

TEACHERS' INNOVATIVE TEACHING STRATEGIES: SCALE DEVELOPMENT USING EXPLORATORY FACTOR ANALYSIS

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Abstract: Teachers play a peculiar role in the formative years of learners schooling, and their importance is something the society cannot undervalue. Teachers involved in moulding the learners into responsible citizens of the country are considered torch-bearers in educating and imparting knowledge to the youth. This study utilized the qualitative and quantitative exploratory research design. The interview transcript on nine school heads and seven teachers were used to develop the constructs and indicators to measure innovative teaching strategies of teachers. The scales developed were administered to three hundred nine public (309) elementary teachers in the ten identified school districts in Iligan City. The result of the investigation identified four factors to measure the teachers innovative teaching strategy namely: Critical Thinking (factor 1), Creativity (factor 2), Social Skills (factor 3), and ICT Skills (factor 4). The findings revealed the teachers' low innovative teaching strategies is on critical thinking and ICT skills. The instrument can be useful in assessing the level of teachers' innovative teaching. However, the newly developed scale be retested for confirmatory factor analysis (CFA) to validate further the items.

Keywords: innovative teaching, teaching strategy, exploratory factor analysis, quantitative, qualitative.

I. INTRODUCTION

Psychological characteristics are of an intangible or latent nature rather than a tangible, evident one and they are called constructs or factors (Kline, 2015; Nunnally & Bernstein, 2014). Constructs are theoretical concepts, and the presence of specific constructs is never absolutely confirmed. Therefore, observations of individual behavior mostly provide conclusions about psychological constructs. These mental constructs such as intelligence, creativity, extroversions, and introversion are not directly evident (Crocker & Algina, 2016). Cronbach and Meehl (1955) describe psychological construct as "some postulated attribute of people" (as cited in Baykul, 2013). All constructs have two primary structures: 1.) Every construct is an abstract summary of the natural order; 2.) Constructs have linked with observable entities or phenomena (Murphy & Davidshofer, 2013).

Constructs that are not directly noticeable defined in two ways. Operational definition, which is essential to measure those constructs; and the theoretical relationship between a given construct and others and the association between a given construct and norms in the external world in addition to the operational meaning (Crocker & Algina, 2016). Operational definitions of constructs could relate to validity studies that discuss the development of a suitable measuring instrument for a construct and to what extent the research instrument measures the related construct.

Analysis of the relationships between responses forms the basis of construct validity to test item pool. To some degree, the procedure of creating construct validity for a test is the development of a scientific theory (Tekin, 2016). Construct

validity is related to the validity of consequences of non-observable variables through observable variables. Construct validity shows how accurately a measuring instrument measures the general psychological characteristic. Measuring the related abstract construct is based on the transformation of the construct into a tangible, observable entity through observable behaviors. The transformation process into a visible construct includes the following stages: determining actions about the measured construct, revealing constructs that are appropriate or inappropriate to the measured factor and showing behavioral forms that express others associated in the measured construct (Murphy & Davidshofer, 2013).

Construct validity in research can be conducted with various ways according to the value and the form of a specified construct and those of the measuring tool used to measure the correlated construct, whether there are theories and scientific research on the construct and some other features (Erkuş, 2033). Exploratory factor analysis (EFA) is the most commonly used process among these. Here is scientific agreement on the fact that factor analysis is a conventional statistical approach used to determine to construct validity (Crocer & Algina, 1986; Cronbach, 1990; Dancy & Reidy, 2014; Erkuş, 2013; Urbina, 2014). Due of the benefit entailed by interior dependencies in constructs by nature, exploratory factor analysis decreases the difficulty of the data and thus provides nearly the same amount of information as extensive data obtained by some original observations, with only a few factors (Çokluk & Büyüköztürk, 2015).

According to Floyd and Widaman (2013), factor analysis has two approaches to the evaluation of psychological constructs: exploration and variable reduction. The exploratory aim of factor analysis defines lower dimensions of measuring instruments that represent a given construct, by the theoretical structure of the tools. Accordingly, the study concentrates on the exploration of hidden variables that form the basis of a scale. Variable reduction in factor analysis is associated with obtaining the number of indicators, which could consider as a summary, with the maximum variability and reliability in an extensive set of variables.

Depending on the aim, factor analysis can be an exploratory and confirmatory factor analysis. In exploratory factor analysis, there is a process of determining factors, concerning the relationships between variables and creating a theory; confirmatory factor analysis can validate a pre-defined hypothesis of inter-variable relationships (Kline, 2015; Stevens, 2016; Tabachnick & Fidell, 2017).

The most important, top priority step of the analysis is deciding the number of factors. Although there are specific considerations in EFA performance, determining the number of elements be far more critical than other decisions, such as selection of logical steps and the type of rotation because the power of exploratory factor analysis can distinguish significant factors from others. Thus, it is crucial to determine the precise balance between correlations. Also, learning the number of elements needs close and in-depth analysis because more or fewer factors than necessary will lead to severe mistakes that affect results (Comrey & Lee, 2012; Gorsuch, 2013; Harman, 2015).

