

# Development, Factor Analysis, and Validation of an EFL Teacher Change Scale (TCS)

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## Abstract

The concept of teacher change is critical in second language teaching and English as a Foreign Language (EFL) context due largely to the fact that, almost, whatever we do in teacher education looks for initiating change of one sort or another. A substantial body of research has been dedicated to investigate teacher change (TC) from various perspectives. However, having studied the related literature, we found no robust, valid and reliable measure for TC in EFL context. Accordingly, effort was made to develop and validate a reliable and valid measure that could assess TC in an EFL context. The review of the prior research resulted in the collection of 186 items affecting TC out of which a temporary data driven model of teacher change was developed. 324 Ph.D. and M.A. graduated EFL teachers took part in exploratory and confirmatory factor analyses of the initial measure. Finally, a 66-item scale consisting of three components and thirteen sub-components was developed. The results showed both factorial validity and internal consistency reliability for the measure. The TCS subscales also had strong validity evidence based on the associations found. This study has various applications for language teachers and practitioners in the field.

**Keywords:** EFL Teacher Change Scale (EFLTCS), Validation, Exploratory Factor Analysis, Confirmatory Factor Analysis

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## **1. Introduction**

With respect to the rapid changing world of the 21st century, increased complexity and subsequently perplexity of today's world, proliferation of knowledge and the growing researchers' willingness towards interdisciplinary studies, teaching is one of the professions that goes through drastic transformation. Accordingly, it is of vital importance for schools, educational systems, policy makers, and teachers to keep pace with the new changes.

The literature on teaching in general and ELT in particular abounds with studies addressing the profession from various perspectives. Teaching theories and policies, teaching methods, teacher education, teaching context, teachers' own characteristics, abilities, cognitive and affective attributes, knowledge and personality are among the related factors that seem to affect teachers' overall performance in one way or another and which lead to change in teachers' personality and practice (Beijaard, Overlook, & Vermont, 2000; Korthagen, 2004, 2010; Penlington, 2008; Hargreaves, 2005; Kayi-Aydar, 2015; Drago-Severson, 2002; Sparks & Loucks-Horsley, 1989; & Marzely, 1996).

Many scholars have focused on the concept of teacher change and its associations with so many variables over the past few decades, including the nature of teacher change (Darling-Hammond, 1999), the teachers' attitudes towards change, their reasons for change, and their readiness to become active agents for change with regard to the emergence of technology (Bruce & Hogan, 1998; Neiss, 2005; Coffman, 2009; Day & Gu, 2007; Fullan & Smith, 1999). In some other studies, teachers' resistance to change (Fullan & Hargreaves, 1996) and different kinds of resistance i.e., emotional and cognitive (Pardo del Val, M., & Martinez Fuentes, C., 2003; Zimmerman, 2006) have been investigated.

### *Development, Factor Analysis, and Validation...*

Furthermore, the concept of teacher change in education has been scrutinized in connection with many other variables, such as teacher professional growth (Supovitz & Turner, 2000; Avalos, 2011; Yurtsever, 2013; Tan, 2015; Hürsen, 2012; Barko, 2004; Aminudin, 2012; Powell et al., 2003; Hustler, 2003; Gabriel et al., 2011; Karimi, 2011) and teachers change over time (Weldy & Gillis, 2010; Hökkä & Eteläpelto, 2014; Sugrue, 2008; Ketelaar et al., 2012; Priestley et al., 2011, 2012; Olson & Craig, 2001). It is said that starting change in teachers' attitudes, beliefs and perceptions is one of the reasons for which many professional development programs and activities are frequently designed (Fullan, 1999, 2000; Guskey, 1982, 1984, 1985, 1986, 1989; Guskey, 2000). They have proposed that such changes (e.g., changing teachers' beliefs about particular aspects and dimensions of teaching or the desirableness of a certain curriculum or instructional innovation) will result in specific changes in their classroom behaviors and practices, which in turn will lead to promote student learning. This perspective is based on Lewin (1935) model who obtained many of his ideas about affecting change from psychotherapeutic models. Having criticized that model (Huberman & Crandall, 1983; Miles & Huberman, 1984; Guskey & Huberman, 1995), some have argued for a new model that re-inspects the process of teacher change to create more effective professional development programs.

Some other scholars like Golombek (1998), pointed out that teachers are often resistant to change. According to Fullan (1985), changes in attitudes, beliefs and understanding happen after changes in behaviors.

Teacher change seems to be taking place on different levels and constructs e.g., knowledge, beliefs, skills, attitudes, behaviors, competences, teaching practice etc. (Beijaard, Meijer, & Verloop, 2004; Baily, 1992; Zhao, 2003; Margerum- Leys & Marx, 2002; Koehler & Mishra, 2005, 2008, 2009). Since,

teachers' knowledge is one of the factors that ascertain teachers' actions and practices in the classrooms (Hughes, 2005), it is necessary to gain a better and deeper understanding of the changing process of teachers' knowledge and its effects on teachers' changes (Fives & Buehl, 2008). As Putnam & Borko (2000) and Shulman (1986, 1987) pointed out, teaching is an extremely complicated activity that is based on teachers' knowledge and is dependent upon access to highly organized systems of knowledge (content, pedagogical, technological) that are cornerstones of teaching.

