ANALYSIS ON THE FACTOR STRUCTURE OF TEACHERS' SENSE OF SELF-EFFICACY SCALE: AN EXPLORATORY APPROACH

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ABSTRACT

This exploratory study gives a comprehensive description on factor structure of teacher's sense of self-efficacy. The goal of this study is to develop a scale on measuring the teacher's sense of self-efficacy. In this design, both qualitative and quantitative data were collected. The research participants included seven (7) teachers for in-depth interviews and ten (10) teachers for focused group discussion. The constructed survey questionnaire from the qualitative interview was disseminated to two hundred 30 elementary and secondary teachers in Matalam North District. Results revealed from the Exploratory Factor Analysis (EFA) three underlying dimensions occur from the teacher's self-efficacy such as classroom management, increased student achievement, and positive feedback from colleagues. Based on the reliability test score revealed on the teacher's self-efficacy is very high with an overall Cronbach's Alpha value of .817. It implies that the scale or questionnaire used in the study contains reliable items or questions that consistently measure the relevant construct. Further, the final instrument which can be used to measure the teacher's self-efficacy contains 3 dimensions with a total of 24 items. In addition, it was suggested that a new tool be created for future references.

Keywords: *Teachers, Self-efficacy, Classroom Management, Increased Student Achievement, Positive Feedback from Colleagues, Exploratory Factor Analysis, Matalam*

INTRODUCTION

One of the key elements that determines the success of teaching-learning activities in a classroom is the teacher. Teachers' teaching actions in the classroom may be impacted by certain affective factors they possess, such as self-efficacy (Hallinger, 2018). Due to its consequences for teaching effectiveness, instructional methods, and student academic achievement, teachers' self-efficacy has gradually taken on a more significant role in school psychology research (Klassen and Tze, 2014). Teachers who have high levels of self-efficacy report more job satisfaction, less stress at work, and easier handling of students' disruptive conduct (Caprara et al., 2003). Therefore, striving to improve the effectiveness and efficiency of schools as well as the well-being of teachers may benefit greatly from understanding the key antecedents of self-efficacy.

Self-efficacy is the conviction that one can plan and carry out the essential steps to deal with the anticipated scenario (Bandura, 1997). Self-efficacy for teachers functions as a characteristic that contributes to individual differences in each teacher, has a significant relationship to learning and achievement, and has a positive association to teachers' classroom management and student academic adjustment (Zee & Koomen, 2016). The self-efficacy of teachers has been linked to student learning (Biasutti & Concina, 2018). According to research, teachers' self-efficacy affects students' learning of math, science, and music (Giles, Byrd, & Bendolph, 2016). Furthermore, according to Clark and Newberry (2018) and Tschannen-moran & Hoy (2001), teacher's self-efficacy has an impact on their teaching efforts, the expected outcome, and their level of optimism. Additionally, this research demonstrates that when teachers' self-efficacy rises, their competence will follow. When compared to teachers with low self-efficacy, teachers with high self-efficacy exert different levels of effort (Septiana, 2018).

In the classroom, students are more motivated by teachers who have high self-efficacy than by teachers who have low self-efficacy (Guo, Connor, Yang, Roehrig, & Morrison, 2017). How well kids learn will depend on how effectively and efficiently teachers can convey knowledge to their students (Kim & Seo, 2018; Swanson, 2014; Wahyuni & Jailani, 2017). On the other side, teachers with low self-efficacy are more likely to give up on their students fast and claim that they lack the requisite learning abilities to engage in the learning activities (Tschannen-Moran et al., 2018). (Santrock, 2016).

Teachers that are more effective also take more risks and set higher standards in their classrooms, which raises student accomplishment. From a broader viewpoint, it has also been shown that teacher self-efficacy is closely linked to other elements including job satisfaction, perfectionism, and emotional intelligence (Moe, Pazzaglia, & Ronconi, 2020). (Moafian & Ghanizadeh, 2009; Rastegar & Memarpour, 2019).