Despite the recent emphasis on achievement, the day-to-day focus of schools has always been on learning how to know, how to know more efficiently and how to know more effectively. The underlying philosophy is more about what students are now ready to learn, how their learning can be enabled and increasing the how to learn proficiencies of students. In this scenario, the purpose of schooling is to equip students with learning strategies, or the skills of learning how to learn. Of course, learning and achievement are not dichotomous; but related. Through growth in learning in specific domains comes achievement and from achievement, there can be much learning (Hattie, 2016).

Effective teaching in schools requires flexibility, energy, and commitment. Successful teaching also requires that teachers be able to provide learner's needs and understand the variations in learner's styles and approaches. Teachers can accomplish these requirements while making an optimal teaching-learning atmosphere by utilizing a variety of teaching strategies and teaching styles. If teachers use a variety of teaching ways and styles, learners are exposed to both familiar and unfamiliar ways of learning that provide both comfort and tension during the process, ultimately giving learners multiple ways to excel. (Kamboj & Singh, 2015).

Innovation means the creation of better or more efficient products, processes, technologies, or ideas that are accepted by those in charge of education – teachers, administrators, and parents. Innovation differs from invention or renovation in that innovation signifies a substantial positive change compared to incremental changes. Not seldom innovations are not accepted by educators or policymakers. So, some say real innovations are the heretic and belong to the future.

Educating for learner's creativity and innovation has become a crucial task of educational institutions (Kilicer 2015). This development is also causing changes to the structure of schools and the qualities and profiles of learners (Ambrose 2015;

Craft 2016; Kilicer 2015). Teachers play a crucial role in teaching creatively and innovatively to the next generation for the changing society. The changing culture calls for a multidimensional character for today's teachers, such as teaching, demonstrating, guiding, facilitating, answering questions, managing classes, and initiating learning communities (Ambrose 2015; Harber 2012).

To be innovative in teaching, it is imperative for teachers to continuously diversify their knowledge base, thinking patterns, and evaluation systems (Darling & Snyder, 2013). Teachers are the ultimate source of creativity and innovation: No matter how good policies are, they rely on teachers to implement them in classes (Ng & Smith, 2014). Teachers need to be able to promote learners learning through innovative teaching approaches. However, the implementation of innovative teaching and learning is a complicated process. Some Teachers apply teaching innovation with great enthusiasm and persist in doing it until it becomes fully integrated into their teaching practices (Jeffrey & Craft 2016). Others never try new teaching methods and strategies or return to their traditional teaching inventory after only a few initial attempts (Abrami et al., 2014).

Previous research points out that many teachers lack competencies for innovative teaching (Lin 2014). However, in the literature, there is a lack of the general framework of teacher competencies for innovative teaching. Competency is defined as the level of integration of knowledge, skills, and attitudes (Stoof et al., 2012; Tigelaar et al., 2014). About innovative competencies are related to the ability of the organization or individual to adopt or implement new ideas, processes, or products successfully (Rogers, 2015). Educational actors need to have a clear vision, awareness, and understanding of what critical competencies and characteristics can entail innovative teaching.

Innovation in education is vital to meet the requirements for preparing the new generation for the more and more advanced society. Technologies, pedagogies, and cultural environment are drivers for educational innovations; notably, the school cultural environment characteristics play essential roles in the changing process. Thus, nurturing an enabling and innovative school environment is critical to facilitate and promote educational innovations (Zhu, 2013). To efficiently manage the diversity climate, recommended strategies for improving the classroom psychological climate and structural diversity of innovations should be in place. Future inquiry opportunities for additional classroom climate tool development to use research as device. (De la Rosa et al., 2014).

In teaching, an innovative mind set is an important issue, and there is a crucial role of teachers for development of innovations. Teacher's belief for innovation, openness, extraversion, and conscientiousness were found positively correlated with all the three domains of innovative work behavior, i.e., idea generation, idea promotion, and idea realization. Neuroticism was negatively correlated with idea generation. Regression analysis revealed that teachers' beliefs for innovation and degree of openness to new or different ideas have a potentially significant impact on innovative work behavior. This study is a significant contribution towards understanding the determining factors of innovative work behavior among teachers (Kundu & Debdulal, 2016).

The innovative teaching strategies combine external resources to design exciting and interactive curriculums for stimulating students' imagination, cultivating the ability of problem-solving, and facilitating independent thinking (Lee & Kang, 2016). Currently, in this 21st century, the term "technology" is an essential issue in many fields including education. Technology is the lifeblood when it comes to knowledge transfer in most countries. Technology integration nowadays has gone through innovations and transformed our societies that have changed the way people think, work and live. (Ghavifekr et al., 2015).

To perform students cannot rely on memory alone; they need to approach each subject strategically and creatively to succeed in the most complex situation. There is similarly some indication that most teaching approaches have a part to play in the classroom. To varying degrees, pupils need to learn from teachers, be informed about their progress and work independently and collaboratively; above all, they need to be continuously challenged (Echazarra et al., 2016).

Various teaching approaches in different settings had a high level of practical application and strengthened links between evidence-based educational principles and day-to-day classroom activities in a practical context. Not only did some teachers move outside of their previous comfort zones in their educational approaches, but learners also experienced new learning methods that they may not have otherwise encountered (Edwards et al., 2014).

