
Development of Elementary School Teachers' Self-Regulated Learning Exploratory Factor Scale

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Self-regulated learning (SRL) is one of the precious ways in teachers' professional development, and its operation level includes different factors. With studies abroad and our preliminary investigation as base, this study developed a scale to test the factors SRL includes. According to the result of 905 teachers working in elementary school by exploratory factor analysis, the SRL for elementary teachers is consisted of its sociality (it included selecting leads and seeking for instructing), its motivation(it included self-improvement and self-excelling), its methods(it included strategy use and habitual behavior), and its outcomes(it included extensive reading and teachers' professional development). All the result indicated Teachers' SRL Scale had clear factor structure, good reliability and validity. It can be used to test the current operating situation of SRL for teachers working in elementary school.

Key Word: Reliability, validity, exploratory factor analysis, scale developing

1. Introduction

In China, and also in most countries around the world, we pay much attention to student's active learning. However, teacher's active learning is, in a sense, neglected. Researchers think that the teachers know "how to teach" is much meaningful than "how to learn". The neglect will be obstacles to teacher in future professional development. In Chinese governmental file "Educational Reform and Development plan (2010-2020)", reminding us, "The first-class education need first-class teachers", "The construction to team of the teachers is the strategic, overall and fundamental project to effect the national education and its future development" (2008).

Professional development is the process for teachers to make themselves professionalization. As a grown-up, teachers' learning has characteristics of adult learning. Adult's psychology owns accurate perception, goal-oriented attention, scientific imagination, and precise, profound thinking ability; in learning, with self-adjustment and self-identification, teachers know what they want and what they can reach; besides, ample life and social experience will direct them to well self-regulated learning. Malcolm S. Knowles said that, "Adult experience is a valuable resource for adult learning" (1970). Moreover, Adult learning motivation is more clearly than student'. Thus, teachers showed preferable active abilities. Looking at theory of Constructivism, professional development is the process that teachers actively do knowledge construction, combining the new knowledge with mastered ones, with which reconstruct a new, wide knowledge structure. Therefore, self-regulated learning is a significant and appropriate way for teacher professional development. Additionally, teacher occupied creation innately, that will promote SRL in a sense.

Starting from 1950s, the topic has gained particular attention and several new theoretical models of self-regulation have emerged. Social cognitive school,

Zimmerman proposed a systematic frame, specifying the details of what SRL'S nature is. The frame contains six aspects in the process of self-regulation, those are, self-target, self-efficiency, values, attribution; strategy use, relax; time planning and management; self-monitoring, self- judgment and behavior control, will; choose and organize environment; selecting leads and seeking for instructing. They are the basis of what we developed, the key content, "Elementary School Teachers' Self-Regulated Learning Exploratory Factor Scale".

2. Methods

2.1 Sample

705 teachers work in elementary school, including 194 male teachers and 511 female teachers. They come from public and private elementary schools in cities in China, like Chongqing, Chengdu, Guiyang, and Qingdao. The technical titles and school age of these teachers distribute reasonably. As

Table 1 Distribution of Technical Titles

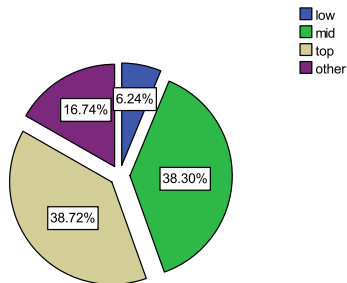
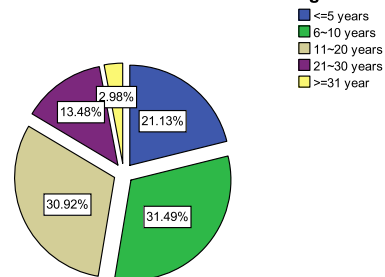


Table 2 Distribution of School Age



shown in Table 1 and 2.

2.2 Developing process

The purpose of this study is, through the literature research, we developed the questionnaire as a tool to investigate the main factor effecting primary school teachers' self-regulated learning's current situation and contents. With further understanding the level, method, outcomes of their SRL, we still hope the tool we developed can offer educational policy development a scientific basis for encouraging and consulting more primary school teachers do SRL.

