

Promoting Inquiry Skills for the Improvement of Self-Efficacy Domains in Special Education Pre-Service Teacher Training

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Abstract

Inquiry skills are important to the development of teachers' self-efficacy domains as a whole and crucial to the continued maintenance and enhancement of their professional self-efficacy. This investigation of inquiry skills in relation to special education teachers' self-efficacy is both quantitative and qualitative. The former is related to determining the predictive power of inquiry skills as the main variable which triggers the development of teachers' self-efficacy domains. The latter is concerned with deeply exploring the main factors hindering or fostering the improvement of inquiry skills in teacher education. The aim is to create opportunities for special education teacher educators to revise their in-class teaching practices. Based on the quantitative results, inquiry skills of teacher trainees were found to have a positive meaningful influence on self-efficacy skills. The qualitative results show that teacher trainees need to improve self-confidence in the domains of knowledge acquisition and knowledge verification as inquiry skills.

Key Words: Inquiry skills, special education, teacher education, knowledge acquisition, knowledge verification

Introduction

Compared to teachers from other fields, special education teachers are expected to possess particular performance-based attributes of self-efficacy (Woolf, 2018; Rupp, Roberts and Olson, 2015; Leko, Brownell, Sindelar and Kiely, 2015; Boardman, Argüelles, Vaughn, Hughes and Klingner, 2005). Besides being able to implement this knowledge and skills when working with cases they encounter in school (Blanton, Sindelar & Correa, 2006; Cook & Cook, 2015), they are expected to be knowledgeable about the content of numerous special related fields which meet student needs. An examination of special education teacher preparation programs of many countries shows clearly that they intend to train teachers who have a deep knowledge base and a wide repertoire of teaching practices (Spooner, Algozzine, Wood & Hicks, 2010; Etscheidt, Curran & Sawyer, 2012; Dukes & Darling, 2014). Yet, teacher education programs are considered insufficient to address prospective teachers' needs (Brownell, Sindelar, Kiely & Danielson, 2010; Shepherd, Fowler, McCormick, Wilson & Morgan, 2016). Moreover, teacher education and professional development programs do not adequately prepare special education teachers for their changing roles, in which they are expected to be knowledgeable about many related fields (Shepherd et al., 2016;

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Leko et. al., 2015).

It is of considerable importance, therefore, that teacher education programs provide instruction in the basic skills that can enhance many self-efficacy domains, and that teacher educators raise their awareness of how to teach these skills in their own fields. Spooner et. al., (2010) in a review of the literature on essential components of special education teacher preparation programs, proposed that it is necessary for these programs to emphasize the improvement of teacher trainees' critical skills and knowledge construction instead of focusing on trends. In a study of special education program development, Etscheidt, Curran and Sawyer (2012) argue that special education teacher preparation programs need to highlight the primary skills that teacher trainees need to cope with their changing roles, sources of knowledge, and responsibilities. Similarly, Dukes and Darling (2014) state that teacher educators should emphasize the primary skills of inquiry practices and foster evaluative discussions of learning environments. These suggestions focus upon teacher education practices which develop inquiry skills as a way to support improvement of self-efficacy domains.

In one of the most current studies of special education teachers' performance based self-efficacies, Woolf (2018) argues that special education teachers should have both specialized knowledge about particular disabilities and basic pedagogy and content knowledge. Such knowledge generally includes effects of understanding disabilities on learning, attitudes toward students, instructional flexibility, and a specific field of expertise. Other studies of the competence domains of special education teachers emphasize that they need to apply certain content knowledge as well as satisfy the unique needs of students (Leko et. al. 2015; Woolf, 2015; Gersten, Keating, Yovanoff and Harniss, 2001; Brown et al. 2010). Further, researchers describe in detail the performance-based self-efficacy domains that special education teachers should possess. However, there is a need for research to identify the basic skills which can develop and improve these self-efficacy domains in teacher education. The aim of the present study is to examine the predictive power of teacher competence domains by using inquiry skills as a base and to explore in depth how to foster these skills in teacher education. It is not realistic to expect that special education teacher trainees will master the whole body of knowledge about their field in the context of teacher education. It may be assumed, however, that novice teachers who have acquired appropriate inquiry skills will be able to continue to increase their knowledge base, improve their practices, and develop their self-efficacy. Therefore prospective teachers should learn ways to acquire evidence-based knowledge, to test the validity of knowledge, and to develop self-confidence in acquiring knowledge (Karademir & Saracaloğlu, 2017; Cook & Cook, 2015; Boardman, et. al., 2005; Leko, et. al., 2015). In particular, they need to acquire current knowledge about the disability categories of the student groups that they encounter, to be able to revise their understanding based on new knowledge, to have self-confidence in this process, and to seek evidence for knowledge. The relevant

literature supporting this view is reviewed in the following section.

Theoretical Framework and Literature Review

Special education teachers should have different learning and teaching functions from teachers specializing in other fields. They should have more knowledge about understanding the disabilities and their effects on learning, which sets the ground for the expertise of special education teachers. Woolf (2015) argues that it is not appropriate to evaluate the performance of special education teachers based on criteria developed for general education teachers, because the diversity of learners and breadth of necessary knowledge in the special education field means that the performance of special education teachers is not clear-cut. Rather, they involve particular competence domains, which she lists in order of their priority, beginning with teaching strategies, communication, and ethical collaboration as the most important, followed by learning environment, planning, and evaluation as moderately important. These performance competence domains are substantively close to self-efficacy domains such as encouraging student participation, the use of teaching strategies, and classroom management, all of which are examined in the present study. In addition, many studies on competencies and criteria for performance evaluation of special education teachers in the literature (Woolf, 2018; Woolf, 2015; Cook & Cook, 2015; Boarman et. al, 2005; Leko et.al, 2015; Ruppert et. al, 2015; Brownell et al., 2010; Spooner et. al. 2010) can be synthesized in the following list of the self-efficacy domains of special education teachers:

- Understanding the disability category and its effects on learning and other outcomes: This skill involves knowledge, skills and competencies related to the identification of student behaviors and learning styles in order to systematically define what is effective for individual students.
- Attitudes toward students: Special education teachers should be able to build positive interactions with students.
- Expert knowledge: Special education teachers are expected to have a wide range of disciplinary knowledge and evidence-based teaching strategies and pedagogies.
- Instructional flexibility: Special education teachers should be able to implement specific teaching strategies which can make students active.
- Self-reflection: In addition to communication skills and teamwork, special education teachers should be able to see themselves as life-long learners and develop their practices via critical individual reflection.
- Diverse knowledge base: They should be aware of multiculturalism and content knowledge of different disciplines.
- Instructional effectiveness: They should implement instructions designed for the improvement of students and evaluate them when necessary.
- Flexible responsiveness: They should have productive skills such as being

able to rapidly adapt to the current situation, being sensitive to meet students' behavioral and physical needs, being aware of learning opportunities for student participation.

