




Developing Efficacy Scale for Teaching Students with Developmental Disabilities and an Analysis by the Special Education Teachers' Sample¹

Gelişimsel Yetersizliği Olan Öğrencilere Yönelik Öğretmen Yeterlik Ölçeğinin Geliştirilmesi ve Demografik Değişkenler Açısından İncelenmesi

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Abstract. This study aimed to develop a scale to assess the efficacy of teaching students with developmental disabilities and test it with a sample of special education teachers (SETs) by demographic characteristics. Exploratory and confirmatory factor analyses were performed to determine the scale's validity and reliability. The exploratory factor analysis revealed that the scale has two factors. The first factor, "Cooperation and Rights Advocacy," was explained as 28.09% of the total variance, with a Cronbach's alpha coefficient of .85. The second factor, "Teaching and Classroom Management," was explained as 18.02% of the total variance, with a Cronbach's alpha coefficient of .79. Cronbach's alpha coefficient for the whole scale was calculated as .82. Also, McDonald's omega coefficients were calculated as .86 for the first, .79 for the second factors, and .82 for the whole scale. As a result, the scale is a valid and reliable tool for determining SETs' efficacies. While the efficacy of SETs did not differ significantly according to the gender and educational level they teach, it differed significantly according to their educational level, disability group of their teaching, and professional seniority.

Keywords: Developmental disability, Special education, Teacher efficacy, Scale development.

Öz. Bu çalışma gelişimsel yetersizliği olan öğrencilere yönelik öğretmen yeterliğini değerlendirecek bir ölçek geliştirmeyi ve bu ölçeği özel eğitim öğretmenleri örneklemini üzerinde demografik değişkenler açısından incelemeyi amaçlamaktadır. Ölçeğin geçerliliği ve güvenilirliğini belirlemek için açımlayıcı ve doğrulayıcı faktör analizleri yapılmıştır. Açımlayıcı faktör analizi, ölçeğin iki faktör içerdiğini ortaya koymuştur. Birinci faktör olan "İşbirliği ve Hak Savunuculuğu", toplam varyansın %28,09'unu açıklamış ve Cronbach's alpha katsayısı 0,85 olarak bulunmuştur. İkinci faktör olan "Öğretim ve Sınıf Yönetimi" ise toplam varyansın %18,02'sini açıklamış ve Cronbach's alpha katsayısı 0,79 olarak hesaplanmıştır. Tüm ölçek için Cronbach's alpha katsayısı 0,82 olarak hesaplanmıştır. Ayrıca, McDonald's omega katsayıları, birinci faktör için 0,86, ikinci faktör için 0,79 ve tüm ölçek için 0,82 olarak hesaplanmıştır. Sonuç olarak bu ölçek özel eğitim öğretmenlerinin yeterliklerini belirlemek için geçerli ve güvenilir bir araçtır. Özel eğitim öğretmenlerinin yeterliği, cinsiyetleri ve öğretim düzeylerine göre anlamlı bir şekilde farklılık göstermezken, öğretim düzeyleri, öğretmenlik yaptıkları yetersizlik grubu ve mesleki kıdemlerine göre anlamlı bir şekilde farklılık göstermektedir.

Anahtar Kelimeler: Gelişimsel yetersizlik, Özel eğitim, Öğretmen yeterliği, Ölçek geliştirme.



Genişletilmiş Özet

Giriş. Gelişimsel yetersizliği olan öğrencilere öğretmenlik yapmak diğer branşlara kıyasla zorlu olabilir ancak bu öğrencilerin gelişimine katkıda bulunmak ve ilerlemelerini görmek tatmin edicidir. GY olan öğrencilere öğretmenlik, farklı özel gereksinimleri olan bireylerle, onların bireysel farklılıklarını dikkate alarak etkili iletişim kurmayı, öğretimsel uyarlamalar yapmayı ve sosyal-duygusal gereksinimlerine duyarlı biçimde karşılık vermeyi içerir. GY olan öğrencilerin, özel dikkat ve anlayış gerektiren çeşitli ihtiyaçları vardır. Bu nedenle öğretmenlerin sabır, öğrencilerin bilişsel, dilsel ve sosyal-duygusal özelliklerini doğru değerlendirme, bireysel farklılıklarını dikkate alarak öğretim sürecini uyarlama ve kapsayıcı bir yaklaşım sergileme gibi yeterliklere sahip olmaları gerekir. Özel eğitim öğretmenleri GY olan öğrencilerin eğitimlerini ilgili müfredat çerçevesinde tamamlayabilmeleri ve bağımsız bir şekilde yaşamaları için gerekli motor ve sosyal becerileri kazanmalarına yardımcı olurlar. Bu süreçte özel eğitim öğretmenleri öğrenciler ve velilerin yanı sıra, özel eğitim öğretmenleri, sınıf öğretmenleri, psikologlar, psikiyatristler ve dil ve konuşma terapistleri gibi çok disiplinli ekip üyeleriyle iş birliği içinde çalışmak zorundadır. Bu bağlamda, özel eğitim öğretmenlerinin iyi iletişim becerilerine sahip olmaları gerekmektedir. Ayrıca, teknolojik becerilere sahip olmak ve yaratıcı ve esnek olmak sahip olmaları gereken nitelikler arasında yer alır. Öğretmen yeterliği, öğretmenlerin profesyonel davranışlarını ve öğrencilerin öğrenmesini etkileyen bir faktördür. Yeterlik, öğretmenlerin öğretim hedeflerini, öğretmeye isteklerini ve çabalarını etkiler. Öğretmen yeterliği öğrenci başarısını etkilemekte; düşük öğretmen yeterliği öğrenci başarısını düşürmektedir. Bu nedenle öğretmen yeterliği eğitim araştırmalarının ilgisini çekmeye devam etmektedir. Öğretmen yeterliğinin kavramsallaştırılmasındaki farklılıklar nedeniyle çeşitli sorunlar ve belirsizlikler ortaya çıkmıştır. Araştırmalar genellikle öğretmen öz-yeterliği üzerine odaklanmaktadır. Bu nedenle özel eğitim öğretmenlerinin yeterliklerini belirlemek amacıyla güncel araştırmalara ihtiyaç vardır. Bu çalışma GY olan öğrencilere yönelik öğretmen yeterliğini değerlendirecek bir ölçek geliştirmeyi ve bu ölçeği özel eğitim öğretmenlerinin demografik özelliklerine göre incelemeyi amaçlamaktadır. İlgili ölçek literatürdeki bir boşluğu doldurarak katkı sağlayacaktır.