"Elementary School Teachers' Self-Regulated Learning Exploratory Factor Scale", has 50 items at beginning, using the self-rating scale of Likert scale, from "has nothing to do" to "fully comply with", assigned for 1-5 scores. Then we selected 705 primary school teachers in Chongqing, Guiyang, Chengdu and Qingdao. According to the measured data, we do item analysis. Through the Independent Samples T-Test, the Pearson correlation coefficient and Zimmerman's SRL theory, we selected items that are insignificant and have low correlation, considering delete them.

Before we do exploratory factor analysis to the scale, we check the Kaiser-Meyer-Olkin measure of sampling adequacy (KMO). The bigger the KMO value is, the more common factors among those variables, which means it is more suitable to do factor analysis. The value of the scale is 0.923. The number is marvelous, that means excellent relationship between variables, showing that these variables are quiet suitable to do factor analysis (Spicer, 2005). As shown in Table 3.

Table 3

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.923
Bartlett's Test of Sphericity	Approx. Chi-Square	6307.776
	df	378
	Sig.	.000

The communalities and factor loading of those items are acted as discrimination index; to decide which item should be selected and recombined. After cluster analysis, we got seven factors. Then we renamed them, with consulting SRL theory proposed by Zimmerman and other relative reference, as shown in Table 4.

Table 4 Factor Structure of Teachers' SRL Scale

Factor 1	Factor 2		Factor 3		Factor 4	
sociality	motivation		methods		outcomes	
selecting leads and seeking instructing	self-improvement	self-excelling	strategy use	habitual behavior	extensive reading	professional development
Cumulative Initial Eigenvalues %				56.924%		

3 Outcomes

3.1 Reliability Index

We use Split-half reliability and the inner-consistence (Cronbach α) as reliability index. As shown in Table 5.

Table 5 Reliability Index of Teachers' SRL Scale

	Factor 1	Factor 2		Factor 3		Factor 4	
Reliability	selecting leads and seeking instructing	self-improvement	self-excelling	strategy use	habitual behavior	extensive reading	professional development
Cronbach's α	0.779	0.767		0.788		0.717	
	0.905						
	Spearman-Brown Coefficient				0.869		
	Guttman Split-Half Coefficients				0.868		

3.2 Validity Index

3.2.1 Content Validity

Zimmerman's SRL research frame will be used to test the content validity of our developed scale. As shown in Table 6.

Table 6 the Research Frame of SRL Proposed by Zimmerman

	Scientific question	Psychological dimension	Task condition	Essence of self-regulation	Process of self-regulation
1	Why to learn	Motivation	Choose to participate	internalization and spontaneous	self-target, self-efficiency
2	How to learn	Methods	Choose methods	premeditated and automated	strategy use, relax
3	When to learn	Time	Control time	Timed and effective	time planning and management
4	What to learn	Outcome	Control outcome	Self-awareness to the outcome	self-judgment and behavior control,

					will
5	Where to learn	Environment	Control physical environment	Sensitivity to the physical environment	choose and organize environment
6	Who to learn with	Sociality	Control social environment	Sensitivity to the social environment	selecting leads and seeking instructing

From Table 6, Zimmerman pointed his ideas about SRL in five views, and each view has six specific details to illustrate. Comparing with the scale we developed, most of the key points are parallel.

3.2.2 Construct Validity

The common way to test the construct validity is factor analysis. The factor of construct is the relationship among all the variables. In each test, the loading on each common factor is the factor validity of the test. The certain proportion of some relevant factors in total variation of the testing score is the construct validity index of the test. The factor loading of items in our developed scale range from 0.443 to 0.776, showing good construct validity. Furthermore, the Cumulative Initial Eigenvalue of the chosen 28 items to the original 50 items is 56.924%, which means the analyzed 28 items can well represent the original 50 items. The factor construct and factor loading are shown at Table 7, 8, 9.

