

**INVESTIGATION AND RESEARCH ON THE PROFESSIONAL KNOWLEDGE  
LITERACY OF GEOGRAPHY TEACHERS IN MIDDLE SCHOOLS IN CHINA**

**BY**

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**ABSTRACT**

Geography teachers' professional development of middle school is a premise and foundation to geography education development. This paper surveyed the professional knowledge literacy of geography teachers in secondary schools based upon a questionnaire. The results showed only 60.245% of the geography teachers could master the knowledge of Physical Geography, and only 73.49% of the geography teachers studied textbooks and teaching methods of middle school geography. Meantime, only 27.71% of the geography teachers can use multimedia and other electronic resources, and only 12.05% of the geography teachers often took part in a course discussion. Besides, due to the lack of extra-curricular reading, it is not conducive to the development of geography teaching. So, geography teachers should set up their consciousness of professional development and concept of lifelong learning. Of course, they should strengthen and improve their subject knowledge structure, conduct the teaching practice, and develop into a research teacher simultaneously.

**KEYWORDS:** Middle school, Geography teacher, Professional knowledge literacy

## 1. Introduction

Teacher is the key to innovation and quality of education. Schools should provide qualified geography teachers in Physical Geography and Human Geography to provide high-quality geography education and teaching for students (Zhang Jianzhen, *et al.*, 2017). For a long time, geography education in middle school has made significant contributions to the growth and education of children and adolescents. In fact, ensuring the quality of effective and valuable geography teaching is important to policymakers and educational leaders (GU-CGE, 2015). "Medium and Long-term Education Reform and Development Plan (2010-2020)" puts forward the needs to enhance teachers' professional level and teaching ability. To improve teachers' ability of education and teaching, Lin Chongde thought teachers must have solid knowledge, which is the prerequisite for teachers to engage in education (Lin Chongde, 2015). In the "Growth model of expert geography teacher", Li Jiaqing put forward the geography teacher must optimize their professional structure, and have the efficient geography teaching ability to become an excellent and mature expert teacher (Li Jiaqing, *et al.*, 2011). With the deepening of the educational reform of core literacy, improving and developing the geography teachers' core literacy become necessary. Meanwhile, improvement of geography teachers' core literacy is also the prerequisite and foundation for the implementing of the major geography literacy of the middle school students, and also the key and the premise of the geography education development.

The research on teacher's knowledge structure began in 1880s. Schulman, American educational psychologist, divided the teacher's knowledge structure into "content knowledge", "general pedagogical knowledge", "curriculum knowledge", "pedagogical content knowledge", "knowledge of learners and their characteristics", "knowledge of educational contexts", "knowledge of educational ends, purposes, and values, and their philosophical and historical grounds" (ZHUXiao-min, *et al.*, 2006; Shulman L, 1987). USA National Teacher Examinations (NET) divides teacher knowledge into three parts: "General knowledge", "Teaching professional knowledge", and "Subject knowledge" (Luo Runsheng, *et al.*, 2001). Zhong Keting, *et al.* thinks teacher's professional knowledge is made up of "Noumenon knowledge", "Conditional knowledge" and "Practical knowledge" (Zhong Keding, *et al.*, 1998). In 2011, China's "Professional Standards for Middle School Teachers (Trial)" divided the teachers' knowledge into "Subject knowledge", "Education knowledge", "Subject teaching knowledge" and "general knowledge". From this perspective, there are diverse opinions on the classification and definition on teachers' knowledge literacy. In this article, Lin Chongde's classification is used, and the teacher's knowledge is divided into "Ontological knowledge", "Conditioned knowledge", "Practical knowledge" and "Cultural knowledge" (Xin Tao, *et al.*, 1999). Geography teachers' Knowledge literacy can be divided into four specific aspects, including (1) Geography knowledge, which refers to the geographical knowledge of geography teachers; (2) Educational subject knowledge, which refers to the basic educational theories guiding geography teaching, such as Pedagogy and Psychology; (3) Practical

knowledge of geography teaching, which refers to the geography teaching practice ability, such as geography teaching design, teaching method rethinking and multimedia operation; (4) Basic scientific and cultural knowledge, which refers to the basic knowledge of other subjects that assist geography teachers.

