



INFANT TODDLER EDUCATION BELIEF SCALE FOR PRE-SERVICE EARLY CHILDHOOD EDUCATORS (ITEBS4PECES): VALIDITY AND RELIABILITY ANALYSIS

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Abstract:

The aim of the current study is to develop a scale that measure pre-service early childhood educators' beliefs about infant and toddler education(I/TE). 384 candidate early childhood educators from different public universities were constituted the sample of the study. Reliability and validity analysis were run for the 60-items "*Infant Toddler Education Belief Scale for pre-service early childhood educators (ITEBS4PECES)*". Explanatory and Confirmatory factor analysis of *ITEBS4PECES* indicated that *ITEBS4PECES* is a 5-Likert scale with 35 items and four factors. Factor loading values ranged between .439 and .762. The total variance explained by the scale is 39.02%. The reliability coefficients of Cronbach alpha ranged from 0.81 to 0.85 for factors. As one of the first attempts to measure beliefs about infant-toddler education of pre-service teachers, this valid and reliable scale is believed to lead more research on infant toddler education and by this way contribute a lot to early childhood education field.

Keywords: infant toddler education, pre-service teacher beliefs, scale development, pre-service early childhood educators

1. Introduction

The infancy and toddlerhood period are one of the cornerstones in the life of human beings. This period, particularly the period of toddlerhood, is characterized by children's tendency to be independent and their need to be connected with others they can trust. Only respectful and responsible adults who are willing to meet the needs of this specific period are able to contribute to the healthy development of the child. Although the research on infancy and toddlerhood focuses mainly on the mother or primary caregiver,

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increasing attention is being given to educators who provide education and care for infants and toddlers. One of the main reasons for this is the increasing demand for center-based infant/toddler education all around the world. As center-based infant/toddler education is under consideration, the majority of research has presented information on the quality of provided education, the quality of the learning environment provided to infants and toddlers, and the quality of the relationship between the educators and infants/toddlers.

There are very few studies on the quality of early childhood teacher education programs and preservice early childhood educators' (PECEs) beliefs about infant/toddler education (ITE). One of the main reasons for the limited research on these issues might be the lack of reliable and valid instruments to understand what kind of beliefs PECEs hold about ITE. A few studies indicated that infant/toddler education is not preferable among in-service and preservice early childhood educators (Ünlü-Çetin, 2019). Not having a reliable and valid scale that might lead to more research might be one of the main reasons for this limited number of studies in the field. This lack also leads to limited research to understand how early childhood teacher education programs influence their preservice teachers' beliefs about ITE. By focusing on this need, this study tries to fill the gap in the field by developing a valid and reliable scale that is specifically developed to measure PECEs' beliefs about infant/toddler education.

Based on qualitative data gathered from 120 fourth-grade Turkish preservice early childhood educators, the Infant Toddler Education Belief Scale for pre-service early childhood educators (ITEBS4PECES) was developed in the current study. The validity and reliability analyses relating to ITEBS4PECES are presented in the following parts along with a theoretical framework.

2. Theoretical Framework

2.1 Infancy and Toddlerhood: "The Prime Times"

The infancy and toddlerhood period has crucial importance in a human being's life. Development in all domains takes place at an incredible speed in this period and includes a lot of critical periods (Grantham-McGregor et al., 2007). For instance, very rapid brain development is observed in infancy and toddlerhood and the main issue that supports brain development is daily experiences (Brotherson, 2005). After completing a 40-week prenatal period and birth, a human being needs others to meet the basic needs for survival. The first years of life, particularly the toddlerhood period, are characterized by the need for "*autonomy with connectedness*" (Sroufe 1996, 206). Trying to be autonomous while still needing to be connected is one of the specific characteristics of the first three years of life and this goes to show the importance of other individuals in the first years of life (Thomason and La Paro, 2009). Considering these two arguments -- rapid development occurs in the infancy/toddlerhood period and human beings need others to survive and develop properly in this period -- it becomes very clear that quality relations,

quality education, and care opportunities provided in the first three years play a crucial role in healthy development.

2.2 Infant/Toddler Education: Not a Preference; Rather, a Need

Although the majority of the previous studies worked with parents to understand others' influence on the development, "*child care providers are becoming increasingly important participants in the promotion of healthy development*" (Thomason and La Paro, 2009). One of the main reasons for this is the growing need for center-based infant/toddler education (I/TE) all around the world. For instance, there are 12 million infants and toddlers in the United States and more than half spend some part or all day under non-parental care. Among the options for non-parental care, center-based care is one of the most popular (Zero to Three, 2017). A similar situation is observed in European countries. According to the Eurydice Report (2019), "*on average, in the EU-28, every third child under the age of three attends some center-based ECEC provision*" and the average schooling ratio is 34% for children under three years old. The Eurydice Report (2019) explained the overall situation for schooling ratios for children under the age of three, citing Denmark at 72%, the BENELUX countries at 60% to 65%, and Germany at 30%. Eastern European countries such as Croatia, Serbia, and Poland were reported as being between 10% and 20%.

However, in many countries like Germany, Spain, Italy, Romania, Slovakia, Montenegro, North Macedonia, and Turkey, the demand for the infant/toddler education is higher than what is provided. For instance, in Germany, 45% of families with children under the age of three demand ECEC services; however, only 33% of them had a chance to engage in I/TE (Alt et al. 2019 cited in Eurydice Report, 2019). These statistics indicate that I/TE is rapidly becoming a need instead of a preference.

