Woolsey, M. L., Harrison, T. J., & Gardner III, R. (2004). A preliminary examination of instructional arrangements, teaching behaviors, levels of academic responding of deaf middle school students in three different educational settings. *Education & Treatment of Children, 27*(3), 263–279.

Woolfolk Hoy, A., Hoy, W. K., & Davis, H. A. (2009). Teachers' self-efficacy beliefs. In K. Wentzel & A. Wigfield (Eds.), *Handbook of motivation at school* (pp. 627- 653). New York, NY: Routled

Wyatt, M. (2014). Towards a re-conceptualization of teachers' self-efficacy beliefs: Tackling enduring problems with the quantitative research and moving on. *International Journal of Research & Method in Education*, 37, 1 66-1 89. doi: 10.1 080/1743727X.2012. 742050.

Zakariya, Y. F. (2020). Effects of school climate and teacher self-efficacy on job satisfaction of mostly STEM teachers: A structural multi- group invariance approach. *International Journal of STEM Education, 7(1),* 1–12.

Sherer, M., Maddux, J. E., Mercandante, B., Prentice-Dunn, S., Jacobs, B., & Rogers, R. W. (1982). The self-efficacy scale: Construction and validation. *Psychological Reports, 51(2),* 663–671.

Skaalvik, E. M., & Skaalvik, S. (2007). Dimensions of teacher self-efficacy and relations with strain factors, perceived collective teacher efficacy, and teacher burnout. *Journal of Educational Psychology*, *99*(3), 611.

Skaalvik, E. M., & Skaalvik, S. (2010). Teacher self-efficacy and teacher burnout: A study of relations. *Teaching and Teacher Education*, *26*(4), 1059-1069.

Smith, G. T. (2005). On construct validity: issues of method and measurement. *Psychological Assessment*, *17*(4), 396.

Tschannen-Moran, M., & Hoy, A. W. (2001). Teacher efficacy: Capturing an elusive construct. *Teaching and Teacher Education, 17(7),* 783–805.

Tschannen-Moran, M., Woolfolk Hoy, A., & Hoy, W. K. (1998). Teacher efficacy: its meaning and measure. *Review of Educational Research, 68*(2), 202.

Usher, E. L., & Pajares, F. (2008). Self-efficacy for self-regulated learning: A validation study. *Educational and Psychological Measurement*, *68*(3), 443-463.

Vermeulen, J., Denessen, E., & Knoors, H. (2012). Mainstream teachers about including   deaf or hard of hearing students. *Teaching and Teacher Education, 28,* 174-181.

Weisel, A., & Dror, O. (2006). School climate, sense of efficacy and Israeli teachers' attitudes toward inclusion of students with special needs. *Education, Citizenship & Social Justice, 1*(2), 157-174.

Weisel, A., & Dror, O. (2006). School climate, sense of efficacy and Israeli teachers' attitudes toward inclusion of students with special needs. *Education, Citizenship and Social Justice*, *1*(2), 157-174.

Pendergast, D., Garvis, S., & Keogh, J. (2011). Pre-service student-teacher self-efficacy beliefs: an insight into the making of teachers. *Australian Journal of Teacher Education*, *36*(12), 46-57.

Pizzo, L. (2016). d/Deaf and hard of hearing multilingual learners: The development of communication and language. *American Annals of the Deaf*, *161*(1), 17-32.

Romi, S., & Leyser, Y. (2006). Exploring inclusion preservice training needs: a study of variables associated with attitudes and self-efficacy beliefs. *European Journal of Special Needs Education*, *21*(1), 85-105.

Ruble, L. A., Dalrymple, N. J., & McGrew, J. H. (2010). The effects of consultation on individualized education program outcomes for young children with autism: The collaborative model for promoting competence and success. *Journal of Early Intervention*, *32*(4), 286-301.

Ruble, L., & McGrew, J. H. (2013). Teacher and child predictors of achieving IEP goals of children with autism. *Journal of Autism and Developmental Disorders*, *43*, 2748-2763.

Ruble, L. A., Usher, E. L., & McGrew, J. H. (2011). Preliminary investigation of the sources of self-efficacy among teachers of students with autism. *Focus on Autism and Other Developmental Disabilities*, *26*(2), 67-74.

Saloviita, T. (2015). Measuring pre-service teachers' attitudes towards inclusive education: Psychometric properties of the TAIS scale. *Teaching and Teacher Education*, *52*, 66-72.

Schermelleh-Engel, K., Moosbrugger, H., & Müller, H. (2003). Evaluating the fit of structural equation models: Tests of significance and descriptive goodness-of-fit measures. *Methods of Psychological Research Online*, *8*(2), 23-74.

Sharma, U., & Jacobs, D. K. (2016). Predicting in-service educators' intentions to teach in inclusive classrooms in India and Australia. *Teaching and Teacher Education*, *55*, 13-23.

Luckner, J. L., & Ayantoye, C. (2013). Itinerant teachers of students who are deaf or hard of hearing: Practices and preparation. *Journal of Deaf Studies and Deaf Education*, *18*(3), 409–423. doi:10.1093/deafed/ent015

Luckner, J. L., & Muir, S. (2001). Successful students who are deaf in general education settings. *American Annals of the Deaf, 146*(5), 435-445.

Martuza, V. R. (1977). Applying norm-referenced and criterion-referenced measurement in education. *(No Title)*.

Malinen, O., Savolainen, H., & Xu, J. (2012). Beijing in-service teachers' self-efficacy and attitudes towards inclusive education. *Teaching and Teacher Education, 28*(4), 526-534.

Maurer, T. J., & Pierce, H. R. (1998). A comparison of Likert scale and traditional measures of self-efficacy. *Journal of Applied Psychology, 83*(2), 324–329. https://doi.org/10.1037/0021-9010.83.2.324.

Muthén, L. K., & Muthén, B. O. (2012). *Mplus user's guide (7th ed.)*. Los Angeles, CA. Netemeyer, R. G., Bearden, W. O., & Sharma, S. (2003). *Scaling procedures: Issues and applications*. sage publications.

Pajares, F. (1997). Current directions in self-efficacy research. *Advances in Motivation and Achievement*, *10*(149), 1-49.