The key to education development is teachers. Improving teachers' professional level is an important part of China's education development and a key to improve the education quality and promote the balanced development of education (Yu Lizhong, 2009). Professional knowledge literacy is an important content for the geography teachers to improve their own teaching, improve their own career development to become a research teacher, and implement the subject core literacy. Under the education reform system of the new college entrance examination, Geography is selected as an elective examination subject, which requires geography teachers to continuously improve their professional knowledge and skills in order to broaden their field of vision and adapt to change (Xu Zhongping, 2016). For investigating and analyzing the professional literacy of the geography teachers in secondary schools, it is of great significance for geography teachers to clarify the problems in their career development and provide him with certain guidance and help.

## **2. Materials and Methods**

To investigate the status of professional knowledge literacy of geography teachers, a survey questionnaire was designed based on the four aspects mentioned above (Xin Tao, et al., 1999) and divided into five parts. The first part is to understand the basic information of teachers, including age, professional title, teaching age, etc.; Second part investigates the subject professional knowledge of geography teachers, including Natural Geography knowledge, Human Geography knowledge, frontier knowledge of Geography, etc.; Third part focuses on the educational knowledge of geography teachers, including Pedagogy, Psychology, and people-oriented teaching concepts; Fourth part focuses on surveying teachers' geographical practical knowledge, including Geography teacher's mastery of curriculum standards, instructional design, curriculum development, teaching seminars, and teaching methods; Fifth part investigates the basic cultural knowledge of geography teachers, including extracurricular development and extra-curricular interests.

The respondents were mainly middle school geography teachers in Hunan and Shaanxi, but few in other provinces. Because the survey involves a wide range, it can basically reflect the current situation of geography teachers' professional knowledge literacy. The survey adopts two methods: online questionnaire and paper questionnaire. The survey received 104 questionnaires, including 83 online questionnaires and 21 paper questionnaires. Effective questionnaires were 95, and the effective rate was 91.35%.

### 3. Results and analysis

#### 3.1 Specialty compositions of geography teachers

From the teachers' majors, 90.527% of them graduated from Geography, and 9.473% of them graduated from non-geography majors (Table 1). From the educational background, the teachers who graduated from geography major of a junior college accounted for just 4.211%, and the teachers who have a master degree accounted for 11.579%. The largest proportion is the geography undergraduate teachers, accounting for 84.210% (Table 2).

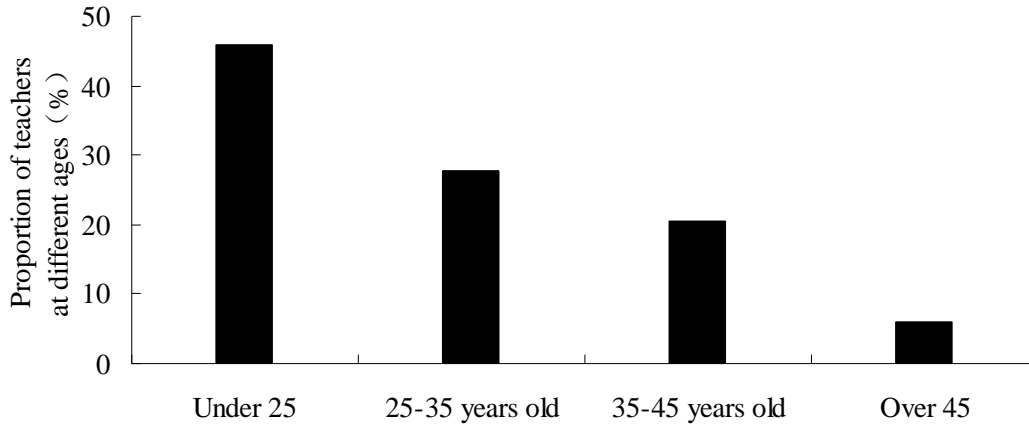
**Table 1 Geography teachers' major**

Geography teachers' specialties	Proportion (%)
Geography major	90.36
Relevant major	2.41
Non-geography major	7.23

