Development of Portfolio Related Scales for Early Childhood Teachers: A Validity and Reliability Study

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Abstract

Portfolio is one of the common forms of pedagogical documentation around the world. However, there is no suitable instrument to measure teachers' portfolio practices in early childhood education. In this study, it was aimed to develop scales on portfolio practices and its possible predictors based upon extended Theory of Planned Behavior (TPB). Initially, content validity was ensured with expert opinions and cognitive interviews with early childhood teachers. After that pilot data were collected from 371 early childhood teachers and exploratory factor analysis (EFA) was conducted to explore the factor structure of the scales. Then, main study data were gathered from 605 early childhood teachers, and confirmatory factor analysis (CFA) was conducted to confirm the factor structure of the scales. Internal consistency coefficients were also calculated for the reliability analysis in both pilot study and main study data. As a result, findings confirmed the validity and reliability of the scales.

Keywords: Early Childhood Education, Portfolio Assessment, Scale Development, Theory of Planned Behavior

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IntroductIon

Developmentally appropriate assessment is one of the characteristics of high-quality early childhood programs (Couchenour & Chrisman, 2000). It supports learning by helping teachers to understand children in their classrooms (Becher et al., 2022). To this end, more specifically, authentic assessment is integrated into teaching and learning to improve instruction, teaching practices, and curriculum development (Litchfield & Dempsey, 2015). A portfolio is a well-accepted authentic assessment type (Gronlund & Engel, 2001). It is at the heart of assessment with young children because of its potential to recognize the uniqueness of each child (Kingore, 2008). However, to reach these offered benefits, there is no right way to create a portfolio system (Banta, 2003). This flexibility gives a crucial role to teachers in creating their own portfolio assessment system. Therefore, a teacher has an important role in achieving the intended purposes and benefits of portfolio assessment. Both their attitudinal and cognitive factors may impact their practices in the classroom (Yan & Cheng, 2015). Although there are some studies regarding teachers' attitudes and practices, most research focuses on one aspect of assessment (e.g., Brown, 2004; Brown et al., 2011). There are also limited number of scales on portfolio assessment, which were developed a while ago. For instance, Sonnier (1999) developed a scale to investigate teachers' portfolio practices. Harris and Curran (1998) investigated teachers' knowledge, attitude, and concerns about portfolio assessment by developing a scale. Similarly, portfolio related attitudes were examined with a scale in the dissertation of Butts (1997). Moreover, Tangdhanakanond and Archwamety (2019) developed a survey to investigate teachers' misconceptions in practicing portfolio assessment.

Having a broad focus, Theory of planned behavior (TPB) provides a comprehensive framework about people's tendency to perform or not to perform a certain behavior. It explains and predicts behaviors in a variety of domains and is supported by a number of research studies (Dunn et al., 2018; Lee et al., 2010; Patterson, 2000; Teo et al., 2016; Tsigilis, 2006; Yan, 2014; Yan & Cheng, 2015; Yan & Sin, 2014). However, it has not been integrated into research studies related to portfolio assessment in early childhood education. Therefore, there are not developed scales related to it in the literature. As a response to this gap, it was aimed to develop the portfolio related scales based upon the extended TPB and confirm the validity and reliability of them in this study.

Portfolio assessment in early childhood education

Portfolios is the widespread form of pedagogical documentation around the world. To define the concept, portfolio means a collection of student work over time and documentation of growth in specific curriculum areas (Fiore, 2012). It includes the "collection of child work and teacher data from informal and formal assessment to evaluate development and learning" (Wortham & Hardin, 2016, p. 241), and it is generally organized as a folder (Knauf, 2015). In portfolio content, systematic collection is important to ensure that a portfolio is developed purposefully regarding its content, organization, and assessment applications. Products must be representative of child work, not just the best works of children. It is also important to include both teacher-selected and child-selected products in portfolio. The teacher determines which products are necessary to report child achievement and learning. On the other hand, child-selected products also individualize the portfolio, reflect child interests, contribute to child ownership, motivate student learning (Kingore, 2008), and enable child self-assessment (Butler & McMunn, 2006). Thus, it contributes to improved self-assessment and self-efficacy of children (Authors, 2016). It can also be used as a communication tool between children, families, and educators (Kingore, 2008). Importantly, it provides a visual representation of child development over time with respect to developmental domains and content standards (Piker & Jewkes, 2013). As a result, it helps teachers to understand student learning and contribute to quality teaching (Kim & Yazdian, 2014). Thus, it enables improved educational practice (Pekis & Gourgiotou, 2017).

Theoretical Framework

There are different affective factors to consider upon teachers' practices. In this study, it was aimed to develop scales on portfolio practices and its possible predictors based on extended TPB. It has been integrated into a variety of research studies in different settings (e.g., Armitage & Conner,

2001; MacFarlane & Woolfson, 2013; Yan & Cheng, 2015; Yan & Sin, 2014). To explain, according to this theory, people are also more likely to engage in the intended behavior if there are strong intentions (Ajzen, 1996). Goal intention provides commitment to achieve it and has a primary role in understanding the motivated behavior (Gollwitzer & Bargh, 1996). Another identified predictor of behavior is also perceived behavioral control. It was proposed that "From a theoretical perspective, self-efficacy and perceived behavioral control are virtually identical" (Fishbein & Ajzen, 2010, p.161). Both refers to perception of capability for performing a specific behavior or reaching a certain goal (Fishbein & Ajzen, 2010). However, since perceived behavioral control might be influenced by external factors, it is less predictive than self-efficacy (Yan & Cheng, 2015). As a result, it was integrated into models together with TPB variables in different research studies (e.g., Patterson, 2000; Yan, 2014; Yan & Cheng, 2015). For instance, it was confirmed that teachers are more likely to practice assessment if they feel confident (Yan & Cheng, 2015), but they are not willing to use assessment methods if they have low self-efficacy (Guo et al., 2014).

Furthermore, TPB highlighted different variables as determinants of the intention including attitudes and subjective norms (Ajzen, 2005). "Attitude is the individual's positive or negative evaluation of performing the particular behavior of interest" (Ajzen, 2005, p. 188). It was defined as a predictor of teachers' intention in practicing formative assessment (Yan & Cheng, 2015). According to TPB, attitude towards a behavior is also determined by behavioral belief, which is related to the consequences of the behavior, and behavior is linked to certain outcomes in each behavioral belief. Another one, subjective norm, is also the perception of the social pressure related to performing or not performing the behavior (Ajzen, 2002; 2005).