Effective teaching in schools requires flexibility, energy, and commitment. Successful teaching also requires that teachers be able to address pupil's needs and understand the diverse learning styles and methods. Educators can achieve these

prerequisites while creating an ideal learning condition environment by using a variety of teaching strategies and styles. On the off chance that teachers utilize varied teaching techniques and styles, pupils exposed to both familiar and unfamiliar better approaches for discovering that give both solace and pressure amid the procedure, at last giving pupils numerous approaches to exceed expectations. (Kamboj & Singh, 2015).

Evidenced-based teaching can potentiate processing in learners that lead in preparing learners that prompt better exchange of aptitudes and information to the working environment and adds to the development of versatile ability. Research demonstrates that evidenced-based teaching techniques are probably going to have the most significant effect on pupils' achievement (Taghipour et al., 2017).

However, in related literature, there is a scarcity of research towards examining teachers innovative teaching strategies for innovative teaching. Although some previous studies have examined the features and qualities of innovative teachers (Chen, 2014; Jin, 2013; Rogers, 2015; Sahin & Thompson 2016) the theoretical and empirical bases are not sufficiently developed to be able to define the key competencies/strategies and the desired qualities or characteristics for innovative teaching. Under this background, understanding what teaching strategies and competencies needed for innovative teaching is the critical issue.

Objectives of the Study

The main objective of this study was to develop a scale that would measure the innovative teaching strategies of teachers in Iligan City. Specifically, the study objectives were to:

1. Develop constructs for teachers' innovative teaching strategies using Exploratory Factor Analysis;
2. Determine the teachers' level of innovative teaching strategies based on; critical thinking, creativity, Social Skills, and ICT Skills

II. METHODS

Research Design

This study employed both qualitative and quantitative exploratory research design with the primary purpose of acquiring an understanding of fundamental causes, views, and drives. It offers understandings or helps to cultivate concepts or theories for possible quantifiable research. Qualitative research makes use of in-depth data collection techniques that allow for the detailed study of all aspects of the case and the exploration of perspective that may have missed by other methods. The qualitative design focuses on the data analysis of one phenomenon, which the investigator chooses to comprehend irrespective of the number of sites, contributors or documents for the study and provides a detailed description and analysis of processes of themes voiced by participants in a particular situation (Polit & Beck, 2008).

Exploratory research design intends to explore the research questions and does not intend to offer final and conclusive solutions to existing problems. Conducted to determine the nature of the problem, this type of research design is not intended to provide conclusive evidence but helps us to have a better understanding of the problem (Saunders et al., 2012). When conducting exploratory research, the researcher ought to be willing to change the direction as a result of the revelation of new data and new insights. Exploratory research design explores the research topic with varying levels of depth. Exploratory research is the initial research, which forms the basis of more conclusive research (Singh, 2007). Moreover, exploratory research tends to tackle new problems on which little or no previous research have been conducted (Brown, 2006). Furthermore, an exploratory study may not have as rigorous as the methodology as it is used inconclusive studies, and sample sizes may be smaller. However, it helps to do the exploratory study as methodically as possible if it is going to be the basis for initial decisions about the way we are going to conduct our next study (Nargundkar, 2008).

In scale development, the following were the process step: conducting the interview, developing items, obtaining expert views (content validity) piloting of the original items (Demir, 2013).

Developing items. Items for the proposed scale taken from the transcripts of the interview conducted by the nine school heads and seven teachers in the Division of Iligan City. After transcribing the audio recording, meanings formulated and grouped into desirable groupings based on the commonality of the different statements. A total of 72 items deduced for the proposed scale.

Obtaining expert views (Content validity). Five experts established the content validity. These experts with varied skills and expertise were asked to evaluate the content validity of the instrument. The five experts include two Education Program Supervisors, one Public School District Supervisor, one School Principal and a Senior Education Program Specialist. Based on their responses a value item-level content validity index (I-CVI) was computed. The evaluation followed the process suggested by Polit, Beck, and Owen (2007) in having experts rate each item on a 4-point Likert scale (not relevant, somewhat relevant, quite relevant, and very relevant) based on item clarity and conciseness. Raters were asked to provide comments and recommendations for revising or adding new items. A criterion of 0.80 of I-CVI among the experts selected for inclusion in the list of items. After incorporating the experts' suggestions and recommendations, a total of 65 items left for pilot testing of the scale.

Pilot Testing. The proposed scale pretested to teachers of another central school not part of the respondents. Teachers were asked to answer the questionnaire to determine the reliability of the items. Cronbach's alpha coefficient was computed to determine the internal consistency of the scale which indicates how well the items fit together conceptually (Nunnally, 1994; DeVon et al., 2007), with the acceptable value of ≥ 0.70 (DeVellis, 2012). Internal consistency was also assessed by corrected item-total correlation, indicating the magnitude of association for individual items with the total scale. The item-total correlation should range from 0.20-0.74, indicating no item redundancy.

