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**ASSESSMENT OF PSYCHOMETRIC PROPERTIES OF TEACHERS' SENSE OF EFFICACY  
BELIEFS BY PRE-SERVICE HOME ECONOMICS TEACHERS IN SOUTH-WEST, NIGERIA**

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**ASSESSMENT OF PSYCHOMETRIC PROPERTIES OF TEACHERS' SENSE OF EFFICACY BELIEFS BY PRE-SERVICE HOME ECONOMICS TEACHERS IN SOUTH-WEST, NIGERIA**

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**Abstract**

The purpose of this study was to investigate the psychometric properties of teacher sense of efficacy scale by pre-service home economics teachers in southwest, Nigeria. Data in this study were collected from a total number of 531 pre-service home economics teachers enrolled in secondary teacher education programmes in Nigeria using the Teacher Sense of Efficacy Scale (TSES). Results showed that pre-service home economics teachers had a low sense of teaching efficacy beliefs. Also, analyses revealed that the TSES is a multidimensional construct with three interpretable factor structures: efficacy for classroom management, efficacy for students' engagement, and efficacy for instructional strategies. More so, the TSES showed adequate and high internal consistency reliability even at the sub-scale level. Based on these findings, it was recommended that more investigation should be conducted to confirm the higher-order factor structure of the TSES and to evaluate the stability of the three factors across different samples in vocational education contexts in Nigeria.

**Introduction**

Home economics as a vocational subject originated in America in 1909 (Jenkins, 2014). It was introduced in Nigeria to inculcate life skills in the students to make them self-reliant. In its early introduction, home economics was meant for girls to acquaint them with the science in the home necessary for taking up roles such as wives, domestic workers, and mothers in the future society (Caraher & McCloat, 2016; Benn, 2012). Today, the role of women has changed as many women take up paid employment outside the home rather than be domestic workers. Domestic practices relating to cooking in the home have changed incongruence to changes in manufacturing food industries that produce

processed foods (Jaffe & Gertler, 2006). Despite the transformation in the role of women about domestic chores, the role of home economics in ensuring and promoting self-reliance in future career opportunities for students cannot be underestimated. Although more females than males offer home economics in tertiary institutions in Nigeria (Egun, 2008), males view the study of home economics as a means to an end and to becoming self-sustaining. For students to be self-reliant and become the hope of any society future, they must be taught life skills in schools that will ensure their sustainable growth and development.

Teachers of home economics have the onerous task of ensuring that students catch the skills, knowledge and values that are not only valuable for their bodily, intellectual, and social security but can make them self-independent and industrious in the future. One life skill that must be caught by pre-service home economics teachers in their bid to become pedagogically skilful, content knowledge confident and excellent teachers of effective educational practices in teaching efficacy belief.

Self-efficacy in teaching is an inevitable construct that has gained popularity among researchers and practitioners of education as there is a gamut of evidence in support of the usefulness of teacher self-efficacy in the educational milieu (Guo, Laura, Justice, & Kaderavek, 2010). Self-efficacy is one's self-judgments of individual competencies to start and productively perform definite tasks at selected levels, disburse more effort, and persist in the face of difficulty (Akinsola & Awofala, 2009). Empirical evidence suggests that teacher self-efficacy is correlated with teacher perseverance and determination in facing challenges (Odanga, Raburu, & Aloka, 2018), students' academic performance (Adu, Tadu, & Eze, 2012; Tschannen-Moran & Barr, 2010), and teacher professional obligation (Mshila, 2012). Although a large body of research has shown the effectiveness of teacher self-efficacy in positively affecting teachers and students, regrettably, such empirical studies have refused to examine the factorial complexity of teaching efficacy beliefs with pre-service home economics cohort. More so, in Nigeria few studies have investigated the level of and the psychometric properties of the teaching efficacy beliefs with pre-service teachers (Arigbabu & Oludipe, 2010). This study has two purposes. First, the study determined the level of teaching efficacy beliefs among pre-service home economics teachers. Second, the study examined the factorial structure of the teaching efficacy beliefs with pre-service home economics cohort in Nigeria.