- Reliance on evidence: They should have the skill of putting into practice evidence-based, in-class practices that affect student performance positively.
- Developing a repertoire of options: They should be able to combine content knowledge and general pedagogy knowledge in order to select evidence-based practices among multiple options in addressing learning disabilities.
- Continuous professional development: They should be able to re-think, re-acquire knowledge and re-plan based on the disability category and the level of learning disability that they encounter.

One of the ways for teachers to improve these performance competence domains is for them to be trained through inquiry to gain inquiry skills, which are the combination of knowledge acquisition, knowledge control (verification) and self-confidence in knowledge acquisition. A special education teacher preparation program which aims to help participants gain inquiry skills should be learner-centered. A special education teacher preparation program which develops inquiry skills guides participants to make deductions, to produce questions, to examine books and other information sources, to make explanations based on evidence, to investigate what is known in the light of evidence, and to discuss results (Maaß & Argue, 2013). Studies oriented to developing inquiry skills and their contribution to teacher self-efficacy performance domains generally emphasize evidence-based teaching practices in special education. Basing knowledge construction on evidence is the most critical dimension of inquiry skills. In the literature, several studies have addressed the use of inquiry skills in the preparation and professional development of teachers in special education and other fields. Holdheide (2015) emphasizes that evidence-based practices should be reflected in instructional practices while attention is drawn to the importance of teachers possessing inquiry skills. Stressing the importance of evidence-based practices in special education teacher preparation, Cook and Cook (2015) assert that while educators usually base knowledge acquisition on their own experiences or expert opinion, they should learn how to construct knowledge based on evidence by being trained with evidence-based practices and examining scientific research, deciding on the quality and validity of the research, consulting multiple sources in the body of research, and being aware of whether the acquired knowledge is meaningful for students and supports their social development. Such a development will support all self-efficacy domains of special education teachers. Evidence-based practices are regarded as a sub-dimension of inquiry skills in the present study. Boardman et. al. (2005) found that special education teachers lack competence in the ability to benefit from evidence-based research, claiming that they do not critically read studies and perceive studies which influence them as more positive. They tend to follow the methods and solutions which they already

know rather than resorting to evidence-based knowledge. One of the ways to address this deficiency may be to expose pre- and in-service teachers to exemplary evidence-based scientific studies and guide them in examining the aims and procedures of the studies and their basis for justifying their results. Such practices will promote teachers' development in self-efficacy domains.

Spooner et. al (2010) identified the themes for evaluating special education teacher preparation programs such as entrepreneurship, professional readiness (knowledge of curriculum, teaching strategies, interdisciplinary studies and assessment), self-confidence, and active professional engagement. Etscheidt, Curran and Sawyer (2012) argue that teacher education should provide opportunities for inquiry-based reflections in order to enhance those areas. Dukes and Darling (2014) emphasize the importance of evaluative discussions in teacher education as these support teacher trainees' growth in self-efficacy performance domains by promoting inquiry skills and encouraging deep learning in all the course outcomes (Powell-Moman & Brown-Schild, 2011). Maaß and Argue (2013) describe inquiry-based instruction as a multifaceted activity that involves asking questions, examining situations, and producing evidence-based solutions to problematic situations. Quigley, Marshall and Deaton (2011), in their study focusing on fostering inquiry skills through instruction, highlight that it is crucial to lay emphasis on each inquiry sub-skill of skills and on replication of studies. One way to develop those sub-skills is for every instructor to utilize inquiry-based instructional steps while teaching his/her subject area, including positing a scientific question, designing processes to address it, to prioritizing evidence, formulating explanations based on scientific knowledge, and verifying and communicating explanations. Understanding and reviewing these steps may promote teacher trainees's development in self-efficacy performance domains.

Kuster, Johnson, Keene and Andrew-Larson (2018) argue that teacher educators should engender an instructional context that provides opportunities for students to explain their opinions and develop common knowledge as a community. Through small group collaborations or individual activities, learners should be given chances to conduct and explain studies on the use of language in the classroom. Leko et. al. (2015), in an analysis of the common core standards (CCSC) and multi-tiered systems of support (MTSS) prepared for special education in schools, conclude that teacher education should be *re-constructed in the light of research- and science-based perspectives* and that current guidelines are insufficient in terms of preparing teachers for having self-efficacy skills. Research- and science-based perspectives for special education teachers entail the ability to search for and acquire knowledge relevant to the present situation and to reflect on the evidence supporting the acquired knowledge. Ruppard, Roberts and Olson (2015) claim that special education teachers, who must be experts in more than one disability category and able to guide different groups in- and out-of-school, should have effective communication and collaboration skills, which, along with self-efficacy

performance domains, are supported by the inquiry skill of constructing explanations based on scientific knowledge. One way to enhance inquiry skills in special education teacher preparation programs is to define and organize the in-class roles of teacher trainees as members of groups responsible for their own learning and of instructors as learning coaches (Dilworth, 1998; Scott, 2017; Rewans, 2016; Marquart, 2004). Teacher trainees should work, in the form of action cycles, as problem-solvers who address an issue in special education. This process of inquiry will enable teacher trainees to bridge the gap between theory and practice and to develop practical applications. In summary, it is necessary to re-think and re-construct course applications to promote special education teacher educators' inquiry skills.