Administration of the scale for Exploratory Factor Analysis (EFA). After the pilot testing and the reliability determination the scale was administered to 309 teachers in the Division of Iligan City. Data gathered was used in performing the Exploratory Factor Analysis through dimension reduction in statistical software. After performing the dimension reduction through Exploratory Factor Analysis, four factors extracted that form part of the final version of the scale developed.

Research Setting

The study was conducted in the nine central schools in the Division of Iligan City namely: Dalipuga Central School, Sta. Felomina Central School, Tambo Central School, North Central School, DJAL Central School, City Central School, UDL Central School, Tomas Cabili Central School and Suarez Central School.

Participants

The participants of this study were the school heads of the nine identified Central Schools. Each participant was invited to participate in the semi-structured interview to elicit descriptions of innovative teaching strategies in their respective schools. Teacher participants were carefully and purposely selected to participate in the interview process to validate the responses of the school head. Purposive sampling is useful when specific features or characteristics of the participants are desired (Patton, 1990). In this study, it is desirable that the participants have some of the features for innovative teaching as identified by the literature review or have been recognized as being innovative in teaching. Public Schools District Supervisors recommended a total of seven teacher participants, and most of them are the regional finalist in the Metro Bank Search for the Most Outstanding Teacher in the country and awardees in the Division-wide search for Most Outstanding Public-School-Teacher.

For the Exploratory Factor Analysis (EFA) a total of 309 teachers were the respondents of the study to ensure sampling adequacy. The researcher ascertained that the teacher respondent is teaching for more than three years. Recruitment of the respondents was voluntary. Informed consent was asked from the participants as proof of their voluntary participation.

Instrument

In conducting the interview, an Interview Schedule was developed. The interview schedule is composed of guide questions designed to elicit responses on how innovative teaching strategies utilized in their school. The outline includes an engaging question, three exploratory questions, and an exit question.

The study also uses the researcher-made questionnaire the transcript of the interviews of the nine school heads and seven teachers. The tool was used to measure the teacher's level of innovative teaching strategies in their classroom. Psychometric properties of the instrument were ascertained first to find it valid and reliable.

Data Gathering Procedure

Before the researcher interviewed the nine school heads and seven teachers, request letter was sent to authorities to give the researcher the permit to conduct the study. Subsequently, the researcher asked the school heads permission to administer the questionnaire to the 309 target respondents for the Exploratory Factor Analysis.

The researcher interviewed the nine school heads and seven teachers of the identified central schools as respondents of the study. An application of an Android phone was used mainly to record the school heads and teachers answers to questions. Formulated statements created after transcribing the interview into a word for word way. The prepared meaning was then picked out from the verbatim reports. A total of 72 items constructed. The validation process then followed it. Five experts in the field of education analyzed each of the items (Sharief et al., 2012). Necessary revisions were made considering the expert views and suggestions. Suggestions and recommendations of the experts were incorporated, only 65 items included in the proposed scale for pilot testing.

The scale with a total of 65 items was pilot tested to the teachers of Sgt. Miguel Canoy Memorial Central School. Forty-five (45) teachers from SMC MCS responded to the proposed scale. The data were then analyzed using Cronbach's alpha. Results show that the scale obtained a coefficient of 0.897. Findings confirm that the items of the proposed scale have internal consistency and highly reliable. The administration of the 65-item scale to the 309 elementary public-school teachers of Iligan City Division followed next. The data gathered was used for the Exploratory Factor Analysis (EFA).

Ethical Issues

In conducting the research, ethical considerations were strictly followed by the researcher to ensure the integrity of the research process. Anonymity and confidentiality of the research participants are central to the conduct of this research. Where possible, researcher aims to assure participants that every effort was made to ensure that the data they provide cannot be traced back to them in reports, presentations and other forms of dissemination. Informed consent from the potential research participants was secured, the researcher employed no deceptive practices, and the participants are informed their right to withdraw any time from the research should they want to.

Data Analysis

Dimension reduction through Exploratory Factor Analysis (EFA) was used to develop the proposed scale. EFA utilized when a researcher wants to determine the number of factors influencing variables and to analyze which variables go together (DeCoster, 1998). A fundamental hypothesis of EFA is that there are m common 'latent' factors to be discovered in the data set, and the goal is to find the smallest factor that will account for the correlations. In this research EFA, was used to establish the constructs of the Innovative Teaching Strategies of teachers. Mean and Standard Deviations. These descriptive indices were computed to determine the level of innovative teaching. Statistical computations of the study were done using Statistical Package for Social Sciences (SPSS).

III. RESULTS AND DISCUSSIONS

Validity Analysis of Innovative Teaching Strategy Scale

Sampling Adequacy and Test of Sphericity. Before to performing the enquiry, the appropriateness of statistics for factor examination assessed. Table 1 presents the Kaiser-Meyer-Olkin (KMO) of sampling adequacy and Barlett's test of sphericity. The KMO value registers 0.958 indicating that the sum of partial correlations is small compared to the sum of connections. The value shows that patterns of correlations are relatively compact that factor analysis yields decisive factors, hence the sample is adequate, and factor analysis is appropriate for the data set (Field, 2005).