It is well known that empirical studies on teacher self-efficacy have been tailored along the Bandura's (1997) framework of self-efficacy. Teacher self-efficacy is conceptualized as the degree to which a teacher is self-assured adequately in his capacity to enhance students' learning (Bandura, 1994). Teacher efficacy is intellectualized as the teacher's confidence and conviction in his or her competency to consolidate and accomplish sequences of action prerequisite and necessary to productively undertake a precise teaching task in an actual milieu (Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998), and the teachers' inspiration to persevere when confronted with obstacles and their readiness to wield strength to overcome hitches and challenges (Woolfolk, 2001). Principally, human behaviour is understood within the interface of two types of expectations viz: outcome expectancy and self-efficacy. Outcome expectancy refers to the judgements about the probable aftermaths of self-efficacy. Perceived self-efficacy is stereotypically a robust predictor of human behaviour than outcome expectancy (Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998) as there is a distinction between teachers with high and low self-efficacy. Aston and Webb (1986) maintained that teachers with high self-efficacy are inclined to be more orderly, show superior skills in pedagogy, enquiring, clarifying, and giving prompt responses to learners showing difficulties in learning and maintaining classroom orderliness. Lowly efficacious teachers show a greater supervisory role than humanistic style to classroom orderliness, expend meaningfully more time in collaborative work as against whole group instruction, have sense of anger and feel threatened by students' misbehaviour, and have challenges in keeping students on track of learning.

Literature search suggests that different instruments have been developed to measure teacher efficacy with the Teacher Efficacy Scale (TES) standing as the first to be developed by Gibson and Dembo (1984). As one of the most widely accepted scale for teacher efficacy, the TES has been deployed for developing other scales like Teachers' Sense of Efficacy Scale (TSES) (Tschannen-Moran & Woolfolk Hoy, 2001) which has enjoyed wide acceptability. With the TES, researchers have developed subject-specific scales for measuring teaching mathematics efficacy (Charalambous, Philippou, & Kyriakides, 2008) and teaching science efficacy (Çakiroglu, Çakiroglu, & Boone, 2005).

While the vital role of teacher efficacy in teacher education programme is unquestionable, there is this age-long debate regarding the factor structure of the various scales used to assess teacher efficacy. Particularly, questions have been asked whether teacher efficacy is a unidimensional or a multi-dimensional construct (Denzine, Cooney, & McKenzie, 2005; Tschannen-Moran & Woolfolk Hoy, 2001; Wheatley, 2005). However, scholars appear to have attained some

consensus, with the progress in the Teachers' Sense of Efficacy Scale (TSES) developed by Tschannen-Moran and Woolfolk Hoy (2001). The TSES has been universally accepted as a measure of teacher efficacy (Fives & Buehl, 2010; Tsigilis, Koustelios, & Grammatikopoulos, 2010; Yilmaz, 2011) with appreciable and consistent score validity finding regarding its multi-dimensional nature with in-service teachers (Fives & Buehl, 2010; Tsigilis, Koustelios, & Grammatikopoulos, 2010). However, argument prevails regarding the consistency of the factor structure of TSES with pre-service teachers (Tschannen-Moran & Woolfolk Hoy, 2001). Regardless of these contradictory results with pre-service teachers (Poulou, 2007; Fives & Buehl, 2010; Tschannen-Moran & Woolfolk Hoy, 2001), no empirical research to date had been conducted into the psychometric properties of teacher efficacy with pre-service home economics teachers in Nigeria. The adoption of TSES worldwide for measuring teacher efficacy in pre-service teachers regardless of lack of consensus in its multi-dimensional nature has necessitated that its psychometric properties be re-conceptualized with pre-service home economics teachers in Nigeria. More so it is necessary to engender cross-cultural comparison of the TSES to enable deployment in different contexts. Thus, the present study would provide the incremental evidence needed in resolving the debate with the pre-service teachers. Since teacher efficacy research in Nigeria is in its infancy stage, the present study investigated the psychometric properties of teacher efficacy scale with pre-service home economics teachers in Nigeria using an exploratory factor analysis. Specifically, the following research questions were addressed:

## Research Questions

1. What is the level of sense of efficacy of pre-service home economics teachers?
2. What is the empirical factor structure of the Teacher Sense of Efficacy Scale (TSES) items?
3. What are the internal consistency reliabilities of the TSES and TSES subscales?