In addition to the theory constructs, several authors suggested that additional variables are necessary for TPB. These variables can increase the variance accounted for in a person's intentions and behavior (e.g., Conner & Armitage, 1998). For instance, personal norm is strongly and positively related to behavioral intentions (Doran & Larsen, 2016). A personal norm is an individual's moral obligation or responsibility to perform or not to perform a behavior (Ajzen, 1991). Similarly, it was agreed that barrier perception might contribute to predictability of intention (Bozioneles & Bennett, 1999). Despite the reported advantages, there are several challenges of the portfolio assessment process to reach offered benefits, and learning about barrier perceptions might provide insight into challenging issues to better support teachers.

Overall, all these constructs might be a considerable factor on portfolio practices. However, TPB has not been utilized as a theoretical framework to investigate portfolio assessment, particularly in early childhood education. There are also fewer research studies on portfolio assessment in the literature (e.g., Authors, 2016; Appl et al., 2014; Knauf, 2017a, 2017b; Krnjaja & Pavlović-Breneselović, 2016; Pickens, 2018), which focus on specific portfolio types or teachers' perspectives on portfolio assessment. As a response to the gap, the scales were aimed to be developed as a part of this study based on an extensive literature review on the theory and portfolio assessment in early childhood education.

METHODOLOGY

Purpose

In the present study, it was aimed to develop scales based upon the extended TPB related to portfolio assessment. This theory has constituted the baseline for other assessment-focused studies within the literature (e.g., Schaaf et al., 2008; Yan & Cheng, 2015). However, it has not been utilized as a theoretical framework for investigating portfolio assessment particularly in early childhood education and therefore, there are no existing scales for this purpose. As a response to this gap, it was aimed to develop the following scales in the present research study related to portfolio assessment in early childhood education: practice, norms, behavioral beliefs, attitude, self-efficacy beliefs, barrier perceptions, and intentions.

Participants

Data were collected from a total of 621 ECE teachers in different districts of Ankara, Türkiye. After data cleaning, a total of 605 usable responses were included in the main data analysis. 99% (f = 601) of teachers were female, and 83% (f = 503) had graduated from an ECE department. The participating teachers worked in two types of public schools: a preschool classroom within an elementary school (48%, f = 289) or an independent preschool (52%, f = 316). There was an assistant teacher within 41% (f = 245) of these classrooms. The total of teaching experience was approximately 14 years (SD = 7.1), and teachers had an average of 20 children (SD = 3.9) per classroom. The participating teachers' ages also ranged from 21 to 60-years-old. Furthermore, seventy-two percent (n = 438) reported using portfolio assessment, while 28% (n = 167) of the teachers reported that they did not (This information was obtained with the question of "Do you use portfolio assessment in your classroom?").

Scale development process

Instrumentation development steps presented by McCoach et al. (2013) and Netemeyer et al. (2003) were considered. Accordingly, the steps taken were specifying scale purpose, reviewing existing instruments, developing operational definitions, selecting a scaling technique, matching items with dimensions, expert review of items, developing directions and conducting a pilot study, and analyzing pilot data. As a first step, operational definitions were created based on a detailed literature review regarding both portfolio assessment and TPB. Then, the items were developed by adopting the principles for TPB scale construction suggested by Ajzen (2002). To this end, the researcher created an item pool for each scale based on previous literature on teachers' beliefs and practices related to assessment (e.g., Brown et al., 2011; Yan, 2014), and items were matched to the appropriate dimension.

After that, for content and face validity, the item pools were examined by seven expert faculty members: three in early childhood education, two from measurement and evaluation, and two science educators. The experts evaluated the suitableness of each item according to a specified construct as well as evaluated each item in terms of clarity. After making the experts' suggested revisions, cognitive interviews using the think-aloud protocol were conducted regarding the prepared scales with two early childhood teachers from public preschools in Ankara. Among the teachers interviewed through the think-aloud protocol, one was utilizing portfolios within their classroom, while the other was not. Through this process, the participants were requested to think aloud while answering protocol questions as well as stating everything that they were thinking (Collins, 2003; Drennan, 2003). Following these cognitive interviews, minor changes were made to a few items to improve clarity (Author, 2022).

Pilot Study

Pilot testing of an instrument provides information regarding clarity of instructions and questions. To this end, all of the scales were piloted, and the pilot study was conducted in a similar context to the later study used in Ankara. After receiving ethical permission, the prepared scales were administered to volunteer teachers, and 371 usable responses were obtained and analyzed in the pilot study. According to Hair et al. (2010), a sample size of 10 cases per item is considered acceptable, and this was satisfied for each scale in the pilot study. In total, 97% (f = 360) teachers were female, and 80% (f = 298) had graduated from an ECE department. Additionally, all participating teachers were working in public preschools. Also, 13% (f = 47) of teachers had an assistant within their classroom. The average amount of teaching experience was approximately 14 years (SD = 8.33), and teachers had 17 children (SD = 6.86) on average in their classroom. Over three-quarters of participants (77%, f = 286) had previously taken an assessment course, while 12% (f = 45) had received in-service training regarding portfolios. Importantly, a majority of participating teachers (77%, f = 285) were using portfolios, whereas 23% (f = 86) were not.

The pilot study data collected were subjected to exploratory factor analysis (EFA) for each of the developed/adapted scales to explore the factor structure of the scales, and Cronbach's alpha was also calculated for each one to report reliability. The number of factors was decided based on the eigenvalue greater-than-one rule and the scree plot (Netemeyer et al., 2003). The literature supports that factor loading of .30 has practical significance for a sample size of 350 or greater (Hair et al., 2010). All factor loadings above .3 were reported in the present study in line with the suggestions. The SPSS 25 program was used to conduct these analyses.

Data collection and analysis

After obtaining ethical permission from the host university human subjects ethics committee and the Turkish Ministry of National Education (MoNE), the data collection tools were administered in preschools for a period of approximately three months. The research data confidentiality was ensured by collecting questionnaires anonymously. Scales were completed by all teachers who were practicing and not practicing portfolio assessment. However, since portfolio practice and portfolio norms scale include items regarding implementation, those scales were only completed by the teachers who were practicing portfolio assessment.

After collecting the primary study data, confirmatory factor analysis (CFA) and Cronbach's alpha values were generated for each scale to confirm these factor structures and ensure reliability. It was accepted that CFI and NFI values greater than .95 (Brown, 2006; Thompson, 2004) and RMSEA values equal to or less than .08 indicate reasonable model fit (Browne & Cudeck, 1993; Fabrigar & Wegener, 2012). These findings were presented in the results section. The SPSS 25 and AMOS 25 statistical programs were used to conduct these analyses. Characteristics of the scales were also presented in the Table 1.