Among other variables tightly connected to teacher change, is what literature refers to as teacher identity and beliefs. Many researchers have investigated the relationship between teachers' identity and teacher change. They have pointed out that teacher identity is never stable and changes constantly throughout teachers' professional lives. As some researchers (Beijaard, Meijer, & Verloop, 2004; Walkington, 2005; Kayi-Aydar, 2015) pointed out, when teachers' professional identity changes, its effects will change the practices, behaviors, and competencies they manifest in action. Also, as it is argued by Beijaard, Meijer & Verloop (2000), when teachers' content, pedagogical and didactical knowledge change, their identity will also change.

In the study of change process, many scholars have emphasized the significant role of teachers' beliefs as a critical factor to teacher practice and change (Burn, Hagger, Mutton, & Everton, 2003; Novak & Knowles, 1992; Powell, 1992; Huberman, 1982, 1985) and as the influencing element on how teachers learn and pursue the changing process (Richardson, 1996). Some researchers (e.g., Baily, 1992; Golombek, 1998 among others) believe that changes in teachers' beliefs lead to changes in their teaching practice. In

### *Development, Factor Analysis, and Validation...*

addition, teachers' beliefs help them in the conceptualization process of their work.

There are some other researchers who have scrutinized how teachers learn and change by developing or applying theory into their practice (Clarke & Hollingsworth, 2002; Korthagen, 2004, 2010; Timperley, & Phillips, 2003). In the same line, some authors have suggested several models for teachers change (Guskey, 2002; Huberman, 1995; Desimone, 2009; Richardson, 2001; Pintrich et al., 1993, to name but a few).

In the same line, there are a number of scholars who have based their research studies on changes at school context. They have worked on the factors that seem to be influential in the process of change implementation in school in general and in innovative technologies in particular (Fullan, 2005; Kontoghiorghes, Awbre, & Feurig, 2005; Li, S. C., 2010). They have revealed three main effective elements in teachers' success including, teachers' attitudes towards change, teachers' contextual pedagogic and technological knowledge, and teachers' understanding of school as a learning organization. In this regard, some researchers showed the capability of schools to cope more successfully with the new changes forced by technological innovation (Giles & Hargreaves, 2006; Wang & Ellinger, 2008; Zhao & Ordonez de Pablos, 2009).

The review of the related literature, further, shows that some researchers have found other factors in making a basis that support changes such as the internal and external conditions under which change take places, the process of handling change, and the change readiness level resulting in successful change accomplishment (Armenakis, Harris, & Feild, 1999; Kotter, 1995; Mento, Jones, & Dirndorfer, 2002; Sashkin & Burke, 1987).

In much the same line, many have explored the effects of using technology in teachers' change. The never-ending introduction of innovative educational

technologies which requires schools to provide a condition for the development of an organizational learning culture in order to maintain transfer of knowledge, creativity, flexibility, and support, which are necessary for adapting effectively and efficiently with constant changes in educational technologies (Collinson, 2010; Coppieters, 2005; Fauske & Raybould, 2005; Zhao & Ordonez de Pablos, 2009; Weldy & Gillis, 2010).

With all these studies, however, the picture on teachers change in general and EFL teacher change in particular is not vivid, inclusive and coherent yet. Indeed, very little if any can be found to have explored how the given concepts in union undergo change or change the overall state of an EFL teacher. Hence, the main purpose of this study was to explore the concept in a more coherent framework and in so doing, effort was made to develop and validate a reliable and valid scale for measuring EFL teacher change.

## **2. Problems with the Existing Measures**

Having conducted a comprehensive review of the related literature for any existing model as well as instruments that might already have been used for assessing related constructs and behaviors in teacher change, the researchers found no robust, valid and reliable measure for measuring teacher change and the one that could account for a more inclusive network of variables affecting EFL teacher change. Furthermore, the existing models and studies had considered the concept of teacher change often monolithically. Accordingly, efforts were made to develop and validate a reliable and valid measure that could assess teacher change in an EFL context considering many of such concerns. It can be highly effective in enhancing the quality of teachers' profession, their teaching practice and subsequently the educational system. This section needs elaboration.

### **3. Construct Description of the EFL TCS**

Studying the related literature on teacher change led the researchers to the identification of three main sources of change in ELT in general and EFL teachers in particular. These three main dimensions were incorporated into the TCS construct definition and the final item pool development. In addition, the three aspects and their relevant subscales were identified and confirmed in the content validity phase by some experts in the field. These three aspects encompassed in the TCS are named Knowledge (consisting of Technological Knowledge, Pedagogical Knowledge, and Content Knowledge), Skills (Leadership Skills, Critical & Reflective Thinking Skills, Communicative & Verbal Skills, and Creativity Skills), and Personality (Mindfulness, Neuroticism, Agreeableness, Openness, Conscientiousness, and Extroversion). Each subscale consists of several factors influencing EFL Teacher Change. EFL Teacher Change Scale (TCS), its three main components and 13 sub-components are displayed in table 1 below.