2.3 Infant/Toddler Education in Turkey

In Turkey, there is a strong belief that during infancy and toddlerhood, children should be with their mothers. According to the data gathered by Turkish Population and Health Research (Hacettepe Üniversitesi Nüfus Etütleri Enstitüsü, 2015), child-care is perceived as a women's issue and 42,5 % of women who participated in the Turkish Statistical Institute's [TUIK] study reported that "child-care" is the main reason for their being unemployed and only 23% of participants reported that they are working. Based on the Turkish Statistical Institute (2016), 34.5% of working mothers' children are cared for by their grandmothers. When the grandparents are not available, a paid caregiver is preferred by parents (Yolcu, 2019). According to the TUIK's results, 13% of mothers use center-based early childhood education and care services and only 1% of them have children between the ages of zero and two (cited in Eğitim Reformu Girişimi [ERG] and Anne Çocuk Eğitim Vakfı [AÇEV] 2017).

In the light of these statistics and the fact that in Turkey there is no compulsory parent support education provided before becoming a parent, the opportunity for children to be educated and cared for by adults who know about child development and who are able to provide opportunities for the entire development in their first three years

is not so common, whereas education and care in the first three years of life is very important and quality care and education have long-lasting effects on the healthy development of children.

As revealed by parents, one of the main reasons for not preferring center-based I/TE is the poor quality services provided to I/T in Turkey (World Bank 2015). In Turkey, I/TE programs (Crèches and daycare centers) are regulated by the Ministry of Family and Social Policies. Unfortunately, there are almost no available data or reports about their quality. Those centers that are allowed to offer education and care services to infants and toddlers vary in terms of their physical conditions (from an apartment to an independent building), while in terms of price, most of the time, high fees are another reason that leads parents not to prefer center-based I/T education. Also, some bad applications (ignorance of children, illegal registration of children, or even corporal punishment for children) in crèches and daycare centers that are presented in the media have resulted in mistrust among parents. Another quality issue concerns educators. Although university graduates are the preferred group, because of low paid and low social status and no chance to be registered by the Ministry of Education, they do not prefer to work in those centers. Therefore, educators working with children in crèches and daycare centers are mainly graduates of vocational high-schools or two-year associate degree programs. However, as in all educational levels, in infant/toddler education too, teachers are one of the main contributors to quality. Educators -- or educarers (Caldwell 2002) -- should have practical and theoretical qualifications for studying with infants and toddlers.

2.4 Infants/toddlers Need Qualified Teachers

Therefore, the quality of education provided to I/T in ECEC services has become a hot topic. Previous studies consistently indicated that quality care and education services provided to individuals in the first three years of life have a long-term positive influence on individuals' later social, language, and cognitive development and academic success (Li, Farkas, Duncan, Burchinal ve Vandell, 2012; Vandell, Belsky, Burchinal, Steinberg, Vandergrift, 2010; Zaslow, Tout, Halle, Whittaker, Lavallo et al., 2010). Indicators used to define quality in early childhood education form three separate categories: (1) structural variables such as features of classrooms and programs; (2) process variables such as teacher-child interaction, implementation of the curriculum, etc. (Thomason and La Paro, 2009); and (3) global quality including both structural and process variables (Hestenes, Cassidy, Hegde, and Lower, 2007). Teacher-related variables are the indicators of how structural variables influence quality in early childhood education (Thomason and La Paro, 2009).

Infant/toddler-qualified educators play a crucial role in the healthy development of infants' and toddlers' cognitive, social-emotional, physical, language, and self-care domains (Cheshire, 2007). For instance, a positive and close relationship established with an educator supports infant/toddlers' self-regulation abilities and helps them to understand others' emotional states (Butterfield, Martin, and Prairie, 2004). The study by Girolametto and Weitzman (2002, 268) indicated that in a child-care setting, toddlers'

language development is supported mostly by “*teachers’ interaction-promoting strategies*”. Then, the question becomes who the qualified teacher in the early childhood education field is. According to Cochran-Smith (2002, 379), teacher quality is determined by the attributes of “*verbal ability*” and “*content knowledge*”. According to the No Child Left Behind Act, a Bachelor’s degree is one of the most important criteria that a qualified teacher should meet (New No Child Left Behind Flexibility, 2004).

It is known that a teacher's educational background is one of the most important indicators of teacher quality. For instance, highly educated early childhood teachers were found to be more likely to engage in sensitive, responsive, and engaging interactions (Norris, 2010; Whitebook, 2003). Similarly, better qualified early childhood educators were found to engage in more play and social interaction (McMullen and Alat, 2002). In the study by Epinosa (2002), it was found that highly qualified early childhood educators are able to organize learning environments in a way that provides more individualized and responsive learning opportunities. Teacher education was also found to be moderately related to positive climate and teacher sensitivity and used behavior guidance strategies in toddler education (Thomason and La Paro, 2009). Since, successful educator-child relationships established during I/T period become the base for later teacher-child relationships (Leifield and Sanders, 2007, as quoted in Cheshire, 2007), having highly educated teachers in this period becomes important for the next generation to establish a quality relationship with teachers in the long term. Although having a qualified teacher is very important for children particularly in the early ages, previous studies indicated that qualified and highly educated early childhood educators prefer to work with older children while staff with no qualifications or early childhood educators who have certificates prefer to work with younger children (Norris, 2010; Rouse, 2008). The question raised then is when this preference is shaped and what kind of beliefs are influential in shaping this preference. To understand the beginning and sources of those tendencies, it is important to understand beliefs relating to teaching young children during preschool years.

2.5 Preservice Teachers: Next Generation Teachers of Infant/toddlers

Although there were few attempts to understand preservice early childhood educators’ (PECEs) preferences for working with young children, studies indicated similar tendencies. Working with older children instead of younger children is more preferable among preservice early childhood educators (Nolan and Rouse, 2013; Rouse, Morrissey, and Rahimi, 2012; Ünlü-Çetin, 2019). Rouse, Moussey, and Rahimi (2012) worked with preservice early childhood educators on their infant/toddler placement and they found that preservice early childhood educators believe they already have all the required skills to work with infant/toddler groups; however, none of them wanted to work with infants and toddlers after their graduation.