Although teachers' self-efficacy beliefs have been the focus of quantitative research for more than 30 years, there is still a great deal of ambiguity surrounding what these beliefs are, how they are formed and develop, how to access them in research, and how to use the knowledge gained from such research. Since the late 1990s, these difficulties have been addressed in a variety of ways and to varying degrees (Bandura 1997; TschannenMoran, Woolfolk Hoy, and Hoy 2008; Henson 2012; Wheatley 2012), but it has occasionally seemed as though there is no clear solution to the misunderstanding.

According to a large body of research, teachers who have high levels of self-efficacy report more job satisfaction, less stress at work, and easier handling of students' disruptive conduct (Caprara, 2013). Therefore, striving to improve the effectiveness and efficiency of schools as well as the well-being of teachers may benefit greatly from understanding the key antecedents of self-efficacy.

The three qualities of teacher efficacy, linguistic ability, and flexibility in Gibson and Dembo's (1984) Teacher Efficacy Scale (TES) had convergent validity coefficients of.42,.30, and.39, respectively, which were statistically significant but small in magnitude. Despite the fact that this instrument has several serious psychometric issues, many foreign researchers have used it extensively for their populations. For example, the instrument's factors are inconsistent, multiple items load on multiple

factors, the subscales have low dependability, and the definitions of the two constructs (PTE and GTE operating) are unclear (Gavora, 2020; Burke-Spero, 2015).

After synthesizing the related studies, there are still issues concerning teachers' self-efficacy that need to be investigated further.

METHODS

Research Design

An exploratory design was used in this study. Exploratory research is described as research conducted to study a problem that has not yet been fully identified. It is carried out to gain a better knowledge of the current problem, but it did not produce conclusive results. A researcher began with a broad concept and then used this study to discover difficulties that can be the focus of future research. An observation and interview were undertaken to determine the teachers' analysis of the self-efficacy scale offered in this study. In this method, the researcher became a member of the social sphere, and data were acquired through interviews, observation, and document analysis.

Research Participants

For the qualitative component, seven (7) teachers were invited for in-depth interviews and ten (10) teachers for focus group discussion from Matalam North District. The results were then used to develop questionnaires and spot emerging themes. Snowball sampling was used to select the participants. This method of choosing participants is non-probability.

200 teachers completed the generated questionnaire for the quantitative data's exploratory and confirmatory factor analyses. A reliability test was conducted with an additional 30 participants after the distribution of 200 questionnaires.

Research Instrument

The research formulated an interview guide questions based on the objectives of the study. These interview guide questions were asked to the participants in the interview and during the focus group discussions. The interview provided views about the factors on teachers' self-efficacy.

Meanwhile, experts were invited to perform content validity of the interview questions and to check the sustainability of the items that captured the underlying dimensions on teachers' self-efficacy. The purpose was to ensure the readability and comprehensibility of the questionnaire.

Participants in the research who were specifically chosen based on the selection criteria provided the data for this study. The researcher developed a rapport and sense of trust with the participants to gather data efficiently.

Statistical Treatment

Principal Axis Factoring (PAF) was used in this research study as the statistical treatment method to investigate the underlying factor structure of the measurement scale. Exploratory factor analysis, which tries to pinpoint the latent factors that contribute to the observed variance in a set of variables, frequently uses the PAF technique. It helped the researcher understood how the variables are related to one another and pinpoint the main causes of any patterns they detect.

Afterwards, the factor correlation matrix was used to analyze the correlations between the latent factors discovered through PAF. It offers a thorough evaluation of the correlations between the identified factors, allowing researchers to comprehend the strength and direction of the associations. I was able to understand the relationships between various components by studying the factor correlation matrix, which is essential for understanding the underlying structure of the measurement scale.

Lastly, Cronbach's alpha was used to evaluate the internal consistency reliability of the measuring scale that was used. Cronbach's alpha is a well-known and reliable statistical approach that assesses a scale's consistency and reliability by looking at the correlations between its items. Using this technique, I was able to check the accuracy of their measurement tool, guaranteeing that it provides reliable and repeatable data.

RESULTS AND DISCUSSION

Emerging Themes on Teachers' Sense of Self-Efficacy

There are four emerging themes based from the results of both the in-depth interview (IDI) and the focus group discussion (FGD) among the selected teachers from Matalam North District. The themes are as follows: *classroom management, increased student achievement, continuous professional growth,* and *positive evaluation from colleagues*.