**Table 1. *EFL Teacher Change Scale (TCS)***

<b>Knowledge (K)</b>	<b>Technological Knowledge (TK)</b>	
		technologically literate
		relating technologies with content and pedagogy
		using different technologies for teaching language skills and components
		using more web.2 tools
		using social networks for teaching various language skills
		using more LMS (learning management systems)
		using blogs and wikis more to interact with students
		using a variety of tools for teaching in the classrooms
	<b>Pedagogical Knowledge (PK)</b>	relating between theory and practice
		Realizing the significance of encouragement, rewards, compliments,
		understanding the basic teaching philosophy
		Realizing the importance of automaticity, self-acting or self-regulating
		using tasks as the core unit of planning and instruction
		putting theory into practice
		creating more enjoyable and authentic tasks
		teaching skills and language components
		relating teaching and learning token with students' personal experiences
		integrating content knowledge & pedagogical knowledge
		maximizing quantity of instruction, handling classroom events, etc.

*Development, Factor Analysis, and Validation...*

	<b>Content Knowledge (CK)</b>	views about ELT theories of language cognitive, linguistic, & socio-affective principles students' intrinsic motivation relationship between language & culture positive/negative effect of students' first language comprehensible input authentic materials
<b>Skills (S)</b>	<b>Leadership Skills (LS)</b>	skillful in planning, guiding & organizing time successful at inspiring & motivating students. communicating more powerfully and prolifically with students
	<b>Critical &amp; Reflective Thinking Skills (CRST)</b>	using more critical thinking skills evaluating students & themselves more on critical & reflective grounds having higher level of meta-cognitive & critical reflectivity critically testing and analyzing class activities
	<b>Communicative &amp; Verbal Skills (CVS)</b>	being more proficient in teacher talk using more authentic English in class using more meaningful English in class
	<b>Creativity Skills (CS)</b>	creating more varied, creative, relevant, & interesting learning activities using a variety of specific teaching procedures creating rich learning environments creatively using technologies in class
<b>Personality(P)</b>	<b>Mindfulness (M)</b>	more at ease in relieving psychological discomfort in class changing behaviorally and cognitively acting upon thoughts, emotions & other

	contents of conscientiousness
	Being more mindful Socio-cognitively
	have raised awareness about teaching and learning purposes
<b>Neuroticism (N)</b>	patient and ambiguity tolerant
	self-confident in teaching
	emotionally stable
	self-concept control
<b>Agreeableness (A)</b>	Enjoying increasing level of agreeability
	attending to students' emotions and affection
	looking at students as whole persons
<b>Openness (O)</b>	being open to new ideas, practices, & theories in the field
	being critical thinker
	being creative
	more receptive to substantial changes
	more receptive to the criticism levelled at them
	more open to change, more experimental, liberal, analytical, & flexible
<b>Conscientiousness (C)</b>	reflecting more on what teachers do & how they treat students
	managing classroom and handling stressful situations easier
	more conscientious, and disciplined
<b>Extroversion (E)</b>	warm, sociable, enthusiastic, & caring in communication with students
	having more inclusive view of what is going on in class

## **4. Methodology**

### **4.1. Participants**

324 Ph.D., M. A. and B. A. graduated EFL teachers took part in this study. 41.2 % of the participants were female and 59.7% were male with the experience range of 5 to 25 years. They were all EFL teachers teaching English courses in Iranian universities and private language institutes.

### **4.2. Procedures**

In the development and validation of EFLTCS, several steps were taken. First, the underlying assumptions of an inclusive EFL teacher change scale were delineated. Then, relating to the content domain of EFL TCS, an item pool was provided, coded, and reduced. At last, applying exploratory and confirmatory factor analyses, the factor structure of the final scale was established.

To achieve the purpose of the study, the present literature with the emphasis on the teachers change in educational contexts was reviewed. To this end, different databases including Elsevier, Science direct, Sage, Willy were searched and reviewed on the concept. 128 full-text research articles and books were identified as the sources of the paper. The following combination of keywords was used to discover the relevant studies that had investigated teacher change in education: the process of teacher change, teacher change in terms of knowledge and skills, professional development and teacher change, technological improvement and teacher change, professional identity and teacher change, etc. These articles were from various fields of studies and were mostly published in journals of Social and Behavioral Science, Journal of Psychology, Teaching and Teacher Education, International Journal of Educational Research, Interdisciplinary Journal of E-learning and Learning

Objects, Journal of Applied Research in Education, Journal of case studies in education and ELT Journals.

Among the main assumptions found on the concept and the ones which motivated us in our attempt to come up with an EFL TCS were the followings:

1. The most valid as well as practical criterion for judging achievement, is the identification, modification, and validation by experts (Ludwig, 1995). The more the broader range of experts, the greater validity of the EFL SCALE. Accordingly, EFLTCS was ranked by the field experts.
2. Multidimensionality of the concept of teacher change shed light to the fact that teacher change is prompted by not only personal factors, but also professional conditions and contexts (Darling & Hammond, 1999). The EFLTCS was, therefore, designed to distinguish various dimensions of teacher change.
3. Changes in teacher practice are the consequences of changes in teachers' beliefs. Subsequently, teachers' beliefs play a central role in teacher development process (Darling & Hammond, 1999). In addition, professional development programs can provide the opportunities for teachers to raise their self-awareness by reflection and critical questions as starting point for later adjustment and change (Clark, & Peterson, 1986). Hence, EFLTCS is designed to establish an indicator of what influences on teachers to push and prompt them for change.

