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The Reliability and Validity of an Instrument for School Development

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Abstract:
The purpose of this study is to determine the reliability and validity of an Instrument for School Development. Professional development, teacher professional competencies and school continual improvement items were accepted by 5 experts who reviewed the content, construct and face validity of this instrument. A survey research with simple random sampling for data collection were administrated to 300 respondents in Sarawak national secondary schools. The total scale of this instrument was .94 which showed high internal consistency with professional development Cronbach alpha at .86, teacher professional competencies at .91 and continual school improvement at .87. The Kaiser-Meyer-Olkin Measure of sampling adequacy (KMO) value was .851 and Bartlett's test of sphericity value at 9517.4 was significant. Total Variance Explained for the first four components recorded eigenvalues of 30.8%. Scree plot showed a break between the second and third component. The factors were retained because eigenvalue of PCA was larger than the criterion value of Parallel Analysis which supported the decision of scree plot to retain only two factors for further investigation. The findings showed that the Instrument for School Development was a reliable and valid instrument.

Keywords: *Instrument for School Development, professional development, teacher professional competencies, school continual improvement*

1. Introduction

The purpose of this study is to determine the reliability and validity of an instrument for school development. School development is a systematic approach for change improvement at the school level designed and focus towards the achievement of its vision which enhanced student learning. This instrument comprised of three variables which included professional development, teacher professional competencies and school continual improvement. The items of professional development encompass learning community, leadership, resources, data driven, design, learning, collaboration, equity and quality teaching. These items were adapted from Standard Assessment Inventory (SAI) by Giwa (2012). Teacher professional competencies items were adapted from New Teacher Center (2011) with six components of teacher professional competencies consisting of field competency, curriculum competency, lifelong learning competency, emotion competency, social culture competency and environment competency by Selvi (2007). School continual improvement items were adapted from Kazi, Gazi, and Ghani (2010) with five factors namely school climate, leadership, high level performance, curriculum development and teacher improvement. The adaptation of this instrument was to determine the correlation between professional development, teacher professional competencies and school continual improvement as a new research instrument. The adaptation fit the needs of a new population, location, language, mode or any of these combinations (Harkness, 2008, 2010; Harkness, Villar, & Edwards, 2010).

Professional development is a process of obtaining training to improve the pedagogical skills, research, personal development, management and assessment (Fakhra & Mahar, 2014). The content, process and context were the solid framework of quality professional development. The context described school climate through learning community, leadership and resources. Process area encompassed data driven, design, learning, collaboration, research-based and evaluation. Quality teaching, equity, active parents and community involvement were the content of professional development (NSDC, 2001). The content, process and context of the theoretical structure of effective professional development experiences with the National Staff Development Council were shown in Figure 1.

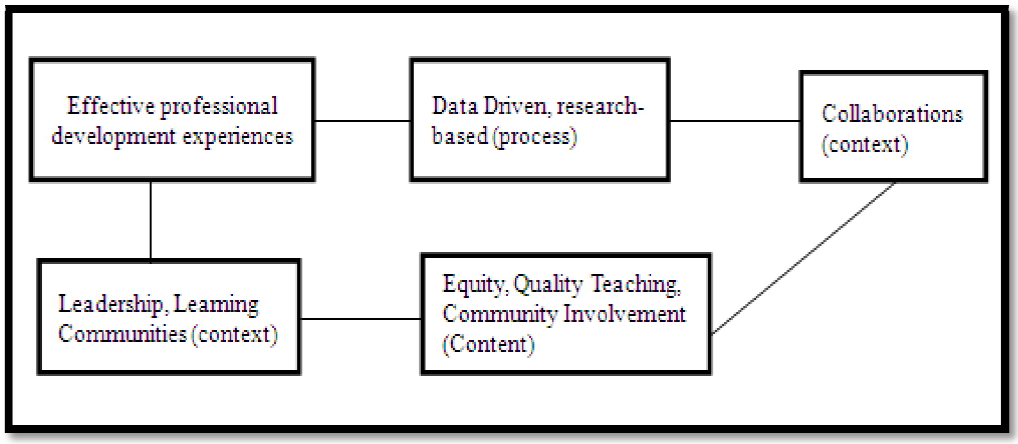

Figure 1: Theoretical Structure of Effective Professional Development Experiences with the NSDC Standards
Source: Giwa (2012)

In this study the context standards address conditions under which the professional development took place which included learning community, leadership and resources. Wested (2000) mentioned that learning community encouraged collaborative and collective learning of teachers to generate daily social changes in school. Teachers could learn new pedagogical skills and strategies through learning community to enhance students learning in achieving the school goals. According to Schramm (2006), student learning improvement required skillful school and district leaders as the guidance toward continual instructional improvement. As an instructional leader, the principal should influence teachers to be aware that learning is a process of cumulative and developmental which never stopped. Resources were the various sources and educational technology used by teachers. However, professional development infused technology as the most important resources to formulate, collaborate and evaluate experiences with the stakeholders (Gersten, Baker, & Griffiths, 2003). Teachers should have mastery of their Information and Communication Technology (ICT) skills through learning community, collaboration and cooperative activities to enable them effectively in classroom instruction.