Yöntem. Araştırmada katılımcılar uygun örnekleme göre seçilmiştir. Araştırmanın katılımcılarını GY sahip öğrencilerle çalışan özel eğitim öğretmenleri oluşturmaktadır. Alanyazın araştırmasının ardından yirmi maddelik bir taslak form hazırlanmıştır. Taslak forma ilişkin özel eğitim programı doktorasına sahip üç akademisyenin görüşü alınmıştır. Uzmanların önerileri doğrultusunda iki madde taslak formdan çıkarılmıştır. Ölçek verileri Google Forms aracılığıyla online olarak toplanmıştır. Araştırmanın katılımcılarına veri toplama araçlarını gönüllü bir şekilde yanıtlayabilecekleri ve herhangi bir gerekçe sunmadan araştırmadan çekilebilecekleri, ilgili veriler ve araştırmanın sonuçları hakkında bilgi alma haklarına sahip olduğu onam formunda sunulmuştur. Ölçeğin faktör yapısını belirlemek amacıyla Açıklayıcı Faktör Analizi (AFA) kullanılmıştır. AFA incelenen çok sayıda değişkenin daha az sayıda faktöre indirgeme imkânı sunmaktadır. AFA'da değişkenler kategorilendirilip veriler özetlenmekte ve aynı özelliği ölçen bağımsız değişkenler bir araya gelerek faktörleşmektedir. Ölçeğin faktör yapısını teyit etmek için ise Doğrulayıcı Faktör Analizi (DFA) kullanılmıştır. DFA'da önceden tanımlanmış olan model verilerle test edilmektedir. Bu amaçla uyum iyiliği indeksleri hesaplanmakta ve yorumlanmaktadır. Bu indekslerden hangilerinin kullanılması ve yorumlanması gerektiği ile ilgili olarak ise ortak bir görüş bulunmamaktadır. Genel olarak ise χ^2/df



değerinin 5'ten küçük, CFI, TLI, NFI değerlerinin .90'dan büyük, SRMR ve RMSEA değerlerinin ise .08'den küçük olması önerilmektedir. Araştırmada veri analizi IBM SPSS Statistics 25 ve Mplus (8.3 versiyon) programları ile gerçekleştirilmiştir.

Bulgular. Araştırmada gerçekleştirilen AFA sonucunda ölçeğin iki faktörlü bir yapıda olduğu belirlenmiştir. İçermiş olduğu maddeler arasındaki anlam ilişkisine göre birinci faktör "Öğretim ve Sınıf Yönetimi" olarak isimlendirilmiştir. Bu faktör, faktör yük değeri .52 ile .79 arasında değişen on maddeden oluşmaktadır. Faktör toplam varyansın %28.94'ünü açıklamaktadır. Faktörün Cronbach Alfa güvenilirlik katsayı ise .89 olarak hesaplanmıştır. Faktörden alınabilecek en düşük puan 10, en yüksek puan 50 şeklindedir. İkinci faktör "İş birliği ve Hak Savunuculuğu" olarak isimlendirilmiştir. Bu faktör, faktör yük değeri .53 ile .81 arasında değişen sekiz maddeden oluşmaktadır. Faktör toplam varyansın %25.71'ini açıklamaktadır. Faktörün Cronbach Alfa güvenilirlik katsayı .87 olarak hesaplanmıştır. Faktörden alınabilecek en düşük puan 8, en yüksek puan 40 şeklindedir. Ölçeğin faktörleri arasında orta düzeyde, pozitif ve anlamlı bir ilişki olduğu belirlenmiştir. Faktörler bağımsız olarak ayrı ayrı puanlanabileceği gibi ölçekten toplam puan da alınabilmektedir. Faktörlerden veya ölçeğin tamamından alınacak puanın artması ilgili yeterlik düzeyinin arttığını ifade etmektedir. DFA sonucunda hesaplanan uyum iyiliği indekslerinin kabul edilebilir seviyede olduğu belirlenmiş ve ölçeğin iki faktörlü yapısı doğrulanmıştır. Geliştirilen ölçek aracılığıyla GY sahip olan öğrencilerle çalışan özel eğitim öğretmenlerinin yeterlikleri çeşitli demografik özelliklere göre incelenmiştir. Özel eğitim öğretmenleri arasında cinsiyet ve görev yapılan eğitim kademesi açısından istatistiksel olarak anlamlı bir farklılık bulunmamıştır. Özel eğitim öğretmenlerinin eğitim düzeyi, görev yapılan yetersizlik grubu ve kıdemleri arasında istatistiksel olarak anlamlı farklılık belirlenmiştir.

Tartışma ve Sonuç. Bu çalışma özel eğitim öğretmenlerinin yeterliklerini ölçmek için geliştirilen bir ölçeğin geçerlik ve güvenilirlik analizlerini içermektedir. Yapılan doğrulayıcı faktör analizi ve açıklayıcı faktör analizi sonuçlarına göre ölçek, iki faktörlü bir yapıya sahiptir. Bunlar "İşbirliği ve Hak Savunuculuğu" ve "Öğretim ve Sınıf Yönetimi" şeklindedir. Bu faktörler sırasıyla %28,09 ve %18,02 varyansı açıklamaktadır ve her iki faktör de yüksek güvenilirlik katsayılarına (Cronbach alpha ve McDonald's omega) sahiptir. Çalışma ayrıca özel eğitim öğretmenlerinin yeterliklerini demografik değişkenlere göre incelemiştir. Özel eğitim öğretmenlerinin cinsiyet ve öğretim düzeyi ile yeterlik düzeyleri arasında anlamlı bir fark bulunmazken; eğitim seviyesi, öğretmenlerin öğretim yaptığı yetersizlik grubu ve mesleki kıdem ile yeterlik arasında anlamlı fark olduğu bulunmuştur. Lisansüstü eğitim düzeyine sahip özel eğitim öğretmenlerinin daha yüksek yeterliğe sahip oldukları, öğretmenlerin uzmanlık alanındaki eğitimlerinin yeterliklerini artırdığına dair alanyazındaki bulgularla paralellik göstermektedir. Özellikle, zihinsel yetersizliğe sahip öğrencilerle çalışan özel eğitim öğretmenlerinin daha yüksek yeterliğe sahip oldukları, ancak otizm spektrum bozukluğu olan öğrencilerle çalışan öğretmenlerin yeterliklerinin daha düşük olduğu bulunmuştur. Bu durum, otizm spektrum bozukluğu olan öğrencilerle çalışmanın getirdiği zorluklarla ilişkilidir ve öğretmenlerin bu alanda yeterliklerini artırabilmek için eğitim almalarının önemini vurgulamaktadır. Ayrıca, 11-15 yıl kıdemi olan öğretmenlerin yeterliklerinin daha yüksek olduğu görülmüştür, ancak 10 yıldan az kıdemi olan ve 16 yıldan fazla kıdemi olan öğretmenlerin yeterlikleri daha düşük olabilmektedir. Bu durum öğretmenlerin deneyim kazandıkça yeterliklerinin değişebileceğini ve düşük kıdeme sahip öğretmenlerin eğitimle desteklenmesi gerektiğini göstermektedir.