Inquiry skills can be triggered in the development of the basic self-efficacy of special education teachers with the help of the above teaching practices. In the current study, the emphasis is on self-efficacy in the domains of "Ensuring Student Participation," "Using Teaching Strategies", and "Classroom Management" (Karademir & Saracaloğlu, 2017; Kuster et. al. 2018; Cook & Cook, 2015; Quigley et. al, 2011; Leko et. al, 2015; Ruppard, Roberts & Olson, 2015). Special education requires evaluating and adapting these dimensions to the needs of specific learning disabilities. Thus, special education teacher trainees should acquire skills which can support ongoing improvement in the present-day context of increasing performance criteria in ever-changing self-efficacy domains (Shepherd et al., 2016; Etscheidt, Curran & Sawyer, 2012; Woolf, 2018; Woolf, 2015; Cook & Cook, 2015; Boarman et. al, 2005; Leko et.al, 2015; Ruppard et. al, 2015). To develop self-confidence in knowledge acquisition related to specific disability categories and other relevant effects, special educators need inquiry skills to search selectively for evidence-based teaching strategies based on the pertinent disability category as a way of acquiring practical knowledge. Toward this end, this study is an attempt to contribute to the field of special education by addressing the following questions:

Research Question 1: Do inquiry skills meaningfully predict the self-efficacy performance domains of special education teachers?

Research Question 2: What are the factors that foster or hinder students' development of inquiry skills in teacher education?

Research Question 3: In what ways do students practice knowledge acquisition and control in special education teacher preparation?

Methodology

The study has a mixed methods design involving the collection and analysis of both qualitative and quantitative data. To deeply interpret social phenomena, mixed methods research, by building a bridge between qualitative and quantitative data, makes a significant contribution to the better understanding of the target phenomena (Creswell, 2003, s. 211; Tashakkori & Teddlie, 1998; Onwuegbuzie & Leech, 2004).

In the present study, multivariate statistics were utilized for analyzing the quantitative dimension, whereas interview techniques were used for the qualitative dimension.

Study group

Purposeful sampling is suitable for mixed methods research as it supports deep investigations into situations with rich information (Creswell et al., 2003, s.284-285). To this end, 129 students enrolled in the department of special education and mental disabilities of Faculty of Education at Mustafa Kemal University in the spring term of 2018 Academic Year were defined as the sampling group. At the time of the study, the department, which was founded in 1994, was facing such problems as an insufficient number of instructors for the increasing number of students. The classroom size ranged from 30 to 35. There were only two instructors in the general field of special education in the department along with three special education field educators specializing in the education of hearing-visual impaired, learning disabilities and special abilities, and childrens' health; three world=knowledge educators specializing in technology-enhanced special education, music education and visual arts education; and five pedagogy educators specializing in materials development, teaching principles and methods, testing and evaluation, classroom management and counseling. Teacher trainees' practicum and observation experiences were situated in Ministry of National Education rehabilitation centers or at different grades levels in state schools that serve students with learning disabilities. According to research findings, 92% of the participants chose to study in their departments, but the rest were studying in the special education and mental disabilities department because they were required to. Among the participating students, 40% held bachelor degrees in other fields, and the rest had not graduated from any undergraduate program. The reason for the high ratio of students who were in their second undergraduate program was that there was a great need for special education teachers in Turkey. Students were at different levels, including 23% freshmen, 30% sophomores, %24 is junior students and 23% seniors. Among students who had completed other baccalaureate degrees, 18% were freshmen, 54% sophomores, students; 26% juniors, and 2% seniors. In terms of gender, 48% of the participants were female, and 52% were male.

To obtain qualitative data, 12 students were selected based on maximum variation sampling, a purposeful sampling technique, based on the students' academic achievement in terms of their average grades, which ranged from 1 to 3.68. Among the interviewees were three seniors, two juniors, four sophomores, and three freshmen, and nine were males and three females. Excerpts taken from interviews coded with identifiers such as G4/TT1 (Grade 4/Teacher trainee 1) for a senior student, G3 (Grade 3) for juniors, G2 (Grade 2) for sophomores, and G1 (Grade 1) for freshmen. Interviews were conducted face-to-face in the office of the researcher and recorded. Necessary explanations about the aim of the study were given to the teacher trainees.

Data Collection Tools and Data Gathering

Teacher self-efficacy scale

The Teacher Self-Efficacy Scale, developed by Tschannen-Moran and Woolfolk-Hoy (2001) and adapted in Turkish by Çapa, Çakıroğlu and Sarıkaya (2005), was employed to determine the self-efficacy levels of the teacher trainees. The scale is composed of 24 items under three factors and yields scores from 24 to 216, corresponding to the lowest and highest levels of self-efficacy. The scale includes three sub-dimensions: encouraging student participation, the use of teaching strategies, and classroom management. The Alpha reliability coefficients for the sub-dimensions of the scale are .82, .86, .84 respectively. For the whole scale, the Alpha reliability coefficient is .93. Concerning the analysis of the results, internal consistency coefficients for the dimensions were .82 for encouraging student participation, .79 for the use of teaching strategies, and .81 for classroom management (.81) respectively, the Cronbach's Alpha coefficient was calculated as .95 for the whole scale.

Inquiry Skills Scale

The scale was developed by Aldan-Karademir and Saracaloğlu (2013) in order to measure the inquiry skills of teacher trainees. It consists of three sub-dimensions, which are knowledge acquisition, knowledge control and self-confidence in knowledge acquisition. In total, there are 14 Likert-scale items under these three factors with a range of scores from 14 as the lowest to 70 as the highest. Cronbach's Alpha coefficients are .76 for "Knowledge Acquisition," .66 for "Knowledge Control," and .82 for "Self-Confidence." The whole scale's Cronbach's Alpha coefficient is .82. Based on the analysis of the results, internal consistency coefficients the three dimensions are .82 for knowledge acquisition, .79 for knowledge control and .81 for self-confidence; and the Cronbach's Alpha coefficient for the whole scale is .95.