Process standards addressed how the professional development was designed which included data driven, design, learning and collaboration. Classroom-based data was used to determine the student's achievement, instructions, curriculum decisions and assessment. Educators and policymakers need the analysis of data for various interventions and pilot programmes designed to improve students' performance (NCREL, 2005). Teachers should always update and monitor their students learning progress for continual improvement. Systematic professional development design can improve teachers' knowledge and student achievement (Garet, Cronen, & Eaton, 2008). When creating any professional development programme, the principal should ensure that design and activity will suit the needs of teacher personal development and students learning outcome. Collaboration referred to group activities, discussion, peer coaching, decision making committee, leadership team and teachers' networking (Bull & Buechler, 1996). Teachers must participate in any collaborative activity but should be active leaders of collaborative teams. According to Roberts and Priutts (2003), learning can improve teaching strategies and capacity, networking and increase the levels of profession efficacy. Thus, teacher should be actively involved in collaborative learning like peer coachi, lesson study, learning walks and professional learning community.

Content standards address what is learned in the professional development which included equity and quality teaching. Equity referred to teachers understanding of students' needs and appreciation, a safe and supportive learning environment, and high expectations of students' academic achievement (Schramm, 2006). Teacher should be able to deal with issues to fulfil students' different needs. Quality teaching is the understanding of lessons content, subject matter, teaching techniques and teacher's willingness to learn new skills and strategies (Nye, Turner, & Schwartz, 2006). Hence, teachers need to improve the quality of their instruction through formal or informal professional development in order to master multi instructional strategies to help students.

Teacher professional competencies was mastery of the curriculum content, resources, structure and scientific methodology (Kurniawan, Murniati, & Khairi, 2011). There were nine teacher professional competencies components including curriculum competency, lifelong learning competency, social culture competency, emotion competency, environment competency, field competency, communication competency, Information Communication and Technology (ICT) competency and research-based competency which produced meaningful teaching and learning (Selvi, 2007) as shown in Figure 2.

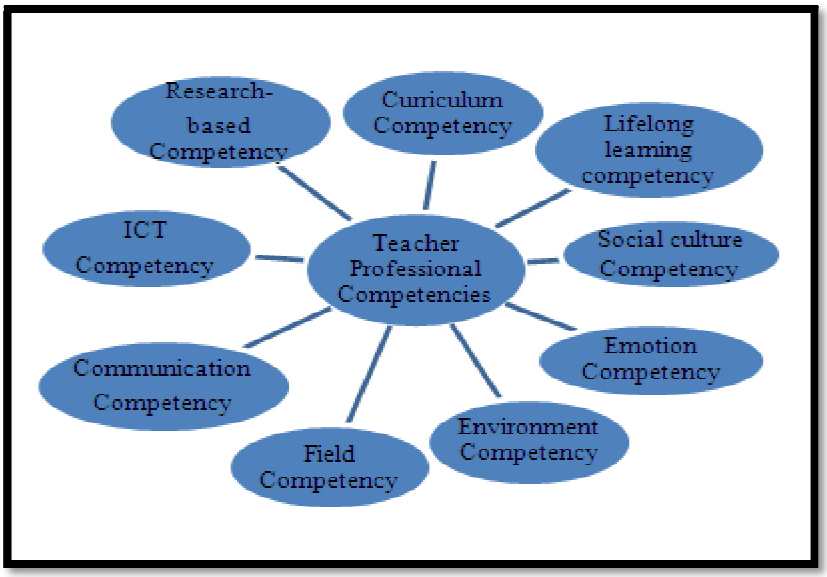

Figure 2: Teacher Professional Competencies Component
Source: (Selvi, 2007)

Six of the components which included field competency, curriculum competency, lifelong learning competency, emotion competency, social culture competency and environment competency were used for this study. Field competency was the most important competency to enable teachers to carry out their profession task of content delivery which ensured students direct interaction with the lesson content (Selvi, 2007). Teachers should be expert in their field to produce meaningful teaching and learning outcomes. Curriculum competency was the knowledge and skills framework of teachers to achieve effectiveness (Selvi, 2007). Teachers' good understanding of curriculum design enabled them to choose suitable strategies which can enhance students learning. Lifelong competency was a person's ability to use any learning instrument to enhance their lifelong learning (Selvi, 2007). Thus, teachers who possessed lifelong competency would be able to develop students' lifelong learning skills. Emotion competency consisted of value, moral, belief, attitude, motivation and empathy of teachers and students with the implementation of psychological and curriculum consultation (Selvi, 2007). Teachers with high emotion competency would be effective mentors who influence students learning. Social culture competency was the background of social and culture which can improve the students' collaborative and learning (Selvi, 2007). Teacher who possessed high social culture competency could understand students social culture through their profile, learning, interaction and progress. Environment competency is an ecology and safety sustainable dimension for learning development (Salite, Ilga, & Pipere, 2006). Teachers who have high environment competency would have demonstrated outstanding classroom management skills to make sure that students will study in a conducive classroom environment.