Pallant, J. (2013). *SPSS survival manual: A step by step guide to data analysis using IBM SPSS,* (5th ed.). England, UK: McGraw-Hill Education press.

Raykov, T. (1997). Estimation of composite reliability for congeneric measures. *Applied Psychological Measurement*, 21(2), 173-184.

Raykov, T., & Shrout, P. E. (2002). Reliability of scales with general structure: Point and interval estimation using a structural equation modeling approach. *Structural Equation Modeling*, 9(2), 195-212.

Grimm, K. J., & Widaman, K. F. (2012). Construct validity. In H. Cooper, P. M. Camic, D. L. Long, A. T. Panter, D. Rindskopf, & K. J. Sher (Eds.), *APA handbook of research methods in psychology, Vol. 1. Foundations, planning, measures, and psychometrics* (pp. 621–642). American Psychological Association. https://doi.org/10.1037/13619-033.

Guskey, T. R., & Passaro, P. D. (1994). Teacher efficacy: a study of construct dimensions.*American Educational Research Journal, 31*(3), 627-643.

Hildebrandt, C. (2017). Informatics Teachers' Self-efficacy-A Survey Instrument and First Results. In *Tomorrow's Learning: Involving Everyone. Learning with and about Technologies and Computing: 11th IFIP TC 3 World Conference on Computers in Education, WCCE 2017, Dublin, Ireland, July 3-6, 2017, Revised Selected Papers 11* (pp. 536-546). Springer International Publishing.

Hoe, S. L. (2008). Issues and procedures in adopting structural equation modelling technique. *Journal of Quantitative Methods*, *3*(1), 76.

Holzberger, D., Philipp, A., & Kunter, M. (2013). How teachers' self-efficacy is related to instructional quality: A longitudinal analysis. *Journal of Educational Psychology, 105(3)*, 774–786.

Inel Ekici, D. (2018). Development of pre-service teachers' teaching self-efficacy beliefs through an online community of practice. *Asia pacific education review*, *19*, 27-40.

Kline, R. B. (2016). *Principles and Practice of Structural Equation Modeling, 4th Eds*. New York, NY: The Guilford Press.

Kline, R. B. (2011). *Principles and practice for structural equation modelling (3rd Eds)*. New York, NY: The Guilford Press.

Little, T. D., Lindenberger, U., & Nesselroade, J. R. (1999). On selecting indicators for multivariate measurement and modeling with latent variables: When "good" indicators are bad and "bad" indicators are good. *Psychological Methods, 4,* 192–211.

Dellinger, A. B., Bobbett, J. J., Olivier, D. F., & Ellett, C. D. (2008). Measuring teachers' self-efficacy beliefs: Development and use of the TEBS-Self. *Teaching and Teacher Education*, *24*(3), 751-766.

Donne, V., & Zigmond, N. (2008). An observational study of reading instruction for students who are deaf or hard of hearing in public schools. *Communication   Disorders   Quarterly, 29*, 219-235.

Eleweke, C. J., Gilbert, S., Bays, D., & Austin, E. (2008). Information about support services for families of young children with hearing loss: A review of some useful outcomes and challenges. *Deafness and Education International, 10*(4), 190-212. doi:10.1002/dei.2470

Eriks-Brophy, A., Smith, A., Olds, J., Fitzpatrick, E., Duquette, C., & Whittingham, J. (2012). Communication, academic, and social skills of young adults with hearing loss. *The Volta Review, 112*(1), 5-35.

Fu, Y. (2017). *Mainstream preservice teachers' self-efficacy to teach English language learners: Scale development and initial validation*. (Publication No. 10268162) [Doctoral dissertation, Indiana University of Pennsylvania]. ProQuest Dissertations Publishing.

Gallaudet Research Institute. (2013). *Regional and national summary report of data from the 2011–2012 Annual Survey of Deaf and Hard of Hearing Children and Youth*. Washington, DC: Gallaudet University.

Gibson, S., & Dembo, M. H. (1984). Teacher efficacy: A construct validation. *Journal of Educational Psychology, 76*(4), 569e582.

Graham, S., Hsiang, T., Ray, A., & Zheng, G. (2020). Do teachers' epistemological beliefs, attitudes, and perceptions of student progress predict teacher efficacy. *Manuscript submitted for publication*.

Green, S. B., & Yang, Y. (2009). Reliability of summed item scores using structural equation modeling: An alternative to coefficient alpha. *Psychometrika, 74(1),* 155-167.

Borders, C., Barnett, D., & Bauer, A. (2010). How are they really doing? Observation of inclusionary classroom participation for children with mild-to-moderate deafness. *Journal of Deaf Studies and Deaf Education, 15*(4), 348-357.

Brouwers, A., & Tomic, W. (2000). A longitudinal study of teacher burnout and perceived self-efficacy in classroom management. *Teaching and Teacher education*, *16*(2), 239-253.

Brunner, M., & Süb, H. M. (2005). Analyzing the reliability of multidimensional measures: An example from intelligence research. *Educational* and *Psychological Measurement, 65*, 227–240.

Cannon, J. E., & Luckner, J. L. (2016). Increasing cultural and linguistic diversity in deaf education teacher preparation programs. *American Annals of the Deaf*, *161*(1), 89-103.

Chan, W., Yung, Y. F., & Bentler, P. M. (1995). A Note on Using and Unbiased Weight Matrix in the ADF Test Statistic. *Multivariate Behavioral Research*, *30*(4), 453-459.

Corral, S., & Calvete, E. (2000). Machiavellianism: Dimensionality of the Mach IV and its relation to self-monitoring in a Spanish sample. *The Spanish Journal of Psychology*, *3*, 3-13.

Council on Exceptional Children. (2015). *CEC initial and advanced specialty sets*. Retrieved from https://www.cec.sped.org/Standards/ Special-Educator-Professional-Preparation/

CEC-Initial-and-Advanced-Specialty-Sets

Council on Education of the Deaf. (2015). *CED standards for programs preparing teachers of students who are deaf and hard of hear- ing*. Retrieved from http://councilondeafed .org/standards/

Currant, P.J., West, S.G., & Finch, J.F. (1996). The robustness of test statistics to nonnormality and specification error in confirmatory factor analysis. *Psychological Methods*, *1*, 16–29.