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Introduction

Teaching students with developmental disabilities may be challenging compared to other branches; however, it is also a rewarding process that contributes to students' development and progress (Loreman, 2013). Teaching students with developmental disabilities involves working with individuals who have diverse and complex needs that require individualized support and understanding (American Psychiatric Association, 2013; Francés et al., 2022). For this reason, teachers are expected to possess a range of competencies, including patience, acceptance, and the ability to respond to students' diverse learning needs (Breyer et al., 2020; Savolainen et al., 2022). Special education teachers (SETs) support students in acquiring motor, social, and independent living skills within the framework of the curriculum (Craig et al., 2016). In this process, SETs collaborate with students, families, and multidisciplinary professionals, and therefore need strong communication skills (Cardona-Molto et al., 2020). Additionally, being technologically competent, flexible, and creative are considered essential qualifications for effective teaching in special education contexts (Kunter et al., 2013). This study aimed to develop a scale to assess the efficacy of teaching students with developmental disabilities and test it with a sample of SETs by demographic characteristics. This study aimed to develop a scale to assess the efficacy of teaching students with developmental disabilities and test it with a sample of SETs by demographic characteristics.

Developmental disability

Developmental disabilities are a group of conditions that begin during development and cause functional impairment, according to the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) (American Psychiatric Association, 2013). These disabilities result in significant functional limitations in three or more major life activities of self-care, receptive and expressive language, learning, mobility, self-direction, economic self-sufficiency, and independent living (State of Delaware Developmental Disabilities Council, 2007). Individuals with various genetic and chromosomal disorders such as intellectual disability, autism spectrum disorder, communication disorder, attention-deficit/hyperactivity disorder, speech and language disorders, specific learning disability, Down Syndrome, general developmental delay, cerebral palsy, Fragile X Syndrome and Fetal Alcohol Syndrome are explained under the umbrella of developmental disability. Of these disabilities, intellectual disability and autism spectrum disorder are expressed as the most prominent groups (Morris-Rosendahl and Crocq, 2020).

The signs of developmental disabilities include behavior, language, and social communication deficits that start early in life and cause a child to fall behind their peers (Francés et al., 2022). Developmental disabilities result in significant functional limitations in three or more major living activities, including self-care, receptive and expressive language, learning, mobility, self-direction, economic self-sufficiency, and independent living ability (State of Delaware Developmental Disabilities Council, 2007). Additionally, children with developmental disabilities frequently experience communication difficulties. These issues can show up as repetitive body motions and behavioral patterns, trouble relating to people, things, and events, difficulty using and understanding language, unfamiliarity with play involving toys and objects, and difficulty adapting to changes in

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routines and familiar environments. It is crucial to remember that these communication issues are factual observations and should be treated as such (Craig et al., 2016).

Self-efficacy

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Self-efficacy is one of the factors that teachers can use to increase the caliber and efficacy of their instruction (Saputro et al., 2020). Self-efficacy refers to an individual's confidence in using acquired skills to perform a specific job or behavior (Bandura, 1977). This theory has also been widely applied in special education research. Several studies indicate that teachers' levels of self-efficacy play a crucial role in implementing effective special education practices (Ahsan et al., 2013). Self-efficacy influences teachers' instructional decisions and behaviors related to special education and is also linked to the concepts, actions, and persistence complicated in serving all students succeed (Cardona-Molto et al., 2020).

Self-efficacy is critical to teachers' capacity to instruct pupils successfully (Sandaraj and Hashim, 2022). The conviction that educators can plan and coordinate instruction to meet pre-established learning objectives is another way to characterize their self-efficacy (Yurtdakal and Karakas, 2021). The idea held by educators that they can effectively instruct and engage students in learning activities despite challenges or low motivation to study is known as teacher self-efficacy (Saputro et al., 2020).

Teacher self-efficacy is derived from the theoretical base of social cognitive theory (Bandura, 1999). Teacher self-efficacy is the extent to which the teacher is confident about their ability to accomplish teaching tasks and professional duties within specific cultures (Tschannen-Moran and Hoy, 2007). In implementing special education practices, teachers' confidence in their skills, knowledge, and abilities is critical to successful implementation (Loreman, 2013). Furthermore, teachers with high self-efficacy are more likely to accept students with behavioral issues in regular classrooms and are prepared to provide differentiated learning services (Weiss et al., 2019). Thus, teachers' self-efficacy in special education is considered a critical factor affecting special education (Soodak and Podell, 1993).

Teachers' self-efficacy contributes to cultivating their special education attitudes and willingness to implement special education (Savolainen et al., 2022). The research found that teachers with higher self-efficacy tend to have more constructive attitudes toward special education and students with developmental disabilities (Özokçu, 2018). Teachers with high self-efficacy are ingenious and can use differentiated teaching strategies to support all students, promoting their development (Breyer et al., 2020).

Teacher efficacy

The primary purpose of education systems is to provide students with the highest quality education. Teachers are the main actors in education systems as the leading implementers of the curriculum. One of the criteria for the quality of education teachers offer is students' learning



outcomes (Rodie, 2022). One of the factors affecting students' learning outcomes and performance is teacher efficacy. Today, difficulties such as the rapid and continuous renewal of knowledge and science, the perceptible dominance of technology in all areas, and the multicultural coexistence (Liakopoulou, 2011) reveal the crucial role of teacher competence in achieving the goals of education systems. Because teachers prepare students for a constantly changing future with today's conditions. Teacher efficacy refers to teachers' belief in their ability to successfully organize and execute the actions necessary to implement a teaching task (Tschannen-Moran et al., 1998). Teacher efficacy includes the knowledge and skills of teachers as a result of their work and qualifications (Ingvarson, 1998). The combination of teachers' qualifications and the knowledge they have acquired determines the work they do and, therefore, their efficacies (Liakopoulou, 2011). Teacher efficacy encompasses teachers' cognitive aspects such as general pedagogical knowledge, beliefs about learning, motivations, and self-regulatory variables (Kunter et al., 2013).