Interview form

Data were collected through interviewing to unearth participants' perceptions (Patton, 2014). The open-ended questions in the semi-structured interview forms developed by the researcher were posed in order to find out the ways to be used to develop questioning skills. Prior to preparing the interview form, the related literature on learning environment supporting the questioning and thinking skills was reviewed. The interview form involves questions grounded upon areas like participating in lessons, giving reasons for answers, evaluating each other's thoughts, evaluating one's own thoughts, searching for evidence, and the ways to obtain information. The interview form was evaluated in terms of applicability and piloted with three students, and then, necessary changes in understandability were made. Additionally, one expert in special education and one in curriculum development read the form and considering their recommendations, the final version of the form was prepared.

Data Analysis

Before the analysis of main data, basic analyses such as extreme values and missing data were performed. Following this, normality and collinearity analyses were employed so as to check whether the data were appropriate for the planned analysis. Based on these analyses, it was revealed that correlation and multiple regression analysis techniques could be used on the data. The interrelations of study variables were analyzed via Pearson Correlation coefficient. Lastly, the predictive power of self-efficacy on academic achievement and inquiry skills was analyzed through multiple regression analysis. The reliability and validity of qualitative data analyses were also ensured. The qualitative data were collected in parallel with the sub-dimensions of inquiry skills based on the quantitative data and presented as a whole. Interviews were transcribed and coded. Themes and codes were also generated by another researcher knowledgeable about special education teacher preparation. The consistency between the codes of the two researchers (Miles and Huberman, 1994) was .91.

Findings

Taking into account the research questions, findings are presented under three subheadings.

Research Question 1: Do inquiry skills meaningfully predict the self-efficacy performance domains of special education teachers?

Mean and standard deviations regarding the total scores of teacher trainees' General Point Averages, inquiry skills and self-efficacy, and the relations among these variables are presented in Table 1.

Table 1.
Means, Standard Deviations and Correlations

	1	2	3	4	5
1. Self-efficacy	-	.45 *	.51*	.42*	.18
2. Inquiry-Self-confidence	-	-	.44 *	.49*	.10
3. Inquiry-Knowledge Acquisition	-	-	-	.61*	.34*
4. Inquiry-Knowledge Control	-	-	-	-	.14
5. Academic achievement	-	-	-	-	-
\bar{X}	58,11	11,53	24,51	18,64	3,07
Ss	14,18	2,34	3,40	3,08	0,41

n= 129, * p< .01

The findings were examined under the three sub-dimensions of the inquiry skills scale, self-confidence in knowledge acquisition, knowledge acquisition and knowledge control. Table 1 shows the analysis of correlations between variables, indicating

meaningful correlations between self-efficacy and self-confidence in knowledge acquisition ($r=.45$; $p < .01$); self-efficacy and knowledge acquisition ($r=.51$; $p < .01$); and self-efficacy and knowledge control ($r=.42$; $p < .01$). However, there is no correlation between self-efficacy and academic achievement ($r= .18$; $p > .01$).

Table 2 illustrates the effects of teacher trainees' scores of academic achievement and inquiry skills on their self-efficacy.

Table 2.

Regression Analyses Regarding the Prediction of Self-Efficacy Skills

Yordayıcı Değişkenler	B	Standart			
		Hata	β	t	p
Sabit	22,35	11,64	-	1,91	.058
Sorgulama -Özgüven	1,59	.62	.263	2,58	.012*
Sorgulama-Bilgi Edinme	1,394	.49	.335	2,81	.006*
Sorgulama- Bilgiyi Kontrol Etme	.394	.535	.086	.736	.464
Akademik Başarı	.95	3,158	.028	.301	.764
R= .576	R ² = .332				Adj. R ² = .30
F(4-92)= 10,93	*p<.05				

Multiple regression analysis was conducted via the standard method (Enter) in order to assess the predictive power of self-efficacy skills on the variables of teacher trainees' self-confidence, knowledge acquisition, knowledge control as inquiry skills and the variable of academic achievement. Self-confidence, knowledge acquisition and knowledge control skills and academic achievement show meaningful relations ($R=.576$, $R^2 = .332$, $Adj. R^2 = .30$) with the self-efficacy skills ($F(4,92)=10,93$, $p<.01$). In the light of these data, inquiry skills along with academic achievement seem to explain 3% of the change in the self-efficacy scores. According to the standardized regression coefficient, the order of importance of the predictive variables in explaining self-efficacy skills is knowledge acquisition ($\beta=.335$), self-confidence ($\beta=.263$), knowledge control ($\beta=.086$) and academic achievement ($\beta=.028$). Taking the significance tests of regression coefficients into account, the predictive variables of self-confidence and knowledge acquisition ($p<.05$) make meaningful contributions to the model whereas knowledge control and academic achievement average do not make significant contributions ($p > .05$) to the model.

Research Question 2: What are the factors that foster or hinder students' development of inquiry skills in teacher education?

The finding that teacher trainees' inquiry skills meaningfully predict the development of self-efficacy shows that inquiry skills should be emphasized in undergraduate

education. Yet, quantitative findings are not sufficient to broaden our perspective on how to develop these skills. For deeper insights, the 12 selected trainees' interviews were analyzed to determine factors which hinder or foster self-confidence in knowledge acquisition, which is the first dimension of inquiry skills in teacher education.

Table 3.

