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Professional Development of Teachers Scale (DDTS): Using Confirmatory Factor Analysis

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Abstract: ***The present study seeks to develop a conceptual framework for measuring Professional Development among teachers in schools, primary and secondary education in Zawiya city, in Libya by adopting three appropriate dimensions of measurement: Planning, Implement and Evaluation. To achieve this goal, we used a confirmatory factor analysis (CFA) through AMOS software. Based on the results, it was found that this model is a valid and reliable model that can be used for measuring Professional Development among teachers in schools, primary and secondary in Libya.***

Keywords: Planning, Implement, Evaluation**,** Confirmatory Factor Analysis, Libya

1. Introduction

Previous studies point to different definitions of professional development which underlie scholars' and researchers' different understanding of it. For instance, as defined by Joyce et al. (1976, p. 6), professional development refers to the process of improving (formally and informally) professional performance of educated people, including educators and professionals so that they can be more competent in carrying out their assigned roles." More specifically, according to Gall and Renchler (1985, p. 6), professional development is described as any efforts made in order to enhance or promote teachers' capacity to become efficient professionals through learning new or updating their knowledge, attitudes and skills." In another definition offered by Fullan (1995, p. 265), professional development refers to the teachers' overall learning (formal and informal) which is continued and experienced by him/her in a compelling learning environment under complex and dynamic changes. More recently, Fullan, Hill and Crevola (2006, p. 21), in arguing that the concept of professional development is more narrow, have used an alternative concept, known as professional learning, which is intended by those authors to describe teachers' individual and collective learning that is ongoing, focused and daily. Another definition of this concept introduced by Day's (1999, p. 27) best points to teachers' pursuit of professional learning within the wider context of change and its interrelated components. Thus, in Day's definition, professional development refers to all natural experiences in learning and activities, including those conscious and planned that aim at directly or indirectly benefit people (individuals or groups) and or schools. These activities reflect the quality of classroom education. Hence, professional development is the process in which teachers acting as agents of change in themoral purposes of teaching by reviewing, renewing and extending their commitment alone and in collaboration with others, teachers. It is also a process of acquisition and development of critical knowledge, skills and emotional intelligence which are essential to good professional thinking, planning and practice with children, young people and colleagues in each phase of their teaching lives. It is not surprising that for teachers, professional development is often situated in one or more paradigms. In general, scholars' criticism is directed towards the "deficit" paradigm highlighted above by Gall and Renchler. This is because it describes professional development as a process targeting to compensate the lack of skills or knowledge, thus viewing teachers as empty vessels that need to be filled" (Garmston, 1991, p. 64). Moreover, it was also criticized for being a "professional growth" paradigm that describes development as more directed by a person himself/herself and derived from the learner's interests and needs (Feiman-Nemser, 2001). Others described it an "educational change" paradigm in which development is viewed as a process that focuses on making changes (Fullan, Hill &Crevola, 2006; Warren-Little, 2001). There are also other scholars who locate professional development within a "problem solving" paradigm that connects the process to improvements in addressing problems, such as learners' achievement needs (Ball & Cohen, 1999; Joyce & Showers, 2002; McLaughlin &Zarrow, 2001). Guskey (1994, p. 63). Thisparadigm places an emphasis on connecting development and notions problem-solving notions. It also views professional development not an event, but an intentional process that systematically puts efforts together in creating positive change or improvement." However, there is another body of research calling for a similarly integrative view of professional development (Day et al., 2005; Goodall et al., 2005; Lieberman & Miller, 2000, 2001). Other researchers have paid direct attention to teachers' ("novice" and "expert") particular professional learning needs at these different stages (Sabers, Cushing, & Berliner, 1991; Berliner 1994, 2001). For instance, Berliner (1994, 2001) examined expertise's development over time, thus developing five broad steps for this development: Novice, Advanced Beginner, Competent Performer, Proficient Performer, and Expert. According to this author, not all professionals will become experts or even proficient performers. Moreover, the teacher's capacity to focus on certain aspects of classroom teaching directly relevant to learners',intellectual work, to observe and hypothesize whatever is in the classroom in details, to qualify his/her observations and interpretations, to make certain types of information relatively important and to take into consideration complex problems arising in the classroom is associated with his/her higher levels of professional development (Hammerness et al., 2005, p. 379). There are some other researchers (Anderson, 1997; Bennett, Anderson,