Similarly, Garvis and Pendergast (2015,128) worked with preservice early childhood educators and they revealed that “*preservice teachers were able to create reflective*

questions about working with infants and toddlers” and “they were able to transfer learning from working with kindergarten children” to infant/toddlers .

In Turkey, Ünlü-Çetin (2019) investigated preservice early childhood educators' perceptions of infant-toddler education. She found that the majority of participants believe that the infant and toddlerhood period is important, yet more than half of the participants (67.5%) believed that infants and toddlers should not engage in center-based care. Again, in the same study, it was found that 59.1% of participants do not prefer to work with infants and toddlers and 90% of the participants believe that working with infant and toddler groups is disadvantageous when compared with working with older children.

All of these findings indicated that something is missing or wrong with the early childhood teacher education programs. Although early childhood education services are for children between the ages of zero and eight, teacher education programs are failing to lead their students to become motivated, willing, and self-efficacious to work with children under three. Studies conducted by Garvis, Lemon, Pendergast, and Yim (2013) and Ünlü-Çetin (2019) pointed out this situation.

3. Early Childhood Teacher Education Program

If preservice early childhood educators are expected to work with infants and toddlers when they enter their profession to increase the quality of I/TE, *“it is important that preservice teachers are provided with adequate knowledge and experience to understand the importance of infants and toddlers”* (Garvis, Lemon, Pendergast, and Yim, 2013, 33). However, in their study, Garvis et al. (2013) found that the majority of early childhood teacher education programs in Australia prepare preservice early childhood educators to work with children older than three years old. Among 55 programs, only 15 programs were found to provide specific courses for preservice early childhood educators specifically for children from birth to three years of age (Garvis et al., 2013, 31).

The same is true for Turkey. In 2018, the early childhood teacher education program was renewed, and a compulsory course called “Education in Infancy and Toddlerhood” was added to the program. However, by 2018 there was still no specific course about infancy and toddlerhood; the majority of the courses mainly focus on kindergarten education. In her study, Ünlü-Çetin (2019) indicated that the majority of preservice early childhood educators (55%) perceive themselves as unqualified to work with infants and toddlers while some of them (19%) perceive themselves as theoretically qualified but practically unqualified. Only a small group (29%) perceived themselves as qualified to work with infants and toddlers. Those who believe they are unqualified to work with infants and toddlers revealed the teacher education program courses' content as the main reason for this situation and they reported that they were prepared to work with older children between the ages of 36-72 during their teacher education program. Although those few studies conducted by Garvis et al. (2013) and Ünlü-Çetin (2019) pointed out some very important points, there is a need for more research on preservice

teachers' beliefs, preferences, motivation, and self-efficacy to work with infants and toddlers.

3.1 Preservice Teachers' Beliefs

As strongly highlighted by Pajares (1992, 326), "*individuals' beliefs strongly influence their perception and affect their behavior*". In the literature, there are many studies indicating that in-service teachers' preferences, applications, and teaching dispositions are influenced by their beliefs relating to teaching. These beliefs are shaped even before they enter the teacher education programs (Pajares, 1992) and yet, teacher education programs play a role in reshaping preservice teachers' beliefs (Pajares, 1992). According to Chapman (2002, 180), "*Beliefs form the bedrock of teachers' intentions, perceptions, and interpretations of a given classroom situation and the range of actions the teacher considers in responding to it*". Liljedahl, Rösken, and Rolka (2019) mentioned that most of the time these beliefs are contradicted by accepted good practices and, therefore, Green (1971) highlighted the role of teacher education programs in reshaping those beliefs and misconceptions that could result in ineffective teaching.

Similarly, beliefs about the importance of the infancy and toddlerhood period, beliefs about the necessity of center-based I/TE and motivation to work with infants and toddlers, and self-efficacy beliefs of working with I/Ts are shaped during early childhood teacher education programs and understanding PECES' infant/toddler education-related beliefs is important for several reasons.

First, understanding about PECES beliefs regarding I/TE is important for teacher educators to reshape their negative beliefs and intervene at the level of motivation of preservice early childhood educators and encourage them to work with infants and toddlers. Teachers begin their profession with implicit and explicit beliefs. Implicit beliefs are shaped by personal experiences while explicit beliefs are shaped by experiences and knowledge gained through the books read during the teacher education program (Charlesworth et al., 1993). Implicit beliefs are permanent, and they are resistant to change (Wilcox-Herzog, 1999), yet the opportunities for socialization provided during education present the chance to change those resistant (Smith, 1997). There are a lot of studies indicating that beliefs held by preservice teachers influence their future practice (Berthelsen et al., 2002; Berthelsen and Brownlee, 2007). Therefore, studying preservice early childhood educators' beliefs about infant/toddler education is important to understand their predispositions to study with infants and toddlers. Understanding predispositions might lead teacher education programs to provide specific professional developmental opportunities for preservice teachers who have positive perceptions of infants and toddlers and who have high motivation to work with them from the beginning of early childhood teacher education program. Although Pajares (1992) highlighted the change-resistant nature of beliefs, understanding preservice teachers' beliefs about infant/toddler education could help teacher education programs to plan a program that might have the power to alter those negative perspectives on infant/toddler education that might lead university graduates not to study with infant and toddlers.