#### **4.3. Item Pool Development**

The review of the prior research resulted in the collection of 186 items out of which the current model of teacher change scale was developed. These 186 items were found as the factors bringing about the changes in teachers. All the factors were supported by whatever other researchers had mentioned in the

### *Development, Factor Analysis, and Validation...*

literature section of their papers on teacher change (e.g., Baily, 1992; Golombeck, 1998; Holt, Armenakis, Harris, et al., 2007; Avidov-Ungar, 2010, etc.). Then, codification and reduction of the items were done and 124 items remained. "Peer-reviewed" method was chosen for the content validity of the scale. They rated the appropriateness of the remained 124 items influencing teacher change on a three-point scale (1=suitable, 2=marginally suitable, 3=very suitable) and classified them into possible categories. Afterward, their ratings were analyzed to ascertain which items to remain in the final scale. According to the reviewers' input, the researchers rephrased and rewrote the items with ratings under 3. Of the main 124 teacher change items, 25 items were rewritten, 4 new items were added according to the comments of the reviewers, 44 items were deleted because of being unsuitable and having similar concepts, and finally, 84 items remained in EFL TCS before the validation process. In order to do the validation (i.e., exploratory & confirmatory factor analyses) of the scale, several assertions for the explanation of the items were provided in the form of an 84-assertion Likert-type questionnaire. Then, Cronbach's Alpha was calculated to estimate the reliability of the scale. Its reliability value was 89%, which indicated a high level of internal consistency.

#### **4.4. Data Analysis**

Principle varimax rotation as well as Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) were run for the scale construction and validation (based on Mulaik's and Millsap's framework in 2000).

#### 4.4.1. Exploratory Factor Analysis

At first, EFA based on principal component factoring (PCF) with varimax rotation were conducted on the 84 items (Cooke & Steed, 2003, p.157; George & Mallery, 2000, p. 285). Items that did not load heavily on primary factors and the items loaded heavily on more than one factor were deleted and discarded from further analysis in CFA. Just factor loadings higher than 0.4 are displayed in table 3 (Raubenheimer, 2004). Factors with eigenvalue greater than 1 were remained according to the rules in judging the adequacy of the factor solution (Lyonski et al., 1996). This level resulted in the removal of 18 items in our sample loaded, resulting in 3 factors. The three-factor solution accounted for 65.362 percent of the total variance. The results (Table 2) indicated that the data were factorable (George & Mallery, 2000, p. 292), with KMO=.891 (>.7) and Bartlett's Test of Sphericity being significant (chi-square=45400.695, df=15, p=.000).

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

<b>Kaiser-Meyer-Olkin Measure of Sampling Adequacy</b>	.891
<b>Approx. Chi-Square</b>	45400.695
<b>Bartlett's Test of Sphericity</b>	<b>Df</b> 15
	<b>Sig.</b> .000

In the next table (Table 3) you can see the results of the exploratory factor analysis.

*Development, Factor Analysis, and Validation...*

**Table 3. The Results of Exploratory Factor Analysis**

Item content	EFA			Variance Extracted %
	Skill	Personality	knowledge	
Q1	Knowledge		.41	22.546 %
Q2	Knowledge		.45	
Q3	Knowledge		.44	
Q4	Knowledge		.58	
Q5	Knowledge		.55	
Q6	Knowledge		.55	
Q7	Knowledge		.74	
Q8	Knowledge		.72	
Q9	Knowledge		.52	
Q10	Knowledge		.62	
Q11	Knowledge		.77	
Q12	Knowledge		.71	
Q13	Knowledge		.73	
Q16	Knowledge		.80	
Q17	Knowledge		.74	
Q18	Knowledge		.78	
Q19	Knowledge		.60	
Q21	Knowledge		.75	
Q22	Knowledge		.63	
Q24	Knowledge		.60	
Q25	Knowledge		.47	28.788%
Q26	Knowledge		.45	
Q27	Knowledge		.57	
Q29	Knowledge		.52	
Q30	Knowledge		.41	
Q32	Knowledge		.55	
Q33	Knowledge		.52	
Q34	Personality	.73		
Q35	Personality	.78		
Q36	Personality	.72		
Q37	Personality	.62		
Q38	Personality	.66		
Q39	Personality	.58		
Q40	Personality	.55		