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& Evans, 1997; Hall &Loucks, 1981; Joyce & Showers, 2002) who have addressed more explicit needs of teachers' professional development in regards to development of their specific teaching skills or teaching repertoire. The Concerns- Based Adoption Model (CBAM), was originated in the 1970s and 1980s, is stated to be the best model that has empirical grounds for better knowledge of the process of implementing educational innovations and significantly influential research on teachers' professional development (Anderson, 1997). As reported in a few studies (Hall &Loucks, 1977; Hall &Loucks, 1981), this CBMA focuses on teachers' stages of concern (SoC) in regards to curriculum innovation as well as their level of use (LoU) of that innovation. Based on this model, there is a relationship between teachers' SoC and LoU. In other words, as teachers are more concernedabout the innovation, their LoU will increase or become higher. This model has been documented to be useful for thinking about appropriate in-service practices given varying levels of concern. For instance, Joyce and Showers (2002) described teachers' development of new teaching skills as "an iterative process of learning, experimenting and reflecting". Thus, the above reviewed studies indicate that the process and needs of teachers' professional development become more complicated by what it means to be an expert teacher across subject areas, different panels, and in different contexts. Based on what has been previously reviewed and stated, the current study attempted to propose a measure or scale for measuring teachers' professional development through these three main dimensions: Planning, Implement, Evaluation.

2. Research Objectives

Generally, the study aims to test the validity of the Professional Development scale as a latent factor by testing the convergent validity known as the average variance extracted (AVE) for each dimension of the main scale, which are the Planning, Implement and Evaluation as well as the items representing them. It also aimed to test the divergent validity known as shared variance (SV) among the investigated dimensions in order to be relying upon them in carrying out tests of correlations and effects or impact with other underlying factors.

3. Method

3.1 Population and Sample of the Study

The study population consisted of all English language teachers in schools, primary and secondary education in Zawiya city, in the west Region of Libya, Overall, it consists of (3036) teachers: (1973) teachers are distributed in (142) primary schools and (1063) teachers are distributed in (92) secondary schools. However, after using a stratified random sample, only (500) were selected for this study: (325) primary school teachers and (175) secondary schools teachers.

3.2 Research Instrument

The researchers designed a questionnaire to test the construct validity of the factor of Professional Development based on some previous studies Kamel (2009), Ziad (2005), Ibtisam (2014), Fouad (2010) and Basil (2014). The first dimension, planning, comprises 7 items, and the second dimension, Implement, consists of 7 items, while the third dimension, Evaluation, has 4 items, thus totaling a number of 18 items for the questionnaire used for measuring Professional Development after testing its external validity (expert judgment). This was achieved by giving the questionnaire to experts in this area and by performing Cronbach's alpha test to test its consistency.

3.3 Confirmatory Factor Analysis

In order to test the validity constructs and the research hypotheses the Structural Equation Modeling (AMOS) model-fitting program is used. The model fit is evaluated by using four indices of the model goodness-of-fit: (1) the comparative fit index (CFI) (2) the chi-square statistics McDonald and Marsh (1990); (3) (RMSEA) between (0.08) to (0.10) indicates a mediocre fit Browne and Cudeck (1993) and would not employ a model a RMSEA greater than 0.1 (>0.1) (MacCallu um et al., 1996). (4) the minimum value of the discrepancy between the observed data and the hypothesised model divided by degrees of freedom (CMIN/DF) or normed chi-square. Marsh and Hocevar (1985);

3.4 Construct Validity and Reliability

According to Hair,Black,Babin, Anderson and Tatham (2006) the employment of factor loading composite reliability (CR) and average variance extracted (AVE) to determine the convergent validity if it equals to or greater than 0.5 (≥0.5) and the composite reliability equals to or greater than 0.7 (≥0.7) if were recommended by Hair et al.(2006). Also, (AVE) reading values should be greater than 0.5 (≥0.5) (Fornel and Larker,1981).

4. Results

From Figure (1) that shows the results of the (CFA) for the proposed model for measuring Professional Development, it is evident that the model is free of the illogical correlation since it reaches or exceeds the integer (1). This also indicates that there is not any problems in the (CFA) used for testing the validity of this model that comprises threedimensions: The first dimension including the Planning, the second dimension including the Implementand the third dimension containing the Evaluation. As seen in Figure (1) and Table (1), the indicators of agreement between the model and the data exceeded the T-value, thus, implying that there is disagreement between Professional Development and the data of the sample since the value of the Chi-Square was (1008.527) and the degree of freedom was (186), and the level of significance was (P=0.000). In addition, we can see that the normative Chi-Square (Chi-Square) was (5.422) being big than (5), and the value of relative strength index (CFI) was (0.827) less thanthe (0.90). The results also show that the value of the index (Rmsea) error square was (0.112) being higher than (0.080). Due to this contradiction between the model and the data, it was necessary to modify the Professional Development model in this study.