Barlett's measure analyzes the null hypothesis if the original relationship medium is an identity medium. Factor analysis demands relationships between variables. The test revealed the approximate Chi-Square value of 5117.925 and a p -value of 0.000, indicating that there are some relationships between variables in the 65 questions included in the analysis, and therefore factor analysis is appropriate. The items of the questionnaires were analyzed using the exploratory factor with the 65 items were subjected to principal component analysis.

Table 1: KMO and Bartlett's Test of Innovative Teaching Strategy Questionnaire

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.958
Bartlett's Test of Sphericity:	Approx. Chi-Square	5117.925
	df	780
	Sig.	0.000

Construct Validity

By Kaiser's criterion, to be able to extract four factors, the sample size must exceed 250; variables are less than 30; commonalities after extraction are higher than 0.70, and average commonality is higher than 0.60. In this analysis of the present study, Kaiser's rule may not be accurate (Field, 2005).

Scree plot is used to support the number of factors extracted. Scree plot is a useful tool for establishing the number of factors to retain in an analysis. Extracted the number of factors that make up the cliff which explains most of the variance. Figure 3 shows a point of inflexion after the fourth factor; therefore, four factors kept in the analysis. The four factors or domains retained.

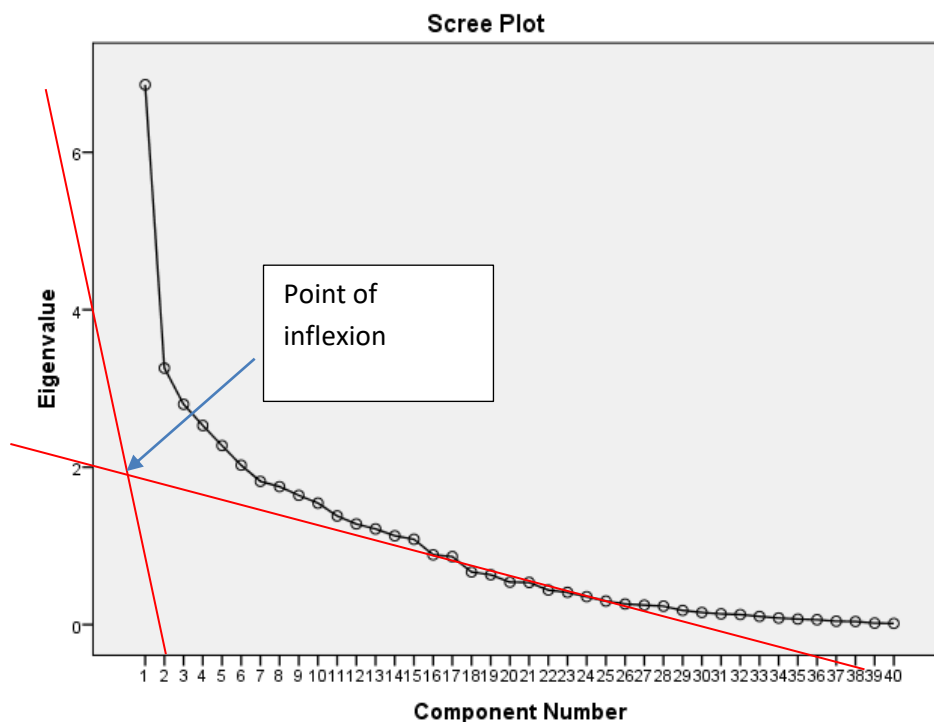
**Figure 1: Scree Plot Indicating the Suitability of a Four-Factor Scale**

Table 2 shows the results of exploratory factor analysis of the 40 items (EFA) retaining four factors for the innovative teaching strategies. Principal Component Analysis (PCA) as a method processed the 65 items of the scale. PCA is often employed incorrectly to reveal latent constructs of observed variables, which is the purpose of EFA. PCA is more appropriate for reducing measured variables into a smaller set of variables by keeping however much difference as could be expected out of the aggregate change in the measured variables (Hee, Dailey, & Lemus, 2002). The analysis yielded removal of eight (25) items as they have factor loadings below 0.50, and the final scale is composed of 40 items. All the variables retained register factor loadings higher than 0.50. The measure of sampling adequacy factor 1 (MSA = 0.948), Factor 2 (MSA = 0.968), factor 3 (MSA = 0.926) and factor 4 (MSA = 0.926). This coefficient indicates that the retained factors have excellent level of sampling adequacy. Computation of Cronbach's alpha coefficients to determine the reliability of each factor. Factor 1 ($\alpha = 0.813$), factor 2 ($\alpha = 0.802$), factor 3 ($\alpha = 0.796$) and factor 4 ($\alpha = 0.790$) possessed high level of reliability. Hence, all the constructs are considered valid and reliable. The scale is, therefore, an acceptable measure of innovative teaching.