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Q41	Personality	.53	
Q43	Personality	.63	
Q44	Personality	.78	
Q45	Personality	.81	
Q46	Personality	.68	
Q47	Personality	.54	
Q48	Personality	.70	
Q49	Personality	.80	
Q50	Personality	.84	
Q51	Personality	.80	
Q53	Personality	.85	
Q54	Personality	.86	
Q55	Personality	.48	
Q56	Personality	.51	
Q57	Personality	.54	
Q58	Personality	.42	
Q59	Personality	.61	
Q60	Personality	.62	
Q61	Skill	.67	
Q62	Skill	.71	
Q64	Skill	.48	
Q68	Skill	.55	
Q70	Skill	.68	
Q73	Skill	.69	14.028%
Q74	Skill	.72	
Q75	Skill	.73	
Q76	Skill	.69	
Q77	Skill	.73	
Q79	Skill	.51	
Q80	Skill	.68	
Q83	Skill	.63	
Q84	Skill	.73	

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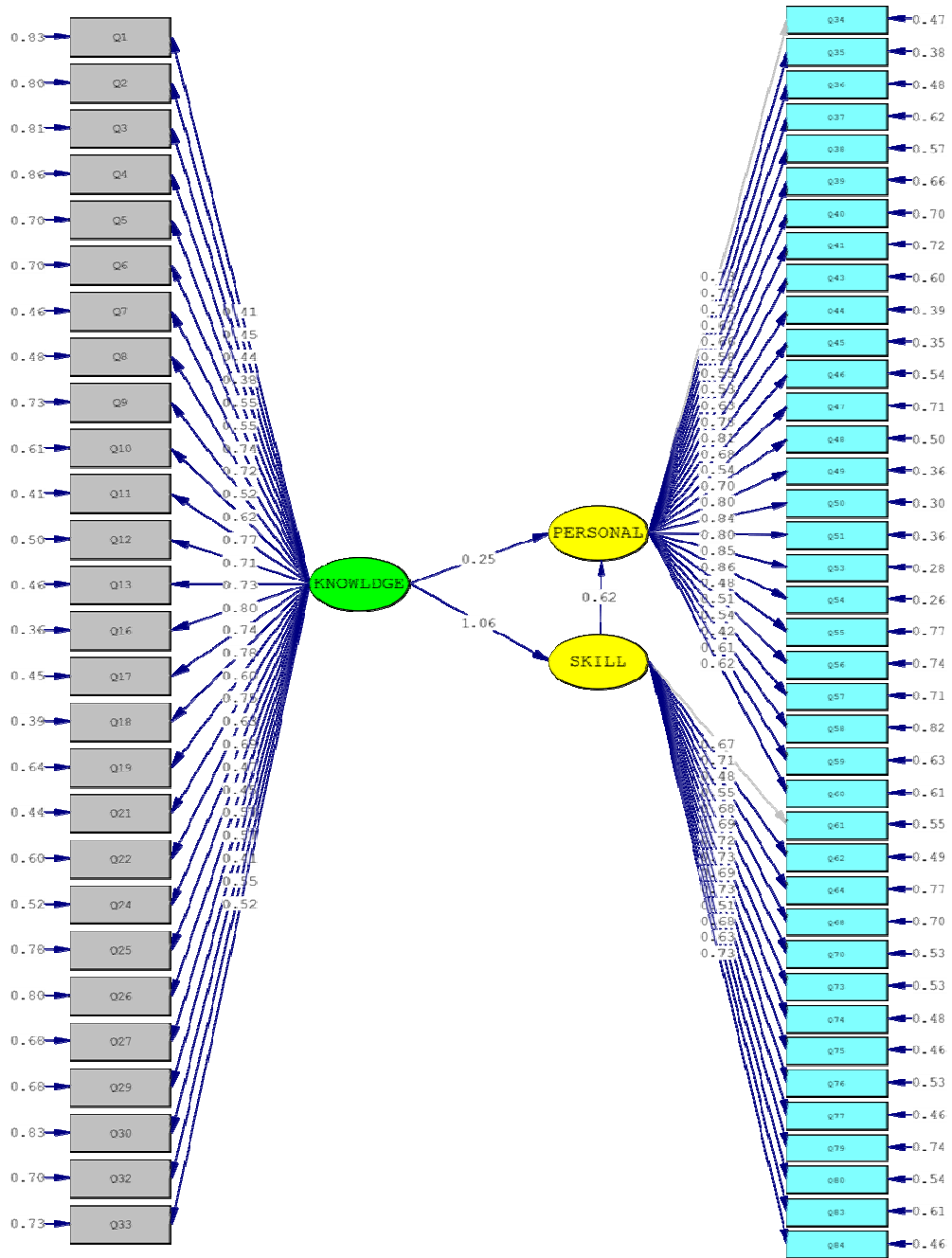
Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

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#### **4.4.2. Confirmatory Factor Analysis**

Next, CFA was used to assess model fit and to verify the number of explored factors. The maximum likelihood algorithm of LISREL (version 8.8) was applied for the calculation. Based on Hair et al, (2006) recommendations, Figure 1 shows that all the standardized loading factors were higher than the cut-point of 0.5 and t-values for all of the items were confirmed to be significant ( $p > 0.05$ ). In addition, the fit indices for the single factor structures (CFI, NNFI, RFI, SRMR and RMSEA) were also above the acceptable levels for all factors (Table 4). According to Sharma (1996), the minimum cut-off value is  $< 3$  for model validation for Chi-Squared/df statistic while the other values for CFI, NNFI, RFI are 0.9, also, RMSEA minimum cut-off value is .05. Therefore, convergent validity was obtained for all constructs at the observation level of outer models. In the following figure (Figure 1), the final fitted CFA model is displayed.