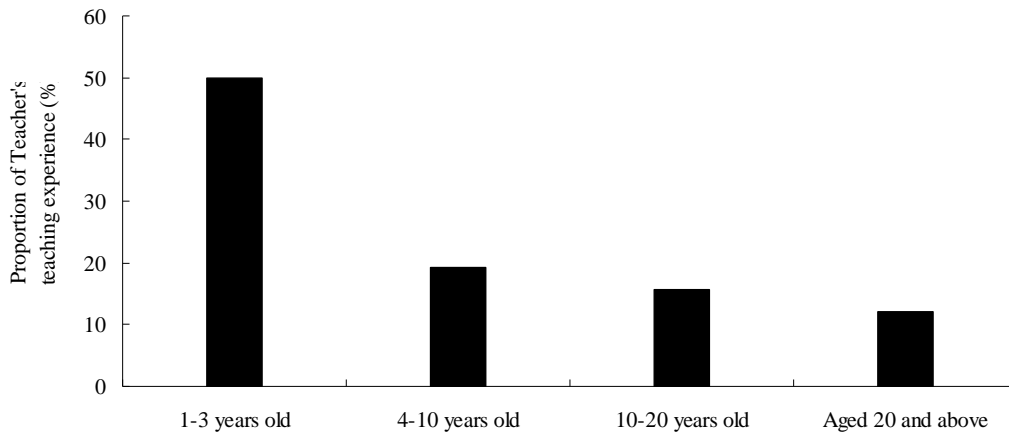
**Table 2 Proportions of Educational background and titles of geography teachers**

Educational background and title	Junior (%)	Intermediate (%)	Senior (%)
Teachers who graduated from Geography major of a junior college	1.053	3.158	0
Teachers who have a Geography bachelor degree	49.474	27.368	7.368
Teachers who have a Geography master degree	6.316	3.158	2.105

From the teachers' age structure, among the teachers surveyed, there are many young teachers under the age of 25, but the proportion of middle-aged teachers is relatively low (Fig. 1). From the perspective of teaching age, there are many teachers with 1-3 years teaching age, and the teachers with 4-20 years teaching age are relatively few (Fig. 2). In view of above status, because many teachers have short teaching time, their teaching experience is not sufficient, which is not conducive to the geography education teaching activities.