School improvement begins with the development of human resources and school culture to ensure that the organization is functioning, meet the organizational needs and be able to cope with new challenges. Professional development that encourages individual and collective learning ensures the continual improvement of school (Tobergte & Curtis, 2002). The success of school continual improvement depends on the ability of the school to manage change and development. The most successful school improvement projects across the country are aware that school advancement is not a single activity or approach but a set of effective professional development process to improve teaching and learning competencies (Harris, 2002).

According to Texas Continuous Improvement Framework (Figure 3), the support and technical assistance can be coordinated and differentiated based on identified needs. The framework built on a foundation of district commitments and support systems, recognizes the importance of a systemic approach to improvement with an emphasis on the critical success factors (CSFs) and best practice research for improvement planning. In this study, 5 factors of school continual improvement included school climate, teacher improvement, leadership, high level performance and curriculum development. School climate is complex and multi-dimensional which includes trust, values, and attitudes of students teachers and administrators (Mitchell, Bradshaw, & Leaf, 2010). Leadership is a process or relationship, a combination of characteristics or personality traits, certain behaviors or leadership skills. Leadership is the process of influencing a group of people towards the goal achievement (Wolinski, 2010). Teacher inprovement is a process of identifying the strength and weaknessess in teaching to make positive changes based on students' learning outcomes. High level performance is defined as the ability of the school to achieve better results within a set period. Curriculum development is a collection of lesson plans and capabilities for effective curriculum planning which is an essential skill for all teachers. Curriculum development included government curriculum statements and negotiations on the determination of objectives, topics and methods of evaluation (Jacobs, Vakalisa, & Gawe, 2011).

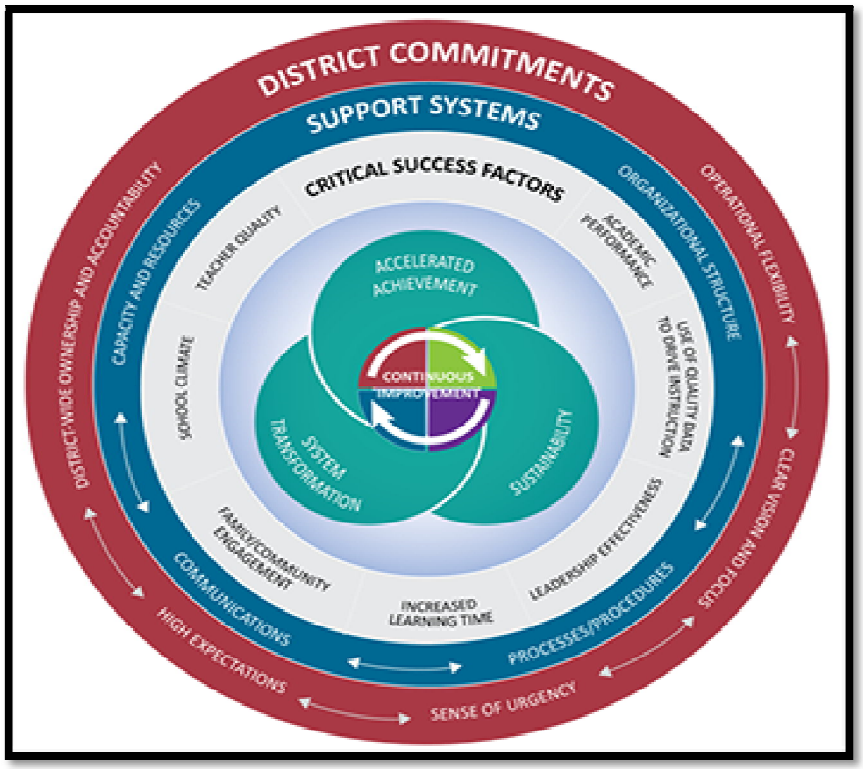

Figure 3: Texas Continuous Improvement Framework
Source: Texas Education Agency (2016)

In this study, the adaptation of the Instrument for School Development is necessary to find out the construct and interrelationship between professional development, teacher professional competencies and school continuous improvement. The reliability and validity of the Instrument for School Development through factor analysis is also very important to make sure it is relevant and suitable to use as an instrument in the education field.