Davila, R. R. (2004). Reviewing the past, assessing the present, and projecting the future. In D. Powers & G. Leigh (Eds.) *Educating Deaf Children: Global Perspective* (pp. 3-12). Washington, DC: Gallaudet University Press.

References

Ajmal, F., u Nisa, Z., & Jumani, N. B. (2020). Self-efficacy of elementary teachers and their attitude towards practices of classroom management. *sjesr*, *3*(3), 246-251.

Alhuzimi, T. E. (2022). Psychometric Properties of a Self-efficacy Scale for Teachers of Autistic Students in Saudi Environment. *Dirasat: Educational Sciences*, *49*(4), 197-208.

Alnahdi, G. (2020). Are we ready for inclusion? Teachers' perceived self-efficacy for inclusive education in Saudi Arabia. *Int. J. Disabil. Dev. Educ.* 67, 182–193. doi: 10.1080/1034912X.2019.1634795

Alnahdi, G. (2019). The Arabic version of the teacher efficacy for inclusive practices (TEIP-AR) scale: a construct validity study. *Cogent Educ.* 6:1618516. doi: 10.1080/2331186X.2019.1618516.

Alvarez, L., Ananda, S., Walqui, A., Sato, E., & Rabinowitz, S. (2014). *Focusing formative assessment on the needs of English language learners.* San Francisco, CA: WestEd.

Angelides, P., & Aravi, C. (2006/2007). A comparative perspective on the experiences of deaf and hard-of-hearing individuals as students at mainstream and special schools. *American Annals of the Deaf, 151*(5), 476-487.

Antonak, R. F., & Larrivee, B. (1995). Psychometric analysis and revision of the opinions relative to mainstreaming scale. *Exceptional Children*, 62, 139-149.

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

Bandura, A. (2006). Adolescent development from an agentic perspective. In T. Urdan, & F. Pajares (Eds.), *Self-efficacy beliefs of adolescents* (pp. 1-43). Charlotte, NC: Information Age.

Bentler, P. M. (2009). Alpha, dimension-free, and model-based internal consistency reliability. *Psychometrika, 74(1)*, 137-143.

ability, such as McDonald's omega, which is a more general procedure that would help fit more situations than Cronbach alpha. It also produces a more accurate reliability estimate and yields a reliability estimate comparable to Cronbach alpha. Based on the data, I conducted the omega coefficient and the Cronbach alpha test. The results showed that the omega test assisted in estimating the composite reliability of a multi-item teachers' efficacy scale, which measures a single latent construct.

In addition, the scale focused only on the teachers' perceptions of DHH students, while other school members' perceptions were not solicited, such as administrators and supervisors; therefore, it cannot be supposed that other school members would have perceptions like those of the study sample. For future researchers, however, the researcher suggests replicating this scale with a larger sample size. Also, it is recommended to use the scale with multiple groups. Finally, further research on this scale and its application in different contexts can yield valuable insights for the ongoing improvement of deaf education programs worldwide.

Conclusion

This study aimed to develop reliable and valid scales to measure teachers' self-efficacy for DHH students in Saudi Arabia. The study gathered data from 214 teachers of DHH students in Saudi Arabia. Based on the findings of the analysis, the teachers' efficacy scales obtained good reliability scores for all five sub-factors. I also measured this scale's validity. In sum, the findings presented in this study offer empirical evidence and support for the validity and reliability of the TSEDE scale; hence, it is valuable for research in the field of deaf education.

Based on the findings of the analyses, the teachers' efficacy scales obtained good reliability scores for all five sub-factors. Also, the fit indices of the scale model demonstrated that the proposed 5-factor model is acceptable and compatible with the data. This indicates that the proposed 5-factor theoretical structure of the teachers' efficacy skills scale was confirmed. By examining its various dimensions, we can gain insight into the factors contributing to teacher efficacy in deaf education and its importance in the learning and achievement of DHH students. This understanding can guide the training of teachers and the development of their professional skills, leading to improved teaching practices and, eventually, enhanced DHH student outcomes. Consequently, the result provides researchers with adequate evidence to implement this scale in different fields of deaf education studies.

Despite the benefits of using confirmatory factor analysis to obtain a more accurate teacher efficacy scale, the researcher was likely to face several problems when conducting this type of analysis for the purpose of his study. For example, the researcher could not get a large sample size in order to obtain a stable parameter estimate (Chan, Yung, & Bentler, 1995; Currant, West, & Finch, 1996). More specifically, 72% of respondents in the survey were male, while only 28% were female teachers. Having an equal number of female teachers to male teachers is important because each group teaches in separate schools' environments and each may have different perceptions about teacher self-efficacy; hence, it is necessary to consider that.

Also, there was a difference between the Cronbach alpha score and the omega coefficient score. This discrepancy occurred because the data needed to meet the Cronbach alpha requirements, such as having a larger sample size. For this reason, I have to consider alternative approaches to assessing reli-

The results from Table 2 show that the score of reliability for subscales using Cronbach alpha was as follows: communication self-efficacy score =0.703, teaching and curriculum self-efficacy score =0.851, class behavior management self-efficacy score =0.875, assessment self-efficacy score =0.755, and collaboration self-efficacy score =0.814. To improve reliability, researchers deleted some items with a lower correlation, which could have been more helpful; hence, I conducted omega coefficient testing. The findings showed that teachers' efficacy scales obtained using the omega coefficient had higher reliability scores for sub-factors as follows: communication self-efficacy score =0.707, teaching and curriculum self-efficacy score =0.854, class behavior management self-efficacy score =0.877, assessment self-efficacy score =0.801, and collaboration self-efficacy score =0.814 compared to Cronbach alpha. Finally, I calculated all the scale's α and ω values separately. I found that the α was 0.942 and the ω was 0.948 for the entire scale. In short, the TSEDE is highly reliable.