**Figure 1. Fitted CFA Model**

*Development, Factor Analysis, and Validation...*

(Note: One of the limitations of LISEREL is that it cannot accept more than 8 characters for each variable's name. So, personal refers to personality in the above model)

The goodness of fit indices was applied to explore the model properly. These indices are summarized in Table 4 which suggests the appropriateness of the model, so the model is confirmed.

**Table 4. *Fit Indices of Teacher Change CFA Model***

Fit indices	Value	Optimal range	Result
$\frac{\chi^2}{df}$	1.039	$0 < \frac{\chi^2}{df} < 5$	Accept
RMSEA	0.014	RMSEA < 0.05	Accept
RMR	0.012	RMR $\geq$ 0	Accept
GFI	0.992	GFI > 0.9	Accept
AGFI	0.971	AGFI > 0.85	Accept
NFI	0.986	NFI > 0.90	Accept
CFI	0.999	CFI > 0.90	Accept
IFI	0.999	IFI > 0.90	Accept

As it is illustrated in Table 4, eight criteria assessed the fit of model. The results of the above table confirmed that all indices are accepted for the model ( $\frac{\chi^2}{df} < 5$ , RMSEA < 0.05, RMR  $\geq$  0, GFI > 0.9, AGFI > 0.85, NFI > 0.90, CFI > 0.90, IFI > 0.90).

In the next step, the number of latent variables were recognized. Table 5 represents the results of the determination of the number of latent factors based on specific amounts. The column of the first specific amounts shows the number of research latent factors and the whole specific amounts of the latent factors. Therefore, the column of specific amounts of teacher change variable, introduces one factor with specific amounts more than 1. Thus, the proposed factor structure has one factor (Table 5).

**Table 5. *The Whole Variance Determined for the Latent Factor of Teacher Change Variable***

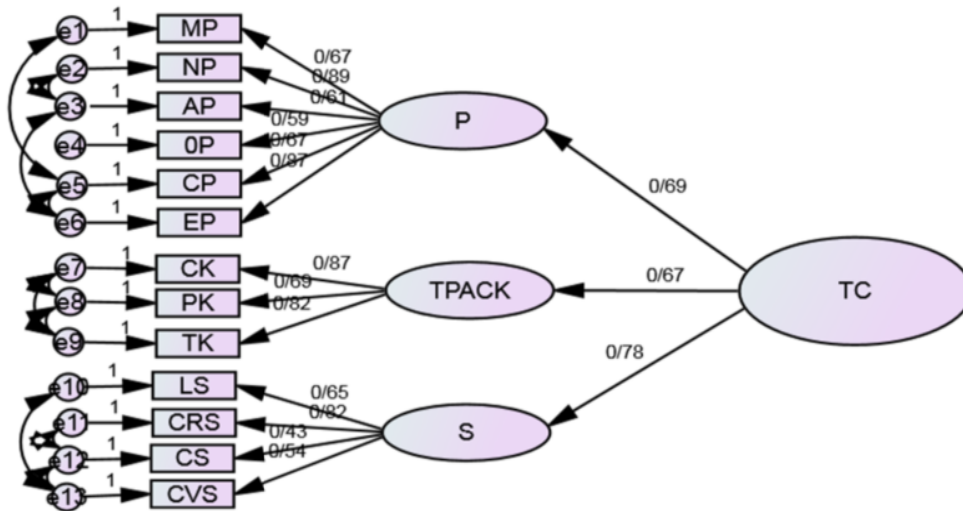
Component	Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.769	55.307	55.304	2.769	55.307	55.307

Factor loading determines the relationship between the extracted factors with the main variables. The Reproduced Correlational matrix, represents the correlation of the factors based on their loading on the extracted factors. As it is shown in Table 6, all three sub-scales of teacher change are well correlated to each other.

**Table 6. *Reproduced Correlational Matrix on the Basis of Factor Loading***

Teacher change	Factor loading
Knowledge	0.678
Personality	0.697
Skills	0.785

After identification of the latent factors of the teacher change, it is necessary to test the correctness of the relationship between these factors and the evident variables. This is done through Confirmatory Factor Analysis in the shape of Measurement Model using AMOS software (Figure 2).



**Figure 2. The Measurement Model of Latent Variable of Teacher Change in the Standardized Estimate**

As figure 2 illustrated, loading factors represent high correlations between each sub-scale and the latent variable. In addition, all of the links among the variables were of direct and positive type with the strongest association between teacher change and teachers' skills (.78).