2. Method

2.1. An Instrument for School Development

An Instrument for School Development had four sections which included respondent's demographic, Section A, Section B and Section C. There were 30 items about professional development in section A which were adapted from Giwa (2012) Standard Assessment Inventory (SAI), with 5 items of learning community, 4 items of leadership, 4 items of resources, 3 items of data driven, 2 items of design, 5 items of collaboration, 3 items of learning, 2 items of equity and 2 items of quality teaching. Section B also had 30 items of teacher professional competencies which adapted from Professional Teaching Competencies (New Teacher Center, 2011) with six components of Selvi's teacher professional competency (Selvi, 2007), including 5 items of emotion competency, 6 items of environment competency, 5 items of field competency, 4 items of social culture competency, 5 items of curriculum competency and 5 items of lifelong learning competency. Another 20 items of school continual improvement in section C were adapted from Kazi et al. (2010) which included 4 items for school climate, 3 items for teacher improvement, 4 items for principal leadership, 4 items for curriculum development and 5 items for high level performance. Overall instrument had 80 items with a 5 point Likert Scale as very frequently (5), frequently (4), occasionally (3), rarely (2), and never (1) (Brown, 2010).

In Section A, learning community items included curriculum and instructional training, mentor's functions, teaching and learning strategy discussion, students' work and colleagues' feedback. Leadership items included the empowerment, instructional improvement and commitment in teachers learning opportunities. Resources items focused on learning and using technology in teaching and professional development opportunities. Data driven items were student-based data to improve their learning. Design items refer to the professional development design and teachers learning strategies. Collaboration items were the effective ways for teachers to work together to accomplish their teaching and learning goals. Learning items meant teachers learn through supervision, professional development programmes and activities. Equity items were the positive relationships between students and teachers, student-based instruction and assessment. Quality teaching items were the opportunities for teacher to practice new skills and continued support to improve student learning.

In Section B, emotion competency items were learning based on students' prior knowledge, life experience, interests, diverse needs, autonomy interaction, problem solving and self-directed reflection. Environment competency items included physical environment, climate, social development, classroom procedures and instructional time to engage students learning.

Field competency items refer to the understanding of teacher in subject content, curriculum, information across subject matter areas, instructional strategies, material, resources and technologies. Social culture competency items included students' background, interest, learning needs evaluation, short term and long-term learning plans, and instructional plan adjustment. Curriculum competency items included students' learning goals, multiple resources, and assessment and performance progress. Lifelong learning competency items were teaching practice reflection, professional development goals establishment and professional practice improvement.

In Section C, school climate items included sstudent's attendance, discipline and attitudes. Teacher improvement items referred to tteacher's instructional techniques and individual help provided to students. Principal leadership items mentioned principal as an able manager, instructional leader and mentors. Curriculum development items refers to the well-defined curriculum, academic focus, mastery basic skills and curriculum-referenced materials used. High level performance items consisted the principal and staffs' high expectations in students learning ability and achievement.

The adaptation of professional development, teacher professional competencies and school continual improvement were necessary and relevant as an Instrument for School Development. This instrument was accepted by 5 experts who reviewed its content, construct and face validity. It is a new instrument with the combination of those variables especially in the education field of research.

2.2. Data Collection

An Instrument for School Development was utilized by 500 teachers with simple random sampling at 20 national secondary schools in Sarawak. Simple random sampling was defined as the process where every individual had the same probability of being selected and no way affected by another individual (Gay, Mills, & Airasian, 2001). There were 350 copies of An Instrument for School Development returned within a month. The researcher found that 300 copies were answered completely and relevantly for reliability and factor analysis. Reliability refers to the consistency, stability and repeatability of results i.e. the result of a researcher is considered reliable if consistent results have been obtained in identical situations but different circumstances (Twycross & Shields, 2004). Factor analysis is useful to examine the relationship between large numbers of variables, disentangle and identify clusters of variables that are linked (Burns & Grove, 2005). According to the sample size at least 300 was comforting for factor analysis (Tabachinick & Fidell, 2007). On the other hand, a rough rating scale for adequate sample sizes in factor analysis mentioned 100= poor, 200 = fair, 300 = good, 500 = very good, 1000 or more = excellent (Comrey & Lee, 1992).

The rrespondents' profile showed in Table 1 was based on demographic features. They were 89 male and 211 female teachers. 171 of the teachers were 22 to 35 years old, 122 teachers were 36 to 56 years old and 7 teachers were older than 57 years. There were 282 teachers with bachelor degree, 17 teachers with master's degree and only a teacher with PhD degree. 168 teachers had less than one year to 10 years of teaching experience, 102 teachers had 11 to 20 years of teaching experience and 30 teachers had 21 years and above of teaching experiences. There were 155 teachers who had less than a year to 5 years' experience of teaching in this school, 81 teachers had 6 to 10 years' experience of teaching in this school and 64 teachers had 11 years and above experience of teaching in schools.