Discussion

Research indicates that teachers' self-efficacy has a crucial role in their commitment, perseverance, and the quality of their education (Holzberger et al., 2013; Zakariya, 2020). Despite a substantial body of research that has provided evidence regarding the significant impact of teachers' self-efficacy on students (e.g., Ajmal et al., 2020; Hildebrandt, 2017; Zakariya, 2020), a limited amount of research has been conducted to investigate the accuracy and reliability of teachers' self-efficacy scales across various groups of deaf education teachers in Saudi Arabia. Therefore, the present study aimed to develop reliable and valid scales to measure teachers' self-efficacy for DHH students in Saudi Arabia.

SRMR = 0.029; IFI = 0.885; and TLI = 0.864. In addition, items that exhibited correlated error variances that were related to each other were under the same factors and had similar characteristics. Hence, I added error covariance between items that contributed significantly to χ2 and subsequently conducted a repeated CFA. These goodness-of-fit values also demonstrated that the proposed 5-factor model is acceptable and compatible with the data. These results confirmed the proposed 5-factor theoretical structure of the teachers' efficacy skills scale. In sum, CFA supported the final version of the TSEDE with five factors and 26 items in total.

Reliability. In regard to internal consistency, two types of reliability testing (Cronbach Alpha and Omega Coefficient) were performed through SPSS as well as Mplus for a total of 26 items measuring the five constructs in the research model: communication self-efficacy subscale [4 items: M1, M2, M4, M6], teaching and curriculum self-efficacy subscale [10 items: T1, T2, T3, T5, T8, T9, T10, T11, T12, T13], behavior management self-efficacy subscale [5 items: B1, B2, B3, B4, B5], assessment self-efficacy subscale [4 items: A1, A2, A3, A4], and collaboration self-efficacy subscale [3 items: L1, L2, L3].

Table 2: Reliability (Omega Coefficient vs. Cronbach Alpha Coefficient)

Factor	Total Item No.	Coefficient ω	Coefficient α
Communication	4	0.707	0.705
Teaching& Curriculum	10	0.854	0.851
Assessment	4	0.801	0.755
Behavior management	5	0.877	0.875
Collaboration	3	0.814	0.814
Total	26	0.948	0.942

Confirmatory Factor Analysis

In order to answer the study's main questions, a confirmatory factor analysis (CFA) was also performed to examine the model fit of teachers' efficacy scales. CFA assesses whether a hypothetical model of factors fits into the data. CFA is now a widely reliable method for assessing and confirming dimensionality (Netemeyer et al., 2003). Therefore, CFA was conducted to support the structure, and It called goodness of fit indices determined model-data conformity, including chi-square goodness of fit ($\chi 2$), goodness of fit index (GFI), comparative fit index (CFI), adjusted goodness of fit index (AGFI), non-normed fit index (NNFI), normed fit index (NFI), standardized root mean square residuals (SRMR), and root mean square error of approximation (RMSEA). If the $\chi 2/df$ rate is three or below and the CFI, NNFI, NFI, GFI, and AGFI values are all over 0.90, the factor structure is considered to have excellent conformity in standard CFA results. A structure is also considered to have good conformity if the CFI, NNFI, NFI, GFI, and AGFI values fall within the range of 0.80 to 0.90 and the SRMR value is between 0.05 and 0.1 (Corral & Calvete, 2000; Hoe, 2008; Kline, 2011; Schermelleh-Engel et al., 2003). If the RMSEA score is less than 0.05, it indicates a high level of conformity. Similarly, if the value falls within the range of 0.05 and 0.08, it is acceptable conformity. If the value falls within the range of 0.08 and 0.10, it indicates mediocre conformity (Hoe, 2008). Alternative research indicates that GFI and AGFI may not be the most optimal indicators of fit and, as a result, should not be solely relied upon when assessing fit (Netemeyer et al., 2003).

In this current study, a confirmatory factor analysis (CFA) was also performed to examine the model fit of teachers' self-efficacy scales. The CFA of the SATEDE scales revealed the following results: $\chi 2 = 722$, df = 121, p < 0.001; RMSEA = 0.06; NFI = 0.83; CFI = 0.882; GFI = 0.84; AGFI = 0.80;

Table 2: *EFA Results*

Item	Factor 1 Teaching &Curriculum	Factor 2 Behavior	Factor 3 Communication	Factor 4 Collaboration	Factor 5 Assessment
T1	.696				
T2	.624				
T3	.621				
T5	.615				
T8	.610				
T9	.605				
T10	.584				
T11	.558				
T12	.520				
T13	.513				
B5		.786			
B4		.711			
B3		.707			
B1		.704			
B2		.696			
M2			.763		
M1			.662		
M4			.584		
M6			.557		
L2				.896	
L1				.783	
L3				.771	
A2					.837
A3					.830
A4					.622
A1					.710

did not function as expected for the five-factor scale. Hence, these items were removed from further analysis.

The author repeated the EFA without including these items. The results of this new analysis confirmed the five– dimensional structure theoretically defined in the research (see Table 2). The Kaiser – Meyer – Olkin MSA was 0.861. The five dimensions explained a total of 58.106 percent of the variance among the items in the study, with Component 1 contributing 32.46%, and component 2 contributing 7.85, component 3 contributing 6.73%, component 4 contributing 5.39%, component 5 contributing 5.11%. The Bartlett's Test of sphericity proved to be significant , and all communalities were over the required value of 0.500. The five factors identified as part of this EFA aligned with the theoretical proposition in this research.

Finally, factor 1 includes items T1, T2, T3, T5, T8, T9, T10, T11, T12 &T13, referring to teaching and curriculum self-efficacy subscale. Factor 2 gathers items B, B2, B3, B4, & B5, which represents to behavior management self-efficacy subscale. Factor 3 includes items M1, M2, M3, M4, & M6, referring to teacher communication self-efficacy subscale. Factor 4 gathers items L1, L2, L3, which represents to collaboration self-efficacy subscale. Finally, factor 5 includes items A, A2, A3, A4, referring to assessment self-efficacy subscale. Factor Loadings are presented in table 2.

Therefore, α and ω represent the proportion of the overall variance of a scale that can be attributed to a common source, i.e., the actual score of the latent construct being measured (Netemeyer et al., 2003). Indeed, reliability estimators based on confirmatory factor analysis may be efficiently used for all situations in which violation of the assumptions for alpha is suspected (Raykov, 1997).