## 5. Discussion and Conclusion

The present paper described the development and validation of an instrument for measuring teacher change in an EFL context. To this end, we constructed a model consisting of exploratory and confirmatory factor analyses. This model was, in fact, employed to test the construct validity of the proposed three factors for the scale, i.e., knowledge, skill and personality. As mentioned earlier, the hypothetical model was developed based on a comprehensive review of the related literature pertinent to teacher change. Although all the three initially proposed components in the instrument were substantiated by

the gathered data, 18 items did not statistically load in exploratory data analysis phase reducing the scale to 66 items. More specifically, Item 14, 15, 20 and 23 did not load on pedagogical knowledge, items 28 and 31 for content knowledge, item 42 on neuroticism, item 52 on openness, items 63, 65, 66, and 67 on leadership skill, items 69, 71, 72 on critical and reflective thinking skills, item 78 on communicative and verbal skills, and items 81, and 82 on creativity skills. Further research is needed to investigate why such items were discarded in the Confirmatory factor analyses. Deletion of the items can be accounted for by many factors including the context of the study, the ability of Iranian EFL teachers in related skills, their knowledge of subject matter, pedagogy and technology and the relationship between teachers' personality traits and the extent of their teaching change. As for the remaining 66 items, the data showed significant statistical relationships between the items in the main scale and the items in their corresponding sub scales. The calculated model-fit estimates also verified the CFA model as a valid measure of teacher change.

As it is perceptible from figure 2, all of the links among the variables were of direct and positive type with the strongest association between teacher change and teacher skills (.78). That is to say, the process of teacher change can be strongly related to the teachers' improvements in terms of skills. In details and according to the factor loadings (table 3), items 75, 77 and 84 (representing items 60, 62, and 66 in the scale) were of the highest factor loadings (.73) which means that teachers are much more proficient in teacher talk as they get more experienced. They use more meaningful English in class, are more capable to successfully align technologies with content and pedagogy. They, also, develop the ability to creatively use technologies to meet specific learning needs much better than before. The second strong relationship is between teacher change and personality (.69) with the highest loading factors (.86, .85 and .84) for items

### *Development, Factor Analysis, and Validation...*

number 54, 53 and 50 (representing items 46, 45 and 43 in the scale). It can be inferred that compared with the past, teachers are more willingness and open to change, more experimental, liberal, analytical, critical, and flexible. They are more receptive to the criticism levelled at them than before, and now they are more creative in the class than before. The last strong association is between teacher change and knowledge (.67). Amongst the knowledge items, items number 18, 11 and 21 (representing items 16, 11 and 18 in the scale) were of the highest loading factors respectively (.78, .77 and .75). It can be implied that teachers employ different and varied strategies to teach skills and language components in the class than before, their understanding of the basic teaching philosophy change over time and now they can better integrate the content knowledge and pedagogical knowledge for teaching particular teaching tasks and texts.

Based on the collected data, the scale is claimed to differentiate between low and high experienced teachers and knowledgeable ones. As it is depicted in appendices B (table 7) and C (table 8), the data reveals when and where the change occurs and in relationship to what variables. It is shown that the higher the educational degree, the higher the scores of the participants on the knowledge items regardless of experience. Also, the more experience the teachers get, the higher the scores on skill and personality items will be regardless of the educational degree.

The result of this study confirmed that teachers who are at the center of language teaching practice should attend to different professional development programs and improve themselves in terms of different kinds of knowledge (content knowledge, pedagogical knowledge and technological knowledge). In Addition, they should construct and reconstruct themselves in terms of personality characteristics (Mindfulness, Neuroticism, Agreeableness,

Openness, Conscientiousness, and Extroversion, etc.), and skills (Leadership Skills, Critical & Reflective Thinking Skills, Communicative & Verbal Skills, and Creativity Skills) to enhance the quality of their profession, and to improve their teaching practice.

This study categorized teacher change in terms of knowledge, skills and personality. Other factors might also be important in the overall teacher change process, which requires further studies in future. We believe that the scale developed in the study can also be a valuable tool for other researchers to measure teacher change in similar pedagogical contexts. For research on teacher change in different pedagogical contexts, further modifications of the scale would be necessary.

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## Appendix A

Teacher Change Scale (TCS)

5=too much 4=quite a lot 3=so-so 2=too little 1=not at all

<b>Knowledge</b>	5	4	3	2	1
<b>A. Technological knowledge</b>					
1. Compared with the past, I am more technologically literate.					
2. I use more web.2 tools in my language classes than before.					
3. In comparison with past, I use different technologies for teaching language skills and components in the class.					
4. Compared with the past, now I am more at ease using social networks teaching various language skills in the class.					
5. Compared with the past, I require my students to use more blogs and wikis to interact.					
6. I try to use more LMS (learning management systems) in the class than before.					
7. Now I am able to Successfully relate technologies with content and pedagogy and developing the ability to creatively use technologies to meet specific learning needs					
8. Now I use a variety of tools-including video, e-mail, desktop conferencing, online programs as well as video conferencing-to teach.					
<b>B. Pedagogical knowledge</b>					
9. My understanding of the relationship between theory and practice has changed.					
10. My understanding of the significance of encouragement, students' anticipation of rewards, compliments, and enthusiasm has taken more practical momentum than before.					
11. Now my understanding of the basic teaching philosophy has changed.					
12. Now the importance of automaticity, self-acting or self-regulating is completely well-known to me.					
13. Now I have a much better understanding of using tasks as a core unit of planning and instruction in language teaching.					
14. Now I Can put theory into practice much easier than before.					
15. Compared with the before, I can create more enjoyable and authentic tasks in the class than before.					