Profile	Demographic Features	Frequency
1. Gender	Male	89
	Female	211
2. Age	22-35 years	171
	36-56 years	122
	57 years and above	7
3. Qualification	Bachelor degree	282
	Masters	17
	PhD	1
4. Teaching experience	Less than 1-10 years	168
	11-20 years	102
	21 years and above	30
5. Experience of teaching in this school	Less than 1-5 years	155
	6-10 years	81
	11 years and above	64

Table 1: Respondent's Profile Based on Demographic Features (N=300)

2.3. Data Analysis

In this study, Statistical Package for The Social Sciences (SPSS) Version 23.0, Windows 2015 was used to analyze the reliability and validity of An Instrument for School Development. The reliability item can be accepted if the Cronbach alpha value (α) is .70 and higher (Lobiondo-Wood & Haber, 2013; Shuttleworth, 2015).

The Exploratory Factor Analysis (EFA) used in educational and psychological fields is to identify the underlying dimensions of a domain of functioning, as assessed by a particular measuring instrument (Floyd & Widaman, 1995). This process determined the number of factors to retain for a group of variables of interest (Fabrigar, Wegener, MacCallum, & Strahan, 1999; Hayton, Allen, & Scarpello, 2004; Henson & Roberts, 2006; Velicer, Eaton, A., & Fava, 2000). In this study, Exploratory Factor Analysis was done to determine the reliability and validity of an instrument for school development. In addition, the Exploratory Factor Analysis (EFA) is used in the early stages of study to gather the interrelationships among a set of variables (Pallant, 2011). Thus, the primary use of Exploratory Factor Analysis in this study was to identify the interrelationships between professional development, teacher professional competencies and school continual improvement.

Kaiser-Meyer-Olkin (KMO) and Bartlett's test of sphericity measured the sampling adequacy. Bartlett's test of sphericity was significant (p <.05 or smaller) for the factor analysis. The KMO index ranged from 0 to 1, with .6 as the minimum value indicating a good factor analysis (Tabachinick & Fidell, 2007). According to Field (2009), KMO values between 0.5 and 0.7 are mediocre, values between 0.7 and 0.8 are good, and values above 0.9 are superb. Scree plot was used to explain the variance in the data set and retained all factors above the elbow or break in the plot. Parallel Analysis was used to compare the size of eigenvalues with those obtained from a randomly generated data set of the same size (Catell, 1966). Parallel Analysis involved comparing the size of the eigenvalues with those obtained from a randomly generated data set of the same size. Only those eigenvalues that exceeded the corresponding values from the random data set were retained. This approach to identify the correct number of components to be retained had been shown to be the most accurate, with both Kaiser's criterion and Catell's scree test tending to overestimate the number of components (Hubbard & Allen, 1987; Zwick & Velicer, 1986).

No modification was made to the Standard Assessment Inventory (SAI) from the National Staff Development Council because its reliability and validity was demonstrated through numerous iterations (Giwa, 2012). The components of Teacher professional competencies matched the Rhode Island Professional Teaching Standards (RIPTS) content standards that outline every teacher presenting quality teaching for the continuous improvement of the teaching profession (New Teacher Center, 2011). The confirmatory factor analysis for school improvement Cronbach alpha were between .60 to .77. 4 items for school climate were .68 to .77, 3 items for teacher improvement were .63 to .71, 4 items for principal leadership were .65 to .76, 4 items for curriculum development were .60 to .67, 5 items for high level performance were .62 to .74 (Kazi et al., 2010). The previous studies showed that professional development, teacher professional competencies and school continual improvement instrument were reliable and valid to be use as an education field research instrument.

3. Findings

The 80 items of the Instrument for School Development were subjected to principal components analysis (PCA) and the data from the 80 items were found suitable for factor analysis. The correlation matrix revealed the presence of many coefficients which were at the value .3 and above. The Kaiser-Meyer-Olkin measure of sampling adequacy (KMO) value was .851 which is more than .6 (Kaiser, 1970, 1974) and the Bartlett's test of sphericity (Bartlett, 1954) value is 9517.4 (p <.05 or smaller). This supported the factor ability of the correlation matrix as shown in Table 2. An Instrument For School Development KMO over 0.8 was a great value mentioned by Field (2009).