Results

Characteristics of respondents

The **characteristics** of the **respondents** is presented in Table 1. A total of 214 teachers for DHH students participated in the study. Of the participants, 72 % were male and 28% % were female.

Table 1. **Characteristics** of the sample ($N = 214$)

Variable	Number and Percentage
Gender (N = 214)	
Male	154 (72%)
Female	60 (28%)

Exploratory factor analysis (EFA)

EFA using the principal analysis (PF) method was conducted. The minimum factor loading criteria was set to 0.50. The results were significant, which indicates its suitability for factor analysis. The Kaiser – Meyer – Olkin measure of

sampling adequacy (MSA), above 0.858 are considered appropriate for factor analysis. Nonetheless, in this initial EFA, some items (i.e. "the teaching& curriculum: T4, T6, T7,", "the

communication: M5", "the collaboration: L4, L5, L6, L7", "the assessment: A5, A6, A7, A8")

analysis (CFA).

Exploratory factor analysis (EFA). EFA was used. Prior to conduct EFA, the suitability of the data for factor analysis was evaluated. The correction matrix was examined, and many coefficients with values of.3 and above were detected. The Kaiser Meyer-Olkin value of.099, which surpasses the acceptable threshold of.6 as suggested by Kaiser (1970, 1974), demonstrates statistical significance. This finding provides evidence for the correlation matrix›s factorability.

A confirmatory factor analysis (CFA). **CFA** was also performed to examine the model fit of teachers' efficacy scales (i.e., to assess how the items measured the corresponding construct) by using the Mplus software (Muthen & Muthen, 2012). It allows for exploring relationships between variables in the process of validating and fitting the measurement model. It is considered a more powerful statistical process because it considers measurement error and multiple latent independent variables that may be measured by various indicators (Kline, 2016). In addition, Mplus software was used to analyze the data (i.e., to assess how the items measured the corresponding construct).

Reliability. The α and ω coefficients measure the degree of interrelation between a set of items that are intended to measure a single construct. It also indicates the common variance between these items. Therefore, α and ω represent the proportion of the overall variance of a scale that can be attributed to a common source, i.e., the actual score of the latent construct being measured (Netemeyer et al., 2003). The scale›s reliability was determined using Cronbach Alpha (α)and Omega Coefficient (ω), which can estimate reliability. The α and ω coefficients measure the degree of interrelation between a set of items that are intended to measure a single construct. It also indicates the common variance between these items.

Validity.

In psychometrics, validity is concerned with the extent to which a particular scale measures what its developer intends it to measure (Furr & Bacharach, 2014). This study measured the content validity and construct validity of the TSEDE scale.

Content validity

In order to verify the precision of the survey before it is distributed,a team of four experts at the Department of Special Education at Taif University rated the appropriateness of each item based on four criteria (ambiguity, relevance, simplicity, and clarity) on a 4-point scale (e.g., 1 = not relevant/clear/ simple or doubtful, 2 = relevant/clear/simple or no doubt but needs minor revision, 3 = item needs some revision, 4 = very relevant/clear/simple or meaning is clear). This is to evaluate the scale's validity, an estimate of the instrument's ease of use, clarity, and readability, to assess teacher efficacy in the field of deaf education. Each item was given four different ratings. The item content validity was calculated by determining the proportion of experts who approved the item and assigned it a score of 3 or 4. I analyzed the results and selected only the items that scored higher than 0.75% for each criterion (Martuza, 1977). Any remaining items that did not meet this threshold were excluded, resulting in a scale consisting of 38 items.

Construct Validity.

According to Grimm and Widaman (2012) and Smith (2005), construct validity is how well one scale fits with other scales in line with hypotheses that were derived from theory about the things that are being measured. *Factor analysis of the data obtained from the scale in question is often used as a preferred method* in construct validation (Antonak & Livneh, 1988). Consequently, the TSEDE scale was subjected to exploratory factor analysis (EFA) and confirmatory factor

Data collection

After obtaining ethical approval No. 45-214 from the Scientific Research Ethics Committee (SREC) at Taif University to conduct the study, the researcher contacted all departments of deaf education and schools, asking them to distribute the online scale for this study. After receiving their agreement to participate in the study, the online scale was electronically delivered to schools and teachers of DHH students across the country. Also, the electronic scale link was briefed on the purpose of this study, and they were made aware that the data would be used only for research and their rights not to participate in this study. They were also informed that their participation in the study was completely voluntary and that their identification would not be recognized in the final data analysis. They had the option of declining participation by not completing the scale. Two weeks after distributing the scale, each department and school administrator received a phone call from the researcher to remind and encourage teachers to complete the surveys. Three weeks later, the researcher collected all the completed online surveys.

Data analysis

I analyzed the data using the Statistical Package for the Social Sciences (SPSS version) program (Pallant, 2013) and the Mplus software (Muthen & Muthen, 2012). Descriptive statistics for teachers' self-efficacy towards teaching DHH students in an inclusion setting were calculated using a 4-point Likert scale (1 = do not use to 4 = always). Furthermore, content validity and construct validity were implemented to ensure that the TSEDE scale measured what I intended to measure in this study. Finally, reliability analysis was used.

efficacy in behavior management, and efficacy in collaboration. Therefore, the researcher developed the teacher efficacy scale to evaluate teachers' efficacy in teaching DHH students. This scale was named Teachers Self-Efficacy in Deaf Education (TSEDE). Most of the TSEDE items (n = 31) were adopted from other scales developed and used by other researchers (i.e., Antonak & Larrivee, 1995; Malinen., Savolainen & Xu, 2012; Saloviita, 2015; Sharma & Jacobs, 2016; Fu, 2017) and were changed to suit the context of this study. However, some items (n = 15) were developed by the researcher on the basis of a review of the literature in special education, particularly deaf education (i.e., Angelides & Aravi, 2006/2007; Borders et al., 2010; Davila, 2004; Donne & Zigmond, 2008; Eleweke et al., 2008; Ericks-Brophy et al., 2006; Luckner & Muir, 2001; Vermeulen et al., 2012; Woolsey et al., 2004). It comprised questions relating to participants' demographic information, such as gender. In addition, 40 items measuring the five constructs in the research model were presented: communication self-efficacy subscale, teaching self-efficacy subscale, curriculum self-efficacy subscale, assessment self-efficacy subscale, class management self-efficacy subscale, and collaboration self-efficacy subscale. Finally, this TSEDE scale was used to measure the constructs given below.