## Methodology

The study employed descriptive method of the survey type. The participants in this study were 351 pre-service home economics teachers (54 males and 297 females) from four public Universities in South-West, Nigeria. Their ages ranged from 16 to 28 years with mean age of 21.4 years. The participants could also be categorised as 255 (72.65%) within the age bracket below 20 years and 96 (27.35%) within the age bracket 20-28 years. 87 (24.79%) were in first year [12 (13.79%) males, 75 (86.21%) females,  $M_{age} = 19.4$  years,  $SD = 2.1$ , age range: 16-25 years], 87 (24.79%) were in second year [12 (13.79%) males, 75 (86.21%) females,  $M_{age} = 21.2$  years,  $SD = 2.3$ , age range: 17-26 years], 87 (24.79%) were in third year [15 (17.24%) males, 72 (82.76%) females,  $M_{age} = 22.3$  years,  $SD = 2.6$ , age range: 18-27 years], and 90 (25.64%) were in fourth year [15 (16.67%) males, 75 (83.33%) females,  $M_{age} = 22.3$  years,  $SD = 2.8$ , age range: 19-28 years].

In this study, data were collected with the Teacher Sense of Efficacy Scale (long form) developed by Tschannen-Moran and Woolfolk Hoy (2001). The TSES consisted of 24 items on a 5-point Likert scale ranging from Nothing - 1, Very Little -2, Some Influence -3, Quite A bit -4 to A Great deal -5. Tschannen-Moran and Woolfolk Hoy (2001) postulate a three-factor solution for both the short and the long forms. These dimensions are branded: efficacy for instructional strategies, efficacy for student engagement, and efficacy for classroom management. Prior empirical studies show that the TSES is a valid and reliable instrument for assessing teaching efficacy. The authors together with eight research assistants administered the TSES to the whole sample and in regularly scheduled classes in the two universities. Data collected were summarized and analysed using principal components factor analysis and Cronbach alpha coefficient.

## Results

### Level of sense of efficacy of pre-service home economics teachers

In the teacher sense of efficacy scale, the score ranged from 1 to 5. A score of 3 is the middle point so higher scores indicate a high sense of efficacy. From 351 pre-service home economics teachers, 90 (25.64%) had scores greater than 3 ( $M=3.56$ ,  $SD=0.31$ , score range: 3.04-4.21, 95%  $CI= 3.49-3.62$ ), 219 (62.39%) had scores less than 3 ( $M=2.36$ ,  $SD=0.38$ , score range: 1.62-2.96, 95%  $CI= 2.31-2.41$ ), while 42 (11.97%) had scores equaled 3 ( $M=3$ ,  $SD=0$ , score range: 3.00, 95%  $CI=3.00$ ). A large proportion of these pre-service home economics teachers had low sense of teaching efficacy. However, the overall  $M=2.74$ ,  $SD=0.62$ , score range: 1.62-4.21, and 95%  $CI= 2.68-2.81$  for the entire sample showed low sense of teaching efficacy beliefs of pre-service home economics teachers.

## Internal Consistency Reliability of TSES

The results of this study showed that the internal consistency reliabilities for the subscales of TSES were: Efficacy for instructional strategies ( $\alpha = .86$ ), Efficacy for student engagement ( $\alpha = .90$ ), and Efficacy for classroom management ( $\alpha = .88$ ) and the internal consistency reliability for the entire scale ( $\alpha = .87$ ) were considered very high and theoretically significant (Awofala & Akinoso, 2017). In short, the three measures epitomize empirically discrete and internally dependable sense of efficacy constructs. The two weeks test-retest reliabilities of .84, .86, .82, and .80 for the entire scale, Efficacy for instructional strategies, Efficacy for student engagement, and Efficacy for classroom management were calculated, correspondingly. The three dimensions indicated suitable test-retest reliability and internal consistency reliability.

## Preliminary analyses before Exploratory Factor Analysis (EFA)

To establish the factor structure of the 24 items TSES, the principal components factor analyses (PCA) with varimax rotation was used. Before this, the data were screened for outliers and missing values. There was no missing value for the 117 respondents and no concern about normality, linearity, multicollinearity, and singularity. Table 1 showed the descriptive statistics for the total score and three sub-scale scores for the sample. The skewness and kurtosis levels were within acceptable ranges. The intercorrelations among the subscale ranged from 0.68 to 0.86 and are statistically significant.

Table 1. Scale-level descriptive statistics for TSES total and subscale scores.