Classroom management. Many participants agreed that classroom management is a key to self-efficiency. This entails establishing guidelines and procedures, encouraging appropriate behavior, and handling any potential behavioral issues. For a teacher to be self-efficient, the classroom needs to be well-managed because it frees them up to concentrate on teaching rather than handling interruptions.

The participants' replies to this topic were as follows:

> *"Efficient teachers are able to create a positive and productive learning environment through effective classroom management techniques …" (IDI2)*

> *"Efficient teachers have a well-organized classroom and materials, which helps to create a smooth and efficient learning environment." (IDI1)*

These statements support the study of Vilches and Bautista (2019) who described teachers that utilized effective classroom management practices had higher levels of self-efficacy. Also, they also discovered that instructors with higher levels of self-efficacy were more likely to have favorable attitudes toward their profession and to be more satisfied with their jobs. Hence, effective classroom management is an essential aspect in increasing teacher self-efficacy and that providing teachers with classroom management training and support can lead to higher teacher effectiveness and better student outcomes.

Conversely, some teachers revealed that having poor classroom management can hamper someone's self-efficiency. It can be challenging for a teacher to maintain control and keep students interested in their lessons when a classroom is poorly

managed. This can result in interruptions and diversion, which might make it challenging for a teacher to instruct effectively and for students to learn. Ineffective classroom management can also result in more behavior issues, which can consume a lot of a teacher's time and effort.

The following were the participants' revelations:

> *"If a teacher is unable to maintain control and discipline in their classroom, it can be difficult for students to focus and learn effectively." (IDI1)*

> *"It can be challenging for children to concentrate and study well if a teacher cannot keep order and discipline in their classroom …" (IDI2)*

Thus, this clearly supports Genzuk's (2016) conclusion that classroom management is a crucial element in fostering teacher self-efficacy and that giving teachers' assistance and training in classroom management techniques can improve teacher effectiveness and student results.

Increased Student Achievement. The participants revealed that having an increase in student achievement could help them gauge their sense of self-efficiency. They revealed that students are more likely to attain their academic goals when a teacher is able to build a well-managed classroom and engage students in learning. This reflects the teacher's ability to design and deliver effective education, manage the classroom atmosphere, and offer students with appropriate feedback and assistance.

As revealed by the participants:

> *"… the precise ways that self-efficacy may have an impact on student results include increases in student achievement. Teachers who have high levels of self-efficacy are more likely to hold their pupils to high standards …" (IDI3)*

> *"Teachers with high self-efficacy are more likely to be able to control their classes effectively, which can result in better student conduct and a more favorable learning environment." (IDI7)*

> *"Teachers who have high self-efficacy are more likely to set high expectations for their students and to provide the support and resources needed for them to achieve those expectations." (FGD1)*

> *"… increases in student achievement are one of the specific ways that self-efficacy may affect student outcomes. High self-efficacy teachers are more likely to hold their students to high standards …" (FGD6)*

These statements support Aydin and Ozer (2019) when they claimed that teachers see their students succeed, they credit that success to their own teaching methods and abilities, which leads to a rise in their self-efficacy beliefs. Furthermore, as teachers' self-efficacy increases, they are more likely to apply effective teaching tactics,

positive reinforcement, and create more opportunities for student participation, all of which contribute to improved student accomplishment.

Meanwhile, Vilches and Bautista (2017) believed that by giving teachers continuing opportunities to improve student outcomes can raise teacher effectiveness and work satisfaction. Hence, student achievement is a key aspect in promoting teacher self-efficacy.

Continuous Professional Growth. A teacher who pursues continuous professional development is more likely to be productive in the classroom and to keep up with best practices in education. Participating in professional development opportunities, engaging in constant self-reflection and review, and requesting input from coworkers and supervisors are all examples of this.

As revealed by the participants:

> *"Proficient improvement amazing open doors can assist educators with remaining current and viable in their showing rehearses, which can build their self-adequacy." (IDI1)*

> *"… teachers ongoing professional development opportunities help them stay up-to-date on current best practices in education and to learn new strategies and techniques for their classrooms." (IDI5)*

Continuous professional development can assist a teacher in keeping abreast of the most recent findings in educational research and the best teaching techniques, which can enhance their capacity to address the various needs of their pupils and result in more successful teaching. According to Andersen and Conlin (2016), the quantity of professional development activities teachers took part in and student accomplishment were statistically significantly correlated. Teachers reported better levels of self-efficacy when they took part in more professional development events.

