

A Validation Study of The Early Childhood Care and Education In-Service Carer-Educators Instrument

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Abstract

ECCE In-Service Carer Educator Instrument is designed to identify early childhood carer-educators' professional competence level in Malaysia by establishing and substantiating its validity. A comprehensive literature review and interviews with experienced childcare educators were conducted to identify the elements that affect the quality of early childhood education. It was reviewed by two experts, in order to augment the validity of this instrument. In addition, this study involved 2522 carer-educators. Principal components analysis revealed six scales observing the early childhood professionalism quality which were knowledge, practices, skills, disposition, career development and career path. Each instrument item covered a component loading range of 0.85 to 0.72. In contrast, the alpha reliability coefficient ranges from 0.91 to 0.96 for every scale. The validity and reliability of the ECCE in-Service Carer-Educators Instrument were verified by the findings of this study. Furthermore, a professional framework for the development of educators of early childhood in Malaysia will be created from the results of this research in order for ECCE to contribute to and maintain its quality in Malaysia.

Keywords

Professional Approach to Early Childhood Education, Instrument, Carers-Educator, Principal Component

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Introduction

UNESCO centralizes education as a potential life-transforming mean such as the Early Childhood Care and Education program (also known as the ECCE program) which focuses on all-inclusive children growth. This intends on building a broad basis for a lifetime welfare and knowledge, and nurturing caring, capable and responsible future populace (UNESCO, 2019). In Malaysia, this motivates the researchers and scholars to strive more on developing, improving and coordinating competencies, professional growth, and career path of carer-educators (Majzub, 2013), in line Malaysia's Ministry of Education who is recently released The Malaysian Educational Blueprint, which recognizes the nation's efforts toward 100% enrollment at all levels, including ECCE (Ministry of Education, 2013).

Expectantly, by 2020, every preschool teacher in Malaysia at least holds an early childhood education diploma (Foong et al., 2018) like in the UK where every ECCE professional must at least have a level 3 qualification or diploma (Nutbrown, 2012). Research continuation is necessary for mutual ECCE professionalism comprehension (Anne et al., 2014). Karila (2010) stated that the ECCE professionalism comprises cultures, communities, organizations and individuals with country-specific practices.

Studies had shown that Malaysia's existing early childhood care and education (ECCE) programs are not at par with those of developed nations such as no uniformity in terms of the childcare trainees' qualifications. To this end, the criteria for hiring such workers have been hotly debated and no solutions have been reached thus far (Foong et al., 2018). Hence, this research focuses on developing and validating a standard ECCE In-Service Carer-Educators Instrument to evaluate an improved Malaysian ECCE professional framework quality.