Table 2: Psychometric Properties of the Scale

Factors	Items	Loadings	Communalities	KMO	Cronbach's Alpha
A. Factor 1 Critical Thinking	Item 56	.736	.644	.867	.813
	Item 18	.730	.641		
	Item 17	.721	.604		
	Item 35	.690	.678		
	Item 60	.670	.640		
	Item 13	.659	.613		
	Item 50	.630	.648		
	Item 22	.593	.657		
	Item 3	.572	.555		
	Item 61	.566	.678		
	Item 4	.544	.556		
B. Factor 2 Creativity	Item 42	.712	.689	.842	.802
	Item 38	.679	.674		
	Item 23	.677	.672		
	Item 15	.664	.670		
	Item 64	.658	.649		
	Item 1	.654	.638		
	Item 10	.646	.633		
	Item 33	.640	.627		
	Item 11	.608	.588		
	Item 53	.599	.677		
	Item 44	.596	.547		
	Item 34	.594	.526		
C. Factor 3 Social Skills	Item 47	.647	.597	.823	.796
	Item 29	.589	.585		
	Item 52	.588	.580		
	Item 7	.577	.576		
	Item 25	.573	.571		
	Item 57	.570	.567		
	Item 24	.569	.557		
	Item 37	.566	.546		
	Item 55	.553	.540		
D. Factor 4 ICT Skills	Item 43	.633	.588	.817	.790
	Item 63	.629	.540		
	Item 27	.580	.587		
	Item 40	.562	.592		
	Item 8	.559	.547		
	Item 48	.534	.625		
	Item 39	.526	.573		
	Item 62	.518	.513		

The Constructs of the Innovative Teaching Strategies Questionnaire

Notes: Extraction Method: Principal Component Analysis

Using the principal component analysis (PCA), four factors were extracted retaining the variables with factor loadings with 0.50 and above. Out of 65 items, 25 items deleted as they do not reach the factor loadings of 0.50. The forty (40) items composed the four-factor scale namely: Factor 1 – Critical Thinking (11 items), Factor 2 – Creativity (12 items), Factor 3- Social Skills (9 items) and Factor 4- ICT Skills (8 items). The items per construct, as well as the factor loadings, are presented in Table 3.

Factor 1- Critical Thinking. Teachers made an agreement that critical thinking has been a significant issue in education. The K to 12 curricula specifically emphasize a thinking curriculum and thereby requires teachers to elevate their learners' mental workflow beyond just memorization which is an excellent stage forward. Critical thinking is a dexterity that learners thoughts will unquestionably need and practice well beyond their school age. Experts reach an agreement that in

keeping up with the ever-changing technological advances, learners will need to acquire, understand, and analyze information on a much more efficient scale by training them to develop higher metacognition skills. Teachers agree that it is their job as educators to equip learners with the strategies and skills they need to think critically to cope with these problems and obstacles they face in life. As an innovative teacher, they agree that continuous improvement and reflection of their teaching method will increase the achievement of the learners. (Adams, 2013).

Factor 2 -Creativity. Teachers see teaching as the search for doing things better, and if the communication process is successful, that attempt is perceived by the learners as creative. Creativity rest not in the teacher, nor in the learners, but in the interface between the two. Moreover, education authorities also suggest that it was more vital to comprehend what is involved in the creation of the role of teacher, and in the communication process with the learners, rather than exploring creative methods to present the subject matter to learners (De Sousa, 2017). The current international economic news put creativity in the forefront. As third world nations proficiently contend with built up economies for manufacturing and less-skilled jobs, the pressure is in the developed world to proceed the next financial breakthrough. Advancement and the innovativeness that drive it are critical to this procedure. Ultimately, education is the place to instill innovativeness in up and coming ages, to set them up for the difficulties countries will look in coming years. The current worldwide enthusiasm for the advancement of imaginative reasoning for all regions of training requires teachers at all levels to develop learning encounters that create original items as well as innovative procedures. These procedures could in a perfect world be connected crosswise over different orders requiring complex critical thinking, inciting imaginative results in various areas. While the authors expected that teachers in the innovative controls of quality and configuration should play the leading part in this advancement of innovative procedures, it is not evident this is going on.

Factor 3 – Social Skills. A common idea that was mentioned by teachers was that an innovative teacher needed to be able to get along with others and respect learner’s ideas by understanding them from their point of view thus giving the learners opportunities to express themselves. Students’ learning is supposed to be on cognitive and social processes. Therefore, teachers’ social skills are assumed to play an important role in learners’ performance.

Furthermore, self-awareness enables teachers to understand the emotions of others and to express interest, care and empathy. Indeed, a large body of knowledge has pointed to interpersonal competencies, in particular empathy and interpersonal relationships, as crucial to teachers (Jennings & Greenberg, 2009; Stronge, 2015). Empathy and care were noted to affect teachers’ ability to understand students’ views and needs (Mugno & Rosenblitt, 2017), to develop and maintain caring, meaningful and supportive relationships with students and to teaching efficiently (Boyd, 2015).

Factor 4 – ICT Skill. There is no doubt that technology has brought about an irreversible change in our world and explained it is futile to attempt to debate about whether or not to adopt technology into the classroom. Educators should acknowledge the reality that technology is here to stay and concentrate on how to help teachers use the new technologies in their teaching and learning such that student learning is enhanced. Our society considers technology use in the classroom as a crucial and integral component to preparing students for successful navigation through our world (Bhatt, 2017).