Additionally, continuous professional development can create a sense of success, drive, and fulfillment for teachers as they take on new tasks and learn new abilities. This can lead to an increased sense of self-efficacy, or belief in one's ability to succeed in specific settings or complete a task.

As stated by FGD4:

> *"… encourage teachers to evaluate their teaching methods on a regular basis and to set precise, attainable goals for themselves and their pupils." (FGD4)*

Consequently, offering teachers continuing chances for professional growth can boost teacher effectiveness and improve student outcomes. Professional development is a significant role in fostering teacher self-efficacy (Vilches and Bautista, 2018).

Positive Evaluation from Colleagues. The teacher could be able to identify their areas of strength and areas for development with the assistance of feedback, which can also validate and acknowledge the effort they put into their instruction. Positive feedback from colleagues can help a teacher feel more motivated and

confident, which can help them feel more efficient. Also, a teacher's professional development can improve from receiving constructive feedback from colleagues. This feedback can assist teachers increase their abilities and knowledge while also boosting their self-confidence.

This was revealed by the participants:

> *"Teachers can improve their self-efficacy by getting feedback and participating in evaluations, which can give them valuable insights into their teaching methods and help them identify areas for improvement." (IDI1)*

> *"Teachers can increase their self-efficacy by receiving feedback and taking part in evaluations, which can provide them with insightful information about their teaching strategies and point out areas in need of development." (IDI3)*

These statements support Garcia and Bautista (2016) who revealed that teachers with favorable peer evaluations performed their jobs better and had higher levels of self-efficacy. Also, they discovered that teachers with higher levels of self-efficacy were more inclined to view their work favorably and to report feeling more satisfied with their jobs.

Additionally, FGD1 and FGD stated:

> *"Receiving criticism and engaging in evaluations can help teachers enhance their self-efficacy by providing useful insights into their teaching approaches and identifying opportunities for growth." (FGD1)*

> *"Receiving feedback and participating in evaluations can help teachers raise their self-efficacy …" (FGD8)*

Positive feedback from colleagues can contribute to the development of a positive and supportive work environment that benefits both students and teachers. Thus, providing teachers with regular opportunities for peer feedback can raise teacher effectiveness and improve student outcomes. It was also noted that positive feedback from peers is a key aspect in promoting teacher self-efficacy (Warren and Strong, 2016).

Construction of Teachers' Sense of Self-Efficacy Scale

Table 1 displays the teachers' sense of self-efficacy scale items based on the participants' narratives and chosen based on their frequency of occurrence in the qualitative interview. Using exploratory factor analysis (EFA), a data reduction strategy was applied to this 24-item survey.

Table 1
Teachers' Sense of Self-Efficacy Scale Items

	5	4	3	2	1

1. I monitor and change classroom management practices on a regular basis to meet the requirements of all learners.					
2. I make a learning environment that is both safe and inclusive for all learners.					
3. I clearly convey student behavior expectations and consequences.					
4. I encourage desirable behavior by employing positive reinforcement tactics.					
5. I incorporate formative and summative assessments.					
6. I use excellent time management practices.					
7. I use data to inform instruction and monitor academic achievement.					
8. I expand instruction to meet the needs of all students.					
9. I use technology to improve instruction and engagement.					
10. I encourage and make possible student autonomy and self-directed learning.					
11. I incorporate a variety of relevant items into my instruction.					
12. I provide regular and constructive comments.					
13. I engage in professional development opportunities on a regular basis to stay updated on best practices.					
14. I reflect on and evaluate personal teaching practice on a regular basis.					
15. I set personal and professional goals and strive toward them.					
16. I pursue advanced degrees and/or certification.					
17. I implement action research.					
18. I participate in online learning community.					

19. I collaborate with colleagues to communicate and put excellent strategies into action.					
20. I create and maintain strong relationships with colleagues and families.					
21. I seek and incorporate criticism from colleagues and supervisors.					
22. I receive recognition for successful collaboration.					
23. I am recognized for my leadership skills.					
24. I am appreciated for my innovation and creativity.					