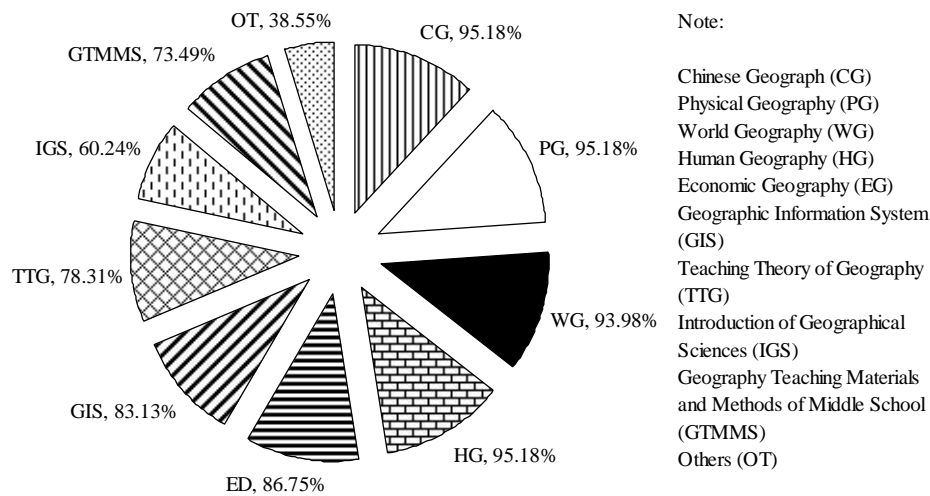
**Fig. 1 Teachers’ age structure**



**Fig. 2 Teacher’s structure of teaching experience**

**3.2 Subject knowledge of geography teachers**

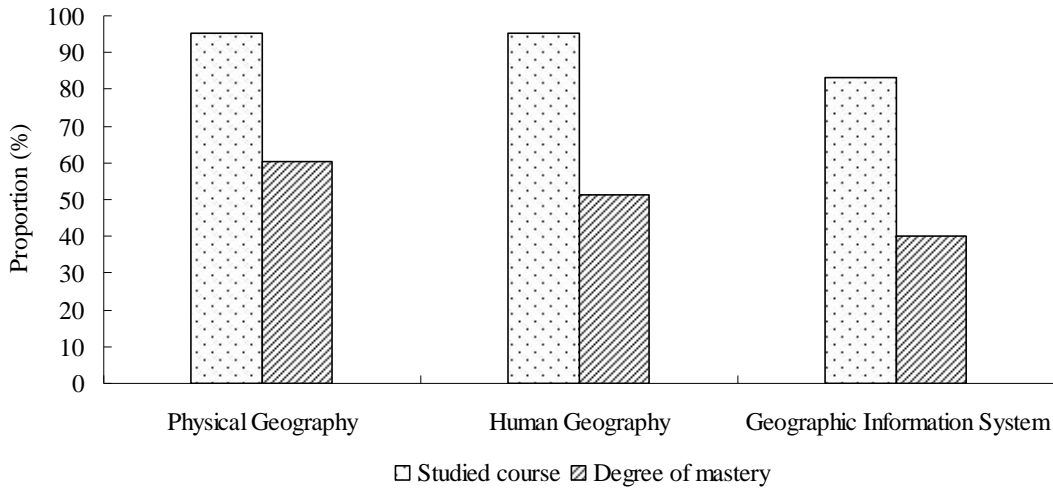
The survey of Geography courses that have been studied showed that knowledge literacy of the basic theory of a middle school geography teacher needed to be improved (Fig. 3). In comparison, geography teachers who have learned traditional geography courses have a higher proportion, while those who have studied geography teaching methods and new geography courses are few. Specifically, more than 93.98% of the teachers studied the curriculum of Physical Geography and Human Geography. Nevertheless, the proportion of teachers who can grasp the knowledge of Physical Geography is 60.245%, and the proportion of teachers who can grasp the knowledge of Human Geography is 51.205%. Compared with Physical Geography and Human Geography, Geographic Information System (GIS) is a new modern geography course. Although the teachers who have systematically studied GIS accounted for 78.31% of the teachers, but the teachers with high quality of geographic information technology accounted for only 39.94% (Fig. 4).



**Fig. 3 Geography course that was studied**

Fig. 3 showed that geography teachers lack Geography teaching knowledge. Among the teachers who have been investigated, 73.49% of them learned Geography teaching materials and teaching methods of middle school, 60.42% of them learned Introduction of Geographical Sciences, and 78.31% of them learned Geography Teaching Theory (Fig. 3). Geography teachers have less study on Geography teaching methods, which make them lack the correct understanding and mastery of Geography teaching methods, so that they can't well grasp the Geography teaching in their teaching practice. Therefore, geography teachers' basic geography knowledge needs to be strengthened. As it is known to all, drawing maps and geographic events are the basic skill of middle school geography teachers. However, among the respondents, the teachers who could accurately draw maps and geographical matters accounted for 53.01% (Fig. 5). What's more puzzling is that only 21.69% of the respondents understood geography curriculum standard deeply (Fig. 6). Doubtlessly, the lack of some knowledge, such as basic theory of subject knowledge, Geography teaching and teaching methods, will inevitably lead to some problems in geography teaching, and thus reduce the quality of teaching.

In addition, although geography teachers who have graduated from the non-geography major have studied many traditional geography courses, such as Physical Geography, Human Geography and Chinese Geography, their study and mastery of Geography teaching methods and new Geography courses are very deficient, which has also reduced the quality of Geography teaching to a certain extent.