Technology tools alone do not increase student learning. Teachers felt their design of the shared technology activities lead to learning experiences that enhanced student learning through engagement and in-depth learning. Teachers integrated technology in the classroom to create a more balanced type of learning episodes, which will help the learner increase his chance to get the maximum potential learning experience based on this activity (Morgan, 2014).

Table 3: Item Loadings per Component based on Rotated Component Matrix

Factors/ Items	Constructs/Indicators	Components			
		1	2	3	4
Factor 1	Critical Thinking				
Item 56	Show open-mindedness and diverse thinking	.746			
Item 18	Embed higher order thinking along with teaching	.733			
Item 17	Demonstrate a clear focus on the teaching objectives	.727			
Item 35	Integrate into the lesson scientific concepts and processes	.699			
Item 60	Train learners to develop higher metacognition skills	.683			
Item 13	Conduct action research to address challenges in the classroom	.673			

Item 50	Reflect on teaching problems and learn from experiences	.646
Item 22	Evaluate strength and weaknesses of learners for enrichment	.621
Item 3	Improve teaching based on the actual conditions of the class	.613
Item 61	Use continuous improvement as an excellent method for teaching	.527
Item 4	Allow learners to generate good ideas	.531
Factor 2	Creativity	
Item 42	Differentiate learning instruction for diverse learners	.753
Item 38	Manifest courage to try new things in teaching	.681
Item 23	Exhibit better skills in the improvisation of instruction	.679
Item 15	Create a democratic climate in the class	.672
Item 64	Utilize learning resources in an active manner	.668
Item 1	Keep up with latest teaching methods in the K to 12 curricula	.662
Item 10	Assume different roles of a teacher	.652
Item 33	Initiate learners' ability to learn and love learning	.649
Item 11	Build a positive teacher-learner environment	.624
Item 53	Set clear learning standards for better learning outcomes	.611
Item 44	Organize teaching as an enjoyable experience for the learners	.603
Item 34	Instill to the learners the responsibility of their learning	.597
Factor 3	Social Skills	
Item 47	Promote social acceptance among learners	.653
Item 29	Give learners opportunities to express themselves	.614
Item 52	Respond swiftly and consistently to inappropriate behavior	.607
Item 7	Am sensitive in non-verbal responses from the learners	.587
Item 25	Work well with other teachers even under pressure	.583
Item 57	Show the ability to socialize and get along with others	.580
Item 24	Exhibit positive attitudes while working in a team	.574
Item 37	Involve parents and stakeholders to bring a positive outcome	.579
	Show empathy and sensitivity to diverse cultures of learners	
Item 55		.561
Factor 4	Information Communication and Technology Skills	
Item 43	Organize classroom activities using technology	.647
Item 63	Utilize ICT as an efficient way to engage learners	.638
Item 27	Extract information from online sources	.617
Item 40	Model to the learners the ethical and positive use of technology	.590
Item 8	Analyze technological issues and inform learners about it	.551
Item 48	Provide technology-rich teaching methods to provoke deeper learning	.547
Item 39	Mobilize learners interests and enhances their knowledge through the use of ICT	.531
Item 62	Utilize a variety of technological tools to increase productivity inside the classroom	.529

Notes: Extraction Method: Principal Component Analysis Rotation Method: Varimax with Kaiser Normalization

Rotation converged in 7 iterations

Table 4. Shows the 40 items retained after the Exploratory Factor Analysis (EFA), teachers will rate this as to how often they used this strategy inside their classroom. The scale used was 4- always; 3-often; 2-seldom; 1-never.

Table 4: The Final scale

Indicators
<i>Critical Thinking</i>
1. how open-mindedness and diverse thinking
2. embed higher order thinking along with teaching
3. demonstrate a clear focus on the teaching objectives
4. integrate into the lesson scientific concepts and processes
5. train learners to develop higher metacognition skills
6. conduct action research to solve existing challenges in the classroom
7. reflect on teaching problems and learn from experiences
8. evaluate strength and weaknesses of the learners for enrichment
9. improve teaching based on the actual conditions of the class
10. pursue continuous improvement as a good excellent of teaching
11. allow the learners to generate good ideas
<i>Creativity</i>
12. differentiate learning instruction for diverse learners
13. manifest courage to try new things in teaching
14. exhibit better skills in the improvisation of instruction
15. create a democratic climate in the class
16. utilize learning resources in an active manner
17. keep up with latest teaching methods in the K to 12 curricula
18. assume different roles of a teacher
19. initiate learners' ability to learn and love learning
20. build positive teacher-learner environment
21. set clear learning standards for better learning outcomes
22. organize teaching as an enjoyable experience for the learners
23. instill to the learners the responsibility of their learning
<i>Social Skills</i>
24. promote social acceptance among learners
25. give learners opportunities to express themselves

26. respond swiftly and consistently to inappropriate behavior
27. m sensitive in non-verbal responses from learners
28. ork well with other teachers even under pressure
29. how the ability to socialize and get along with others
30. xhibit positive attitudes while working in a team
31. nvolve parents and stakeholders to bring positive outcome
32. how empathy and sensitivity to diverse cultures of learners