Teacher efficacy is the belief in one's ability to influence desirable learning and engagement outcomes in students, even in the face of challenging or unmotivated learners (Tschannen-Moran and Woolfolk Hoy, 2001). According to Fackler and Malmberg (2016), teacher efficacy is influenced by a variety of factors, including the individual characteristics of the teacher (e.g., gender and experience), the classroom environment (e.g., performance level), and the school and principal's background (e.g., the principal's work experience). The learning experience for students is impacted by teacher efficacy, which is linked to improved individual teacher performance (Goddard et al., 2004). Teachers with a strong sense of efficacy indicate higher levels of organization, planning, and enthusiasm, and they spend more time teaching in areas where they feel more efficacious. In contrast, teachers who feel less efficacious avoid subjects and topics (Coladarchi, 1992).

The present study

Teacher efficacy is one-factor affecting teachers' professional behavior and students' learning (Klassen et al., 2011). Efficacy affects teachers' teaching goals, willingness, and effort to teach. Teachers with a high sense of efficacy plan and organize better (Allinder, 1994). It has been stated that teacher efficacy affects student achievement (Connor et al., 2005; Lee and Lee, 2020; Rivkin et al., 2005), while deficiencies in teacher efficacy negatively affect student achievement (Lee, 2018). In addition, it has been demonstrated that teacher efficacy is strongly associated with student outcomes, such as motivation and self-efficacy beliefs (Tschannen-Moran and Hoy, 2001). For this reason, it continues to attract the attention of educational research.

Due to disagreements in the conceptualization of teacher efficacy, various problems and uncertainties have emerged in measuring structure (Tschannen-Moran and Hoy, 2001). Research generally focuses on teacher self-efficacy (Klassen et al., 2011). In order to measure the concept, various tools have been developed, such as responsibility for student achievement (Guskey, 1981), teacher locus of control (Rose and Medway, 1981), teacher efficacy scale (Gibson and Dembo, 1984), teacher efficacy scale (Bandura, 1997), Ohio State teacher efficacy scale (Tschannen-Moran and Hoy, 2001). Of these, the Ohio State teacher proficiency scale is widely used. This scale is often used as a teacher efficacy scale and has been adapted to different cultures (e.g., Çapa et al., 2005; Oktaviola

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and Lubis, 2022; Salas-Rodriguez et al., 2021). Most of the research has focused on general education teachers. Few studies focus on the competence of SETs (e.g., Coladarci and Breton, 1997; Meijer and Foster, 1988). Therefore, there is a need for up-to-date research to determine the efficacies of SETs. This study aimed to develop a scale to assess the efficacy of teaching students with developmental disabilities and test it with a sample of SETs by demographic characteristics. The relevant scale will contribute by filling a gap in the literature.

Methodology

Participants

Participants were selected using convenience sampling. The study included 251 special education teachers (SETs) in the exploratory factor analysis (EFA) and 230 SETs in the confirmatory factor analysis (CFA). All participants were working in schools affiliated with the Ministry of National Education in Istanbul, Türkiye.

The demographic characteristics of the participants are presented in Table 1 (EFA sample) and Table 2 (CFA sample).

Table 1.
Demographic characteristics of participants (EFA sample, N = 251)

Variable	Category	n	%
Gender	Female	110	43.8
	Male	141	56.2
Professional Seniority	1-5 years	35	13.9
	6-10 years	66	26.3
	11-15 years	56	22.3
	16-20 years	53	21.1
	21 years and more	41	16.3
Education Level	Bachelor's degree	224	89.2
	Master's degree	27	10.8
Teaching Level	Preschool	19	7.6
	Primary school	89	35.5
	Secondary school	82	32.7
	High school	61	24.3



Table 2.
Demographic characteristics of participants (CFA sample, N = 230)

Variable	Category	n	%
Gender	Female	103	44.8
	Male	127	55.2
Professional Seniority	1-5 years	33	14.3
	6-10 years	62	27.0
	11-15 years	52	22.6
	16-20 years	49	21.3
	21 years and more	34	14.8
Education Level	Bachelor's degree	207	90.0
	Master's degree	23	10.0
Teaching Level	Preschool	15	6.5
	Primary school	82	35.7
	Secondary school	77	33.5
	High school	56	24.3

Draft form and data collection

As a result of literature research (e.g., Coladarci and Breton, 1997; Meijer and Foster, 1988; Klassen et al., 2011; Tschannen-Moran et al., 1998; Tschannen-Moran and Hoy, 2001), a draft form consisting of twenty items was developed. Three academicians who completed their doctorates in the special education program provided feedback on the draft form. Based on the experts' suggestions, two items were removed from the draft scale due to content validity evaluations, as they were deemed insufficiently representative of the construct and redundant with other items. Then, the draft form of the scale containing 18 items was transferred to Google Forms, and the data were collected online. After the EFA step, demographic characteristics were added to the form, and data were collected again. While collecting data, the consent form indicated that they could voluntarily answer the data collection tools and withdraw from the study without giving any reason. They had the right to be informed about the collected data and the study results.

Data analysis

EFA was used to determine the factor structure of the scale. EFA offers the opportunity to reduce the large number of variables studied to a small number of factors (Tabachnick and Fidell, 2014). In this way, the number and quality of factors are determined (Brown, 2015). In EFA, the data are summarized by categorizing the variables, and the independent variables measuring the same feature are combined and factored (Tabachnick and Fidell, 2014). The coefficients of skewness and kurtosis were utilized to assess normality. It was recommended that the absolute values of skewness and kurtosis should not exceed 2 (Hair et al., 2010). Z scores were employed to detect possible

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univariate outliers, with cases falling outside the range of $-3 < z < +3$ regarded as potential outliers (Tabachnick and Fidell, 2013). Before determining the scale's factor structure with EFA, the item-total score correlations for the scale items were calculated. In the present study, an item-total correlation coefficient of .30 was adopted as the minimum threshold for item retention, in line with recommendations in the scale development literature (Field, 2013; Nunnally and Bernstein, 1994). Ebel (1965), however, provides a more nuanced interpretation, suggesting that item-total correlations between .40 and 1.00 are sufficient; values between .30 and .39 indicate no revision is necessary; and values between .20 and .29 suggest revision may be needed. Values below .20 indicate that the item should be removed from the scale. The Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy/Bartlett's Test of Sphericity was examined. The KMO value should exceed 0.60 (Tabachnick and Fidell, 2014), and the Bartlett Test of Sphericity should be significant (Bartlett, 1950). The Principal Axis Factoring was selected for factor extraction, and Direct Oblimin was selected for rotation. The eigenvalue that is more significant than 1, the flattening point of the eigenvalue graph, and the number of factors based on the variance ratio that each component explains were considered for determining the number of factors. When deciding on the items to be included in the factor, it was considered that each item's factor loading value should be .32 or above (Tabachnick and Fidell, 2014). Cronbach's alpha (α) and McDonald's omega (ω) were calculated for reliability.