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.851
Bartlett's Test Of Sphericity	Approx. Chi-Square	9517.426
Df	3160	
Sig.	.000	

Table 2: KMO and Bartleltt's Test of an Instrument for School Development

According to Kasier's criterion, the first four components of the Instrument for School Development recorded eigenvalues above 1 (14.95, 3.93, 3.16, 2.59). These four components explained a total of 30.8% of the variance. Principal components analysis revealed the presence of four components with eigenvalues exceeding 1, explaining 18.69%, 4.92%, 3.95% of the variance respectively as shown in Table 3.

Total	% of Variance	Cumulative %
14.95	18.69	18.69
3.93	4.92	23.61
3.16	3.95	27.56
2.59	3.24	30.80

Table 3: Total Variance Explained of an Instrument for School Development

Scree Plot of the Instrument for School Development shown in Figure 4 that each eigen values of the factor, shape of the curve changed direction and became horizontal with a break between the second and third component. Components 1 and 2 explained much of the variance than the remaining components. Catell (1966) scree test was used to decide whether to retain the two components for further investigation. This was supported by the result of Parallel Analysis which showed only two components with eigenvalues exceeding the corresponding criterion values for a randomly generated data matrix of the same size (80 items × 300 respondents).

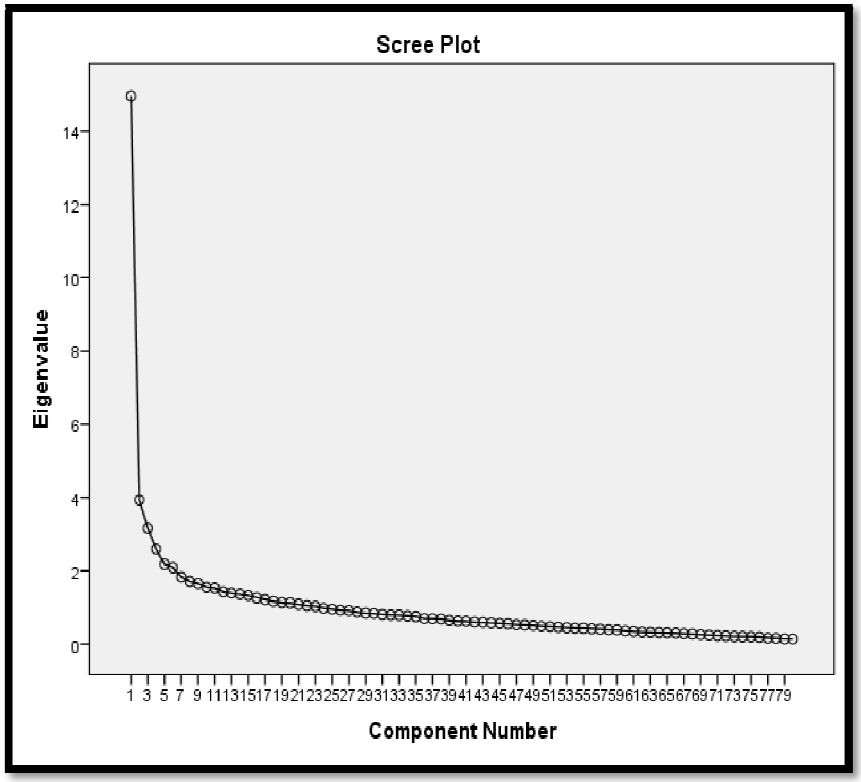

Figure 4: Scree Plot of an Instrument for School Development

Table 4 showed the Comparison of Eigenvalues from PCA and Criterion Values from Parallel Analysis of An Instrument for School Development. The Monte Carlo PCA for Parallel Analysis was used to generate 100 sets of random data of the same size of the real data file of the Instrument for School Development (80 items × 300 respondents). The factors were retained because eigenvalue of PCA was larger than the criterion value from Parallel Analysis which supported the decision from the scree plot to retain only two factors for further investigation (Watkins, 2000). The result from the Parallel Analysis indicated that all 4 components were accepted.

Component Number	Actual Eigenvalue from PCA	Criterion Value from Parallel Analysis	Decision
1	14.957	2.2218	accept
2	3.934	2.1179	accept
3	3.160	2.0449	accept
4	2.592	1.9869	accept

Table 4: *Comparison of Eigenvalues from PCA and Criterion Values from Parallel Analysis of an Instrument for School Development*

Table 5 showed the Total Variance Explained of An Instrument for School Development. The two-component solution explained a total of 23.6% of the variance, with Component 1 contributing to 18.7% and Component 2 contribute. To aid in the interpretation of these two components, oblimin rotation was performed. The rotated solution revealed the presence of simple structure (Thurstone, 1974) with both components showing a number of strong loaded substantially on only one component.