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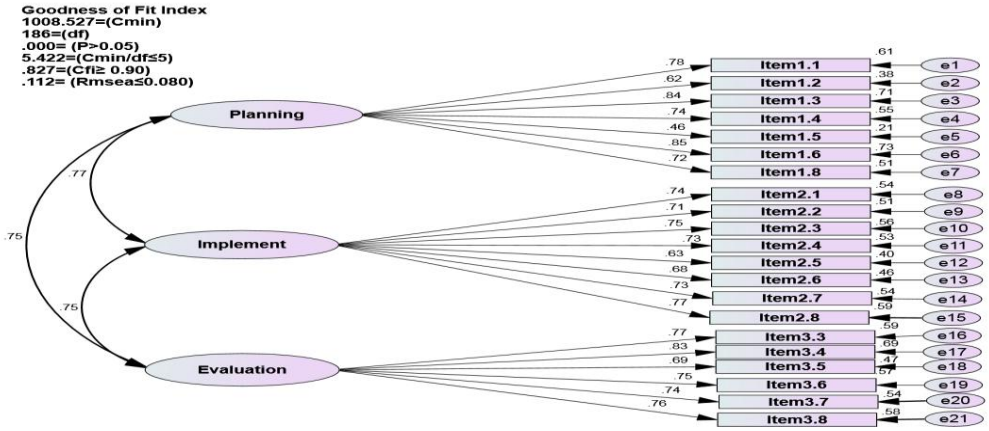


Figure 1: Model Professional Development before the amendment

In order to modify this model, we followed was deleting (1.2), (1.5)of the Planning.And also linking some of the items according between (1.1 with 1.6). In addition to we followed was deleting (2.2), (2.5), (2.6 and 2.7)of the Implementand also linking some of the items according between (2.3) with (2.4),In addition to we followed was deleting (3.6and 2.7) to what is shown in Figure (2). And to what Amos confirmed by analysis of Amos.

4.1 Confirmatory Factor Analysis of the Professional Development model

The results of the goodness-of-fit of the final revised of the Professional Development model showed that normed chi-square (CMIN/DF) was (2.568), the (CFI) was (0.966) and Rmseawas (0.067). Figure (2) shows the adequacy of the final revised of the Professional Development model.

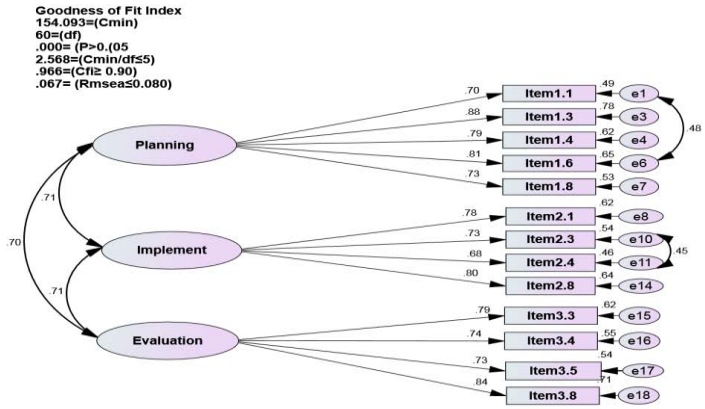


Figure 2: Professional Development model after amendment

Table 1: index value of Professional Development model before and after modification

Indicators consistency	index value before modification	index value after modification	Function value on the quality of conformity
Cmin	1008.527	154.093	---
df	186	60	---
P	0.000	0.000	Non
Cmin/Df	5.422	2.568	Less than (5)
CFI	0.827	0.966	More (0.90)
Rmsea	0.122	0.067	Less than (0.08)

4.2. Construct Validity and Reliability:

4.2.1 Planning

In the present study, lodging for the parameters factor ranged from 0.71 to 0.88, with all parameters were above 0.5 (≥0.5). The reliability was greater than 0.7 (≥0.7), it ranged from 0.945 to 0.946. In addition, the AVE reading was 0.62 where the value was greater than 0.5 (≥0.5). Consequently, all results fulfilled the AVE, and the reliability discriminant validity of the model. In general, The first Dimension of the Professional Development modelwas fit and fulfilled the construct as depicted in Table (2).

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Table 2: Construct Validity and Reliability of Professional Development model- Planning

dimension	Items Code	reliability	estimate	S. E.	C. R.	P	Loading	R	AVE
Planning	1.1	0.918	0.880	0.59	14.805	0.000	0.70	0.49	0.61
	1.3	0.917	1.000	-	-	-	0.88	0.78	
	1.4	0.921	0.918	0.54	17.799	0.000	0.79	0.62	
	1.6	0.916	0.972	0.52	18.555	0.000	0.81	0.65	
	1.8	0.921	0.889	0.56	15.831	0.000	0.73	0.53	

4.2.2. Executing

In the current study, the lodging for the parameters factor ranged from 0.73 to 0.81, with all parameters were above 0.5 (≥0.5). And the reliability was greater than 0.7 (≥0.7), it ranged were 0.946. In addition, the AVE reading was 0.59 where the value was greater than 0.5 (≥0.5). Consequently, all results fulfilled the AVE, and the reliability discriminant validity of the factor. In general, the second Dimension of the Professional Development modelwas fit and fulfilled the construct as depicted in Table (3).