ICT Skills

33. rganize classroom activities using technology
 34. tilize ICT as an effective way to engage learners
 35. xtract information from online sources
 36. odel to the learners the ethical and positive use of technology
 37. nalyze technological issues and inform learners about it
 38. rovide technology rich teaching methods to provoke deeper learning
 39. obilize learners interests and enhances their knowledge through the use of ICT
 40. tilize a variety of technological tools to increase productivity inside the classroom
-

Teachers' Innovative Teaching Strategies

The teachers' innovative teaching was also assessed in this study (Table 4). The overall results of Mean and Standard Deviation revealed the innovative teaching of teachers ($M = 3.25$; $SD = 0.14$). Findings imply that teachers are highly innovative in their teaching. They were able to generate new ideas and put into productive practice. In this sense, innovation can involve creating a new method or a new use for an existing method or a new solution to a problem. Innovation often occurs at a local level, within the tools, materials, and expertise available in the local context. Teachers innovate by modifying existing practice or tools, with each innovation creating a new context that makes previously unimaginable innovation possible (Goatley & Johnston, 2013). Innovation has been an essential aspect of the educational system of the country, (Hobday et al., 2014) suggested that to produce innovative ideas; teachers must have a design-thinking mentality.

As further revealed in the results of Mean and Standard Deviations computations, Table 4 further show that the factor for critical thinking has a mean of 2.47 and SD of 0.44 which means that teachers have a low level in open-mindedness and diverse thinking. Teachers were not able to embed higher order thinking skills along with teaching and integrate into the lessons scientific concepts and processes. Teachers were also low in the conduct of action research and continuous improvement as a way to solve challenges in their classroom.

Regarding creativity, the factor has a Mean and Standard Deviation $M=3.26$ and $SD=0.48$ respectively, which indicates that teachers are highly innovative because they manifest courage to try new things in teaching, exhibit better skills in the improvisation of instruction and organize teaching as an enjoyable experience for the learners.

Creative teaching occurs when teachers use imaginative approaches to make learning more interesting, exciting and compelling. Good teaching requires creative teaching as the critical component. However, it is not a guarantee that learners will develop their creative potential. Teaching creativity goes a step further by also developing the creative abilities of the children. Nevertheless, teaching creativity is not possible without creative teaching. In teaching, there are

always new challenges, and creative teachers manage them extraordinarily well because they constantly reinvent themselves and adapt their teaching styles and strategies (Aud et al.,2017).

Social Skills results of the computed Mean and Standard Deviation (M=3.28; SD=0.23), which means that teachers are very high in their social skills which are particularly important for teachers' efficacy. Recently, the importance of learners' social-emotional competencies to their learning and achievement in academics is recognized (Dolev & Leshem, 2016). Positive teacher-student relationships have been noted to be an essential element of quality teaching, providing pupils with stable, safe, supportive and pro-social classroom atmosphere which enhances overall growth, well-being, positive behaviors', motivation and academic success (Brackett & Katulak, 2006; Jennings & Greenberg, 2009). Such an atmosphere also contributes to teachers own well-being (Split, Koomen, & Thijs, 2017).

Information Communications Technology skills with a computed Mean and Standard Deviation (M=2.48; SD=0.21). Teachers are highly innovative when they organize classroom activities using technology, utilize ICT as an efficient way to engage learners.

Table 5: Descriptive Statistics of Teachers' Innovative Teaching Strategies

Constructs	Mean	StDev
Critical Thinking	2.47	0.44
Creativity	3.26	0.48
Social Skills	3.28	0.23
ICT Skills	2.48	0.21
Overall	3.25	0.14

Scale: 1.0 - 1.75 -Very Low; 1.76-2.50 - Low; 2.51 - 3.25 - High; and 3.26 -4.0 – Very High

Summary of Findings

Using the Exploratory Factor Analysis (EFA), the findings of the study indicate that four (4) factors can be used to measure the teacher's innovative teaching strategies. The following are the identified factors/theme: Critical Thinking (factor 1), Creativity (factor 2), Social Skills (factor 3) and ICT Skills (factor 4). The Cronbach's alpha coefficients were also computed which revealed that the scales possessed a very high level of reliability and construct validity and have excellent sampling adequacy and high level of reliability. The Mean and Standard Deviation were used to measure the level of teacher's innovative teaching. The study revealed that teacher's level of innovative teaching strategies is high. Their social skills were also high although they exhibit low in critical thinking.

IV. CONCLUSION

The study provides a scale to measure teacher's innovative teaching strategies. Based on the Cronbach's alpha coefficients results, the tool possessed a very high level of reliability and constructed validity. Therefore, the instrument can be useful in assessing the level of teachers' innovative teaching strategies. Public School District Supervisors can utilize it, Program Specialists for Planning and Research as well as the Human Resource Development, School Heads, researchers and teachers in assessing innovative teaching strategies. Training may be conducted to address the need of the teachers in developing their critical thinking skills, and training and workshops may enhance the ICT skills of teachers. It is also suggested that the newly developed scale be retested for Confirmatory Factor Analysis (CFA) to validate the items further.

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