	Sample (n=351)					
	M	SD	Skewness	Std.Error	Kurtosis	Std.Error
Student engagement	2.36	1.29	.62	.13	-.51	.26
Instructional strategy	2.31	1.11	.58	.13	-.33	.26
Classroom managment	3.55	1.40	-.73	.13	-.80	.26
TSES Total	2.74	.62	.21	.13	-.56	.26

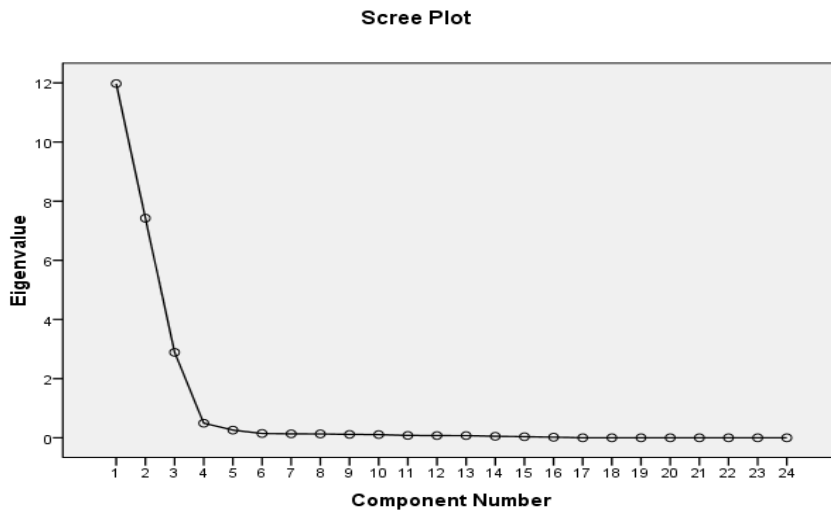
Note. Scale minimum = 1.00; scale maximum =5.00.

Preliminary investigation showed adequacy of the input data as confirmed by the Bartlett's test of sphericity,  $\chi^2 = 3753.01$ ;  $df=65$ ;  $p<.001$  which tests the null hypothesis that the correlation matrix is an identity matrix. The Kaiser-Meyer-Olkin measure of sampling adequacy (MSA) fell within acceptable range (values of .60 and above) with a value of .88. Each of the variables also exceeded the threshold value (.60) of MSA which ranged from .780 to .936. Most of the partial correlations were small as indicated by the anti-image correlation matrix. These measures all led to the conclusion that the set of 24 items of TSES was appropriate for PCA.

## Exploratory Factor Analysis of TSES

Principal components analysis (PCA) was conducted to fix the number of factors to be retained in the TSES subcategories based on the conjecture of a varimax interaction between factors. The initial pre-rotation resulted in three factors with eigenvalues greater than 1 (Kaiser, 1960; Tabachnick & Fidell, 2007), accounting for approximately 92.86% and based on its pattern of factor loadings, this unrotated factor model was theoretically less meaningful and as such was difficult to interpret. Therefore, the analysis proceeded to rotate the factor matrix orthogonally to achieve a simple and theoretically more meaningful solution. Varimax rotation was used for the orthogonal solution. By rotating three factors, the total percentage of variance accounted for remained at 92.86%. An examination of Cattell's (1966) scree test produced a three-factor solution (Figure 1). This seemed to support the original theory on which the instrument is based which had proposed three factors. For interpretational clarity, a salient loading (Gorsuch, 1983, p. 208) of 0.40 was selected as one that is sufficiently high to assume the existence of an item-factor relationship. The first factor, which accounted for 49.90% of the variance (eigen value=11.98), was labelled Efficacy for students engagement and this factor included 8 items. The second factor, Efficacy for instructional strategies included 8 items and accounted for 30.93% of the variance (eigenvalue=7.12). The third factor, Efficacy for classroom management included 8 items and accounted for 12.03% of the variance (eigenvalue=2.89). The study showed that all the

communalities for the factor analysis satisfied the minimum requirement of being larger than 0.50. These ranged from 0.89 to 0.99. Figure 1 below is the scree plot which graphs the eigenvalue against the component number and is suggestive of a three-component model.



**Fig. 1.** Cattell scree plot showing the number of components and eigenvalues of the correlation matrix.

Table 2 displayed the factor loadings for the orthogonal three-factor model of TSES. All items loaded .80 and above on their primary factor and none of the secondary loadings exceeded .30.

