education	46	110.22	15.941
Total	236	116.14	15.858

When Table 4 is examined, it is seen that the department with the highest TPACK average is Turkish Language Teaching (122.85) and the lowest is Preschool Teaching (110.22). The results of the Anova analysis to determine whether there is a significant difference between the scores of the departments are given in Table 5.

Table 5 ANOVA results regarding TPACK scores of teacher candidates

	SS	df	MS	F	p	Sig. Dif.
Between Groups	4432.647	5	886.529	3.730	.003	Preschool - Turkish Language Teaching
Within Groups	54665.739	230	237.677			
Total	59098.386	235				

When Table 5 is examined, it is seen that TPACK scores of pre-service teachers differ according to departments ($F_{(5-230)}$ =3.730, p<.05). According to the post-hoc analyses conducted to reveal which departments have a significant difference, it is seen that there is a significant difference between the students studying in Preschool Teaching and Turkish Language Teaching departments in favor of Turkish Language Teaching department.

The mean scores of the pre-service teachers according to their departments in the Learning Disabilities scale are given in Table 6.

Table 6 Distribution of pre-service teachers' learning disabilities teaching skill scores by departments

	N	X	Sd
Physical Education Teacher Education	33	44.91	5.491
English Language Teaching	43	44.26	4.635
Classroom Teaching	37	45.62	4.192
Turkish Language Teaching	33	45.79	4.364
Elementary Mathematics Teacher Education	44	43.59	3.559
Preschool Education	46	43.28	4.783
Total	236	44.46	4.565

When Table 6 is examined, it is seen that the department with the highest mean score of Learning Disabilities Teaching Skills is Turkish Language Teaching (45.79) and the lowest mean score is Preschool Teaching (43.28). The results of the Anova analysis to determine whether there is a significant difference between the scores of the departments are given in Table 7.

Table 7 ANOVA results regarding pre-service teachers' learning disabilities teaching skill scores

	SS	df	MS	F	p
Between Groups	213.563	5	42.713	2.098	.067
Within Groups	4683.094	230	20.361		
Total	4896.657	235			

When Table 7 is examined, it is seen that pre-service teachers' Learning Disability Teaching Skill scores do not differ according to departments ($F_{(5-230)}$ =3.730, p>.05). The results of the correlation analysis conducted to determine the relationship between pre-service teachers' TPACK skills and Learning Difficulties Teaching Skills are given in Table 8.

Table 8 The relationship between TPACK and learning disability teaching skills of pre-service teachers

		OG	TPACK
OG	Pearson Correlation	1	.615**
	p		.000
	N	236	236
TPACK	Pearson Correlation	.615**	1
	p	.000	
	N	236	236

** p < 0.01

Pearson correlation analysis results were analyzed to examine the relationship between TPACK skills of pre-service teachers and Teaching Skills for Learning Disabilities. According to the results of the analysis, there is a significant positive relationship between the two variables at the level of .615 (p<.001). In other words, we can say that the higher the TPACK skills of pre-service teachers, the higher the Learning Disability Teaching Skills.

Results and discussion

One of the skills considered necessary for Pre-Service teachers to become good teachers is technological pedagogical content knowledge. This skill is a model consisting of sub-fields necessary for teachers to integrate technology into classroom environments. A teacher with high TPACK skills can take advantage of the advantages of technology to prepare activities for students with different characteristics. One of these differences is individuals with learning difficulties. In this study, Pre-Service teachers' TPACK skills and their teaching skills for learning disabilities were examined.

It is seen that pre-service teachers' TPACK skills are at a good level but can be improved. This may be due to the fact that the TPACK model is a well-known and widely studied subject by researchers and that teacher training programs are in accordance with the TPACK framework.

When pre-service teachers' teaching skills for learning disabilities are examined, it is seen that they remain at a low level and pre-service teachers should be developed in this field. In the study conducted by Alperen and Beyhan (2022) with teachers, it was seen that teachers' teaching skills for learning disabilities were high. This situation can be interpreted as that teachers develop their teaching skills by encountering individuals with learning disabilities during their duty. Because it is seen that there is no course for the development of teaching skills for learning disabilities in teacher training programs, and learning disabilities are mentioned only within the scope of special education course. It can be said that this situation is not sufficient for the development of pre-service teachers' teaching skills in this field.

When the teaching skills for learning difficulties are analyzed according to the departments, it is seen that there is no significant difference between the departments. This may be due to the fact

that this skill is currently low in all departments. The striking result here is that although Turkish pre-service teachers' teaching skills towards learning disabilities are low, they are higher than other departments. It is seen that the lowest department is preschool teaching. Ertaş (2022) found that preschool teachers had low levels of knowledge about learning disabilities and high misconceptions in this field. This finding also coincides with the findings in TPACK scores. When TPACK scores are analyzed according to departments, it is seen that the highest score is in Turkish language teaching and the lowest score is in preschool teaching and the difference between the scores is significant.

It is seen that the relationship between TPACK skills of pre-service teachers and their teaching skills for learning disabilities is a positive, significant, and moderate relationship. This result explains the fact that the departments with the highest and lowest scores were the same for both scales.

Recommendations

It is seen that pre-service teachers have low levels of teaching skills for learning disabilities. In order to prevent this situation, adding elective or compulsory courses on learning disabilities to teaching programs can contribute to the development of teaching skills. It is seen that pre-service teachers' TPACK skills are at a good level, but their learning disability teaching skills, which are positively related to it, are not at a sufficient level. It is useful to conduct research in which knowledge and skills related to learning disabilities are added to the pedagogical knowledge part of the TPACK model.