RESULTS

EFA, CFA, and reliability analysis findings

Portfolio practice scale: Developed to assess teachers' portfolio practices in terms of content, child participation, and sharing. The "content" factor indicates the components and organization of the portfolio content (e.g., "Organizing portfolio according to specific criteria like development area, subject, date."). "Child participation" presents information regarding the children's active engagement within the portfolio process (e.g., "Deciding what to include in portfolio with children"). "Sharing" also provides information about teachers' practices of sharing portfolios with different stakeholders, including the children and their families (e.g., "Organizing portfolio sharing days"). It was asked of teachers to rate how often they implement specific practices from these three factors. It was designed as a 5-point rating scale ranging from "never" (1) to "always" (5) and consisted of 13 items.

Initially, factor analysis with principal axis factoring was conducted for 14 items through direct Oblimin rotation, and a three-factor structure was revealed. The KMO value was .905, and Bartlett's Test of Sphericity was determined to be significant ($\chi2$ (91) = 2052, $p < .001$), thus verifying the data suitability for factor analysis. Additionally, all communality values were above .30. Whereas only for the fourteenth item (Sharing the portfolio with the child's next teacher), it was found to be .180. However, it was an essential item to investigate and get an indication about its practice by considering the benefits for the future teacher. Therefore, these were retained for investigation, and three factors were determined in a scree plot, as expected. Moreover, a three-factor structure was revealed through the eigenvalue greater-than-one rule, which explained a total of 63.60% variance. Thus, it was recognized that almost all items (except items 9 and 10) loaded to the three related components. This suggested that it was useful to investigate potential explanations for low loaded items within the literature, for example, whether this may have occurred due to "poor item design, inadequate sampling or inappropriate inclusion of the variable" (Fabrigar & Wegener, 2012, p. 138). Therefore, for clarification, the wording of these items was revised following the pilot study, and the

decision was made to re-investigate them through CFA. The Cronbach's alpha values were calculated for each of these dimensions at .84 for "content", .79 for "child participation", and .86 for "sharing".

In CFA, with the main study data, following modifications, all items loaded significantly to the respective factor except item 14 (Sharing the portfolio with the child's next teacher), which loaded with a value of .144. As the same problem appeared in the pilot study, it was decided to exclude this item from the scale. Following the item deletion, the CFA results showed that the three-factor model structure indicated a reasonable fit with the following fit indices χ^2/ df = 3.788, $p < .001$, CFI = .966, NFI = .952, and RMSEA = .080. Standardized estimated ranged from .608 to .678 for "content", .697 to .795 for "child participation", and .775 to .789 for "sharing". Moreover, the Cronbach's alpha coefficients were estimated as .84 for "content", .84 for "child participation", and .82 for "sharing". Item total correlations also indicated that items are correlated with the total scale (ranging from .52 to .68 for "content," from .59 to .74 for "child participation," and from.65 to .71 for "sharing").

Portfolio norms scale: Developed to measure teachers' both personal norms and subjective norms regarding portfolio assessment. It consists of 10 items, and it was designed as a 7-point rating scale ranging from "strongly disagree" (1) to "strongly agree" (7). "Personal norms" referred to the teacher's personal feelings of obligation to utilize portfolio assessment (e.g., "I use portfolios to improve my teaching"), while "subjective norms" meant the social pressure they felt to utilize portfolio assessment (e.g., "I use portfolios because of the school administrations' expectations to use them").

Initially, factor analysis with principal axis factoring was conducted on ten items using direct Oblimin rotation, and a two-factor structure was revealed. The KMO value was .789, and Bartlett's Test of Sphericity was found to be significant (χ^2 (45) = 1380, $p < .001$), as a result, verifying the data suitability for factor analysis. All communality values were above .30, and a scree plot indicated two factors. Moreover, a two-factor structure was revealed according to the eigenvalue greater-than-one rule, explaining 62.46% of the variance. Additionally, all items loaded with two related components, and Cronbach's alpha values were calculated at .87 for "personal norms" and .82 for "personal norms". Then, in CFA with main study data, model's fit indices indicated a reasonable fit with χ^2/df = 3.726, $p < .001$, CFI = .957, NFI = .952, and RMSEA = .079. Standardized estimates ranged from .592 to .963 for "personal norms" and .411 to .880 for "subjective norms." Furthermore, the Cronbach's alpha coefficients were .87 for "personal norms" and .83 for "subjective norms". Item total correlations also indicated that items are correlated with the total scale (from .60 to.83 for "personal norms" and from .42 to .75 for "subjective norms").

Portfolio-related behavioral beliefs scale: Developed to determine teachers' beliefs regarding the potential benefits of portfolio assessment (e.g., "Identify the strengths of children"). It consists of 15 items with one dimension, and it was designed as a 7-point rating scale ranging from "Not at all" (1) to "Completely" (7). Initially, factor analysis with principal axis factoring was conducted on 15 items. The KMO value was .957, and Bartlett's Test of Sphericity was also found to be significant (χ^2 (105) = 7666, $p < .001$), therefore verifying the data suitability for factor analysis. All communality values were reached above .30, and one factor indicated in the scree plot. Similarly, the eigenvalue greater-than-one rule revealed a one-factor structure, explaining 77.40% of the variance. All items were loaded to one factor. The Cronbach's alpha value was also calculated at .98. Then, in CFA with main study data, results indicated that the one-factor model fit the data reasonably well (X^2/df = 5.347, $p < .001$, CFI = .964, NFI = .955, and RMSEA = .08). Standardized estimates ranged from .721 to .888. Moreover, Cronbach's alpha coefficient was estimated as .97. Item total correlations also indicated that items are correlated with the total scale (from .74 to .88).

Portfolio-related attitude scale: Developed to identify teachers' attitudes regarding portfolio assessment, which refers to their favorable or unfavorable assessments of portfolio assessment (e.g., "Necessary-Unnecessary"). It was designed on a 7-point semantic differential scale and consisted of seven items with one dimension. Initially, factor analysis with principal axis factoring was conducted on seven items. The KMO value was .928, and Bartlett's Test of Sphericity was also found to be

significant (χ2 (21) = 3464, p < .001), therefore verifying the data suitability for factor analysis. All communality values were above .30. Consistent with the scree plot, one factor, explaining 84.89% of the variance, appeared according to the eigenvalue greater-than-one rule. All items were loaded to one factor. The Cronbach's alpha value was also calculated as .97. Then, in CFA with the main study data, the model fit indices were at an acceptable level: X^2/df = 3.244, p < .001, CFI = .992, NFI =. 988, and RMSEA = .072. Standardized estimates were between .829 and .915. Furthermore, Cronbach's alpha coefficient was estimated as .96. Item total correlations also indicated that items are correlated with the total scale (from .83 to .91).