Second, understanding the infant/toddler education-related beliefs of preservice teachers is also important for changing the visual images of teachers among the next generation. As cited by Pajares (1992, 324), “*Goodman (1988) reported that preservice teachers express their educational philosophy in verbal terms but the perspectives on which these philosophies are based are rooted in visual guiding images from earlier experiences as pupils*”. According to Pajares (1992), beliefs about teachers begin shaped very early in life from the time children first meet a teacher; those beliefs are strengthened during the school years and they are resistant to change, remaining intact even in adulthood. Similarly, Schommer-Aikins (2004, 22) highlighted that beliefs are “*like possessions. They are like old clothes; once acquired and worn for a while, they become comfortable. It does not make any difference if the clothes are out of style or ragged. Letting go is painful and new clothes require adjustment*”. Therefore, shaping young children’s beliefs about teaching and teachers from the beginning of life through qualified teachers will have a long-lasting effect and might help the social transformation of the teaching profession. That is, when children’s early experiences with teachers are shaped by qualified teachers who are responsive, caring, and respectful toward infants and toddlers, this might influence beliefs about teachers and perhaps influence the practices of future teachers since some of those children are going to choose teaching as a profession.

4. Significance of the Study

In spite of its importance, very few studies have investigated preservice early childhood educators’ beliefs, perceptions, or preferences relating to working with infant/toddler groups (exp, Garvis and Pedergast, 2015; Rahimi, 2012; Ünlü Çetin, 2019). Although these studies contributed a lot to the field, all of them used qualitative data gathering strategies so that their findings are limited to the preservice early childhood educators who participated in the studies and limited to reflecting the general position of preservice early childhood educators. One of the main reasons for this might be the lack of a valid and reliable scale that is able to measure preservice early childhood educators’ beliefs about infant/toddler education.

In the literature, there are a great deal of teacher belief scales at both the international and national level; the Teacher Questionnaire (Charlesworth et al., 1993), the Teacher Belief Scale (Burts et al., 2009), Teacher Beliefs Scale (Charlesworth, Harts, Burths, Harnandez, 1991), the Teacher Beliefs Q-Sort (Rimm-Kaufmann et al., 2006), Attitude Scale for the Teaching Profession (Aşkar and Erden, 1987), Educational Belief Scale (Yılmaz, Altinkurt and Çokluk, 2011) and Attitude Scale of the Teaching Profession (Üstüner, 2006).

Some scales were specifically developed for early childhood educators: the Pre-School Teachers’ Self-Efficacy Beliefs Scale (Tepe and Demir, 2012), Early Childhood Teachers Children Participation Rights Belief Scale (Coşkun, 2015), Preservice Teachers’ Attitudes toward Inclusion Questionnaire (PTAI, El-Ashry, 2009), the Teacher Beliefs and Practices Survey: 3- to 5- Year Olds (Burts et al., 2001, as quoted in Anderson, 2015).

There are also two belief scales specifically prepared for infant/toddler educators: The Teacher Beliefs and Practices Survey: Infants and toddlers (Burts and Sciaraffa, 2001) and the Beliefs about Infant/Toddler Education and Care (BAITEC, Anderson 2015). The first scale was developed 18 years ago and only one pilot study was conducted. The aim of the second scale, BAITEC by Anderson (2015), was to understand the classroom experiences and practices of in-service early childhood educators' who work with infants and toddlers. These two scales were specifically developed for infant/toddler educators - - Teacher Beliefs and Practices Survey: Infant and Toddlers -- and BAITEC cannot be used for preservice early childhood educators since answering the questions requires classroom experience with infants and toddlers. That is, there is no available scale to measure preservice early childhood educators' beliefs about infant/toddler education. Therefore, the aim of this study is to develop a scale to measure preservice early childhood educators' beliefs about the importance of infancy/toddlerhood, about the necessity of center-based infant/toddler education, their motivation to work with infants and toddlers, and their self-efficacy beliefs for studying infants and toddlers. It is believed that the scale developed in the current study will fill an important gap in the literature and pave the way for research into preservice early childhood educators' beliefs about infant/toddler education.

5. Material and Methods

5.1 Study Group

In the study there were two phases: 120 fourth grade preservice early childhood educators participated in the first phase of the study. All participants were fourth-grade students in the same state university in different educational years. The majority of the participants were female (n=110) and their average age was 24.52. In this phase, the participants were asked five open-ended questions about infant/toddler education and their written responses to those questions were gathered. The data for this phase were used for the preparing item pool in the current study. The belief statements most-repeated by the participants were included in the item pool. In the end, 60 items were developed from this qualitative data.

In the second phase, the study group consisted of 384 preservice early childhood educators from different state universities. This time, the participants were PECEs from the first, second, third, and fourth grades. In this context, 384 teacher candidates attending the early childhood teacher education program at Kırıkkale University (n = 150), Gazi University (n = 50), Bolu Abant İzzet Baysal University (n = 100), and Zonguldak Bülent Ecevit University (n = 80) formed the sample of the phase. A total of 93.0% of the participants were women and 6.5% were men. In addition, 13.0% were first-grade, 26.3% were second-grade, 43.5% were third-grade and 14.6% were fourth-grade. The mean age for the sample of the second phase was 20.3. It can be said that the participants in the two phases were not identical but very similar.

5.2 Data Instruments

A. Participant Information Form

Through the information form developed by the researchers, information was obtained about the participants' gender, class, age, university, and the status of their education in high school and infancy.

B. Infant Toddler Education Belief Scale for Pre-service Early Childhood Educators (ITEBS4PECES)

The eight scale-development stages suggested by DeVellis (1991) were followed during the development of this scale. The eight steps that DeVellis (1991) suggested should be followed while developing the scale are summarized in Figure 1.