CFA was used to confirm the factor structure of the scale. In CFA, the predefined model is tested with data (Kline, 2016). For this purpose, the goodness of fit indices are calculated and interpreted. There is no consensus on which of these indices should be used and interpreted. Generally, it is recommended that the χ^2/df value be less than 5, CFI, NFI, TLI values greater than .90, and SRMR and RMSEA values less than .08 (Byrne, 2016; Kline, 2016). The Average Variance Extracted (AVE) was calculated as an overall indicator of the convergence among a group of items representing a latent construct measured reflectively to assess convergent validity. An AVE greater than .50 indicates that the indicators effectively represent the construct (Fornell and Larcker, 1981). Composite Reliability (CR) was calculated as a measure of internal consistency reliability. CR values of .7 or higher denote good reliability (Hair et al., 2009).

Demographic characteristics of SETs were assessed for significant differences using the t-test, one-way ANOVA analysis, and post hoc comparisons. IBM SPSS Statistics 25 program was used for EFA and analyses related to demographic characteristics, and Mplus (8.3 version) was used for CFA.

Findings

Findings related to EFA

The skewness coefficients of the items varied between -1.402 and .602, and the kurtosis coefficients varied between -1.545 and .815. It was therefore assumed that the data follows a normal distribution. Eighteen participants with cases exceeding the $-3 < z < +3$ range were considered potential outliers and were not included in the analysis.



Before determining the scale's factor structure using EFA, the item-total score correlations for the scale items were calculated and presented in Table 3.

Table 3.

Item-total score correlation values of scale items

Item Number	Item-total Score Correlation Value	Item Number	Item-total Score Correlation Value	Item Number	Item-total Score Correlation Value
i1	.49	i7	.25	i13	.37
i2	.44	i8	.38	i14	.56
i3	.52	i9	.53	i15	.38
i4	.50	i10	.46	i16	.55
i5	.29	i11	.36	i17	.51
i6	.36	i12	.43	i18	.47

Table 3 shows that the item-total score correlations ranged from .25 to .56. Although Items 5 (.29) and 7 (.25) exhibited relatively low correlations, these values fall within the range where revision rather than immediate removal is considered (Ebel, 1965). Therefore, these items were retained and subjected to further examination in the EFA stage.

Item 1 and item 2 were removed from the scale because they had high loadings on both factors. So, subsequent analyses were continued with sixteen items. The KMO value was calculated as .87. The Bartlett Test of Sphericity value ($\chi^2 = 1122.012$, $df = 153$, $p = .000$) was significant. The results show that the scale is suitable for factorization.

While determining the number of factors with EFA, various techniques are used, such as calculating the eigenvalue, interpreting the eigenvalue graph, and evaluating the variance ratio explained by the factors. The number of factors can be determined as the eigenvalue calculated for the correlation matrix is greater than 1. However, since this technique is relative, it should be used with others when deciding the number of factors. Another option is to decide on the ideal number of factors according to the point where the eigenvalue graph flattens out. Another option is to determine the number of factors according to the variance ratio explained by each factor. Factors can be excluded from the model when the variance does not increase significantly (Finch et al., 2016). In this study, the techniques mentioned were evaluated together while determining the number of factors.

The eigenvalue graph of the scale is illustrated in Figure 1.

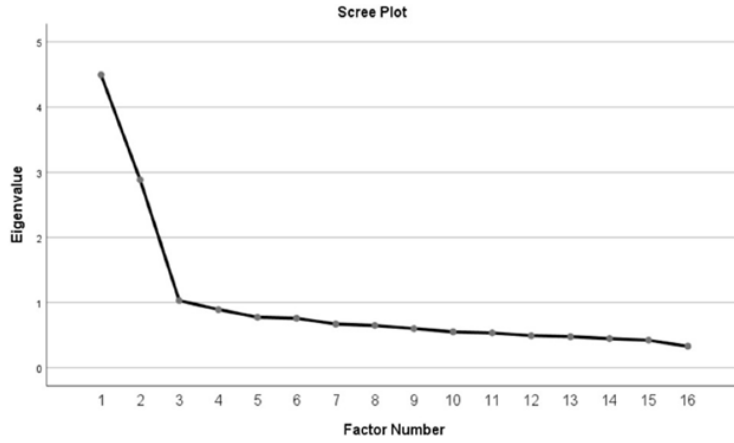


Figure 1. Eigenvalue graph of the scale

Figure 1 shows that the point where the eigenvalue graph flattens out reveals that the ideal factor number is two. In addition, the variance remains relatively high after the second factor. Based on this, it was decided that the factor number of the scale was two. The variance explained by the first of these factors was 28.09%, and the second was 18.02%, totaling 46.11%.

The item number, rotated factor load value, mean, standard deviation, α , and ω values of the items belonging to the scale are presented in Table 4.

Table 4.

Item number, rotated factor load value, mean, standard deviation, α , and ω values of scale items

Factor	Item Number	Rotated Factor Load Value	Mean	Standard Deviation	α	ω
First Factor	i10	.77	3.39	.94	.85	.86
	i3	.73	3.56	.78		
	i18	.72	3.31	.86		
	i14	.70	3.43	.79		
	i16	.65	3.52	.83		
	i9	.64	3.68	.77		
	i4	.51	3.81	.87		
Second Factor	i17	.48	4.04	.52	.79	.79
	i7	.61	4.58	.61		
	i13	.61	4.61	.62		
	i11	.61	4.47	.64		
	i12	.60	4.42	.66		
	i15	.58	4.51	.62		
	i6	.57	4.45	.61		
i5	.52	4.54	.60			
i8	.40	4.40	.73			
Total	-	-	64.81	6.11	.82	.82

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Table 4 shows that the rotated factor loading values of the items in the scale vary between .40 and .77. The items were distributed among the factors, as eight items in the first factor and eight in the second. Cronbach's α reliability coefficients were calculated as .85 for the first and .79 for the second factors and .82 for the whole scale. Also, McDonald's ω reliability coefficients were calculated as .86 for the first, .79 for the second factors, and .82 for the whole scale.

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Considering the meaning relationship between the items, the first factor was named "Collaboration and Rights Advocacy" and the second was named "Teaching and Classroom Management."

The correlation coefficients of the factors are presented in Table 5.

Table 5.
Pearson Correlation Coefficients

	1.	2.	3.
1. Collaboration and Rights Advocacy	-		
2. Teaching and Classroom Management	.21**	-	
3. Total	.85**	.69**	-

** $p < .01$

Table 5 shows a weak, positive, and significant relationship between the scale factors ($r = .21, p < .01$); a very strong, positive, and significant relationship between the first factor and the total ($r = .85, p < .01$) and a strong, positive, and significant relationship between the second factor and the total ($r = .69, p < .01$).