Portfolio-related self-efficacy beliefs scale: Developed to measure teachers' feelings of competency regarding portfolio assessment (e.g., "To what extent can you provide active participation of children in the portfolio process?"). It is unidimensional with 14 items, and it was designed as a 7-point rating scale ranging from "Not at all" (1) to "Completely" (7). Initially, factor analysis with principal axis factoring was conducted on 14 items. The KMO value was .945, and Bartlett's Test of Sphericity was found to be significant (χ2 (91) = 5179, p < .001), therefore verifying data suitability for factor analysis. All communality values were above .30, and the scree plot indicated one factor. Similarly, one factor emerged according to the eigenvalue greater-than-one rule, explaining 68.01% of the variance. It was seen that all items were loaded to the hypothesized factor. Cronbach's alpha value was also calculated at .96. Then, in CFA with main study data, model's fit indices indicated a reasonable fit with X^2/df = 3.929, p < .001, CFI = .966, NFI = .962, and RMSEA = .080. Standardized estimates ranged from .670 to .817. Furthermore, the Cronbach's alpha coefficient was .95. Item total correlations also indicated that items are correlated with the total scale (from .68 to .81).

Portfolio-related barrier perceptions scale: Developed to determine teachers' perceptions regarding factors which inhibited their practice of portfolio assessment (e.g., "Crowded classroom"). This is a unidimensional scale with 11 items. It was designed as a 7-point rating scale ranging from "Not at all" (1) to "Completely". Initially, factor analysis with maximum likelihood method was conducted on 11 items. The KMO value was .795, and Bartlett's Test of Sphericity was significant (χ2 (55) = 1782, p < .001), which verified the data suitability for factor analysis. All communality values were above .30, and one factor indicated in the scree plot. Similarly, the eigenvalue greater-than-one rule revealed a one-factor structure, explaining 40.97% of the variance. All items were loaded to one factor. The Cronbach's alpha value was also calculated at .86. Then, in CFA with main study data, results indicated that the one-factor model fit the data reasonably well (X^2/df = 3.883, p < .001, CFI = .968, NFI =. 958, and RMSEA = .080). Standardized estimates ranged from .571 to .773. Moreover, Cronbach's alpha coefficient was estimated as .91. Item total correlations also indicated that items are correlated with the total scale (from .59 to .73).

Portfolio-related intention scale: Developed for identifying teachers' willingness to expend effort regarding portfolio assessment (e.g., "I will organize portfolio sharing days in the next year."). It consisted of four items with one dimension, and it was designed as a 7-point Likert scale ranging from "strongly disagree" (1) to "strongly agree" (7). Initially, factor analysis with principal axis factoring was conducted on four items. The KMO value was .835, and Bartlett's Test of Sphericity was significant (χ2 (6) = 1004, p < .001), therefore verifying data suitability for factor analysis. All communality values were above .30, and the scree plot indicated one factor. Consistent with the scree plot, one factor, explaining 77.95% of the variance, according to the eigenvalue greater-than-one rule. All items were loaded to one factor. The Cronbach's alpha value was also calculated at .90. Then, in CFA with the main study data, the model fit indices indicated well fit with X^2/df = .223, p < .001, CFI = 1.000, NFI = 1.000, and RMSEA = .000. Standardized estimates were between .779 and .846. Furthermore, Cronbach's alpha coefficient was estimated as .90. Item total correlations also indicated that items are correlated with the total scale (from .73 to .83).

DISCUSSION

The constructs of the developed scales were determined with respect to both TPB and the literature on portfolio assessment in early childhood education. TPB has been used in a variety of

research studies in the literature (e.g., Dunn et al., 2018; Knabe, 2012; Macfarlane & Woolfson, 2013; Martin & Kulinna, 2004; Menand et al., 2021; Yan, 2014). However, it has not been integrated into portfolio assessment in early childhood educations. Therefore, there are no developed scaled related to these constructs. In this study, the scales were developed to investigate early childhood teachers' portfolio practices and predictors, which are practice, norms, behavioral beliefs, attitude, self-efficacy beliefs, barrier perceptions, and intention. To test the validity and reliability of the newly developed scales, different methods, e.g., internal consistency with the alpha coefficient, content validity by using an expert review, and structural validity by using EFA and CFA were adopted. As a result, it was determined that practice scale consists of three factors, which were titled as content, child participation, and sharing, and norms scale covers two constructs including personal norms and subjective norms. The other ones were also determined as consisting of one factor, which were called as behavioral beliefs, attitude, self-efficacy beliefs, barrier perceptions, and intention. Diagrams of the scales are provided in the Appendix.

Analysis results supports the three dimensional construct of portfolio practice scale (content, child participation, and sharing), and this is consistent with the available literature on this topic. To explain, to serve its assessment purpose, portfolio content has an important role. To make sure to include information about progress, it might be necessary to include classroom assessments, not only performance products. It is important to ensure that all developmental and subject matter areas are adequately documented for all children, and a child's thinking and learning process are also documented (McAfee et al., 2016). Another construct, child active participation in portfolio process is also important to reach its offered benefits. Children's involvement makes it a portfolio rather than only a work folder (Shores & Grace, 1998). For instance, to reflect individuality and child uniqueness, children select some products. Child selection provides more value and ownership of portfolio by the child, and it provides variety in each child's portfolio (Kingore, 2008). Furthermore, portfolios become a tool for sharing with families and other stakeholders into the education process. Those improve communication between child, teacher, and parents as providing observable products and understandable or concrete evidence about child performance (Kingore, 2008; Stiggins, 2005). Thus, practice scale was constituted of three factors including content, child participation, and sharing, which were titled according to the content of the constructs.

According to analysis results, norms scale also consists of two factors as personal norms and subjective norms. Personal norms and subjective norms were found as a predictor of intention in different research studies (e.g., Bamberg et al., 2007; Harland et al., 1999; Roos & Hahn, 2019; Yan & Cheng, 2015), and these were constituted as a single factor in these research studies (e.g. Tsigilis et al., 2006; Yan, 2014). Similarly, in this study, these two constructs were brought together and determined as two factors of portfolio norms scales. Moreover, in line with the literature, other scales (behavioral beliefs, attitude, self-efficacy beliefs, barrier perceptions, and intention) were determined as one factor. For instance, behavioral beliefs include items related to the benefits of portfolio assessment. Teacher beliefs about the assessment processes have an impact on their processes of assessment practices and also guide their instructional practices in the classroom (Barnes et al., 2017). In the related literature, a variety of benefits of portfolio assessment were reported including demonstration of student growth and progress over time; facilitation of communication and collaboration among teachers, students, and parents; and providing opportunities to transform teaching to meet the needs of individual students (Hou & Hsieh, 2019; Kim & Yazdian, 2014). These points were included in this scale as formulating one factor.