*Development, Factor Analysis, and Validation...*

16. Now I employ different and varied strategies to teach skills and language components in the class.					
17. Compared with before, I try to relate teaching and learning token with my students' personal experiences.					
18. Compared with the past, now I can integrates the content knowledge of a specific subject and the pedagogical knowledge for teaching that particular subject easier than before.					
19. Now I can maximize the quantity of instructional time, handling classroom events, teaching at a steady pace, maintaining clear direction in lessons much easier than before.					
<b>C. Content knowledge</b>					
20. My views about ELT has changed over the years I have been the profession.					
21. My understanding of the theories of language teaching has changed.					
22. Now I am more familiar with cognitive, socioaffective, and linguistic principles and their manifestation in language teaching practice.					
23. Now I attach more importance to meaningful learning for creating long-term retention in my students than before.					
24. My understanding of the significant relationship between language and culture has changed.					
25. Now I am more familiar with positive and negative effects of native/first language on students' learning.					
26. Now I have a greater and deeper understanding of the importance of providing comprehensible input.					
27. Now my views about creation and negotiation of meaning and practicing with authentic materials related to students' needs and interests has changed.					
<b>Personality</b>					
<b>A. Mindfulness</b>					
29. Compared with the past, I am much more at ease in relieving psychological discomfort in class.					
30. As the result of gaining more experiences, I have changed behaviorally and cognitively.					
31. Compared with the past, I act more upon thoughts, emotions and other contents of conscientiousness.					

32. Compared with the past, I am more Socio-cognitive mindful which enables me to categorize everything more cognitively, and be well-aware of the context and situation.					
33. I've raised my awareness about teaching and learning purposes, subsequently I pay more attention to them from different aspects.					
<b>B. Neuroticism</b>					
34. I am now more patient and ambiguity tolerant with my students' errors than before.					
35. I am more self-confident in my teaching than before.					
36. Compared with the past, I am more emotionally stable.					
37. Compared with the past, I have a higher self-concept control.					
<b>C. Agreeableness</b>					
38. My level of agreeability increased compared with the past.					
39. I attend much more to the emotions and affection side of my students than before					
40. I look at my students as whole person compared with before.					
<b>D. Openness</b>					
41. Now I am quite open to the new ideas, practices, and theories in the field than before.					
42. Today, I am a much better critical thinker than before regarding what I do and the way I treat my students in the class.					
43. Now I am more creative in the class than before.					
44. I am now more receptive to substantial changes than before.					
45. Now I am more receptive to the criticism levelled at me than before.					
46. Compared with the past, I am more willingness and open to change, more experimental, liberal, analytical, critical, and flexible					
<b>E. Conscientiousness</b>					
47. I reflect more on what I do and how I treat my students in the class than before.					
48. I can manage classroom and handle stressful situations easier and better than before through improving some of my personality traits.					
49. Compared with the past, I am more conscientious, and discipline					
<b>F. Extroversion</b>					
50. Now I am warmer, more sociable, enthusiastic, and caring in communication with my students compared with the past.					

*Development, Factor Analysis, and Validation...*

51. I have a much more inclusive view of what is going on in the class than before.					
52. Now I am more eager to exchange ideas, methods, worksheets, teaching materials with more experience colleagues.					
<b>Skills</b>					
<b>A. Leadership skills</b>					
53. I am more capable of planning, guiding and organizing my time and energy than before.					
54. Compared with the past, I am more successful at inspiring and motivating my students.					
55. I communicates much more powerfully and prolifically with my students inside and outside of the class than before.					
<b>B. Critical &amp; reflective thinking skills (CRTS)</b>					
56. I use more critical thinking skills in the class than before.					
57. I evaluate my students and myself more on the critical and reflective grounds than before.					
58. Compared with the past, I have a higher level of meta-cognitive and critical reflectivity.					
59. I am able to critically test and analyze the class activities compared with 5/10 years ago.					
<b>C. Communicative and verbal skills</b>					
60. I am much more proficient in teacher talk as compared with before.					
61. I try to use much more authentic English in class than before.					
62. I use more meaningful English in class than before.					
<b>D. Creativity skills</b>					
63. Now I am able to create more varied, creative, relevant, interesting, and enjoyable learning activities than before.					
64. I am more proficient in using a variety of specific teaching procedures as compared with the past.					
65. Now I am more competent to create a fun, motivating, non-threatening, secure, cooperative and rich learning environment.					
66. Now I am able to successfully aligning technologies with content and pedagogy and developing the ability to creatively use technologies to meet specific learning needs					

## Appendix B

**Table 7. Percentage of Participants' Knowledge, Skill and Personality in Relation To Their Educational Degree**

Educational degree	Variables related to teacher change		
	knowledge	skills	personality
B.A.	18%	13%	32%
M.A.	25%	23%	29%
Ph.D.	57%	64%	39%

## Appendix C

**Table 8. Percentage of Participants' Knowledge, Skill and Personality in Relation to their Experience Level**

Experience level	Variables related to teacher change		
	knowledge	skill	Personality
0-8			
8-16	33%	11%	18%
16-24	29%	16%	23%
	38%	63%	59%