Legend:
5 = Always
4 = Often
3 = Sometimes
2 = Seldom
1 = Never

Dimensions of teachers' self-efficacy

The Kaiser Meyer-Okin Measure (KMO) of Sampling Adequacy and Bartlett's test of sphericity were conducted before component analysis was conducted on the proposed 24-item scale for teacher's self-efficacy. Results were emphasized in Table 2.

Table 2. **KMO and Bartlett's Test**

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.879
Bartlett's Test of Sphericity	Approx. Chi-Square	2944.968
	Df	276
	Sig.	.000

The results show that KMO generated a score of .879 which shows that the dataset's variables have a high degree of correlation, and the sample size is suitable for factor analysis. This score is very near to 1, indicating that the dataset is highly homogeneous and that there are significant correlations between the variables. Additionally, the results of the Bartlett's Test of Sphericity show a significant value of .000, indicating that the data have patterned relationships and that factorability was presumed. Thus, there was empirical support for moving forward with the factor analysis.

Derivation of Factors Structure of Teacher's Self-Efficacy. The 24-item scale was examined using an unrotated factor matrix with estimations of eigenvalues, percent of

variance, and cumulative variance in order to ascertain the number of factors. Eigenvalues show how much variance can be accounted for overall by a particular primary component. In theory, they can be either positive or negative, but in fact, they invariably explain positive variance (UCLA, 2021). According to the Kaiser criterion, all components have eigenvalues less than 1.0, which is the amount of information typically included in a single item (Costello & Osborne, 2005).

Meanwhile, 3 factors with eigenvalues greater than one were identified in the model. Each item's loading factor corresponds to a factor value greater than .40. This indicates that there was a sufficient connection between factors and variables; hence, the item may be regarded a component of the specific factor.

Table 3. Pattern Matrix

Pattern Matrix			
	1	**2**	**3**
1. I monitor and change classroom management practices on a regular basis to meet the requirements of all learners.	.687		
2. I make a learning environment that is both safe and inclusive for all learners.	.455		
3. I clearly convey student behavior expectations and consequences.		.425	
4. I encourage desirable behavior by employing positive reinforcement tactics.	.785		
5. I incorporate formative and summative assessments.		.415	
6. I use excellent time management practices.	.744		
7. I use data to inform instruction and monitor academic achievement.	.620		
8. I expand instruction to meet the needs of all students.		.435	
9. I use technology to improve instruction and engagement.		.582	
10. I encourage and make possible student autonomy and self-directed learning.	.489		
11. I incorporate a variety of relevant items into my instruction.		.492	
12. I provide regular and constructive comments.		.721	
13. I engage in professional development opportunities on a regular basis to stay updated on best practices.	.511		
14. I reflect on and evaluate personal teaching practice on a regular basis.	.700		
15. I set personal and professional goals and	.570		

strive toward them.			
16. I pursue advanced degrees and/or certification.			
17. I implement action research.		.773	
18. I participate in online learning community.		.577	
19. I collaborate with colleagues to communicate and put excellent strategies into action.		.523	
20. I create and maintain strong relationships with colleagues and families.			
21. I seek and incorporate criticism from colleagues and supervisors.		.477	
22. I receive recognition for successful collaboration.			.772
23. I am recognized for my leadership skills.			.933
24. I am appreciated for my innovation and creativity.			.805

Extraction Method: Principal Axis Factoring.
Rotation Method: Promax with Kaiser Normalization.
a. Rotation converged in 7 iterations.

Table 4 shows the pattern matrix generated by Principal Axis Factoring with a Promax rotation algorithm and Kaiser Normalization. It is clear from the findings that items 16 and 20 did not match the required criterion of item loading by reporting no values, and hence these items were subjected to elimination. This is corroborated by Field (2009), who recommends suppressing loading smaller than .4 and rerunning the analysis to achieve the required components.

Furthermore, the item loadings of each item to their factor are greater than.4, indicating sufficient correlation between factors and variables and thus qualifying as a component of the factor.