Likewise, self-efficacy, intention and attitude were included in variety of the research studies related to TPB and similarly consisted of one factor or become a construct of the scale (e.g., Patterson, 2000; Teo et al., 2016; Tsigilis et al., 2006; Yan, 2014; Yan & Cheng, 2015). To explain, self-efficacy refers to an individual's beliefs in capabilities to achieve a goal or produce a performance which has an impact on an individual's life and determines individual feelings, thoughts, words, actions, and interactions (Bandura, 1997). According to Bandura (1977), self-efficacy has two dimensions: personal efficacy and outcome expectancy. People practice actions if they believe in their abilities (personal efficacy) and if they believe that actions will result in desirable outcome (outcome

expectancy). In this study, personal efficacy dimension was included and it is called portfolio related self-efficacy beliefs.

To conclude, a number of scales were developed on portfolio assessment based upon the extended TPB, and their validity and reliability were ensured with required analysis as a part of this study. The exploratory factor analysis results presented the factor structure of the scales and then, these were confirmed by confirmatory factor analysis. Cronbach's alpha test also ensured the reliability of the constructs. When all of these values are examined, it has been determined that the results obtained are within the range of acceptable values specified in the literature.

Although the sample size is sufficient in this study, those can be examined with a larger group of teacher participants in future research studies. Predictive impact of these variables on teachers' portfolio practices might be investigated by hypothesizing models and testing them with advanced statistical methods. They might also be enriched in future studies by adding different constructs or including different assessment methods. Identifying relationships and examining factors affecting teachers' portfolio practices might help to understand teacher participation in the portfolio process and help teachers to successfully practice portfolio assessment process (Kiser, 2008).

Conflicts of Interest: No potential conflict of interest was declared by the authors.

Funding Details: The authors did not receive any funding or financial support for the research, authorship, and/or publication of this article.

CRediT Author Statement: This work was generated from a part of the Ph.D. dissertation of first author under the supervision of second and third author

Ethical Statement: Ethical permission was taken from the Middle East Technical University Human Subjects Ethics Committee and the Turkish Ministry of National Education. The authors followed all the ethical standards established by these institutions.

REFERENCES

Ajzen, I. (1991). The theory of planned behavior. Or*ganizational behavior and human decision processes, 50*(2), 179-211.

Ajzen, A. (1996). The social psychology of decision making. In E.T. Higgins, & A.W. Kruglanski (Eds.), *Social psychology: Handbook of Basic Principles* (pp.297-325). New York, NY: The Guilford Press.

Ajzen, I. (2002). Perceived behavioral control, self-efficacy, locus of control, and the Theory of Planned Behavior. *Journal of Applied Social Psychology, 32*(4), 665-683.

Ajzen, I. (2005). *Attitudes, personality, and behavior* (2nd edition). Maidenhead: Open University Press.

Alaçam, N., & Olgan, R. (2016). Portfolio assessment: Does it really give the benefits that it purports to offer? Views of early childhood and first-grade teachers. *Early Child Development and Care, 186*(9), 1505-1519. doi: 10.1080/03004430.2015.1108970

Alaçam N. (2022). *Comparative investigation of early childhood teachers' portfolio practices: Cases from Turkey and the United States* (Unpublished Doctoral Dissertation). Middle East Technical University, Türkiye.

Appl, D. J., Leavitt, J. E., & Ryan, M. A. (2014). Parent-child portfolios: ''Look—this book is all about us!''. *Early Childhood Education Journal, 42*(3), 191–202. doi:10.1007/s10643-013-0598-1

Armitage, C. J., & Conner, M. (2001). Efficacy of the theory of planned behavior: A meta-analytic review. *British Journal of Social Psychology, 40*(4), 471-499.

Bamberg, S., Hunecke, M., & Blobaum, A. (2007). Social context, personal norms, and the use of public transportation: Two field studies. *Journal of Environmental Psychology, 27*, 190–203. doi: 10.1016/j.jenvp.2007.04.001

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, *84*(2), 191–215.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York, NY: W. H. Freeman & Company.

Banta, T.W. (Ed.). (2003). *Portfolio assessment: Uses, cases, scoring, and impact.* San Francisco, CA: Assessment Update Collections.

Barnes, N., Fives, H., & Dacey, C.M. (2017). U.S. teachers' conceptions of the purposes of assessment. *Teaching and Teacher Education, 65*, 107-116. http://dx.doi.org/10.1016/j.tate.2017.02.017

Becher, I., Rigaud, V.M., & Epstein, A. (2022). Getting to know young children: Alternative assessments in early childhood education. *Early Childhood Education Journal.* https://doi.org/10.1007/s10643-022-01353-y

Bozionelos, G., & Bennett, P. (1999). The Theory of Planned Behavior as predictor of exercise: The moderating influence of beliefs and personality variables. *Journal of Health Psychology, 4*(4), 517-529.

Brown, G. T. L. (2004). Teachers' conceptions of assessment: Implications for policy and professional development. *Assessment in Education: Principles, Policy & Practice*, *11*(3), 301-318.

Brown, T.A. (2006). *Confirmatory factor analysis for applied research*. New York, NY: The Guilford Press.

Brown, G. T. L., Hui, S. K. F., Yu, F. W. M., & Kennedy, K. J. (2011). Teachers' conceptions of assessment in Chinese contexts: A tripartite model of accountability, improvement, and irrelevance. *International Journal of Educational Research, 50*(5/6), 307-320.

Browne, M. W., & Cudeck, R. (1993). Alternative ways of assessing model fit. In K. A. Bollen & J. S. Long (Eds.), *Testing structural equation models* (pp. 136-162). Newbury Park, CA: Sage.

Butler, S.M., & McMunn, N.D. (2006). *A teacher' guide to classroom assessment. Understanding and using classroom assessment to improve student learning*. San Francisco, CA: Jossey-Bass.

Butts, M.M (1997). *A survey of elementary school teachers' attitude toward student portfolio assessment (*Unpublished Doctoral Dissertation). The University of Mississippi, MS, U.S.

Collins, D. (2003). Pretesting survey instruments: An overview of cognitive methods. *Quality of Life Research 12*, 229–238.

Conner, M. & Armitage, C. J. (1998) Extending the theory of planned behavior: A review and avenues for further research. *Journal of Applied Social Psychology, 28*, 1429-1464.

Couchenour, D., & Chrisman, J.K. (2000). *The Sage Encyclopedia of Contemporary Early Childhood Education.* Sage Publications. ProQuest E-book Central, http://ebookcentral.proquest.com/lib/wisc/detail.action?docID=4625105.

Doran, R., & Larsen, S. (2016). The relative importance of social and personal norms in explaining intentions to choose eco-friendly travel options. *International Journal of Tourism Research, 18,* 159–166.