Research Method

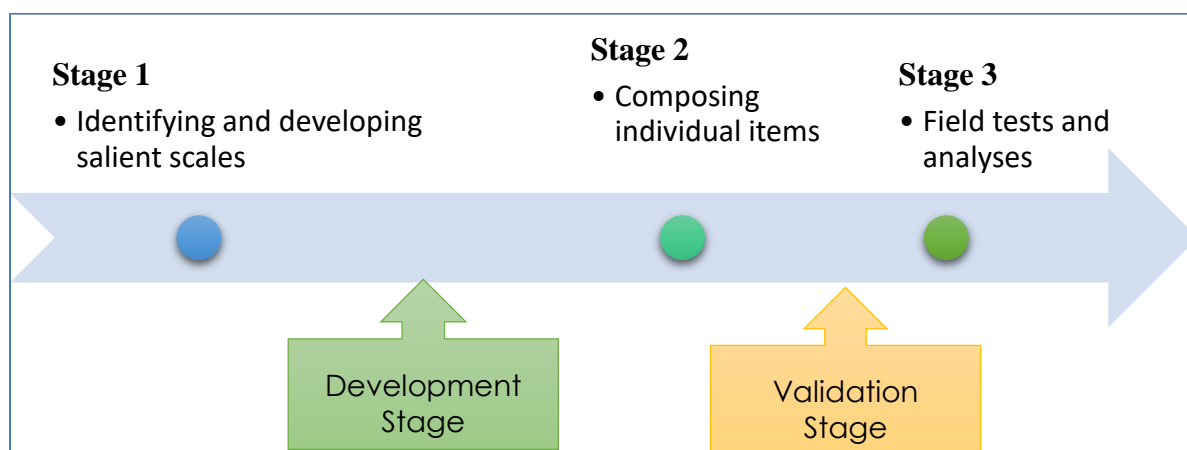
Development Stage

Establishing and substantiating the Early Childhood Care and Education In-Service Carers-Educator Instrument (ECCEICEI) is the core of this research. A quantitative method was used with the design of a cross-sectional survey which is cost and time effective while concurrently allowing a study on multiple variables. A series of questionnaires was used to collect all data with a random stratified sampling of 2522 carer-educators as participants from numerous government and private institutions in several states in Malaysia.

The ECCEICEI comprises three stages: (1) salient scales were classified to decide key elements in developing pre-school professionalism; (2) two essential steps: (i) familiarizing with developed items and developing more items for newly identified scales, and (ii) distributing all item sets for experts' validation; and (3) items field testing, preceding item analysis and validation. These were performed by (Shaharudin et al., 2020; Shaharudin et al., 2019; Che Ahmad et al., 2015).

Figure 1.

A Three-Stage Approach Applied in ECCEICEI Establishment.



Validation Stage

Principal Component Analysis (PCA) reduces the huge data matrix dimension by retaining the most initial data variabilities (Shaharudin et al., 2017). To find the eigenvalues and eigenvectors based on the data matrix covariance matrix, PCA uses the correlation matrix. This forms the utmost data variations (Shaharudin et al., 2021).

Cronbach's Alpha

A value of Cronbach's Alpha measures the degree of internal consistency between a group of items, and can also be scales of reliability taken as a measure. The "high" alpha value does not prove the measure is one-dimensional. When developing the ECCEICEI, the Cronbach's Alpha coefficient was used to measure the internal consistency of each scale.

Results And Interpretation of The Data

This study utilized PCA techniques to validate the items assessing the quality of questions. The PCA for ECCEICEI began with 84 items which were divided into six, namely the disposition, knowledge, skills, practices, career development and career path. By replacing the variables with the first few components that have a significant variance and ignore components with no significant information, the Components to be extracted by PCA method is to reduce its dimensionality. As a general rule of thumb, the first three types of rules that are used are scree plot, Kaiser's rule, and proportion of explained variance (Alvin, 2002; Norman, 1987).

Among the methods used is the Kaiser's rule to choose the appropriate number of components to retain. This method selects the eigenvalues based on the amount of variance for components. Under this rule, eigenvalues greater than the average eigenvalue (i.e., $\lambda \geq 1$) were retained because these axes summarize more information than any single original variable (Donald, 1993). Hence, to determine the number of principal components, those components with $\lambda \geq 1$ are used. Every component item and its loadings with a load component more than 0.50 will be retained in the PCA. Variance rates between 40% and 60% are acceptable for social sciences (Che Ahmad et al., 2018).

Table 1 illustrates the eigenvalues, total variation of the data and item in component loading for six ECCEICEI sections. The PCA for disposition section of ECCEICEI began with 8 items which then gathered into a factor with eigenvalues of 5.40 which is a significant value ($\lambda \geq 1$). The significant initial component explained 67.45% of the total variance. Every component and its loadings for the disposition section with load component higher than 0.50 were retained in the PCA. For the ECCEICEI for the disposition field test, a scale was established. After the PCA, the scale retained all items where 8 items clustered into a component with eigenvalues larger than 1. Hence, no item was omitted. The final form of this instrument presented 8 items for the disposition scale.

The PCA for the knowledge section of ECCEICEI began with 16 items which then gathered into a factor with eigenvalues of 9.87 which is a significant value ($\lambda \geq 1$). The significant initial component explained 61.66% of the total variance. Every component and its loadings for the knowledge section with load component higher than 0.50 were retained in the PCA. Hence, for the ECCEICEI for the knowledge field test, a scale was established. All 16 items within the scale whose eigenvalue was greater than 1 remained after the PCA. Hence, no item was omitted. The final form of this instrument presented 16 items for the knowledge scale.