Findings related to CFA

To confirm the two-factor structure of the scale, a first-level multi-factor CFA model and a second-level CFA model were used. The skewness coefficients of the items varied between -1.362 and .472, and the kurtosis coefficients varied between -1.523 and .731. It was therefore assumed that the data follows a normal distribution. Eighteen participants with cases exceeding the $-3 < z < +3$ range were considered potential outliers and were not included in the analysis. The first-level multi-factor CFA model is illustrated in Figure 2.

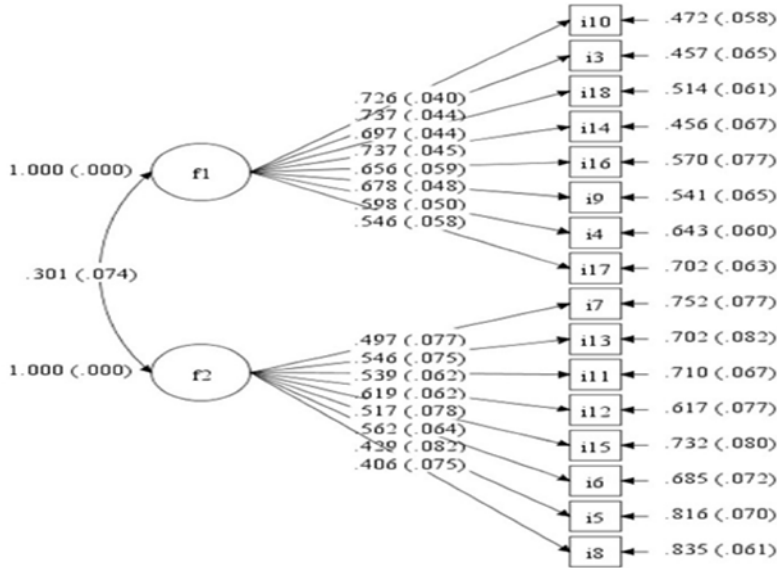


Figure 2. First-level multi-factor CFA model of the scale

As a result of the analysis, fit indices were calculated as $\chi^2 = 130.73$, $df = 103$, $\chi^2/df = 1.26$, $p < .001$, RMSEA = .036, SRMR = .059, CFI = .97, TLI = .96.

The second level CFA model is illustrated in Figure 3.

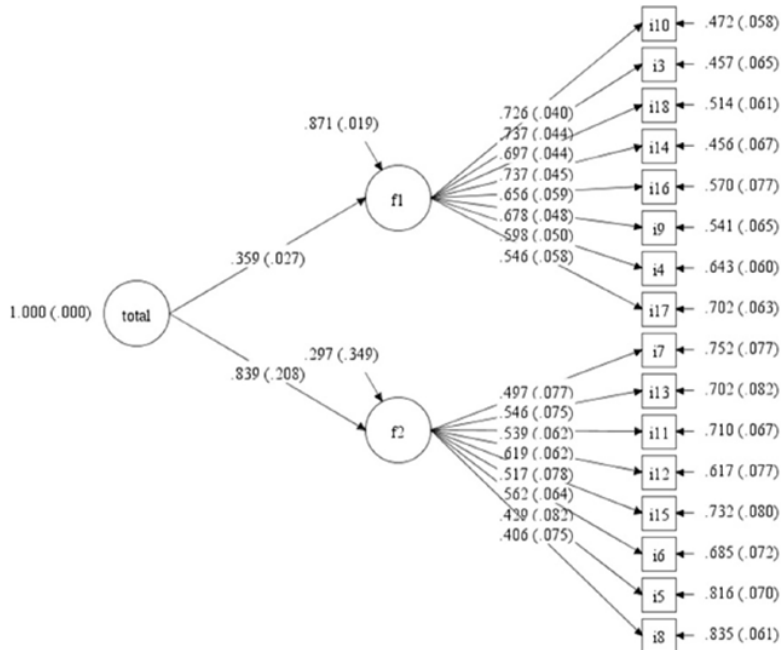


Figure 3. Second-level CFA model of the scale



As a result of the analysis, fit indices were calculated as $\chi^2 = 129.46$, $df = 102$, $\chi^2/df = 1.26$, $p < .001$, RMSEA = .036, SRMR = .059, CFI = .97, TLI = .96. The AVE value of the first factor was calculated as .46, and the CR value was calculated as .87. The AVE value of the second factor was calculated as .27, and the CR value was calculated as .74. The AVE values for the factors were below .50. If the AVE value is below 0.50, convergence validity can be accepted if composite reliability is satisfied (Fornell and Larcker, 1981). As a result, the convergent validity and construct reliability were ensured.

Findings related to demographic characteristics

The study examined whether the efficacy levels of SETs differ statistically by their gender, educational level, the disability group they teach, the educational level they teach, and their professional seniority. Table 6 presents the t-test results for the efficacy of SETs by gender, educational level and disability group they teach.

Table 6.

T-test results of the SETs by the gender, educational level and disability group they teach

Variable		N	Mean	SD	df	t	p
Gender	Female	97	64.95	6.77	210	-.184	.85
	Male	115	65.10	5.59			
Educational Level	Bachelor's degree	191	64.27	5.76	210	-5.854	.00
	Master's degree	21	71.95	5.16			
Disability Group	Autism (ASD)	93	60.02	3.23	210	-15.177	.00
	Intellectual disability	119	68.95	4.90			

Table 6 shows no statistically significant difference in efficacy scores between the groups by the gender of SETs ($t_{(210)} = -.184$, $p > .05$). A statistically significant difference in efficiency scores between the groups by the educational level of SETs ($t_{(210)} = -5.854$, $p < .05$). The scores show that SETs with a master's degree are more efficacy. A statistically significant difference in efficacy scores between the groups by the disability group of SETs' teach ($t_{(210)} = -15.177$, $p < .05$). The scores show that SETs teaching students with intellectual disabilities are more efficacy.

A one-way ANOVA test assessed the efficacy of SETs by the educational level they teach. Levene's statistic indicated significance, suggesting unequal variances ($p < .05$), and the group sizes were also unequal. Therefore, Welch's F is recommended to address issues caused by violations of the homogeneity of variance assumption (Field, 2013). As a result, Welch's F was employed to determine whether there was a significant difference between the groups. Accordingly, there was no significant difference between the groups, $F(3, 52.400) = 1.089$, $p > .05$.

There was a significant difference between groups for the efficacy of SETs by their professional seniority, $F(4, 90.603) = 4.047$, $p < .05$. Post hoc comparisons were conducted using the

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Games-Howell test to compare the groups. Table 7 presents the Games-Howell test results for the efficacy of SETs by professional seniority.