The TSEDE scale was first tested in a pilot study, and some items were modified and reworded. All items were measured using a four-point Likert scale, ranging from 1 (do not use) to 4 (always). Literature shows that the Likert scale is a popular method used by researchers to measure teachers' self-efficacy (Maurer & Pierce, 1998). Therefore, the researcher chose a Likert scale to measure the items used in the current study.

that operate in the school setting under which teachers respond to and engage in teaching and learning for their DHH students. The study will examine five constructs: communication efficacy, teaching and curriculum efficacy, assessment efficacy, behavioral management efficacy, and collaboration efficacy. In terms of investigation, the following is the research question: Is the newly developed scale valid and reliable to assess the efficiency of teachers' self-efficacy skills for DHH students?

Methods

Participants

The participants have been chosen using convenience sampling. Participants were Saudi teachers for DHH students from across Saudi Arabia. To determine the appropriate sample size, most SEM experts recommend a minimum sample size of approximately 200 or more (Kline, 2016; Little et al., 1999). Accordingly, at least 200 teachers of DHH students were needed in this current study. All teachers responded through an electronic survey that was made available via the Docs-Gmail website. Teachers were recruited from schools and social media sites such as Twitter and Facebook. Two hundred and twenty-one surveys were collected. Seven surveys were eliminated during the analysis because many responses were incomplete. Then, surveys from two hundred and fourteen teachers of DHH students were analyzed.

Measures

Because the purpose of the current study was to define and then adequately capture the domains that best represent teacher efficacy for inclusion in the field of deaf education, the relevant literature on inclusive education suggests that teachers of DHH students need to be qualified in five areas in order to teach effectively. These areas were efficacy in communication, efficacy in teaching and curriculum, efficacy in assessment,

ulum. Teachers will want to use a variety of assessments to determine students' proficiency levels and enter into a continuous cycle of obtaining proof of student learning, giving them feedback about their learning, and utilizing assessment results to modify instruction (Alvarez et al., 2014). Therefore, teachers of DHH students have to demonstrate the ability to utilize assessment data to determine eligibility, program selection, and placement decisions for individuals with exceptionalities, particularly those from culturally and linguistically diverse backgrounds (Cannon & Luckner, 2016; CED, 2015). Moreover, teachers working with DHH students should be aware of the knowledge and skills needed by teachers to effectively educate a varied population of DHH students (Luckner & Ayantoye, 2013).

         Although the efficacy of teacher scales has acceptable reliability and validity, they do not cover all the efficacy areas required by deaf education teachers, such as communication skills, curriculum adaptation, assessment, and diagnosis of DHH students' levels, which are considered essential requirements for professional licensing and professional preparation of deaf education teachers (CED, 2015; Council on Exceptional Children, CEC, 2015; Luckner & Ayantoye, 2013). Given the measurement limitations identified in the scales used to assess teacher self-efficacy in deaf education, there is a need to develop a scale to measure the level of self-efficacy of teachers of DHH students. The purpose of the current study was to develop a valid scale that may be used to assess teachers' self-efficacy to teach DHH students in public school settings that focuses more on the teaching practice called the Deaf Self-Efficacy Scale for Teachers (DSEST). Specifically, the researcher sought to measure the number of dimensions, internal consistency (reliability), and validity of scores obtained from the DSEST in a sample of deaf education teachers. This study may add to the body of knowledge already existing in the field of deaf education. The findings of this study would inform us of the factors

Some researchers (i.e., Romi & Leyser, 2006; Weisel & Dror, 2006) who have investigated teacher efficacy in inclusive education have frequently used general teacher efficacy measures, like the Teacher Efficacy Scale-TES (Gibson & Dembo, 1984), which consists of three fundamental dimensions: 1) managing behavior, 2) inclusive instruction, and 3) collaboration. This scale has been applied in many studies in the field of special education to measure the effectiveness of special education teachers in teaching students with special needs in inclusive schools (i.e., Brouwers & Tomic, 2000; Ruble et al., 2010; Ruble et al., 2011; Ruble et al., 2013). This scale has been translated into languages other than the original language of the measures, English. For instance, the scale was translated and standardized for special education teachers in the Kingdom of Saudi Arabia and used (i.e., Alhuzimi, 2022; Alnahdi, 2019; Alnahdi, 2020).

Notably, previous studies demonstrate how complex teachers› thinking about the inclusion of special needs students is and suggest that many factors need to be considered in analyzing teachers› efficacy in the field of deaf education (Council on Education of the Deaf, CED, 2015). For instance, many deaf and hard of hearing (DHH) students begin their formal schooling with limited proficiency in their written and native sign language (see Pizzo, 2016). The efficacy of teachers for DHH students has to address the needs of DHH students in a variety of settings across communication modalities (i.e., sign language, spoken language, bilingual/bicultural) (Cannon & Luckner, 2016; CED, 2015; Gallaudet Research Institute, 2013). Teachers of students who are DHH have to demonstrate the ability to develop and choose educational materials, resources and approaches that address cultural and linguistic differences among DHH students (Cannon & Luckner, 2016; CED, 2015). Furthermore, teachers working with DHH students should understand that assessment is necessary for planning instruction and curric-

area of functioning being studied, as they can differ across different tasks and activities. According to Bandura (2006), the efficacy belief system is a differentiated set of self-beliefs linked to distinct realms of functioning, not a universal characteristic.

Therefore, teacher self-efficacy scales should be customized to the specific area of instructional functioning (Usher & Pajares, 2008). This may enable researchers to choose the scales most relevant to the research they would like to conduct. In this respect, Bandura (2006) points out two advantages of using specific teacher self-efficacy scales (TSES). Firstly, it acknowledges the difficulties instructors encounter in certain areas. Conversely, it enhances the ability to predict how teacher self-efficacy contributes to other constructs, such as students› academic achievements and teacher behavior. Hence, it is essential to develop a measure of teacher self-efficacy.