Themes and Codes Emerged in the Dimension of Self-confidence as an Inquiry Skill

	Themes	Codes	Grade				n
			4	3	2	1	
Inquiry Skills	Situations that foster	The opportunity to express views	**	**	*	*	6
		Teacher collaboration		*	**		3
		In-class group work		**	*	**	5
	Situations that hinder	Peers' presentations			*		1
		Other students who study at their second university				*	1
		Continuous direct instruction	***	**	***	***	11

*n= The number of teacher trainees

Participants generally associated self-confidence issues in knowledge acquisition within their teacher preparation program with minimal active participation in lessons, that is, their reluctance to talk, make explanations or respond to the questions in the classroom. They expressed the problem of low self-confidence when they did not find any opportunity to participate in the lesson. They stated that the most fundamental factor that prevented them from participating in lessons was the instructor's choice of continuous direct instruction (n=11). Teacher trainees stressed that because they did not want to interrupt the instructor, they abstained from sharing their views, as illustrated by the following interview excerpts:

I share my opinions without hesitation in the class, question the information but there is still direct instruction method in the class, the instructor gives lecture and we take the exams. In such a situation, I hesitate to interrupt the instructor and I just listen (G4/TT3, senior who had among the highest scores on inquiry skills and self-efficacy).

Instructors always teach but do not support student participation. They teach and go; therefore I cannot find any chance to present my ideas without hesitation in the class. I hesitate to interrupt the instructor (G1/TT3, freshman with high scores on inquiry skills and self-efficacy).

I only had the chance to take part in group work a maximum of two or three lessons throughout three years, I did not hesitate to share my opinions and the instructor worked with us (G3/TT1, junior with low inquiry skills score).

As noted by the last student, they could share their views without hesitation in collaborative activities with the instructor (n=3), and this increased their self-confidence (n=6), as did in-class group work with peers or with the instructor (n=5). It was also reported that the presence of students who had already completed a baccalaureate degree (n=1) and making presentations about the main topics covered in the class (n=1) led to a decrease in the participants' self-confidence:

There are so many graduate students who are studying at their second university in the class, so I just listen during lessons and I do not want to share my opinions because I believe what they say is true (G1/TT2, freshman).

A student who said that he/she only listened when peers made presentations stated, I hesitate to interfere with presentations of my friends (G2/TT2).

Research Question 3: In what ways do students practice knowledge acquisition and control in special education teacher preparation?

Table 4.

Themes and Codes in Relation to the Dimension of Ways of Practicing Knowledge Acquisition and Knowledge Control as an Inquiry Skill

Themes		Codes	Grade				
			4	3	2	1	n
Inquiry Skills	Ways for knowledge acquisition	Asking someone who is a credible source of the knowledge	***	*	*	***	11
		Searching online sources	*	**		**	4
		Accessing library resources	*			*	2
		Using more than one source	***	*	*	**	7
	Knowledge Control	Producing alternative solutions	**	-	-	-	2
		Evaluating others' views	***	-	*	*	5
		Thinking about one's own views	**	*	**	*	6

*n= The number of teacher trainees

The qualitative findings related to inquiry skills revealed two themes, students' ways of acquiring knowledge and their ways of controlling knowledge. It was found that to acquire knowledge participants most preferred to ask to someone who is a credible source of the knowledge (n=11):

When I need to acquire knowledge, the primary step that I follow is to ask for help to my friends from whom I can get support in the class, but if they do not know, then I freely explain to my instructor that I cannot do it (G2/TT2)

A third of the interviewees said they consulted online sources (n=4). For example, *I do not make deep investigations; generally I look for online sources (G3/TT1)*. A few accessed resources in libraries (n=2). One stated, *I do some research by myself and try to acquire the necessary knowledge or I try to obtain knowledge from my instructor somehow (G1/TT2)*.

In the dimension of knowledge control, more than half of the participants (n=7) indicated that they controlled knowledge by means of examining more than one source. A senior with the highest level inquiry skills used multiple approaches:

I search for knowledge from several sources, go to library for searching, examine online sources and ask my instructors about what sources that they can suggest (G4/TT3)

Half of the participants (n=6) resorted to thinking about their own views while almost half (n=5) evaluated others' views, and a few (n=2) reported that they controlled knowledge by producing more than one way to solve a problem.

Based on quantitative findings, this class possessed the lowest score on knowledge control. Within this theme, all senior students who had high scores on inquiry skills and self-efficacy mentioned that they used more than one source and evaluated their peers' views. A senior who had a high score on inquiry skills as well as academic achievement said, *If I learned the topic one week ago, I think on it and evaluate my own views (G4/TT3)*. Freshman, sophomore and junior students tended not to look for alternative answers or solution or to evaluate their peers' views. One said, *We do not evaluate each other's views from different perspectives; we skip it rapidly if we have a different view (G3/TT1)*. Another student said, *I do not evaluate myself in terms of lessons. I do not think about whether I learned a topic or not (G1/TT2)*. While one student indicated, *I evaluate alternative solutions so that I can see what else I should think about and which solutions may be more appropriate (G4/TT2)*, in contrast, another student expressed, *I continue with another topic if I find the solution to the problem and I do not look for alternative solutions (G2/TT2)*.

Discussion

In this investigation of the predictive power of teacher trainees' inquiry skills and academic achievement on their self-efficacy dimensions, it was found that teacher trainees' average academic achievement scores cannot meaningfully explain their total scores on self-efficacy skills, whereas inquiry skills have a meaningful positive relationship with self-efficacy skills. To sum up, teacher trainees' scores on self-efficacy skills increase as their scores on inquiry skills increase. Inquiry skills are composed of sub-dimensions of self-confidence, knowledge acquisition, and knowledge control. When those dimensions are examined in detail, knowledge acquisition and self-confidence dimensions predict self-efficacy skills at a significant level. The self-efficacy

dimension investigated in this study comprises three dimensions, which are encouraging student participation, classroom management, and use of teaching strategies. In relation to current issues in the field, we can infer that inquiry skills contribute to the competence of special education teacher trainees. For example, determining which learning disability should be educated at which level is a hot topic, and teachers do not use practices that can lessen the burden of such decisions (Brownell et al., 2010; Cook & Cook, 2015), and there is some discussion that teacher education is inadequate in meeting teachers' needs in this area (Brownell et al., 2010; Shepherd et al., 2016; Leko et al., 2015). Effective practices are directly linked to encouraging student participation, the use of teaching strategies, and classroom management. The predictive power of inquiry skills on these competence domains is at a significant level, indicating that engaging in inquiry about what is done in the process of teaching is of primary importance, and the process of inquiry is a necessary aspect of putting teachers' roles and tasks into practice (Zeichner, 1983). Also, inquiry enhances evidence-based teaching practices and is crucial for teachers to bridge the gap between theory and practice by realizing what works and what does not work in practice (Cook and Cook, 2015). One way to develop teachers' competences of teaching strategies and pedagogical decision-making is inquiry- and evidence-based education (Boardman et al., 2005; Cektinkaya and Ozyurek, 2019; Zion, Schain and Shmueli, 2013). These findings indicate that special education teacher educators should think on ways to improve inquiry skills with the ultimate goal of training teachers with high self-efficacy.