Classroom Management, Increased Student Achievement, and Positive Feedbacks from Colleagues were the three factors that emerged from EFA. There were 6 items for factor 1, Classroom Management; 6 items for factor 2, Increased Student Achievement; and 10 items for factor 3, Positive Feedbacks from Colleagues.

Table 4. Factor Correlation Matrix

Factor Correlation Matrix

Factor	1	2	3
1	1.000	.658	.240
2	.658	1.000	.266
3	.240	.266	1.000

Extraction Method: Principal Axis Factoring.
Rotation Method: Promax with Kaiser Normalization.

Table 4 illustrates how factor analysis was used to assess variables and categorize them into relevant components for use in subsequent statistical analysis. The Factor Correlation Matrix estimates the correlation between the two extracted components. The greater the correlation, the greater the disparity between the factor and pattern matrices. The rotated and unrotated solutions will be the same if the correlation is zero.

Table 5. Reliabilty Analysis of the Scale to Teacher's Sense of Self-Efficacy

Factor	Cronbach's Alpha
Factor 1	.784
Factor 2	.830
Factor 3	.845
Overall Reliability	**.817**

Reliability Test. The instrument's validity and reliability were tested, and the uniformity of the items was examined. With a Cronbach's Alpha value of .817, Table 5 showed that the overall reliability test of teacher's sense of self-efficacy is high. It was found out that subscale for Classroom Management (a=.784), Increased Student Achievement (a=.830), and Positive Feedbacks from Colleagues (a=.845) are also high and above 0.70. It implies that the scale or questionnaire used in the study contains reliable items or questions that consistently measure the relevant construct.

Final Version of the instrument to Teacher's Self-Efficacy

The final version of the instrument, which is the output of this study, is presented provided in Table 5. This scale consists of 24 items. Specifically, a total of six (6) items for Classroom Management, six (8) items for Increased student achievement, and ten (10) items for positive feedback from colleagues. The five-point Likert scale from 5-always to 1- never is shown above.

Table 6
Instrument for Teachers' Sense of Self-Efficacy Scale

	5	4	3	2	1
1. I monitor and change classroom management practices on a regular basis to meet the requirements of all learners.					
2. I make a learning environment that is both safe and inclusive for all learners.					
3. I clearly convey student behavior expectations and consequences.					
4. I encourage desirable behavior by employing positive reinforcement tactics.					

5. I incorporate formative and summative assessments.					
6. I use excellent time management practices.					
7. I use data to inform instruction and monitor academic achievement.					
8. I expand instruction to meet the needs of all students.					
9. I use technology to improve instruction and engagement.					
10. I encourage and make possible student autonomy and self-directed learning.					
11. I incorporate a variety of relevant items into my instruction.					
12. I provide regular and constructive comments.					
13. I engage in professional development opportunities on a regular basis to stay updated on best practices.					
14. I reflect on and evaluate personal teaching practice on a regular basis.					
15. I set personal and professional goals and strive toward them.					
16. I implement action research.					
17. I participate in online learning community.					
18. I collaborate with colleagues to communicate and put excellent strategies into action.					
19. I seek and incorporate criticism from colleagues and supervisors.					
20. I receive recognition for successful collaboration.					
21. I am recognized for my leadership skills.					
22. I am appreciated for my innovation and creativity.					

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Legend:

5 = Always
4 = Often
3 = Sometimes
2 = Seldom
1 = Never

CONCLUSIONS

To give the light of the study, the following conclusions are enumerated:

1. Four emerging themes significantly emphasized on teacher's self-efficacy include: classroom management, increased student achievement, continuing professional development, and positive feedback from colleagues.

2. Results revealed from the Exploratory Factor Analysis (EFA) three underlying dimensions occur from the teacher's self-efficacy such as classroom management, increased student achievement, and positive feedback from colleagues.

3. Reliability test revealed the results on teacher's self-efficacy scale that the overall Cronbach's Alpha was .817 which interpreted as high. It means that the validity of the instruments was very high and suitable for using the instrument as a tool.

4. Results from the Exploratory Factor Analysis revealed that there are 24 items of sets of questionnaires that are suitable for factor loadings. This means that these items are appropriate and pass the face validity for measuring tools in the study.

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