Preschool teachers have an important responsibility in diagnosing children with learning disabilities, especially in the preschool period when children work with letters and numbers for the first time. However, it is seen that pre-service preschool teachers' teaching skills for learning disabilities are low. It is beneficial to increase research on learning disabilities in preschool. For this purpose, learning difficulties courses can be offered at university level. The source of this lack of knowledge in pre-service teachers may be the lack of knowledge of the academicians who teach their courses. At this point, research can be planned to examine the knowledge levels of academicians about learning disabilities.

Disclosure statement

No potential conflict of interest was reported by the author(s).

References

American Psychiatric Association. (2000). Quick reference to the diagnostic criteria from DSM-IV-TR (p. 370). Washington, DC: APA.

Arabaci, Ö. (2018). Investigation of Classroom Teacher Candidates' Knowledge Levels Related to Specific Learning Disabilities and Their Thoughts about Their Competencies (Unpublished Master's Thesis). Gaziantep University, Institute of Educational Sciences.

Avcı, A. & Beyhan, N. (2022). Investigation of Classroom Teachers' Teacher Competencies for Students with Learning Disabilities. *Journal of Ahmet Keleşoğlu Faculty of Education*, *4*(1), 43-59.

Birol, Z. N., & Zor, E. A. (2018). Classroom Teachers' Views on the Problems They Experience with Students Diagnosed with Special Learning Disabilities. *Gazi University Gazi Faculty of Education Journal*, *38*(3), 887-918.

Çoğaltay, N., & Çetin, I. (2020). Classroom Teachers' Competencies Related to Specific Learning Disabilities: A Qualitative Research. *Academia Journal of Educational Research*, *5*(1), 126-140.

Çuhadar, S. (2017). Classroom Teachers' Opinions on Educational Assessment Process. *Trakya University Journal of Faculty of Education*, *7*(2), 526-549.

Demir, B. (2005). *Assesment of learning disability in kindergarten and first grade pimary school students* (Unpublished Master's Thesis). Marmara University, Institute of Educational Sciences, Istanbul, Turkey.

Doğan, H. (2012). *Analyzing the effect of early intervention educational program applied to 5-6 year old children carrying special learning difficulties risk* (Unpublished Doctoral Dissertation). Marmara University, Institute of Educational Sciences, Istanbul, Turkey.

Ekiz, D. (2009). *Scientific Research Methods*. Anı Publishing, Ankara

Ertaş, H. C. (2022). *Determination of Knowledge Levels of Preschool Teachers about Learning Disabilities* (Unpublished Master's Thesis). Trakya University, Institute of Social Sciences.

Firat, T., & Koçak, D. (2018). Classroom Teachers' Views on the Definition of Learning Disabilities. *Abant Izzet Baysal University Journal of Faculty of Education*, *18*(2), 915-931.

Gallagher, J. J. (1974). Phenomenal Growth and New Problems Characterize Special Education. *The Phi Delta Kappan*, *55*(8), 516-520.

Görgün, B., & Melekoğlu, M. A. (2019). Analyzing the Studies in the Field of Specific Learning Disabilities in Turkey. *Sakarya University Journal of Education*, *9*(1), 83-106.

Kargın, T. (2007). Educational Evaluation and Individualized Education Program Preparation Process. Ankara University *Faculty of Educational Sciences Journal of Special Education, 8*(01), 1- 15. Https://Doi.Org/10.1501/Ozlegt_0000000103

Korkut, A., Keskin, I., & Can, S. (2016). Development of Teacher Competencies Scale for Students with Learning Disabilities. *Amasya University Journal of Faculty of Education*, *5*(1), 133-155.

Melekoğlu, M. A. (2017). Introduction To Specific Learning Disabilities. M. A. Melekoğlu and O. Çakıroğlu (Editors), Children with Specific Learning Disabilities, 3rd Edition (pp. 15-47). Ankara: Vize Publishing

MoNE (2006). *Special Education Services Directive*, Official Gazette dated 31.05.2006 and numbered 26184.

MoNE (2018). Special Education Services Regulation. Http://Www.Resmigazete.Gov.Tr/Eskiler/2018/07/20180707-8. Htm Accessed on 14.02.2024.

Özkardeş, O. G. (2013). A Descriptive Analysis of Research on Specific Learning Disabilities in Turkey. *Boğaziçi University Journal of Education*, *30*(2), 123-153.

Öztürk, E. (2013). Evaluation of Technological Pedagogical Content Knowledge of Pre-Service Classroom Teachers in Terms of Some Variables. *Uşak University Journal of Social Sciences*, *6*(2).

Schmid, M., Brianza, E., & Petko, D. (2020). Developing a Short Assessment Instrument for Technological Pedagogical Content Knowledge (Tpack. Xs) and Comparing the Factor Structure of an Integrative and a Transformative Model. *Computers & Education*, *157*, 103967.

Shulman, L.S. (1986). Those Who Understand: Knowledge Growth in Teaching. *Educational Researcher, 15*(2), 4-14.

Turnbull, A., Turnbull, R., & Wehmeyer, M. L. (2007). Exceptional Lives: Special Education In Today's Schools. New Jersey: Prentice Hall.

Uçgun, D. (2003). Special Learning Disability in terms of Turkish Teaching. Tubar, 13, 203- 217. Http://Dergipark.Ulakbim.Gov.Tr/Tubar/Article/Viewfile/5000072814/500006703.

Yıldırım, S., Alagöz, A., & Uysal, Ö. (2022). Multimedia Material Development with Lumi Education. 15th International Computer and Instructional Technology Symposium, September 7-9, Book of Proceedings, Çanakkale.

Yiğiter, S. (2005). *Investigation of the Relationship Between Classroom Teachers' Knowledge Levels Related to Special Learning Disabilities and Their Attitudes Towards Inclusion of Children with Special Learning Disabilities* (Unpublished Master's Thesis). Marmara University Institute of Educational Sciences, Istanbul, Turkey.