Drennan, J. (2003). Cognitive interviewing: verbal data in the design and pretesting of questionnaires. *Journal of Advanced Nursing, 42*(1), 57-63.

Dunn, R., Hattie, J., & Bowles, T. (2018). Using the Theory of Planned Behavior to explore teachers' intentions to engage in ongoing teacher professional learning. *Studies in Educational Evaluation, 59,* 288–294. https://doi.org/10.1016/j.stueduc.2018.10.001

Fabrigar, L.R., & Wegener, D.T. (2012). *Exploratory factor analysis. Understanding statistics.* Oxford University Press.

Fiore, L.B. (2012). *Assessment of young children: A collaborative approach.* New York, NY: Routledge.

Fishbein, M., & Ajzen, I. (2010). *Predicting and changing behavior. The reasoned action approach.* New York, NT: Psychology Press.

Gollwitzer, P.M., & Bargh, J.A. (1996). *The psychology of action: Linking cognition and motivation to behavior.* New York: The Guilford Press.

Gronlund, G., & Engel. B. (2001). *Focused portfolios: A complete assessment for the young child*. St. Paul, MN: Readleaf Press.

Guo, Y., Dynia, J., Pelatti, C., & Justice, L. (2014). Self-efficacy of early childhood special education teachers. *Teacher and Teacher Education, 39*, 12-21. doi: 10.1016/j.tate.2013.11.005

Hair, J.F., Black, W.C., Babin, B.J., & Anderson, R.E. (2010). *Multivariate data analysis: A global perspective* (7th ed.). Upper Saddle River, New Jersey: Pearson Education.

Harland, P., Staats, H., & Wilke, H.A.M. (1999). Explaining proenvironmental intention and behavior by personal norms and the Theory of Planned Behavior. *Journal of Applied Social Psychology, 29*(12), 2505-2528. https://doi.org/10.1111/j.1559-1816.1999.tb00123.x

Harris, M.B., & Curran, C.M. (1998). Knowledge, attitudes, and concerns about portfolio assessment: An exploratory study. *Teacher Education and Special Education, 21*(2), 83-94.

Hou, Y., & Hsieh, M.F. (2019). Helping parents reexamine children's emergent writing performance through parent–teacher portfolio sharing conferences. *Australasian Journal of Early Childhood, 44*(4), 378-391. doi: 10.1177/1836939119870924

Kim, Y., & Yazdian, L.S. (2014). Portfolio assessment and quality teaching. *Theory into Practice, 53*(3)*,* 220-227. doi: 10.1080/00405841.2014.916965

Kingore, B. (2008). *Developing portfolio for authentic assessment, PreK-3: Guiding potential in young learners.* Thousand Oaks, CA: Corwin Press.

Kiser, W.K. (2008). *The NAEYC classroom portfolio process: Examining the relationship between demographic characteristics and external factors that support teacher motivation* (Unpublished Master's thesis). University of North Carolina at Chapel Hill, U.S.

Knabe, A.P. (2012). *Applying Ajzen's theory of planned behavior to a study of online course adoption in public relations education* (Doctoral dissertation). Retrieved from Dissertations.

Knauf, H. (2015). Styles of documentation in German early childhood education. *Early Years, 35*(3), 232-248. doi: 10.1080/09575146.2015.1011066

Knauf, H. (2017a). Making an impression: Portfolios as instruments of impression management for teachers in early childhood education and care centers. *Early Childhood Educ J, 45*(4*)*, 481–491.

Knauf, H. (2017b). Documentation as a tool for participation in German early childhood education and care. *European Early Childhood Education Research Journal, 25*(1), 19-35. doi: 10.1080/1350293X.2015.1102403

Krnjaja, Z., & Pavlović- Breneselović, D. (2016). Preschool teachers' perspectives on the purpose of a child portfolio in the preschool curriculum: The case of Serbia. *Journal of Contemporary Educational Studies, 67*(133), 148-167.

Lee, J., Cerreto, F.A., & Lee, J. (2010). Theory of Planned Behavior and teachers' decisions regarding use of educational technology. *Educational Technology & Society*, *13*(1), 152–164.

Litchfield, B.C., & Dempsey, J.V. (2015). Authentic assessment of knowledge, skills, and attitudes. *New Directions for Teaching and Learning, 142*, 65-80.doi: 10.1002/tl.20130

MacFarlane, F., & Woolfson, L.M. (2013). Teacher attitudes and behavior toward the inclusion of children with social, emotional and behavioral difficulties in mainstream schools: An application of the theory of planned behavior. *Teaching and Teacher Education, 29*,46-52. https://doi.org/10.1016/j.tate.2012.08.006

Martin, J.J., & Kulinna, P.H. (2004). Self-efficacy theory and the theory of planned behavior: Teaching physically active physical education classes. *Research Quarterly for Exercise and Sport*, *75*(3), 288-297. doi: 10.1080/02701367.2004.10609161

McAfee, O., Leong, D.J., & Bodrova, E. (2016). *Assessing and guiding young children's development and learning* (6th ed.). Boston: Pearson.

McCoach, D.B., Gable, R.K., & Madura, J.P. (2013). *Instrument development in the affective domain. School and Corporate Applications* (3rd ed.). New York: Springer.

Menand, V., Clément, M.E., & April, J. (2021). Early childhood educator's intention to provide support in the context of parental violence: The contribution of the theory of planned behavior. *Journal of Early Childhood Teacher Education, 42*(2), 162-181, doi:10.1080/10901027.2021.1918295

Netemeyer, R.G., Bearden, W.O., & Sharma, S. (2003). *Scaling procedures. Issues and applications.* Thousand Oaks, CA: Sage Publications.

Patterson, R.R. (2000). *College and pre-college teachers' beliefs, intentions, and behaviors regarding the implementation of microbiology activities presented in a professional development workshop: An application of the theory of planned behavior* (Unpublished Doctoral Dissertation). Duquesne University, Pittsburgh, PA, U.S.

Pekis, A., & Gourgiotou, E. (2017). Parental perceptions about children's authentic assessment and the work sampling system's implementation. *International Journal of Assessment Tools in Education, 4*(2), 182-210. doi: 10.21449/ijate.318250

Pickens, A. (2018). *Pre-kindergarten and kindergarten teachers' perceptions of the student growth portfolio model in Tennessee* (Doctoral Dissertation). Retrieved from Electronic Theses and Dissertations.

Piker, R.A., & Jewkes, A.M. (2013). Assessing young children's learning. In D.R. Reutzel (Eds.), *Handbook of research-based practice in early education* (pp.250-271). New York, NY: Guilford Press.