Table 3: Construct Validity and Reliability of Professional Development model- Executing

dimension	Items Code	reliability	estimate	S. E.	C. R.	P	Loading	R	AVE
Executing	2.1	0.920	0.914	0.62	14.644	0.000	0.78	0.62	0.61
	2.3	0.920	0.901	0.66	13.589	0.000	0.73	0.54	
	2.4	0.920	0.824	0.66	12.415	0.000	0.68	0.46	
	2.8	0.919	1.000	-	-	-	0.80	0.64	

4.2.3. Evaluation

In this study, the lodging for the parameters factor ranged from 0.72 to 0.85, with all parameters were above 0.5 (≥0.5). The reliability was greater than 0.7 (≥0.7), it ranged were 0.946. In addition, the AVE reading was 0.60where the value was greater than 0.5 (≥0.5). Consequently, all results fulfilled the AVE, and the reliability discriminant validity of the Dimension. In general, the third Dimension ofthe Professional Development *model*model was fit and fulfilled the construct as depicted in Table (4).

Table 4: Construct Validity and Reliability of Professional Development model- Evaluation

dimension	Items Code	reliability	estimate	S. E.	C. R.	P	Loading	R	AVE
Evaluation	3.3	0.920	0.914	0.55	16.478	0.000	0.79	0.62	0.60
	3.4	0.920	0.856	0.56	15.276	0.000	0.74	0.55	
	3.5	0.919	0.914	0.59	15.003	0.000	0.73	0.54	
	3.8	0.918	1.000	-	-	-	0.84	0.71	

4.3 Fornell -Larcker Criterion

In order to test the predictive validity (discrimination) among the dimensions of the Professional Development scale, the researchers used Fornell -Larcker Criterion, considering that the AVE for each dimension of the main scale would be higher than the SV of all relations or links. Table (5) shows the results obtained from this test concerning the relations among the three dimensions of the scale of organizational commitment.

Table 5: Covariance between the three dimensions of Professional Development

No	Latent Variables	Planning	Executing	Evaluation
1	Planning	0.61	-	-
2	Executing	0.50	0.61	-
3	Evaluation	0.49	0.50	0.60

As seen in Table (6), the SV among the three dimensions is the result of multiplication of the correlation value by itself, and from the results in the same table regarding the AVE, it is evident that the AVE for every dimension of the Professional Development scale was higher than the SV among all the dimensions. Such result suggests that organizational commitment model metFornell -Larcker Criterion and achieved the required predictive validity among its three investigated dimensions.

5. Conclusion

This paper achieved the main goal of the study which was to test the validity of a proposed model for measuring Professional Development of Teachers among through the use of a CFA as a means to structural equation modeling (SEM-AMOS). This was proposed and developed based on the identified measurement dimensions of the main factor (Professional Development) in previous studies Kamel (2009), Ziad (2005), Ibtisam (2014), Fouad (2010) and Basil (2014). The results obtained in the present study especially regarding the validity of the measurement indicated the constructed model in its three dimensions is a reliable and valid measurement tool that can be used in measuring the Professional Development teachers within schools. The model achieved the required convergent validity or the AVE, among its three dimensions which even exceeded (0.50). The study also proved that the model achieved the required divergent validity or SV among its three dimensions: Planning, Implement, Evaluation, where the AVE was higher than the SV for all three dimensions, a result that was in agreement or consistent with Fornell -Larcker Criterion.

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Appendix A

Training and Supervising Programs	Items	Description
Planning	1.1	Training programs benefit me in developing my ability to prepare the annual plan.
	1.3	They benefit me in the necessity of diversity of the goals to include the three areas of conceptual and procedural knowledge and problem-solving.
	1.4	They guide me in selecting suitable educational aids and techniques for creating effective learning activities.
	1.6	They help me to choose learning and teaching activities in a way that contributes to achieving the goals.
	1.8	They enable me to formulate various classroom questions.
Executing	2.1	Training programs benefit me in how to raise learners' motivation.
	2.3	Training programs develop my skill of raising classroom questions.
	2.4	Training programs help to take into account individual differences.
	2.8	They develop my teaching of facts, concepts and principles.
Evaluating	3.3	Training programs improve my ability to prepare objective tests.
	3.4	They improve my ability to prepare oral tests.
	3.5	Training programs help in the preparation of improved essay tests that reveal learners' weaknesses.
	3.8	They enable to acquire the skill of building or developing treatment plans based on the results of the evaluation.

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