Total	% of Variance	Cumulative %
14.95	18.7	18.7
3.93	4.92	23.6
3.16	3.95	
2.59	3.24	

Table 5: Total Variance Explained of an Instrument for School Development

Table 6 was the Pattern Matrix of the Instrument for School Development which showed the factors loaded for each of the 4 variables. The highest loaded item of component 1 consisted of items J3, M3, L4 and H2 with values .63, .56, .56 and .55 respectively. The values of the 4 loaded items of component 1 obtained from the Pattern Matrix of the instrument For School Development were high. Item J3 was learning experience encouragement. Item M3 was the short term and long-term learning plans. Item L4 was the appropriated instructional strategies which matched the subject matter. Item H2 was student-based instruction and assessment. Items J3, M3 and L4 were under the component of teacher professional competencies and item H2 was the content of professional development.

Component 1	Component 2
J3	.63
M4	.56
L4	.56
H2	.55

Table 6: Pattern Matrix of an Instrument for School Development

Table 7 showed the values of 4 items generated by the Structure Matrix of An Instrument for School Development. The values obtained were unique to the Oblimin output which showed the correlation between the variables and factors. Items J3 (.57), L4 (.55), M4 (54) and L1 (.53) were loaded in component 1. Item J3 was learning experience encouragement. Item L4 was appropriated instructional strategies for the subject matter. Item M4 was student-based instructional plans modification. Item L1 was subject content matter and student development demonstration. These 4 items were under the component of teacher professional competencies.

Component 1	Component 2
J3	.57
L4	.55
M4	.54
L1	.53

Table 7: *Structure Matrix of an Instrument for School Development*

Table 8 was the Communalities of An Instrument for School Development which showed the extraction for item R1, T3, T4 and T2. The variance for each of these items were .46, .45, .43 and .42. The communalities values of the 4 items were more than .3. This meant that the items fitted well with each other respectively. Item R1 was the principal's role which was under the principal leadership factor. Item T3 was the school expectation in student learning. Item T4 was the principal's expectation of students and staffs. Item T2 was the confidence of students learning ability. These four items were under school continual improvement factor.

	Initial	Extraction
R1	1.000	.46
T3	1.000	.45
T4	1.000	.43
T2	1.000	.42

Table 8: Communalities of an Instrument for School Development

The Reliability Analysis of An Instrument for School Development as shown in Table 9 indicated that professional development factor Cronbach alpha was .864. Teacher professional competencies was .910 and school continual improvement

was .872. The total scale was .941 which showed that internal consistency was high. The overall scores of each 3 factors of An Instrument for School Development was stable, consistent and reliable as a research instrument for the education field.

Factor	Cronbach's Alpha Values (A)
1. Professional development	.86
2. Teacher professional competencies	.91
3. Continuous school improvement	.87
Total	.94

Table 9: Reliability Analysis of an Instrument for School Development

The findings showed that the Instrument for School Development was a reliable and valid instrument. KMO value is .851 with Bartlett's test of sphericity value 9517.4 which was significant. The first four components of the Instrument for School Development recorded eigenvalues were 14.95, 3.93, 3.16, 2.59 with a total of 30.8% of the variance. Scree Plot showed each eigenvalue of the factors with a break between the second and third component. The result of the Parallel Analysis showed that the component decision was accepted. The professional development Cronbach alpha was .86, teacher professional competencies was .91 and school continuous improvement was .87 with a total scale .94 which showed that internal consistency was high, stable and consistent.

4. Discussion and Conclusion

In Section A, learning community items which consisted of curriculum, instruction training, mentor's roles, teaching and learning strategy discussions, students' work and colleagues' feedback showed the collaborative and collective learning among teachers to generate the daily social change in school. Leadership items included the empowerment, instructional improvement and commitment in teachers learning opportunities which were provided through principal's support and commitment. Resources items focused the use of technology in teaching and learning, and professional development opportunities. The context of professional development described school climate through 5 items of learning community, 4 items of leadership and 4 items of resources.

The professional development process area encompassed 3 items of data driven, 2 items of design, 5 items of collaboration and 3 items of learning. Data driven items were student- based which aimed to improve their learning. This data was useful to enhance students' achievement, increase the quality of instruction, to make effective curriculum decisions and assessment, and to design various interventions and pilot programmes. Design items referred to the professional development design and teachers learning strategies because systematic design can improve teachers' knowledge and students' achievement. Collaboration items referred to the effective ways teachers collaborate work together to accomplish their teaching and learning goals through group activities, discussions, peer coaching, decision making committees, leadership team and networking. Learning items included coaching and supervision, professional development programmes and activities which can improve teaching strategies, networking, teaching capacity and high-level profession efficacy.

The content of professional development comprised 2 items of equity and 2 items of quality teaching. Equity items consisted of the positive relationships between students and teachers, student-based instruction and assessment. These items were designed to establish teachers understanding in addressing issues such as fulfilling the different needs of students. Quality teaching items were the opportunities for teacher to practice new skills and get confirmed support to improve student learning. Teachers willingness to learn the new skills and strategies can increase their understanding of lessons content, subject matter and good classroom practices.