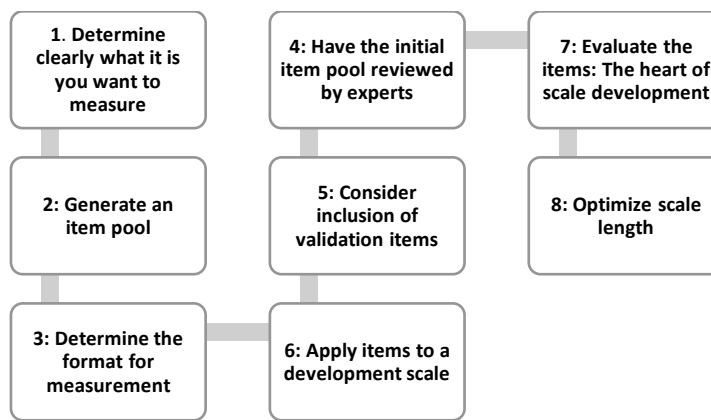


Figure 1: Eight Stages of Scale Development (DeVellis 1991)

In this context, the current study started with the first step, “Deciding what to measure.” As stated in the introduction, it was decided to develop a scale that measures the perceptions of teacher candidates about education in infancy to fill the gap in the literature. This gap in the literature was discovered in the study process while investigating the perceptions of preservice teacher candidates who study in qualitative and fourth grade with 120 pre-school preservice teacher candidates during the infancy period. Due to the lack of a structured scale, the first author prepared a written interview form consisting of five open-ended questions aimed at understanding the perceptions of 120 pre-school preservice teacher candidates about center-based infant/toddler education. The answers obtained through this written interview form were used to create the item pool of the current scale and then the process of creating the item pool, the second stage of the scale development process, was completed.

According to DeVellis (2013), the third step that should be followed in developing a scale is to decide on the structure of the scale. The current scale is structured as a 5-point Likert type scale consisting of Strongly Agree, Agree, Undecided, Disagree and Strongly Disagree. In the fourth stage, DeVellis (2013) recommends getting expert opinion. Accordingly, the scale was examined by three experts in the field of early childhood education and two experts in the field of assessment and evaluation in

educational sciences. Corrections were made to the items in line with the feedback given by the experts.

In the fifth stage, DeVellis (2013) proposes transferring the items to the trial form to examine structural or other types of validity. The scale was applied to 10 different students and based on their feedback about the clarity of the statements, the items were restructured and corrected. In the sixth stage, after the necessary corrections were made, the original 60-item scale form was prepared and applied to 384 preservice early childhood educators. For the seventh and eight stages, i.e. the process of making validity and reliability tests and making the scale available, Explanatory and Confirmatory Factor analyses were conducted. The results are presented as follows.

5.3 Data Analysis

Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) were used as evidence of construct validity in the development of the scale. Alpha coefficient was calculated to determine the internal consistency of the scale, and test-retest reliability coefficient was calculated to determine its stability.

EFA was used to statistically determine the validity of the ITEBS4PECES. The aim of EFA is to reach a few definable meaningful structures from many variables (items) that these variables can explain together (Büyüköztürk, 2006). Whether an item in the scale is included in a factor to be defined in the EFA depends on the high loading value indicating its relationship with that factor. Items that give a high loading value with a factor are called items that measure the structure defined by the factor. Although the item factor loading value is generally 0.40 and higher, items with factor loading value 0.30 can also be kept on the scale (Kline, 1994; Tabachnik and Fidell, 1989). In this study, 0.40 was determined as the factor loading lower limit.

Following the EFA, CFA was applied for the construct validity of ITEBS4PECES. Whether the structure to be obtained according to EFA results has been verified or not was analyzed using CFA. The aim of CFA is to evaluate the extent to which a factorial model consisting of factors (latent variables) formed by many observable variables is compatible with real data. The model to be analyzed can define a structure determined by using the dataset of an empirical study or based on a certain theory (Sümer, 2000). Numerous fit indexes are used in CFA to evaluate the validity of the model. The most frequently used among them are (Cole, 1987; Sümer, 2000); Chi-Square Fitness of Good Statistic, χ^2 , Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), Non-Normed Fit Index, NNFI, Normed Fit Index (NFI), Goodness of Fit Index (GFI). The values observed in the scale model are the perfect fit between $\chi^2 / d < 3$; $0 < RMSEA < 0.05$; $0.97 \leq NNFI \leq 1$; $0.97 \leq CFI \leq 1$; $0.95 \leq GFI \leq 1$ and $0.95 \leq NFI \leq 1$; $4 < \chi^2 / d < 5$; $0.05 < RMSEA < 0.08$; $0.95 \leq NNFI \leq 0.97$; $0.95 \leq CFI \leq 0.97$; $0.90 \leq GFI \leq 0.95$ and $0.90 \leq NFI \leq 0.95$ show acceptable fit (Kline, 2005; Sümer, 2000).

6. Results and Discussion

6.1 Exploratory Factor Analysis Findings

KMO and Bartlett tests were conducted to determine whether the scale is suitable for factor analysis. In this context, the KMO test measurement result should be 0.50 and above, and the Bartlett sphericity test result should be statistically significant (Jeong 2004, 70). The KMO test 0.81 and Bartlett sphericity test were also found to be significant in all subscales ($p < 0.001$) and it was concluded that factor analysis could be applied to the scale.

Principal component analysis was conducted to reveal the number of factors. It was determined that five factors have higher eigenvalues than other factors and explain the variance more.