Another essential problem in the field of special education is that the criteria for determining special education teachers' self-efficacy and evaluating their performance are not clear (Brownell et al., 2010; Woolf, 2018; Woolf, 2015; Blanton et al., 2006). Special education teachers are expected to have a wide knowledge base and to apply this knowledge to benefit their students in schools as well as pedagogical knowledge of evidence-based teaching strategies and be capable of using strategies which encourage students to be active (Woolf, 2018). To satisfy so many expectations, teachers should know ways of acquiring knowledge acquisition and select evidence-based practices. Because knowledge acquisition and knowledge control underlie inquiry skills, teacher education should be constructed to develop these skills, which will also help them gain thinking and communication skills (Cook and Cook, 2015; Boardman et al., 2005). These developments are essential for the improvement of self-efficacy.

Instructional competencies such as providing for student participation and classroom management are important for the self-efficacy domain. Effective teachers teach classroom rules, explain things clearly, and give regular feedback. These practices call on pedagogical knowledge, which is more essential than specialized content knowledge in the field in special education (Blanton et al., 2006). Therefore, teacher trainees should be taught through inquiry how to organize the teaching process as a pedagogical skill. Teachers who have inquiry skills become knowledgeable in what kinds of

knowledge will be taught to whom, relevant sources of knowledge, time management strategies, individualized learning techniques, and reflection on self-evaluation. Such reflections arising through inquiry can help teachers explore moral, ethical, political, and instructional issues (Zeichner, 1983). Kuster, et. al. (2018) argue that teaching based on inquiry can have positive impacts upon learning outcomes and should not be regarded as relevant to only one educational level. Moreover, special education teachers should be able to realize and organize factors related to particular disabilities that may impede students' social and academic participation (Woolf, 2018). All these are pertinent to encouraging student participation as part of teacher self-efficacy.

This study reveals that the dimension of self-confidence in knowledge acquisition, as an inquiry skill, is enhanced if special education teacher educators give teacher trainees chances to share their views by providing a collaborative classroom environment and to encouraging in-class group discussions. In contrast, trainees are unwilling to participate and experience hesitations in knowledge acquisition when instructors or more knowledgeable peers dominate classroom discourse. In particular, graduate students who already familiar with pedagogical topics always talk, which undermines undergraduates' self-confidence. There should be in-class group activities in which students at the same levels can participate in idea sharing sessions, case studies and collaborative practices which can support thinking skills and students' active participation in knowledge construction. In this way, teacher trainees' pedagogical skills and self-efficacy may be fostered (Wilson, Floden & Ferrini-Mundy, 2001).

Encouraging student participation is one of the self-efficacy domains focused on in this study. One way to develop teacher trainees' self-efficacy is to orient them to activities in which they can be involved in active inquiry. To accomplish this in teacher education courses, the instructor should introduce evidence-based studies and present characteristics of scientific knowledge; also teacher trainees should be exposed to scientific problems and make explanations while teaching content area (Quigley et.al, 2011). Kuster et. al. (2018) argue that inquiry skills can be promoted by the integration of in-class activities that support students' explanations and views, the development of common understandings in the class as a community, and the organization of an instructional environment appropriate to this objective. Leko et. al. (2015) emphasize that the current programs are insufficient in developing teachers' self-efficacy skills and need to be reconstructed periodically in accordance with developments in research and science. Ruppert, Roberts and Olson (2015) propose that special education teachers need support for improving their communication and collaboration skills. This finding is consistent with the findings of the present study. One of the ways to develop communication and collaboration is by fostering inquiry skills. In a similar vein, according to research on special education programs, it is possible to foster teacher self-efficacy by basing knowledge on evidence, using reflective inquiry techniques, having evaluative discussions, guiding teacher trainees to make evidence-based explanations, and

discussing scientific knowledge (Spooner, et. al, 2010; Etscheidt, Curran & Sawyer, 2012; Dukes & Darling, 2014). Such instruction promoting inquiry skills will foster teacher self-efficacy by motivating teacher trainees to acquire knowledge, to wonder, to produce new ideas and to make evidence-based inquiries. (Powell-Moman & Brown-Schild, 2011). Çetinkaya (2019) points out that inquiry-based teacher education enhances teacher trainees' collaboration, cognitive development, effective teaching and personal learning skills. In parallel with the significance of inquiry skills, Lemley, Hart and King (2019) assert that evidence-based education supports teacher professional development and collaboration skills by increasing their own disciplinary literacy and facilitating the transfer of this knowledge to teaching. All of these skills are directly related to teacher self-efficacy domains.

Teacher trainees tend to obtain expert opinions or ask someone who is credible in order to acquire knowledge. However, acquiring knowledge from only one source or confining themselves to others' views is not sufficient for the improvement of special education teacher trainees' self-efficacy or their awareness of how to access scientific sources. Instructional decisions should be made in light of scientific evidence-based knowledge. Another important problem in special education is that methods which are proposed in scientific studies and are shown to have positive influences on student development are not reflected in teaching practices (Cook & Cook, 2015) and that special educators often do not accept or even examine the results of evidence-based studies (Boardman et. al, 2005). Yet educators should go beyond their own views research-based knowledge while making instructional decisions. For the enhancement of self-efficacy skills, teachers must benefit from research results, resort to more than one source, and put the knowledge gained from these sources into practice or they may face several problems in their teaching processes.