Furthermore, the Tschannen-Moran and Woolfolk Hoyös (2001) Teachers› Sense of Efficacy Scale (TSES) is widely used in education to assess teacher self-efficacy. In contrast to prior broad assessments such as Gibson and Dembo›s (1984) study, the TSES consists of three specific subscales that measure teachers› self-efficacy beliefs in three unique areas of instructional performance: classroom management, instructional strategies, and student engagement. Although initially designed for in-service teachers, several research studies have utilized this scale to assess the teachers› self-efficacy beliefs (Inel Ekici, 2018; Pendergast et al., 2011). The Norwegian Teacher Self-Efficacy Scale (Skaalvik & Skaalvik, 2007) illustrates a specific teacher›s self-efficacy for evaluating their beliefs. This scale consists of the following six subscales: discipline management, instruction, student motivation, adjusting education to meet the requirements of individual students, working with families and coworkers, and adjusting to changes and obstacles.

For example, teachers who have a strong belief in their abilities to teach and positively impact student outcomes effectively are more likely to create a positive learning environment, foster student engagement, and achieve higher levels of academic success (Ajmal et al., 2020; Dellinger et al., 2008). Also, teachers who strongly believe in their ability to effectively instruct students dedicate more time and effort to supporting those who face learning challenges, ultimately promoting their success (Bandura, 1997; Gibson & Dembo, 1984). Therefore, studies indicate that teachers› self-efficacy has been found to play a significant role in influencing student learning outcomes (Dellinger et al., 2008; Hildebrandt, 2017; Skaalvik & Skaalvik, 2007; Tschannen-Moran & Hoy, 1998).

A way to investigate teachers› efficacy of competence is by examining their self-efficacy beliefs (Tschan-nen-Moran & Woolfolk Hoy, 2001; Woolfolk Hoy et al., 2009; Wyatt, 2014). There is a substantial correlation between teachers› self-efficacy and their behavior, as well as their willingness to accept new practices and innovations in the classroom (Bandura, 1997; Skaalvik & Skaalvik, 2007; Tschannen-Moran & Hoy, 2001). Teacher beliefs include judgments about competence to teach special needs students and attitudes about special needs students› abilities. Furthermore, teacher self-efficacy has been assessed using various scales and instruments (Skaalvik & Skaalvik, 2007; Tschannen-Moran & Hoy, 1998). However, there is a lack of agreement regarding the adequate construction of teacher self-efficacy scales (Skaalvik & Skaalvik, 2010). Some researchers have developed general teacher self-efficacy assessments that are more comprehensive and not limited to certain behaviors or circumstances (i.e., Gibson & Dembo, 1984; Sherer et al., 1982). Other researchers critique general measures for their lack of predictions and explanations (Pajares, 1997; Usher & Pajares, 2008). Bandura (2006) asserts that self-efficacy scales (SES) should be customized to the specific

Introduction

      Teachers worldwide encounter challenges from increasing workloads, shifting policies and expectations, and societal changes. Studies indicate that teachers' self-efficacy is critical to their persistence, commitment, and quality of education (Holzberger et al., 2013; Zakariya, 2020). Teachers' self-efficacy (TSE), which refers to teachers' beliefs in their ability to confront these challenges, significantly impacts student learning (Tschan-nen-Moran & Woolfolk Hoy, 2001). The self-efficacy scale is a tool that can be used in educational research and practice to measure teachers' beliefs in their ability to effectively perform various teaching tasks and responsibilities (Sherer et al., 1982). While considerable studies have demonstrated the significant impact of TSE on both teachers and students (Ajmal et al., 2020; Dellinger et al., 2008; Hildebrandt, 2017; Skaalvik & Skaalvik, 2007; Zakariya, 2020), a limited number of research studies have investigated the accuracy and reliability of TSE across various groups of deaf education teachers in Saudi Arabia. Therefore, this study aims to develop and validate a scale for evaluating deaf education teachers' self-efficacy in teaching deaf and hard of hearing (DHH) students in Saudi Arabia.