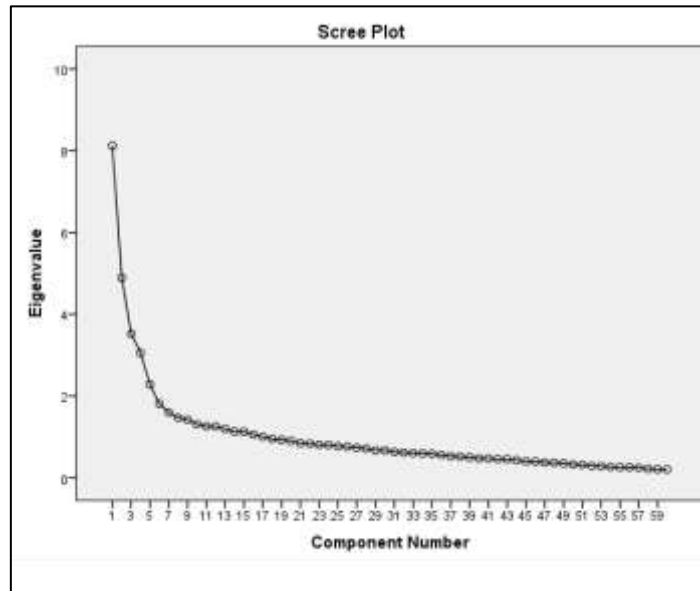


Figure 1: Scatter diagram for the eigenvalues of the factors

After the number of factors was determined, the analysis was repeated with the varimax technique, which is one of the most feasible methods. and steep rotation techniques due to the appearance of a five-factor structure. The number of factors is fixed to five. However, since the factor loading of all items in the fifth factor is below 0.40, the number of factors in the scale is restricted to four. A total of 24 items with a factor loading below the specified limit value 0.40 were excluded from the scale. The scale with a 60-item pool was determined to have 35 items and a four-factor structure after analysis. The factor loads obtained are indicated in Table 1.

Table 1: Factor loadings and explained variance proportions obtained from EFA

Items	1. Factor	2. Factor	3. Factor	4. Factor
I32	.702			
I38	.701			
I43	.665			
I27	.650			
I17	.619			
I13	.520			
I7*	.490			
I21*	.484			
I45	.451			
I51	.449			
I28		.762		
I30		.745		
I31		.687		
I22		.551		
I39		.548		
I25		.505		
I1		.467		
I42		.449		
I14		.439		
I15			.711	
I2			.675	
I24			.627	
I59			.626	
I44			.601	
I16*			.550	
I54			.500	
I35			.473	
I29*			.433	
I58*				.693
I26*				.655
I53				.609
I52				.595
I34*				.584
I3R				.561
I57				.480
Variance Explained	19.17%	10.24%	9.14%	6.98%
Total Variance Explained	39.02%			

* reverse items

According to the EFA findings, planned as 60 items, 24 items in the scale were excluded because they had a factor loading below 0.40. The scale is structured as 35 items and four factors. Factor loading values vary between 0.439 and 0.762. The total variance explained by the scale is 39.02%.

The first factor includes items such as “I know developmental indicators that can be used to prepare learning activities for infants and toddlers.” “I am able to prepare learning activities for infants and toddlers.” or “I am qualified to work with infants and

toddlers.” All of the items grouped under the first factor present PECES’ beliefs about themselves as an effective educator for infants and toddlers. Therefore, this factor was called “Self-efficacy Beliefs for Working with Infants and Toddlers.” This factor includes 10 items.

In the second factor, items such as “I believe experiences and information gathered in the infancy and toddlerhood period, influence later development,” “Infancy and Toddlerhood period includes many critical periods.” and “Infancy and toddlerhood period is crucial for cognitive development.” All of the items loaded to this factor present PECES beliefs about the importance of the infancy and toddlerhood period. Therefore, this factor was called “Beliefs About the Importance of Infancy and Toddlerhood.” This factor includes nine items.

Items for the third factor present beliefs of PECES about the importance of infant/toddler education. One example is “I believe that infants and toddlers who participate in center-based infant/toddler education would be better in cognitive development than infants and toddlers who are cared for at home.” Another example can be a reverse item: “During infancy and toddlerhood, the best education and care is provided by mothers or grandmothers at home.” Since these and all other items reflect PECES’ beliefs about the importance and consequences of infant/toddler education, this factor was called “Beliefs about the Necessity of Infant/Toddler Education.” This factor includes nine items.

The last factor includes items such as “I do not prefer to work with infants and toddlers unless I have to” (reverse item) or “I think working with infants and toddlers would be enjoyable and pleasant.” These and all other items loaded to this factor provide information on whether PECES want to work with infants and toddlers; therefore, this factor was called “Intention to work with Infants and Toddlers.” This factor includes seven items.

6.2 Confirmatory Factor Analysis Findings

CFA was applied to evaluate whether the scale’s four-factor and 35-item structure was confirmed. In the first CFA applied, items with a t value that was not statistically significant were examined. According to this study, no statistically insignificant with t value was found. The path diagram obtained is given in Figure 2.

When Figure 2 is examined, it can be seen that the final scale consists of 35 items and four factors. Fit indices were found as $\chi^2 = 2802.01$, $\chi^2 / sd = 4.83$, CFI = 0.89, NNFI = 0.90, NFI = 0.90 and GFI = 0.82. When the coefficients showing the relationship between the observed variables of the model showing the factorial structure of the scale and its factors were examined, it was concluded that all the fit indexes except GFI were sufficient. Considering the compliance statistics calculated with CFA, it was decided that the four-factor structure of the scale determined by EFA findings generally complied with the data collected.