**Table 1.** Item Loadings and Communalities ( $h^2$ ) for Principal Components Analysis on TSES Items Depicting Three-Factor Model

Item	Factor Loadings $h^2$		
	1	2	3
<b>Efficacy for Student Engagement (<math>\alpha = .90</math>)</b>			
1. How much can you do to get through to the most difficult students?	.917	.022	-.286
2. How much can you do to help your students think critically? .970	.946	-.033	-.272
4. How much can you do to motivate students who show low interest in school work? .989	.951	.005	-.292
6. How much can you do to get students to believe they can do well in schoolwork? .942	.922	.017	-.301
9. How much can you do to help your students value learning? .923	.913	.074	-.291
12. How much can you do to foster student creativity? .989	.951	.005	-.291
14. How much can you do to improve the understanding of a student who is failing? .928	.913	.074	-.291
22. How much can you assist families in helping their children do well in school? .989	.951	.005	-.292
<b>Efficacy for Instructional Strategies (<math>\alpha = .86</math>)</b>			
7. How well can you respond to difficult questions from your students?	.001	.974	.108
10. How much can you gauge student comprehension of what you have taught?	-.020	.933	.129
11. To what extent can you craft good questions for your students? .945	.060	.967	.084
17. How much can you do to adjust your lessons to the proper level for individual			

students? .885		.021	.936	.090
18. How much can you use a variety of assessment strategies?	.001	.914	.108	.960
20. To what extent can you provide an alternative explanation or example when students are confused?	-.020	.933	.129	.888
23. How well can you implement alternative strategies in your classroom? .945		.060	.967	.084
24. How well can you provide appropriate challenges for very capable students?	.021	.936	.090	.885
<b>Efficacy for Classroom Management (<math>\alpha = .88</math>)</b>				
3. How much can you do to control disruptive behaviour in the classroom? .958		-.305	.082	.927
5. To what extent can you make your expectations clear about student behaviour? .957		-.304	.081	.926
8. How well can you establish routines to keep activities running smoothly? .902		-.280	.154	.894
13. How much can you do to get children to follow classroom rules? .930		-.283	.141	.911
15. How much can you do to calm a student who is disruptive or noisy? .874		-.276	.143	.882
16. How well can you establish a classroom management system with each group of students?	-.286	.118	.885	.879
19. How well can you keep a few problems students from ruining an entire lesson? .879		-.219	.120	.874
21. How well can you respond to defiant students?	-.281	.117	.900	.903

Note:  $h^2$ =communalities

Extraction Method: Principal Components Analysis.

Rotation Method: Varimax with Kaiser Normalization.

## Discussion

The initial stride in guaranteeing operational mediation tactics to arrest lack of teaching efficacy is to produce a psychometrically wide-ranging, but also effective measurement of teaching efficacy beliefs. This study renewed the commitment to theoretically focused and empirically built explorations that add to the extant literature on psychometric properties of teacher sense of efficacy instrument for pre-service home economics teachers in a completely diverse setting and location.

First in this study attempt was made to clarify the reliability of the TSES and its sub-scale and two methods for ascertaining an instrument reliability have been employed: Cronbach alpha reliability coefficient and test-retest reliability coefficient (Awofala & Akinoso, 2017). The results showed that TSES has a good internal consistency reliability using Cronbach alpha. The long-form TSES used in the study has reliability coefficients greater than .80. Each of the sub-scales of TSES (i.e., Student Engagement, Instructional Strategies, and Classroom Management) has a reliability coefficient higher than .80. More so, the coefficients of congruence for the TSES and its sub-scales were generally strong. For construct validity of the TSES, we employed item to total score correlations. Each item in the three sub-scales was found to correlate highly significantly at ( $p < .01$ ) with the total score for that sub-scale. The correlation coefficients for each of the item in the respective sub-scales reflect the factor loading coefficients that were yielded as a result of running a principal component exploratory factor analysis (Awofala & Akinoso, 2017). The high and meaningful reliabilities recorded in this study have proved that the TSES would be useful and handy for home economics educators in depicting the teaching efficacy beliefs of their pre-service teachers. The present study has shown that the TSES is a reliable and valid measure of pre-service home economics teachers' sense of efficacy beliefs. Second, this study examined the level of sense of teaching efficacy beliefs of pre-service home economics teachers. Majority of the pre-service home economics teachers in this study had low sense of teaching efficacy beliefs ( $N=219$  (62.39%),  $Mean=2.36$ ,  $SD=0.38$ ) while 90 (25.64%) of the pre-service home economics teachers showed high sense of teaching efficacy beliefs ( $Mean=3.56$ ,  $SD=0.31$ ) and only 42 representing 11.97% of the pre-service home economics teachers had moderate sense of teaching efficacy beliefs ( $Mean=3$ ,  $SD=0.00$ ). The low sense of teaching efficacy beliefs in the entire sample might be a result of their inexperience in teaching as they are yet to be fully