**Fig. 4 Geography teacher's learning and mastering of Geography curriculum**

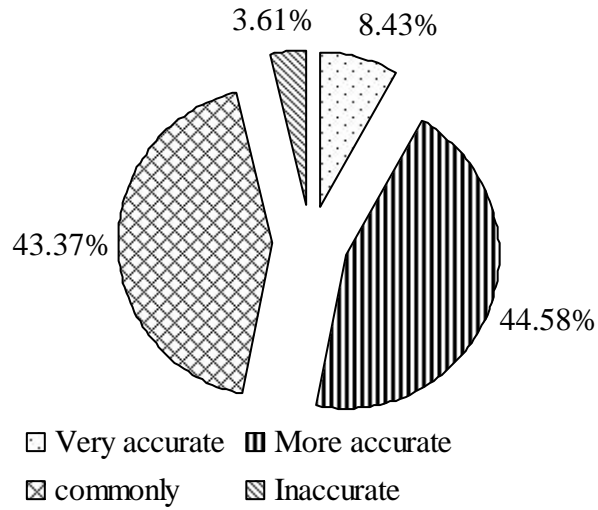
**3.3 Education subject knowledge literacy of geography teachers**

Among the geography teachers surveyed, many of them studied Education and Psychology, accounting for 92.77% and 80.72% respectively. However, the proportion of teachers who studied is quite low, which accounts for only 57.83% (Fig. 7). This is not good for teachers to sublimate and summed up their teaching experience as educational theory. The survey also showed that only 59.04% of the geography teachers knew the “Standard of a good lesson”, and 63.86% of the teachers concerned about the goal of the new curriculum reform. However, unfortunately, they lack knowledge of other education and teaching knowledge. From the classification of teaching objectives and the classification of teaching evaluation, their proportion is just 32.53% and 33.73%, respectively (Fig. 8). To further see, teachers who can often use the principles and knowledge of Education to sublimate their experience into Geography teaching rules accounted for only 43.37% (Table 3).

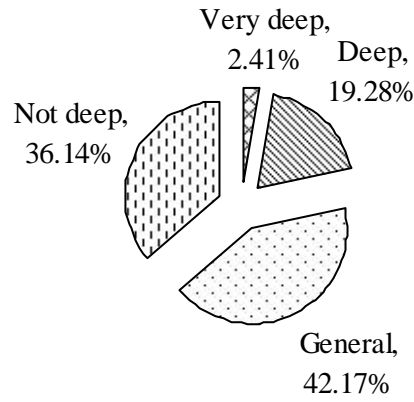
**Table 3 Proportions of teachers using education knowledge to sum up**

Question	Option	Proportion (%)
Do you often use Education knowledge to sum up?	Often	43.37
	Occasionally	40.96
	Less	14.46
	No	1.2

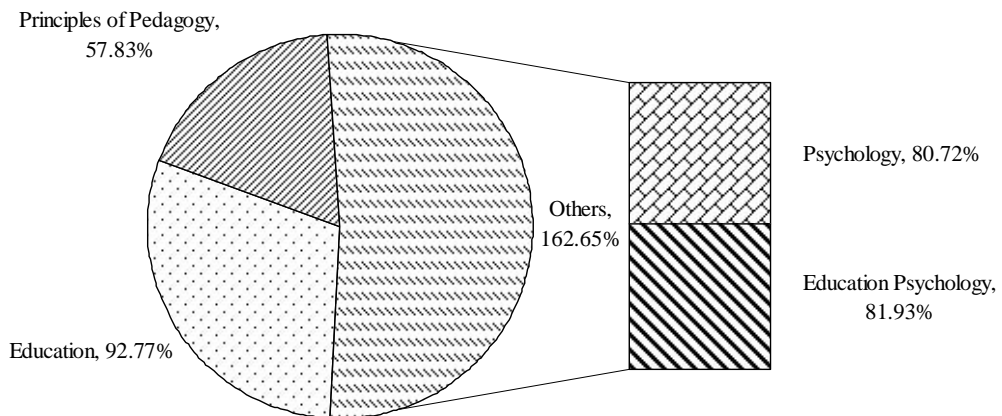
Obviously, although the Geography teacher has the basic knowledge of Education theory, the knowledge reserve of the Principles of Pedagogy still needs to be improved. Moreover, it is not mature to apply the knowledge of Pedagogy to the teaching practice. Therefore, Pedagogy knowledge, as a guiding course of teaching practice, needs further improvement.