There is no one clear answer or solution to these problems, and new ways are better discovered through inquiry (Pedler, 2011). Also, questioning one's previous experiences and knowledge while new learning ways enables one to learn deeply (Soffe, Marquart & Hale, 2011). Moreover, recent special education reforms and policies emphasize that scientific inquiry is crucial for instructional decisions and to decide what works in practice (Cook & Cook, 2015). If a teacher trainee accepts the accuracy of knowledge without questioning and does not compare it with other sources, he/she cannot engage in analysis and interpretation. Assuming that self-efficacy skills will develop without analysis and interpretation may lead to the loss of time and effort. Hence, special education teacher educators should support the development of inquiry skills by directing teacher trainees to ways of acquiring knowledge applying scientific knowledge to practice. Teachers should also know how to reach and understand many sources and perhaps own a good personal that supports their preliminary preparations. Such preparations are important for understanding the disability categories and other content important to teachers' self-efficacy. Blanton et. al. (2006) tried multiple meth-

ods to increase the quality of special education teachers and concluded that teachers' preliminary preparations promote relations between teachers and students. All of these developments are connected to teacher self-efficacy.

Producing alternative solutions, benefitting from more than one source, evaluating peers' views and reflecting on one's own views are basic behaviors of inquiry skills. The findings indicate that only a few participants expressed that they made use of these skills. Special education practices are so complex and specialized that the related problems cannot be solved without reflecting on multiple solutions. Specially-designed programs and individualized education focusing on students' particular needs are key elements in this field (Shepherd et al., 2016). To satisfy diverse needs, educators need to devise more than one instructional routine and need a wide repertoire of solutions. Cetinkaya and Ozyürek (2019); and Zion, Schain and Shmueli (2013) found that teacher trainees could develop different research questions and produce more than one solution when they were involved in inquiry-based education. Accordingly, special education teacher programs can improve teacher self-efficacy via implementations that develop inquiry skills. Marquart (2004) claims that reflecting on and evaluating peers' views and engaging in group work can develop inquiry skills effectively. Each member of a group contributes interpretations and reflections, which fosters acquisition of deep knowledge with the help of questions and support of a learning coach. Such practices, along with field experiences and performance assessment, can stimulate professional development appropriate for 21st century special-education teacher education and address problems in special education which are related to the development of teacher self-efficacy.

Because the process of inquiry offers opportunities for discovering different sources of knowledge and reflecting on one's own views, it is effective preparation for undertaking the complex tasks of special education. Inquiry helps teacher trainees self-regulate their own learning, identify problems, ask questions, determine the gaps between theory and practice, and produce possible solutions (Marquart, 2004). Moreover, teacher trainees who can access multiple knowledge sources and reflect on their own and peers' views will discover ways of acquiring knowledge acquisition and reflecting on real-life problems. In this regard, special education teacher preparation should include extensive field work experience (Woolf, 2018). Teacher trainees who possess inquiry skills are able to evaluate peers' views and knowledge based on field experiences and thereby improve their teaching performance and self-efficacy while designing their own teaching based on evidence-supported knowledge. Enabling special education teacher trainees to acquire inquiry skills may lead them to be self-confident in discovering ways for knowledge acquisition and thinking about evidence for knowledge, which will contribute to their overall self-efficacy.

Limitations and Suggestions

- The qualitative part of the study includes detailed comments on questioning. However, self-efficacy skills cannot be generalized. Further studies conducted with more participants studying at third and fourth grades from different universities need to be carried out.
- The university where the study was conducted faces such problems as an inadequate number of teacher educators and an increasing number of students. Similar studies can be carried out in the special education departments of other universities which have higher quality conditions and standards with regard to special education teacher preparation and compared with the present study.

References

- Aldan-Karademir, Ç., & Saracaloglu, A. S. (2013). The development of inquiry skills scale: reliability and validity study. *Asian Journal of Instruction*, 1(2), 56-65.
- Blanton, L. P., Sindelar, P. T., & Correa, V. I. (2006). Models and measures of beginning teacher quality. *The Journal of Special Education*, 40(2), 115-127. doi: 10.1177/00224669060400020201
- Boardman, A. G., Argüelles, M. E., Vaughn, S., Hughes, M. T., & Klingner, J. (2005). Special education teachers' views of research-based practices. *The Journal of Special Education*, 39(3), 168-180. doi: 10.1177/00224669050390030401
- Brownell, M. T., Sindelar, P. T., Kiely, M. T., & Danielson, L. C. (2010). Special education teacher quality and preparation: Exposing foundations, constructing a new model. *Exceptional Children*, 76(3), 357-377. doi: 10.1177/001440291007600307
- Cook, B. G., & Cook, S. C. (2013). Unraveling evidence-based practices in special education. *The Journal of Special Education*, 47(2), 71-82. doi: 10.1177/0022466911420877
- Creswell, J. W. (2003). *Research design. Qualitative, quantitative, and mixed methods approaches*. Second Edition. Sage publications Inc.
- Çapa, Y., Çakiroğlu, J. & Sarıkaya, H. (2005). The development and validation of a Turkish version of the teachers' sense of efficacy scale. *Education and Science*, 30 (137), 74-81.
- Çetinkaya, M.& Özyürek, C. (2019). T (2019). The effect of inquiry-based science activities on prospective science teachers' scientific process skills. *International Online Journal of Education and Teaching*, 6(1), 56-70.
- Dilworth, R. L. 1998. Action Learning in a Nutshell. *Performance Improvement Quarterly* 11, no. 1: 28-43. DOI: 10.1111/j.1937-8327.1998.tb00076.
- Dukes, C., & Darling, S. M. (2014). Metaphors, organisms, and evolving approaches: Examining special education teacher preparation. doi: 10.1177/0888406413516157
- Dukes, C., Darling, S. M., & Doan, K. (2014). Selection pressures on special educa-