Roos, D., & Hahn, R. (2019). Understanding collaborative consumption: An extension of the Theory of Planned Behavior with value-based personal norms. *Journal of Business Ethics, 158*(3). doi: 10.1007/s10551-017-3675-3

Schaaf, M.F., Stokking, K.M., & Verloop, N. (2008). Teacher beliefs and teacher behavior in portfolio assessment. *Teaching and Teacher Education, 24(7)*, 1691–1704. https://doi.org/10.1016/j.tate.2008.02.021

Shores, E.F., & Grace (1998). *The portfolio book: A step by step guide for teachers*. Beltswille, Maryland: Gryphon House.

Sonnier, C.A. (1999). *Elementary general educators' beliefs, attitudes, and practices of portfolio assessment* (Unpublished Doctoral Dissertation). The University of Alabama, Tuscaloosa, AL, U.S.

Stiggins, R. (2005). *Using student-involved classroom assessment to close achievement gaps* (4th ed.). Columbus, OH: Merrill Prentice Hall.

Tangdhanakanond, K., & Archwamety, T. (2019). Teachers' misconceptions and current performance in implementing student portfolio assessment in elementary schools in Thailand. *International Journal of Psychology: Biopsychosocial Approach, 23*, 39-62. https://doi.org/10.7220/2345-024X.23.2

Teo, T., Zhou, M., & Noyes, J. (2016). Teachers and technology: Development of an extended theory of planned behavior. *Educational Technology Research and Development, 64*, 1033–1052. doi: 10.1007/s11423-016-9446-5

Thompson, B. (2004). *Exploratory and confirmatory factor analysis. Understanding concepts and applications*. Washington, DC: American Psychological Association.

Tsigilis, N. (2006). Applicability of the planned behavior theory to attitudes of students in early childhood education toward teaching culturally diverse classes: The role of self-identity. *Psychological Reports, 100*, 1123- 1128. https://doi.org/10.2466/pr0.100.4.1123-1128

Tsigilis, N., Tsioumis, K., & Gregoriadis, A. (2006). Prospective early childhood educators' attitudes toward teaching multicultural classes: A planned behavior theory perspective. *Journal of Early Childhood Teacher Education, 27,* 265–273. doi: 10.1080/10901020600843624

Wortham, S., & Hardin, B.J. (2016). *Assessment in early childhood education* (7th ed.). USA: Pearson.

Yan, Z. (2014). Predicting teachers' intentions to implement school-based assessment using the Theory of Planned Behavior. *Educational Research and Evaluation, 20*(2), 83-97. doi: 10.1080/13803611.2013.877394

Yan, Z., & Cheng, E.C.K. (2015). Primary teachers' attitudes, intentions and practices regarding formative assessment. *Teaching and Teacher Education, 45*, 128-136. http://dx.doi.org/10.1016/j.tate.2014.10.002

Yan, Z., & Sin, K. (2014). Inclusive education: Teachers' intentions and behavior analyzed from the viewpoint of the Theory of Planned Behavior. *International Journal of Inclusive Education, 18*(1), 72-85. doi: 10.1080/13603116.2012.757811

Table 1 Characteristics of the Scales

| Scale	Number of factors	Factors	Number of items	Sample item	Cronbach's alpha
1.Portfolio Practice	3	Content	6	"Organizing portfolio according to specific criteria like development area, subject, date"	.84
		Child participation	4	"Deciding what to include in portfolio with children"	.84
		Sharing	3	"Organizing portfolio sharing days"	.82
2.Portfolio Norms	2	Personal norms	4	"I use portfolios to improve my teaching"	.87
		Subjective norms	6	"I use portfolios because of the school administrations' expectations to use them"	.83
3.Portfolio-related Behavioral Beliefs	1	Behavioral beliefs	15	"Identify the strengths of children"	.97
4.Portfolio-related Attitude	1	Attitude	7	"Necessary-Unnecessary"	.96
5.Portfolio-related Self-Efficacy Beliefs	1	Self-efficacy beliefs	14	"To what extent can you provide active participation of children in the portfolio process?"	.95
6.Portfolio-related Barrier Perceptions	1	Barrier perceptions	11	"Crowded classroom"	.91
7.Portfolio-related Intention	1	Intentions	4	"I will organize portfolio sharing days in the next year"	.90

APPENDIX
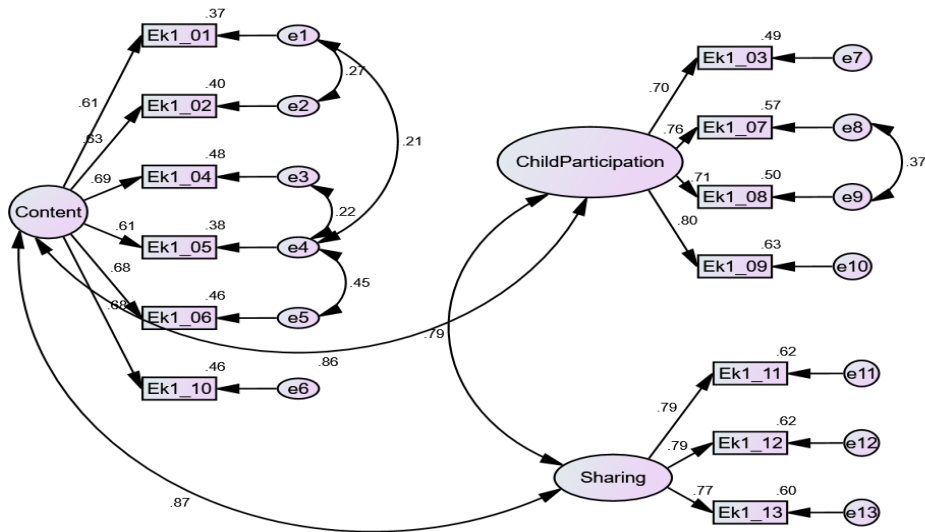
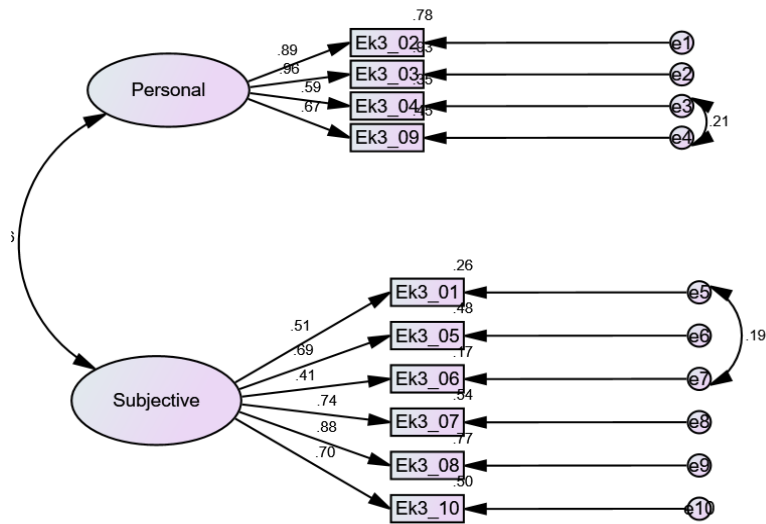**Figure 1. Diagram of Portfolio Practice Scale**