**Fig. 5 Accuracy of drawing maps and Geographical events**

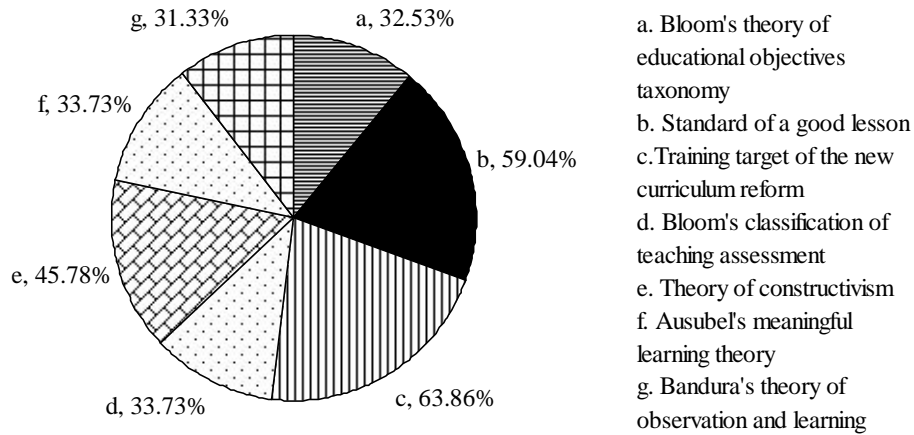


**Fig. 6 Depths of interpreting Geography Curriculum Standards**



**Fig. 7 Learned Education courses**

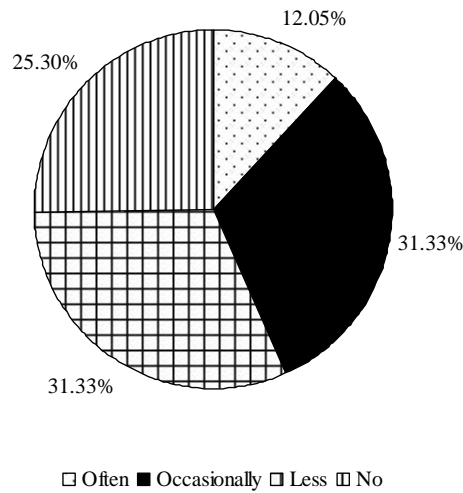




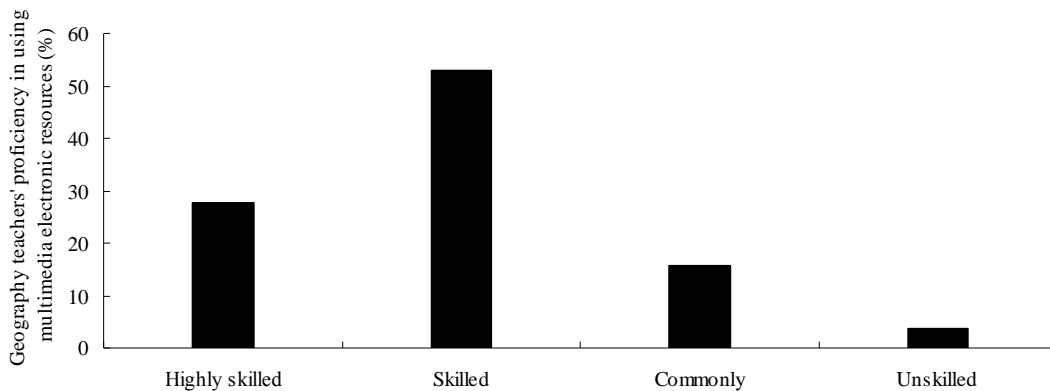
**Fig. 8 Degrees of geography teachers' understanding of Education knowledge**

**3.4 Knowledge literacy of geography teachers' teaching practice**

The survey showed that only 8.43% of the geography teachers could prepare their lesson plans, which were very suitable for students' learning and teaching practice, yet 72.79% of them can compile a lesson plan that is better suitable for students' learning and teaching practice (Table 4). For local curriculum research (e.g. school-based curriculum, local teaching material, etc.), fewer teachers are able to participate. Actually, only 12.05% of the teachers participated in the Geography course discussion regularly (Fig. 9). Although electronic resources are becoming more and more important to teach, only 27.71% of geography teachers can skillfully use electronic resources (e.g. multimedia) to teach (Fig. 10). And for making and collecting Geography AIDS and specimens, only 8.43% of geography teachers do it regularly (Table 5). While adjusting the lesson plan in time according to the teaching situation is necessary, just 63.86% of geography teachers changed their lesson plan in time (Fig. 11).