engrossed in the art of teaching in the normal classroom setting. This finding negated the finding of Arigbabu and Oludipe (2010) in which they found high science teaching efficacy beliefs in the Nigerian population. It is important to note that pre-service teachers with high teaching efficacy beliefs may not be digitally distracted in the classroom (Awofala, Olabiyi, Okunuga, Ojo, Awofala & Lawani, 2020) and the self-efficacy beliefs may help them increase their entrepreneurial intention about teaching (Awofala, 2023; Awofala, Olabiyi, Ojo, Oladipo, Fatade, & Udeani, 2023) to promote their 21<sup>st</sup> century skills in education (Awofala, Ojo, Okunuga, Babajide, Olbiyi & Adenle, 2019) and critical thinking skills (Okunuga, Awofala, & Osarenren, 2020; Awofala & Lawal, 2022) which may be more amenable to constructivist teaching strategies of cooperative learning (Awofala & Lawani, 2020; Olabiyi & Awofala, 2019) and differentiated instruction (Awofala & Lawani, 2020).

Third, this study investigated the likelihood of a factor structure fundamental to the TSES and principal components factor analysis computed with varimax rotation supported a three-factor model of teacher sense of efficacy namely, Student Engagement, Instructional Strategies, and Classroom Management. This result supported the groundbreaking efforts of Tschannen-Moran and Woolfolk Hoy (2001) at developing a multidimensional teacher sense of efficacy beliefs instrument. This result suggests that the pre-service home economics teachers' beliefs are differentiated into three distinct factors, and this might have resulted from experience garnered by these pre-service teachers in the course of their teacher education programme concerning classroom management, engagement, and instructional practices. However, this ran contrary to the findings of Fives and Buehl (2010) in which one-factor solution emerged for the pre-service teacher data but concurred with the three-factor solution emerged for practising teachers (Fives & Buehl, 2010). The three interpretable factors found in the current sample confirmed the cultural invariance nature of the TSES. The high reliabilities of the three teaching efficacy dimensions reveal the precision of the measurement, hence conforming to the requisites for researching into construct validity. From a specialist's viewpoint and in recognition of the multidimensional nature of the teaching efficacy beliefs in the measurement, there is a need to identify expert and individual development (Skaalvik & Skaalvik, 2007). Interestingly, this piece of information may be utilized for current and definite mediations in consolidating teachers' sense of efficacy beliefs as a prelude to improving their well-being and job fulfilment to avert fatigue and emotive collapse (Skaalvik & Skaalvik, 2010; Klassen, Tze, Betts & Gordon, 2011). The delineation of teacher sense of efficacy into three dimensions also reveals that the construct agrees with the facets of teaching quality like classroom management, student engagement, and instructional strategies of intellectual stimulation that are the preoccupation of researchers working on instructional and pedagogical quality often evaluated at the level of the student (Wagner, Göllner, Helmke, Trautwein & Lüdtke, 2013; OECD, 2014; Creemers & Kyriakides, 2008; Seidel & Shavelson, 2007) for teaching effectiveness (Awofala, 2012).

In this wise, the TSES may be useful for different professionals to assess the level of teaching efficacy of pre-service teachers. First, home economics educators may use this instrument as a selection tool to gauge the level of pre-service home economics teachers in their teaching practicum. Second, researchers may deploy the instrument as a research tool to study the relationships between teacher sense of efficacy and other important constructs.

## Conclusion

Despite the evidence of interpretable three-factor structure for the TSES measure and the invariance of the underlying model with pre-service home economics teachers in Nigeria, the study generalization is limited by the in-built bias of the factor-analytic procedure (e.g., selection of the number of factors, choice of rotation). Also, the demographic characteristics of the sample may be a limiting factor as pattern differences due to gender or cultural groupings were unexplored and may exist (Awofala & Akinoso, 2017). However, more investigation should be conducted to confirm the higher-order factor structure of the TSES and to evaluate the stability of the three factors across different samples in vocational education contexts. In conclusion, future studies should investigate concurrent validity of the TSES by correlating its scores with other valid and reliable measures such as the teacher efficacy scale (Gibson & Dembo, 1984) for probable generalisation of the study findings.

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