Table 7.
Games-Howell test results by the seniority of SETs

(I) Seniority	(J) Seniority	Mean Difference (I-J)	Std. Error	p	95% Confidence Interval	
					Lower	Upper
1-5 years (1)	6-10 years (2)	-.887	1.460	.97	-5.052	3.276
	11-15 years (3)	-4.647*	1.621	.04	-9.219	-.076
	16-20 years (4)	-1.628	1.578	.83	-6.089	2.832
	21 years and more (5)	.231	1.576	.99	-4.236	4.699
6-10 years (2)	1-5 years (1)	.887	1.460	.97	-3.276	5.052
	11-15 years (3)	-3.760*	1.167	.01	-7.011	-.508
	16-20 years (4)	-.740	1.106	.96	-3.821	2.340
	21 years and more (5)	1.119	1.104	.84	-1.984	4.222
11-15 years (3)	1-5 years (1)	4.647*	1.621	.04	.076	9.219
	6-10 years (2)	3.760*	1.167	.01	.508	7.011
	16-20 years (4)	3.019	1.311	.15	-.629	6.668
	21 years and more (5)	4.879*	1.310	.00	1.218	8.540
16-20 years (4)	1-5 years (1)	1.628	1.578	.83	-2.832	6.089
	6-10 years (2)	.740	1.106	.96	-2.340	3.821
	11-15 years (3)	-3.019	1.311	.15	-6.668	.629
	21 years and more (5)	1.859	1.256	.57	-1.654	5.374
21 years and more (5)	1-5 years (1)	-.231	1.576	.99	-4.699	4.236
	6-10 years (2)	-1.119	1.104	.84	-4.222	1.984
	11-15 years (3)	-4.879*	1.310	.00	-8.540	-1.218
	16-20 years (4)	-1.859	1.256	.57	-5.374	1.654

* $p < .05$

Table 7 shows a statistically significant difference between the groups ($p < .05$). The difference between the first and third groups, the second and third groups, the third and fourth groups, and the third and fifth groups were statistically significant. The scores show that the efficacy of the third group is higher than the others.

Discussion and Conclusion

The study's EFA results showed that the scale had a two-factor structure. Considering the meaning relationship between the items, the first factor was called "Collaboration and Rights Advocacy." This factor consists of eight items with a factor load value between .48 and .77. The



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factor explains 28.09% of the total variance. The Cronbach's alpha reliability coefficient of the factor was calculated as .85, and the McDonald's omega reliability coefficient was calculated as .86. The lowest score that can be obtained from the factor is 8, and the highest score is 40. The second factor was called "Teaching and Classroom Management." This factor consists of eight items with a factor load value between .40 and .61. The factor explains 18.02% of the total variance. The Cronbach's alpha reliability coefficient of the factor was calculated as .79, and the McDonald's omega reliability coefficient was calculated as .79. The lowest score that can be obtained from the factor is 8, and the highest score is 40. The Cronbach's alpha and McDonald's omega reliability coefficients for the whole scale were calculated as .82. Thus, while the factors can be interpreted independently, the scale can also be interpreted as a whole. An increase in the score obtained from the factors or whole indicates increased related efficacy. CFA results showed that the goodness of fit indices calculated in the study were acceptable, and the two-factor structure of the scale was confirmed.

Research on teacher efficacy is increasing. However, more research is needed in different contexts to expand the generalizability and cultural competence of the concept (Ho and Hau, 2004). While research on the measurement of teacher efficacies initially included broader statements of efficacy (e.g., Gibson and Dembo, 1984), subsequent research has narrowed the focus to examine different aspects of efficacy (e.g., Tschannen-Moran et al., 1998). Recent studies have examined teachers' domain-specific efficacies such as science, mathematics, and reading (Klassen et al., 2011). Fewer studies have been conducted on the efficacies of SETs (e.g., Coladarci and Breton, 1997). Therefore, more research is needed, and the scale developed in this study will contribute to the literature in this context.

Through the developed scale, the efficacies of SETs in teaching students with developmental disabilities were examined by various demographic characteristics. As a result, there was no statistically significant difference in SETs' gender and the educational level of SETs' teaching. There was a statistically significant difference in educational level, the disability group SETs' teaching, and seniority. According to educational level, SETs with a master's degree are more efficacy. There are studies in the literature that support this finding (e.g., Baş, 2022; Moran, 2007; Tomlinson, 2005). The high level of efficacy of teachers with a master's degree shows that increasing their level of education has a positive effect on teachers' efficacy. Moran (2007) stated that teachers with a master's degree are more qualified to teach and assess their students. So, SETs should be encouraged to get a master's degree, improve their opportunities for this aim, and increase their motivation for career development.

The study's results showed that SETs teaching students with intellectual disabilities are more efficacy. This result parallels the relevant literature (e.g., Boujut et al., 2017; Zhang et al., 2017). The higher efficacy of teachers teaching students with intellectual disabilities than teaching students with ASD suggests that teachers are negatively affected by the difficulties inherent in ASD. Catalano et al. (2022) stated that the efficacy of teachers teaching children with ASD is poor. However, they emphasized that teachers who receive pre-service and in-service training can improve their effectiveness in teaching students with ASD. Catalano et al. (2020) found that the teachers who need to enhance their teaching effectiveness are those teaching children with ASD. However, they

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stated that teacher efficacy increased when they received training to improve their efficacy. As a result, it is essential to provide pre-service and in-service training to teachers who work with children with ASD, and it would be more appropriate for these teachers to teach students with different disabilities after teaching children with ASD for a while.

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The study's results showed that SETs with 11-15 years of seniority are more efficacy than both teachers with ten years or less and 16 years or more of seniority. Similarly, the literature has revealed that teachers with less seniority in the field of special education may have poor efficacy towards children with developmental disabilities, and teachers who have taught children with developmental disabilities for a long time may also have lower efficacy (e.g., Catalano et al., 2022; Wasserman, 2010). Vosough Matin (2023) reported that teachers with low professional seniority had lower levels of efficacy towards students with developmental disabilities compared to their colleagues with medium and high professional seniority. Kulberg (2019) stated that teachers with high professional seniority who teach children with developmental disabilities have poorer efficacy than teachers with lower professional seniority. So, it can be said that the participation of teachers in training programs with low professional seniority who teach children with developmental disabilities may improve their efficacy. However, teachers with high professional seniority may feel burnout, and support to reduce this feeling may increase teachers' efficacy.

Realizing valid and reliable measurements of special education teacher efficacy will enable the theoretical and practical development of the concept. Research findings show that the scale is a valid and reliable tool. Using the scale in research will contribute to the emergence of its validity, reliability, and measurement quality.