- tion teacher preparation: Issues shaping our future. *Teacher Education and Special Education*, 37(1), 9-20. doi.org/10.1177/0888406413513273
- Etscheidt, S., Curran, C. M., & Sawyer, C. M. (2012). Promoting reflection in teacher preparation programs: A multilevel model. *Teacher Education and Special Education*, 35(1), 7-26. doi: 10.1177/0888406411420887
- Gersten, R., Keating, T., Yovanoff, P., & Harniss, M. K. (2001). Working in special education: Factors that enhance special educators' intent to stay. *Exceptional children*, 67(4), 549-567. doi: 10.1177/001440290106700408
- Holdheide, L. (2015). Same debate, new opportunity: designing teacher evaluation systems that promote and support educators in practices that advance all students' learning. *Journal of Special Education Leadership*, 28(2).
- Karademir, Ç., & Saracaloğlu, A. S. (2017). Öğretmen adaylarının sorgulama ve eleştirel düşünme becerilerinin öğretmen öz yeterlik düzeyine etkisi. *Electronic Turkish Studies*, 12(33).
- Kuster, G., Johnson, E., Keene, K., & Andrews-Larson, C. (2018). Inquiry-oriented instruction: A conceptualization of the instructional principles. *PRIMUS*, 28(1), 13-30. doi:10.1080/10511970.2017.1338807
- Leko, M. M., Brownell, M. T., Sindelar, P. T., & Kiely, M. T. (2015). Envisioning the future of special education personnel preparation in a standards-based era. *Exceptional Children*, 82(1), 25-43. doi: 10.1177/0014402915598782
- Lemley, S. M., Hart, S. M., & King, J. R. (2019). Teacher Inquiry Develops Elementary Teachers' Disciplinary Literacy. *Literacy Research and Instruction*, 58(1), 12-30. doi: 10.1080/19388071.2018.1520371
- Marquardt, M. J., 2004. *Optimizing the Power of Action Learning*. Palo Alto, CA, Davies:Black Publishing.
- Maaß, K., & Artigue, M. (2013). Implementation of inquiry-based learning in day-to-day teaching: a synthesis. *ZDM*, 45(6), 779-795.
- Miles, M. B., Huberman, A. M., Huberman, M. A., & Huberman, M. (1994). *Qualitative data analysis: An expanded sourcebook*. sage.
- Onwuegbuzie, A. J., & Leech, N. L. (2004). "Enhancing the Interpretation of "Significant" Findings: The Role of Mixed Methods Research". *The Qualitative Report*, 9(4): 770-792
- Patton, M. Q. (2014). Nitel araştırmannın doğası. In M. Bütün & B.Demir (Trans. Ed.). Nitel araştırma ve değerlendirme yöntemleri, (pp.3-33). Ankara: Pegem Yayıncılık
- Pedler, M., ed., 2011. *Action Learning in Practice*. Gower Publishing, Ltd.
- Powell-Moman, A. D., & Brown-Schild, V. B. (2011). The Influence of a Two-Year Professional Development Institute on Teacher Self-Efficacy and Use of Inquiry-Based Instruction. *Science Educator*, 20(2), 47-53.
- Quigley, C., Marshall, J. C., & Deaton, C. (2011). Challenges to inquiry teaching and suggestions for how to meet them. *Science Educator*, 20(1), 55-61.

- Revans, R., 2016. ABC of Action Learning. Farnham: Gower. Ritchhart, R., 2002. Intellectual Character: What It Is, Why It Matters and How to Get It. San Francisco: Jossey-Bass.
- Ruppar, A., Roberts, C., & Olson, A. J. (2015). Faculty perceptions of expertise among teachers of students with severe disabilities. *Teacher Education and Special Education, 38*(3), 240-253. doi: 10.1177/0888406414552331
- Scott, K. S. 2017. An Integrative Framework for Problem-Based Learning and Action Learning. *Human Resource Development Review 16*, no. 1:3–34. DOI: 10.1177/1534484317693090.
- Shepherd, K. G., Fowler, S., McCormick, J., Wilson, C. L., & Morgan, D. (2016). The search for role clarity: Challenges and implications for special education teacher preparation. *Teacher Education and Special Education, 39*(2), 83-97. doi: 10.1177/0888406416637904
- Soffe, S. M., M. J. Marquardt, and E. Hale. 2011. Action Learning and Critical Thinking: A Synthesis of Two Models. *Action Learning: Research & Practice 8*, no. 3: 211-30. doi: 10.1080/14767333.2011.614927.
- Spooner, F., Algozzine, B., Wood, C. L., & Hicks, S. C. (2010). What we know and need to know about teacher education and special education. *Teacher Education and Special Education, 33*(1), 44-54. doi: 10.1177/0888406409356184.
- Tashakkori, A., & Teddlie, C. (1998). *Mixed methodology: Combining qualitative and quantitative approaches*. Applied Social Research Methods Series (Vol.46). Thousand Oaks, CA: Sage.
- Tschannen-Moran, M., and Hoy, A. W. (2001). Teacher efficacy: Capturing an elusive construct. *Teaching and teacher education, 17*(7), 783-805. doi: 10.1016/S0742-051X(01)00036-1.
- Wilson, S. M., Floden, R. E., & Ferrini-Mundy, J. (2001). Center for the Study of Teaching and Policy, *Teacher preparation research: Current knowledge, gaps, and recommendations: A research report prepared for the US department of education and the office for educational research and improvement*, February 2001. Center for the Study of Teaching and Policy.
- Wolf, S. B. (2015). Special education professional standards: How important are they in the context of teacher performance evaluation?. *Teacher Education and Special Education, 38*(4), 276-290. doi: 10.1177/0888406414557284
- Wolf, S. B. (2018). Critical skills for special educator effectiveness: which ones matter most, and to whom?. *Teacher Education and Special Education*. doi: 0888406418776714.
- Zeichner, K. M. (1983). Alternative paradigms of teacher education. *Journal of teacher education, 34*(3), 3-9. doi: 10.1177/002248718303400302
- Zion, M., Schanin, I., & Shmueli, E. R. (2013). Teachers' performances during a practical dynamic open inquiry process. *Teachers and Teaching, 19*(6), 695-716. doi: 10.1080/13540602.2013.827457