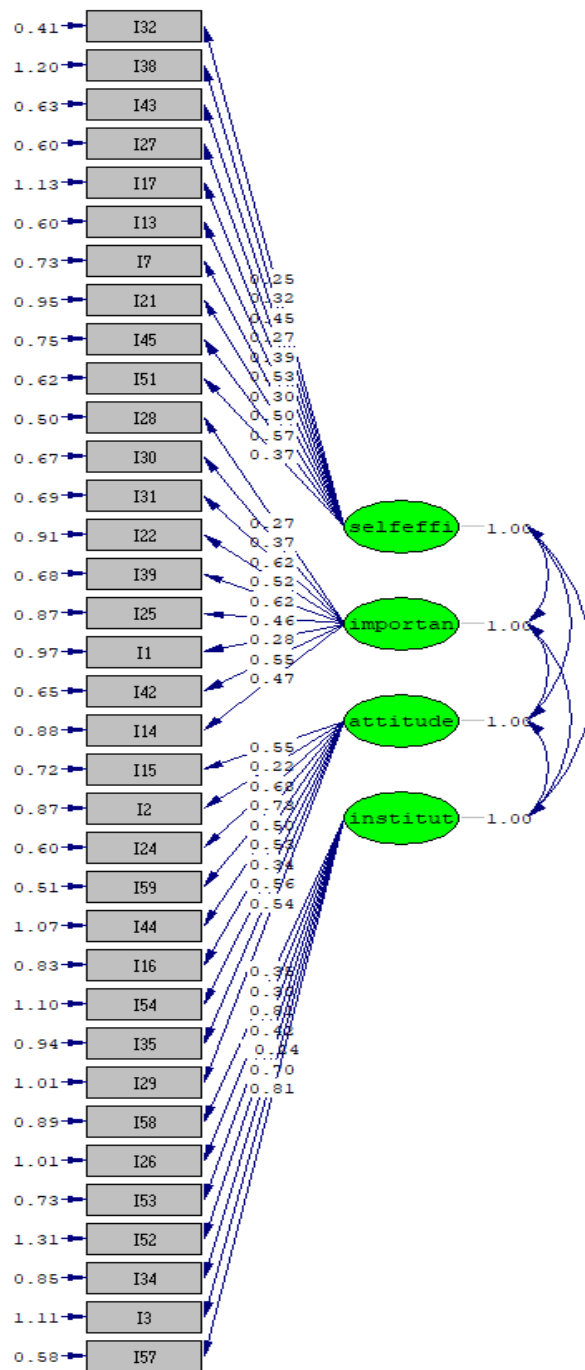


Figure 2: Path Diagram

Regression values and t values of the items are given in Table 2.

Table 2: Regression and t values from CFA

Items	Regression Values	t values	Items	Regression Values	t values
I1	0.25	6.60	I44	0.47	8.61
I2	0.34	5.45	I45	0.55	10.83
I13	0.45	9.37	I51	0.22	4.20
I14	0.27	6.02	I52	0.70	13.84
I15	0.41	6.69	I53	0.74	15.30
I17	0.52	10.92	I54	0.49	8.10
I22	0.30	6.11	I57	0.52	9.50
I24	0.52	8.99	I59	0.32	5.31
I27	0.57	10.69	I3	0.56	9.63
I28	0.35	7.48	I7	0.53	8.97
I30	0.27	6.68	I16	0.34	6.14
I31	0.33	6.89	I21	0.30	5.17
I32	0.61	11.89	I26	0.81	13.73
I35	0.49	8.67	I29	0.42	6.18
I38	0.64	12.72	I25	0.23	4.33
I39	0.42	7.69	I34	0.70	10.62
I42	0.25	4.57	I58	0.80	14.60
I43	0.57	11.70			

When Table 2 is examined, it is determined that the obtained regression coefficients and t values are significant, and the model is confirmed.

6.3 Additional Evidence for Construct Validity

As evidence of construct validity, it was investigated whether the total scores obtained from the scale developed within the scope of the research differed according to the grade level of the PECEs and according to the PECEs' previous experience of getting a course related to infant/toddler education. For this purpose, the significance of the change in the factor scores of the first- and fourth-grade students and the significance of the change in the factor scores of the students who took and did not take courses for infant/toddler education were examined with the t test for independent samples.

When the obtained findings were examined, it was determined that all factor scores of the scale differed depending on being a first- or fourth-year students (t values 2.14 - 2.94, $p < 0.05$). The mean scores of the fourth-grade students are significantly higher than the average scores of the first-grade students.

It was also found that all factor scores of the scale differed depending on whether they took courses for I/TE or not (t values 1.98 - 3.22, $p < 0.05$). The average score of students taking courses is significantly higher than the average scores of students who did not take courses. These findings show that the total scores obtained from the scale can separate the groups.

6.4 Cronbach Alfa Reliability Coefficient as Internal Consistency

Cronbach Alpha reliability coefficient was calculated to determine the internal consistency of the scale. The alpha value of the first factor, Self-efficacy Beliefs for

Working with Infants and Toddlers, is 0.85, the alpha value of the “Beliefs About the Importance of Infancy and Toddlerhood” is 0.81, the alpha value of “Beliefs About the Necessity of Infant/Toddler Education” is 0.83 and the alpha value of “Intention to Work With Infants and Toddlers” was calculated as 0.82. Tezbaşaran (1997, 47) states that a reliability coefficient that can be considered sufficient on a Likert-type scale should be as close to 1 as possible. According to these results, it can be said that the reliability of each factor in the scale is high enough. Table 3 provides a summary of the scale.

Table 3: Brief Information on ITEBS4PECES

Name of the Factor	Sample items	Item Number	α
Self-efficacy Beliefs for Working with I/T	I am able to prepare learning activities for infants and toddlers.	10	0.85
Beliefs about the Importance of I/T	I believe experiences and information gathered in the infancy and toddlerhood period influence later development.	9	0.81
Beliefs about the Necessity of I/TE	I believe infants and toddlers who participate in I/TE would show better cognitive development than I/T cared for at home.	8	0.83
Intention to work with I/T	Unless I have to, I do not prefer to work with infants and toddlers.	7	0.82

6.5 Test–Retest Reliability Coefficient as Stability

The test-retest reliability coefficient was calculated to determine whether the scale made stable measurements over time. For this purpose, 33 of the 384 students included in the research were randomly selected. The scale form was applied to these 33 students at the end of a three-week period. The Pearson Moments Product Correlation Coefficient for the scores obtained from both applications and the t test were applied for the related samples. The correlation coefficient is significant and close to 1; t test results for related samples are not expected to be statistically significant.

Correlation coefficients obtained for each factor of the scale vary between 0.73 - 0.90. These coefficients are significant at 0.05 level and high. The t test results for the related samples are given in Table 4.