The 30 items of 9 professional development standards were based on their theoretical and dimensional framework namely context, process and content. The Cronbach alpha for professional development which was .86, is reliable as an education field research instrument. Standard Assessment Inventory (SAI) from the National Staff Development Council had no modification made to the survey because its reliability and validity were demonstrated through numerous iterations (Giwa, 2012).

In Section B, the component of teacher professional competencies included 5 items of emotion competency, 6 items of environment competency, 5 items of field competency, 4 items of social culture competency, 5 items of curriculum competency and 5 items of lifelong learning competency. Emotion competency items consisted students' prior knowledge, their life experiences, interests, diverse needs, autonomy interaction, problem solving and self-directed reflection. The emotion competency discussed the value, moral, belief, attitude, motivation and empathy of teachers and students toward the implementation of psychological and curriculum consultation. Environment competency items included physical environment, climate, social development, classroom procedures and instructional time to engage the students learning in a safe and sustainable dimension. Field competency items referred to the understanding of teachers in subject content, curriculum, information across subject matter areas, instructional strategies, materials, resources and technologies. These items were essential for teachers to carry out their professional task and to allow students interact directly with the lesson content. Social culture competency items included students' background, interest, learning needs evaluation, short term and long-term learning plans and instructional plan adjustment which can improve the students' collaborative skills and learning. Curriculum

competency items included students' learning goals, multiple resources, assessments and performance progress. This competency ensured that knowledge and skills can be garnered to develop effectiveness in education. Lifelong learning competency items were teaching practice reflection, professional development goals establishment and profesional practice improvement for teachers to enhance their lifelong learning and develop students' lifelong learning skills.

The 30 items of teacher professional competencies were grouped based on their 6 theoretical components which included emotion competency, environment competency, field competency, social culture competency, curriculum competency and lifelong learning competency. The Cronbach alpha for teacher professional competencies was high at .91, consistent and reliable as an education research instrument. The items were matched the Rhode Island Professional Teaching Standards (RIPTS).

In Section C, the factors of school continual improvement were 4 items of school climate, 3 items of teacher improvement, 4 items of principal leadership, 4 items of curriculum development and 5 items of high level performance. School climate items included student attendance, discipline and attitudes involving the trust, values and attitudes of students. Teacher improvement items referred to teacher's instructional techniques and individual help provided to students in making positive changes in line with students' learning outcomes. Principal leadership items mentioned the principal as an able manager, instructional leader and mentor by influencing teachers towards advising goal set. Curriculum development items referred to the well-defined curriculum, academic focus, mastery of basic skills and curriculum-referenced materials used which included government curriculum statements, negotiated objectives, topics, methods and evaluation. High level performance items consisted the principal's and staffs' high expectations of students learning ability and goal achievement for the school to achieve better results within a set period.

The 20 items of school continual improvement was based on 5 theoretical factors namely school climate, teacher improvement, principal leadership, curriculum development and high-level performance. The Cronbach alpha for school continuous improvement was .87, consistent, reliable and obtained using as an education research instrument. The confirmatory factor analysis for school improvement of Kazi et al. (2010) Cronbach alpha were between .60 to .77. 4 items for school climate were .68 to .77, 3 items for teacher improvement were .63 to .71, 4 items for principal leadership were .65 to .76, 4 items for curriculum development were .60 to .67, 5 items for high level performance were .62 to .74.

The previous studies done by Giwa (2012), New Teacher Center (2011) and Kazi et al. (2010) showed that professional development, teacher professional competencies and school continual improvement instruments were valid as separate research instrument. However, in this study, the findings indicated that the adaptation and combination of these three variables also showed that it was a reliable and valid research instrument for the education field. This study proved that the professional development, teacher professional competencies and school continual improvement can be integrated to develop a valid and reliable reference for stakeholders like the ministry of education, district education and school management to design national professional development programme and activities, setting the standard for teacher professional competencies and factors of school continual improvement. This instrument could also be used by stakeholders to measure the level of professional development, teacher professional competencies and school continual improvement. It also be used to conduct corrective measure. In addition, findings from this explorative study strongly indicated that the integrated instrument is a valid and reliable reference for stakeholders.

The researcher suggests that a more complex and sophisticated set of technique namely the Confirmatory Factor Analysis (CFA) be run to test specific hypotheses or theories concerning the structure underlying professional development, teacher professional competencies and school continual improvement. A second recommendation is a model for professional development could be designed based on the solid framework of quality professional development which included context, process, content and standards. A 21st century teacher professional model can also be developed by comparing the teacher professional competencies component and the national teacher competency standard. Finally, a school continual improvement model can be built based on the school continual improvement factors and framework.

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