Implications for practice

Individuals with developmental disabilities are increasing in society. Education plays a crucial role in integrating them into society. It is a universal approach that these individuals are supported in the least restrictive environments and receive education with their peers. In this context, teachers undertake an essential task. Teachers must find the best way to teach to provide each student with the best learning experience. In order to respond to the constantly changing needs of students depending on their difficulties, teachers need to update their efficacies according to the necessities of the time. In this context, the scale developed in this study will allow teachers to determine their efficacies. It is also a tool that can be applied quickly and used by researchers conducting scientific studies in this field.

Research ethics

Ethical permission of the research was approved by Bartın University Social and Human Sciences Ethics Committee. Ethics committee document number is 2023-SBB-0640. This study was performed in line with the principles of the Committee on Publication Ethics (COPE). All the participants were informed in the data collection process that they could voluntarily answer the data collecting instruments and withdraw from the study without any reason. A part of this study was

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delivered as an oral presentation at the XI International Eurasian Educational Research Congress, Turkey.

Author contributions

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All authors contributed to initial study conception and study design, wrote the literature review of the study. Data analysis was performed by all authors. The first draft of the manuscript was written by all authors. All authors contributed to conclusion and discussion. All authors reviewed and contributed to all versions of the manuscript.

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Conflict of interest

The author reported no potential conflict of interest.

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Appendix

Efficacy Scale for Teaching Students with Developmental Disabilities

Sayfa | 873

Item Number (Madde Numarası)	Item Expressions (Madde İfadesi)	Strongly Agree (Tamamen Katılıyorum)	Agree (Katılıyorum)	Undecided (Kararsızım)	Disagree (Katılmıyorum)	Strongly Disagree (Hiç Katılmıyorum)
1	*I can overcome the behavioral problems of students with developmental disabilities. (Gelişimsel yetersizliği olan öğrencilerin davranış sorunlarının üstesinden gelebilirim)	⑤	④	③	②	①
2	*I can take precautionary measures against hazards/accidents that may occur for students with developmental disabilities. (Gelişimsel yetersizliği olan öğrencilere yönelik oluşabilecek tehlike/kazalara karşı önleyici tedbirler alabilirim)	⑤	④	③	②	①
3	I can collaborate with other teachers, paraprofessionals, and administrators to improve the quality of education received by students with developmental disabilities. (Gelişimsel yetersizliği olan öğrencilerin aldıkları eğitimin kalitesini artırmak için diğer öğretmenler, yardımcı personeller ve yöneticilerle işbirliği yapabiliyorum)	⑤	④	③	②	①
4	I can conduct activities to promote the social acceptance of students with developmental disabilities. (Gelişimsel yetersizliği olan öğrencilerin sosyal kabulünü teşvik etmeye yönelik faaliyetler yürütebilirim)	⑤	④	③	②	①
5	I can communicate by considering the individual differences of students with developmental disabilities. (Gelişimsel yetersizliği olan öğrencilerin bireysel farklılıklarını dikkate alarak iletişim kurabilirim)	⑤	④	③	②	①
6	I can encourage/ensure the active participation of students with developmental disabilities in activities. (Gelişimsel yetersizliği olan öğrencilerin aktivitelere aktif katılımını teşvik edebilir / sağlayabilirim)	⑤	④	③	②	①
7	I can prepare/apply IEP (individualized education program) and ITP (individualized teaching plan) for students with developmental disabilities to acquire academic and non-academic skills. Gelişimsel engelli öğrencilere akademik ve akademik olmayan becerileri kazandırmak amacıyla bireyselleştirilmiş eğitim programı (BEP) ve	⑤	④	③	②	①



	bireyselleştirilmiş öğretim planı (BÖP) hazırlayabilir/uygulayabilirim.					
8	I can evaluate the development and progress of students with developmental disabilities. (Gelişimsel yetersizliği olan öğrencilerin gelişimini ve ilerlemesini değerlendirebilirim)	⑤	④	③	②	①
9	I can inform the families of students with developmental disabilities to protect their children from the risks of neglect and abuse. (Gelişimsel yetersizliği olan öğrencilerin ailelerini, çocuklarını ihmal ve istismar riskinden korumak için bilgilendirebilirim)	⑤	④	③	②	①
10	I can prepare a family education program for parents of students with developmental disabilities. (Gelişimsel yetersizliği olan öğrencilerin ebeveynlerine yönelik aile eğitim programı hazırlayabilirim)	⑤	④	③	②	①
11	I can develop materials aligned with the learning needs of students with developmental disabilities. (Gelişimsel yetersizliği olan öğrencilerin öğrenme ihtiyaçlarına uygun materyaller geliştirebilirim)	⑤	④	③	②	①
12	I can use various strategies so that students with developmental disabilities can acquire the learning outcomes in the curriculum. (Gelişimsel yetersizliği olan öğrencilerin müfredatta yer alan öğrenme çıktılarını edinebilmeleri için çeşitli stratejiler kullanabilirim)	⑤	④	③	②	①
13	I can organize activities that students with developmental disabilities will enjoy and have them play games. (Gelişimsel yetersizliği olan öğrencilerin hoşlanacağı oyunlar oynatabilir ve etkinlikler düzenleyebilirim)	⑤	④	③	②	①
14	I can inform my stakeholders about institutions, organizations, foundations, and associations that provide services and support for students with developmental disabilities and their families. (Gelişimsel yetersizliği olan öğrencilere ve ailelerine yönelik hizmet veren ve destek sağlayan kurum, kuruluş, vakıf ve dernekler hakkında paydaşlarımı bilgilendirebilirim)	⑤	④	③	②	①
15	I can support students with developmental disabilities in acquiring their daily life and self-care skills. (Gelişimsel yetersizliği olan öğrencilerin günlük yaşam ve özbakım becerilerini gerçekleştirmelerine destek olabilirim)	⑤	④	③	②	①
16	I can use different approaches such as phone calls, home visits, communication books, and parent meetings to communicate with the families of students with developmental disabilities.	⑤	④	③	②	①



	(Gelişimsel yetersizliği olan öğrencilerin aileleri ile iletişim kurmak amacıyla telefonla görüşme, ev ziyareti, iletişim defteri, veli toplantısı gibi farklı uygulamalara başvurabilirim.)					
17	I can conduct activities to prevent peer bullying that may arise for students with developmental disabilities. (Gelişimsel yetersizliği olan öğrencilere yönelik ortaya çıkabilecek akran zorbalığını önlemeye yönelik çalışmalar yapabilirim)	⑤	④	③	②	①
18	I can inform my stakeholders about laws and policies in special education. (Özel eğitim alanındaki yasa ve politikalar hakkında paydaşlarımı bilgilendirebilirim)	⑤	④	③	②	①

*items removed from the scale (ölçekten çıkarılan maddeler).