Table 4: Test–Retest Findings

Factor	Group	N	\bar{X}	SD	df	t	p
Self-efficacy Beliefs to work with I/T	First application	33	42.11	5.13	32	1.12	0.657
	Second application	33	40.69	5.36			
Beliefs about Importance of I/T	First application	33	38.13	4.98	32	1.09	0.698
	Second application	33	39.19	4.83			
Beliefs about the Necessity of I/TE	First application	33	37.59	4.69	32	0.94	0.589
	Second application	33	36.47	4.56			
Intention to work with I/T	First application	33	28.12	3.54	32	1.10	0.670
	Second application	33	29.36	3.59			

When Table 4 is examined, it can be seen that the first application and second application scores obtained from the scale did not differ statistically. This can be presented as evidence that the stability of the scale is high.

6.6 Scoring of Scale

An overall total score cannot be obtained for ITEBS4PECES. The reason for this is that the correlation between the dimensions is low. Correlation between dimensions varies between 0.12 - 0.40 indicating a low- and medium-level relationship. Therefore, total scores should be calculated for each factor separately. Scale factor scores can be obtained following the 5-point Likert type. For the first factor, high scores refer to higher self-efficacy to work with infants and toddlers while the low scores indicate low self-efficacy for working with infants and toddlers. There are two reverse items in this factor.

For the second factor, high scores indicate that PECES believe in the importance of infancy and toddlerhood period in the lives of human beings. In this factor, there is only one reverse item.

For the third factor, high scores indicate that PECES give importance to the infant/toddler education and they believe that infant/toddler education is necessary. In this factor, there are two reverse items.

For the last factor, high scores mean that PECES have high intention to work with infants and toddlers while low scores mean PECES do not want to work with infants and toddlers when they enter the early childhood education profession after their graduation. There are four reverse items in this factor.

7. Conclusion

This study aimed to develop a valid and reliable scale to understand and measure the beliefs of preservice early childhood educators about infant/toddler education. The study was conducted in two different phases. In the first phase, qualitative data were gathered from a sample of 120 preservice early childhood educators and from these data, 60 items were developed for the initial form of the scale. Later, in the second phase, the initial 60-item scale was applied to 384 preservice early childhood educators. Explanatory Factor Analysis revealed a four-factor scale structure with 35 items. These four factors were called Self-efficacy beliefs for working with infants and toddlers, Beliefs about the importance of infancy and toddlerhood, Beliefs about the necessity of infant/toddler education, and Intention to work with infants and toddlers, respectively. These factors explained almost 39% of the variance. The factor accounted for 19%, 10.24%, 9.14% and 6.98% of the explained variance, respectively. The results of EFA indicated a Cronbach Alpha Coefficient of 0.85 for the first factor; 0.81 for the second factor, 0.83 for the third and 0.82 for the fourth factor. It can be said that each factor is highly reliable for the sample of preservice early childhood educators. In addition to Cronbach Alpha Coefficients, test-retest analyses yielded consistent results. Results of CFA, also indicated

that the 4-factor structure of the scale determined by EFA findings generally complied with the data collected.

Based on the results of EFA and CFA, it can be said that Infant/Toddler Education Belief Scale for Preservice Early Childhood Educators (ITEBS4PECES) is a valid and reliable scale that can be used to understand the self-efficacy beliefs of PECEs, their beliefs about the importance of the infancy and toddlerhood period, about the necessity of infant/toddler education, and PECEs intention to work with infants and toddlers. In addition to validity and reliability analyses, an independent sample t-test was run to determine whether or not there is a difference among the beliefs of PECEs depending on their grade level and educational history about assembling a course on infant/toddler education. It was revealed that fourth-grade PECEs and PECEs who took a course on infant/toddler education got higher scores in all factors.

This is an expected finding since positive experiences related to performance are one of the main factors influencing self-efficacy (Bandura, 1997). That is, when a person has positive past experiences similar to the performance that will be engaged in, this person has higher self-efficacy about his/her performance. Previous studies indicated that fourth-grade PECEs have higher self-efficacy and more positive attitudes towards their profession (Duatepe and Akkuş, 2004; Parker, 1998). Marchant (1992) proposed that experience is one of the most important factors that influence self-efficacy. In parallel with these previous proposals, in the current study, fourth-grade students who had many experiences with children because they had completed many courses on early childhood education and field teaching experience courses obtained higher scores from all factors. Since these students have worked with older children in their practicum, they might think that their success will be similar when they work with infants and toddlers. A very similar finding was made by Garvis and Pendergast (2015) indicating that preservice teachers use their knowledge for older children while thinking about working with infants and toddlers.

In addition to fourth-graders, PECEs who took infant/toddler education course got higher scores from all factors, as well. This also indicated that being experienced and knowledgeable influence PECEs' infant and toddler education-related beliefs. This is also consistent with previous findings that indicated PECEs who worked with younger children in their practicum and attended teaching experience courses have a positive tendency to work with younger children and a higher self-efficacy to work with infants and toddlers (Ünlü-Çetin, 2019).

8. Recommendations

The developed scale, ITEBS4PECES, is expected not only to fill a gap in the early childhood education field but also to pave the way for more research about infant/toddler education with PECEs. For instance, this scale can be used to understand the factors influencing the self-efficacy beliefs of PECEs related to working with infants and toddlers. In the case of cultural adaptations, comparisons among PECEs in different

countries and cultures could be made. By using the ITEBS4PECES, the influence of different interventions to increase self-efficacy beliefs of PECEs for working with infants and toddlers, beliefs about the necessity of infant/toddler education or intention to work with infants and toddlers can be determined. In this way, the best practices that lead higher qualified teachers to work with infants and toddlers might be identified and early childhood teacher education programs can be improved. Also, this scale can be used by the administrators of infant/toddler education centers to employ educators who are more self-efficacious and better motivated to work with infants and toddlers to increase the quality of infant/toddler education and care.

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