**Fig. 9 Teachers participating in the discussion and compilation of the local curriculum**



**Fig. 10 Geography teachers' proficiency in using multimedia electronic resources**

According to table 4, most teachers' lesson plans can basically conform to the actual situation of teaching, which is not only good for teaching implementation, but also good for students' learning. Because of the influence of their own and policy, geography teachers seldom pay attention to and participate in Geography curriculum teaching and research and a discussion on the local curriculum, which leads to their poor quality of Geography teaching and research and difficult to improve. Because many geography teachers are not skilled in using multimedia electronic resources, they can't show the Geography course more vividly and interestingly through modern information technology, which makes the Geography class boring and the students lose the interest of learning Geography. Obviously, the result is not conducive to students' progress and development. Fig. 11 reflects that most teachers can reflect on teaching in time and adjust their teaching plan, which is beneficial to the implementation of teaching. However, part of geography teachers' literacy of teaching design and teaching reflection needs to be improved doubtlessly.

**3.5 Basic cultural knowledge literacy of geography teachers**

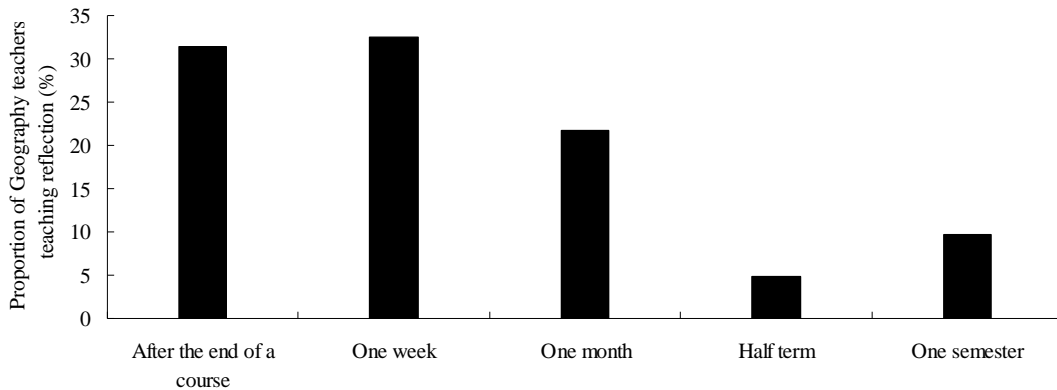
As far as basic scientific and cultural knowledge literacy is concerned, the time spent by geography teachers to increase their knowledge through extra-curricular reading is less, and only 33.73% of the teachers can read extra-curricular reading regularly (Table 5). Because of the lack of extra-curricular reading time, geography teachers don't have enough time to read extra-curricular books, which makes their vision limited and is not conducive to the development of knowledge in the classroom.

**Table 4 Proportions of designing lesson plans according to the actual teaching situation**

Topic	Option	Proportion (%)
Are the lesson plans you designed according to "Geography Curriculum Standards", textbooks, teaching supplementary materials and students' learning situation fitting the actual situation of teaching?	Very fitting	8.43
	More fitting	72.29
	Commonly	16.87
	Not fitting	2.41

**Table 5 Situations of making and collecting Geography AIDS and specimens**

Option	Proportion (%)
Regularly	8.43
Occasionally	67.47
No	24.1



**Fig. 11 Situation of geography teachers' teaching reflection**

**Table 5 Situation of geography teachers' extra-curricular reading**

Item	Proportion (%)
Regular reading	33.73
Occasionally read	57.835
Less reading	8.43
Not read	0

#### 4. Suggestions to improve teachers' knowledge literacy

The above surveys and analyses showed there were still many deficiencies in geography teachers' professional knowledge literacy. Under the requirements of core literacy, geography teachers need to improve their professional level to achieve professional development constantly. Specifically, we can start from the following aspects:

(1) Construct and improve geography knowledge system of geography teachers. The survey results showed geography teachers' mastery of Geography knowledge is not comprehensive. However, a reasonable teacher's knowledge structure is a necessary condition for teachers to engage in teaching work, and a prerequisite for teachers to solve problems in education and teaching (Zhang Jiahui, et al., 2015). Therefore, it is not enough for geography teachers to have enough geography knowledge, and an excellent geography teacher also needs complete knowledge structure. Subject teaching knowledge is the core issue of geography teachers' professional development (Liu Lan, et al., 2009). Therefore, geography teacher should strengthen their learning of geography curriculum teaching method. Of course, they also should pay more attention to the analysis and research on the geography curriculum standard and local curriculum. Moreover, they should master the whole knowledge system. To grasp the subject knowledge skeleton, teachers should improve their basic knowledge and the frontier knowledge of the geography to form a knowledge system from macro to micro and from part to whole.

(2) Learn to apply Pedagogy, Psychology to teaching activities. From the above analysis, it is known that the geography teacher lacks some basic education knowledge and ideas, and can't apply the education knowledge well to the process of Geography education and teaching. Pedagogy knowledge can guide teachers to understand the teaching regularity, and then choose suitable teaching methods and teaching means to improve teaching quality continuously. Psychological knowledge can not only guide the geography teachers to better grasp the students' psychological development law, but also improve the teachers' psychological quality (Shao Zeyu, et al., 1996). So teachers can teach students in accordance with their aptitude and step by step, and conduct teaching activities better according to students' laws of physical and mental development. Therefore, geography teachers need to strengthen the learning and training of education knowledge to enhance their education knowledge literacy

constantly. In addition, in the process of teaching, geography teachers should learn how to use the knowledge of Pedagogy and Psychology to sum up the educational law according to the teaching problems. More importantly, they can use these laws to guide their teaching practice.

(3) Improve teacher's teaching practice ability. The ability of teachers' teaching practice is directly related to the quality of teaching and the quality of student's development (Li Jiaqing, et al., 2012). However, at present, the quantity and quality of geography teachers in China are difficult to guarantee the completion of practical teaching tasks (LI Qing, 2007). Schools can organize activities, such as Geography experience exchanging meeting, teaching competition of geography teachers, open class and school's training, to exchange experience through activities. At the same time, teachers should carry out teaching reflection based on teaching practice, sum up experience, practice again, rethink, and improve their teaching practice ability constantly.

(4) Establish the concept of lifelong learning, and making efforts to become a research teacher (Li Jiaqing, 2013). Geography teachers need to pay attention to the hot issues of geography, such as resource and environment, cross-regional sustainable development, global warming, to popularize the latest frontier knowledge of geography for students. Improving a professional research ability of geography teachers, summing up the law of education in practice, teaching reflection and combining geography teaching theory with practice can better study geography teaching and better guide geography teaching activities.

(5) Formulate teachers' career development plan. Tang Yuguang (Tang Yuguang, 1999) and Xue Zhihua (XUE Zhi-hua, 2006) thought teachers' professional development was the process of teachers' initiative to build their own professional knowledge. Making a teacher's career development plan can make the geography teachers clear the goals and needs of self development, and guide themselves development. Meantime, the needs of teachers' professional development may be different in different periods. Therefore, they need to adjust their planning objectives according to their own circumstances and put them into action.

## **5. CONCLUSION**

There are several problems in geography teachers' knowledge literacy:

(1) As far as geography knowledge literacy is concerned, their knowledge reserve of geography basic theory is good, though the degree of mastery is slightly lower. Nevertheless, their geography teaching method and frontier geography knowledge are obviously inadequate.

(2) Geography teachers learned many education subjects, but the proportion of applying pedagogical knowledge into teaching practice is low.

(3) Seen from Geography teaching practice knowledge, geography teachers seldom participate in

curriculum discussions. Moreover, they had a low research quality, and were unskilled in the use of multimedia technology. However, it is gratifying that most of the geography teachers' lesson design conformed to the students' actual situation, and the teachers could adjust their teaching plan in time according to their teaching reflection, which is beneficial to the implementation of the teaching plan to some extent.

(4) The number of geography teachers who conducted extra-curricular reading is relatively fewer.

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