Table 7 Factor construct and loading of sociality in Teachers' SRL

Num	Item	factor loading	Num	Item	factor loading
33	colleague-learning and show yourself by internet	0.766	35	listen and consider others' views to my work and study	0.576
36	communicate and discuss with colleagues by internet	0.729	32	share teaching experience plans with colleagues	0.538
34	listen other teachers class	0.698			
Eigenvalue			8.353		

Table 8 Factor construct and loading of motivation in Teachers' SRL

self-improvement			self-excelling		
Num	Item	Factor loading	Num	Item	Factor loading
8	Through my study, I want my students get well achievements	0.703	25	I want to complete class teaching by my hard working	0.657
10	I want to learn experience from excellent teachers	0.686	17	Be eager to master all the knowledge and skills in teaching	0.627
12	I want to raise students' comprehensive quality	0.497			
40	Consulting from excellent colleagues	0.443			
Eigenvalue		1.867	Eigenvalue		1.106

Table 9 Factor construct and loading of method in Teachers' SRL

strategy use			habitual behavior		
Num	Item	Factor loading	Num	Item	Factor loading
38	will mark the key contents when learning by symbols	0.738	29	organize the contents when learning by tables and diagrammatic sketch	0.633
39	associate the new materials with the known contents when reading	0.589	9	Make a study plan	0.573
37	express the important viewpoint in my own words when learning	0.452	24	study the modern educational technology	0.466
22	concern the relevant knowledge of my own teaching subject	0.438	11	I'm able to use learned knowledge to teaching practice	0.457
18	learn some new teaching ideas and methods	0.432			
Eigenvalue		1.031	Eigenvalue		1.009

Table 10 Factor construct and loading of outcome in Teachers' SRL

extensive reading			teachers' professional development		
Num	Item	Factor loading	Num	Item	Factor loading
3	read articles on education and teaching	0.706	41	actively participate in research and discuss	0.651
23	read famous educators' monographs	0.644	44	learn the teacher professional morality	0.613
13	learn educational research methods	0.614	50	learn the professional knowledge of my subject	0.523
19	often read teaching reference books	0.528	48	often do trainings for teaching skills	0.415
Eigenvalue		1.408	Eigenvalue		1.165

4. Discussions

4.1 The conceptual structure of Teacher's SRL

According to Zimmerman (2000a) self-regulation is cyclical in nature, he defines self-regulation as "self-generated thoughts, feelings and actions that are planned and cyclically adapted to the attainment of personal goals".

4.2 The factor exploratory scale to primary school teacher

We developed the "Elementary School Teachers' Self-Regulated Learning Exploratory Factor Scale", based on Zimmerman's SRL Frame. We did exploratory factor analysis with the data collect in several cities in China; we got the result that, teacher's SRL scale could be conclude in four factors. They are sociality, motivation, method and outcome. The items that each factor contains are 5, 6, 9 and 8. Besides, motivation included self-improvement and self-excelling; methods included strategy use and habitual behavior); outcomes included extensive reading and teachers' professional development.

4.3 The redevelopment of our "Elementary School Teachers' Self-Regulated Learning Exploratory Factor Scale"

After the SRL Frame proposed, Zimmerman (2000) developed another social cognitive model of self-regulation, which is based, as its name indicates, on Bandura's (1986) social cognitive theory. According to this model, self-regulation involves three classes of determinants. They're, a forethought phase, a performance phase and a self-reflection phase (Zimmerman, 2000a).

The function of our current scale is to test the current SRL situation, main way to operate and the SRL outcome of teachers. Next step, we will enrich the scale with the foregoing three phases.

5. Conclusion

5.1 Self-Regulated Learning Exploratory Factor Scale showed good reliability and validity. It can be used to test the current operating situation of SRL for teachers working in elementary school.

5.2 The result of 905 teachers working in elementary school by exploratory factor analysis is that, the SRL for elementary teachers is consisted of its sociality (selecting leads and seeking for instructing), its motivation (self-improvement and self-excelling), its methods (strategy use and habitual behavior), and its outcomes (extensive reading and teachers' professional development). All the result indicated Teachers' SRL Scale had clear factor structure, good reliability and validity.

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