Literature Review

      Over the last two decades, the concept of self-efficacy has been expanded to focus on the field of education, particularly teachers' feelings of confidence across different teaching areas. Teacher self-efficacy is defined as teachers' beliefs in their own ability to manages the tasks and challenges associated to their daily professional activities (Bandura, 2006). It is widely understood to mean teachers› percpetions and belief that they may impact the students› learning, despite these students could have less motivation (Guskey & Passaro, 1994). Teacher beliefs are essential in teaching and learning (Graham, 2020).
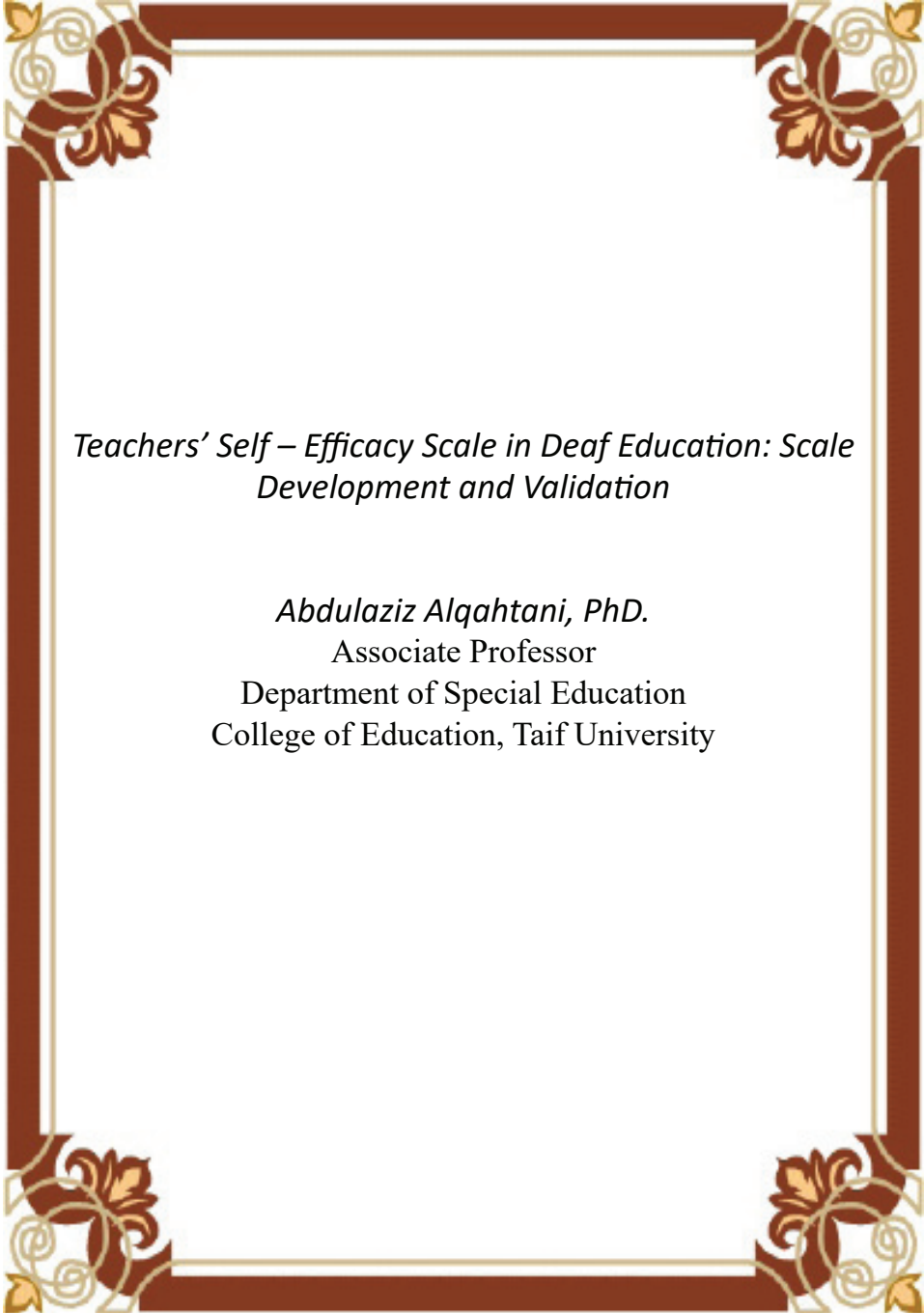
الملخص

هدفـت الدراسـة الحاليـة إلـى تطويـر مقيـاس للكفـاءة الذاتيـة لمعلمـي التلاميـذ الصـم وضعـاف والتحقـق مـن خصائصـه السـيكو متريـة. تم تطبيـق المقياس الذي أعـده الباحـث على عينـة (٢١٤) معلمـاً ومعلمـة للتلاميـذ الصم وضعـاف السـمع في معاهـد الصـم وبرامـج الصم وضعـاف السـمع في المملكـة العربيـة السـعودية. كشفت نتائـج الدراسة تمتـع مقياس الكفـاءة الذاتيـة لمعلمي التلاميـذ الصم وضعـاف السـمع المَعَـد مـن قبـل الباحـث بدلالات صـدق عاليـة سـواء على مسـتوى صـدق المحتوى، والصـدق العاملـي الاستكشـافي والتوكيـدي. وتمتـع مقيـاس الكفـاءة الذاتيـة لمعلمي التلاميـذ الصـم وضعاف السـمع المَعَد من قبل الباحث بدلالات ثبات عاليـة في ضوء كلاً مـن معامـل ألفـا كرونبـاخ الذي بلـغ (٠,٩٤٢) ككل، و معامـل أوميجا (ω) الذي بلـغ (٠,٩٤٨ = ω) ككل، و معامـل أوميجـا بـين أبعـاد المقيـاس الـذي بلـغ (٠,٧٢٨ = ω) لبعـد الكفـاءة الذاتيـة في التواصـل،(٠,٨٦٧ =ω) لبعـد الكفـاءة الذاتيـة في التدريس والمناهـج، (٠,٧٥١ = ω) ،(٠,٨٢٢ = ω) لبعـد الكفـاءة الذاتيـة في التقييم والتقويـم، (٠,٨٨٠ = ω)، لبعـد الكفـاءة الذاتيـة في إدارة السـلوك، و (٠,٨٥٣ = ω) لبعـد الكفـاءة الذاتيـة في التعـاون. أظهـرت نتائـج الدراسة الحاليـة تمتـع مقيـاس الكفـاءة الذاتيـة لمعلمـي التلاميـذ الصم وضعـاف السـمع الذي أعـد الباحـث بخصائـص سيكو متريـة عاليـة على مسـتوى الصدق والثبات. اسـتنادًا إلى هذه النتائـج، يقدم الباحـث اقتراحات للبحوث المستقبلية وتطبيقها للتطوير المستمر لبرامج تعليم الصم.

الكلمات المفتاحية: المعلم، الصم وضعاف السمع، الكفاءة الذاتية، تعليم الصم

Abstract. The present study aimed to develop the Teacher Self-Efficacy Scale for students who are deaf and hard of hearing (TSEDE) and test its psychometrics. In a sample of Saudi teachers of DHH students in Saudi Arabia (N = 214; 72% male), the TSEDE scale was implemented. The study revealed that the self -efficacy scale for teachers of DHH students, developed by the researcher, has high validity in terms of content validity, exploratory validity, and confirmatory validity. The results demonstrated high levels of reliability, as indicated by both the Cronbach's alpha coefficient (0.942) and the Omega coefficient was, for the overall scale, as well as the the Omega coefficient (= 0.707) for communication self-efficacy, = 0.854 for teaching and curriculum self-efficacy, = 0.801 for assessment self-efficacy, = 0.877 for behavior management self-efficacy, and = 0.814 for collaboration self-efficacy. These values suggest that the scale has good internal consistency. To conclude, these results provide evidence that the TSEDE scale is reliable, valid, and, thus, valuable for research in the field of deaf education. Based on these results, the researcher presents suggestions for future research and its application for the continuous development of deaf education programs.

Keywords: *teacher, deaf and hard of hearing, self-efficacy, deaf education*

Teachers' Self – Efficacy Scale in Deaf Education: Scale Development and Validation

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