Furthermore, the PCA for the skills section of ECCEICEI began with 20 items which then gathered into a factor with eigenvalues of 11.94 which is a significant value ($\lambda \geq 1$). The significant initial component explained 59.71% of the total variance. Every component and its loadings for the skills section with load component higher than 0.50 were retained in the PCA. Hence, for the ECCEICEI for the skills field test, a scale was established. After the PCA, the scale retained all items where 20 items clustered into a component with eigenvalues larger than 1. Hence, no item was omitted. The final form of this instrument presented 20 items for the skills scale.

Table 1.

Eigenvalues, Total Variation of The Data and Item in Component Loading for Six ECCEICEI Sections.

Section	Disposition	Knowledge	Skills	Practices	Career Development	Career Path
Initial Item	8	16	20	10	14	16
Eigenvalues	5.40	9.87	11.94	6.17	8.80	10.36
No. of component obtained	1	1	1	1	1	1
Total variation (%)	67.45	61.66	59.71	70.15	62.87	64.76
Item in component loading	8	16	20	9	14	16

Moreover, the PCA for the practices section of ECCEICEI began with 10 items which then gathered into a factor with eigenvalues of 6.17 which is a significant value ($\lambda \geq 1$). The significant initial component explained 70.15% of the total variance. Every component and its loadings for the practices section with load component higher than 0.50 were retained in the PCA. Hence, for the ECCEICEI for the practices field test, a scale was established. After the PCA, the scale retained all items where 9 items clustered into a component with eigenvalues larger than 1. Evidently, there was an omitted item. The final form of this instrument presented 9 items for the practices scale.

The PCA for the career development section of ECCEICEI began with 14 items which then gathered into a factor with eigenvalues of 8.80 which is a significant value ($\lambda \geq 1$). The significant initial component explained 62.87% of the total variance. Every component and its loadings for the career development section with load component higher than 0.50 were retained in the PCA. Hence, for the ECCEICEI for the career development field test, a scale was established. After the PCA, the scale retained all items where 14 items clustered into a component with eigenvalues larger than 1. Hence, no item was omitted. The final form of this instrument presented 14 items for the career development scale.

Finally, the PCA for the career path section of ECCEICEI began with 14 items which then gathered into a factor with eigenvalues of 10.36 which is a significant value ($\lambda \geq 1$). The significant initial component explained 64.76% of the total variance. Every component and its loadings for the career path section with load component higher than 0.50 were retained in the PCA. Hence, for the ECCEICEI for the career path field test, a scale was established. After the PCA, the scale retained all items where 14 items clustered into a component with eigenvalues larger than 1. Hence, no item was omitted. The final form of this instrument presented 14 items for the career path scale.

The reliability for each refined ECCEICEI scale for 2522 carers' educator in Malaysia is presented in Table 2. For the six ECCEICEI scales, a range between 0.91 and 0.96. is used for the internal consistency reliability (coefficient alpha). Particularly, the Cronbach's Alpha was determined for each section: 0.93 for disposition, 0.96 for knowledge, 0.96 for skills, 0.91 for practices, 0.95 for career development and 0.96 for career path.

Table 2.

Scale reliability for ECCEICEI by using Cronbach's Alpha coefficient

Section	Number of Items	Cronbach's Alpha
Disposition	8	0.93
Knowledge	16	0.96
Skills	20	0.96
Practices	10	0.91
Career development	14	0.95
Career path	16	0.96

Discussion

This study focuses on developing a reliable, valid instrument to measure the ECCEICEI. The draft scale is comprised of 84 items and was administered to 2522 carer-educators in Malaysia. As a result, all instrument items including their respective load components exceeding 0.50 retained in the PCA; specific items were removed. The items were classed into disposition, knowledge, skills, practices, career development and career path. As analysed, the ECCEICEI was highly reliable with useful construct validity concerning carer-educators professionalism development. The ECCEICEI with 6 scales and 84 items was easily administered and answered. It is an added-value to the instruments already existing in particular in developing professionalism through measurement carer-educators. However, the care aspects need to be critically regarded.

Conclusion

This research describes an instrument growth and substantiation that assesses the ECCE competencies level of in-service carer-educators, another added values to the existing instruments. The results verified the reliability of the ECCEICEI. However, further research could refine this instrument by regarding the respondents' characteristic differences.

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