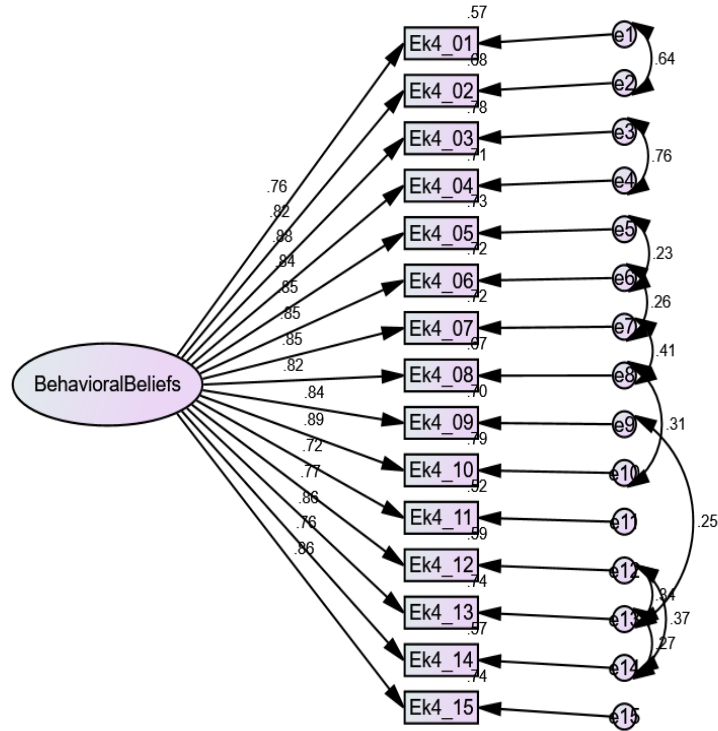**Figure 2. Diagram of Portfolio Norms Scale**

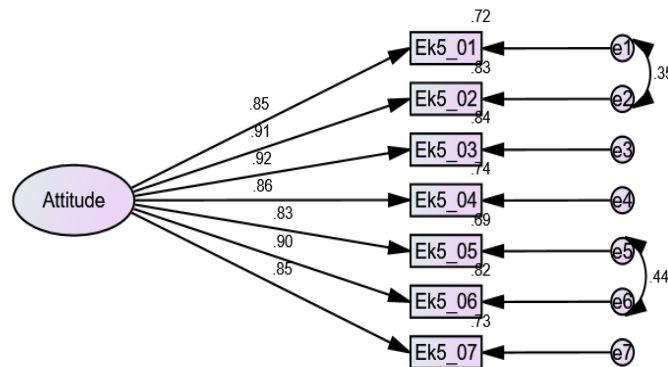**Figure 3. Diagram of Portfolio-related Behavioral Beliefs Scale**
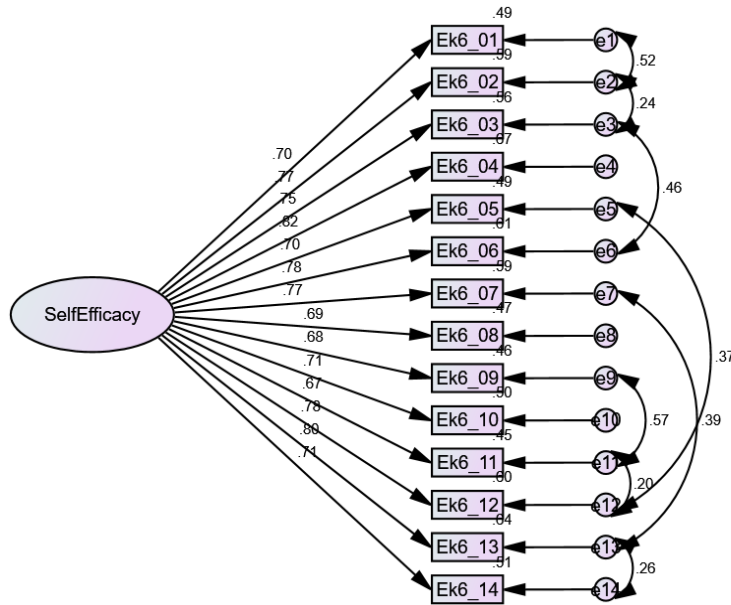

Figure 4. Diagram of Portfolio-related Attitude Scale

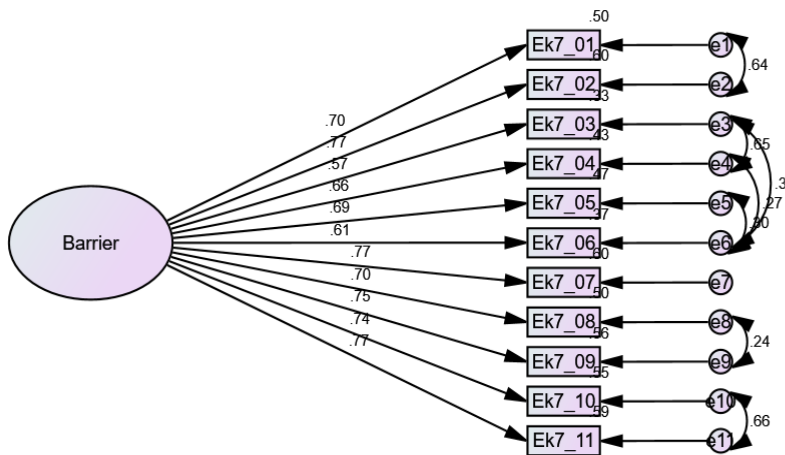**Figure 5. Diagram of Portfolio-related Self-Efficacy Beliefs Scale**
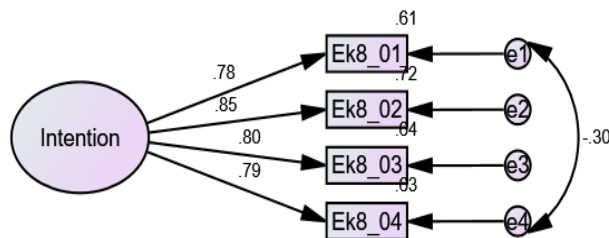

Figure 6. Diagram of Portfolio-related Barrier Perceptions Scale

Figure 7. Diagram of Portfolio-related Intention Scale