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Improving Map Reading Skills of Elementary Level Student Teachers through Activity-Based Training

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KEYWORDS Achievement. Activity-Based Teaching. Geography. Map Skills. Pre-service Teachers

ABSTRACT The study was designed as the single group pre-test and post-test experimental design aimed at studying the effectiveness of activity-based training in improving map reading skills of elementary level student teachers. 67 student teachers were selected as samples using a convenience sampling technique. The developed achievement test and module on map reading skills were validated by the subject experts. After that, the activity-based training on map reading skills was given to the student teachers using the prepared module. The results derived from inferential statistics indicated that the given activity-based training using the prepared module was effective in improving the map reading skills of the student teachers. However, the imparted activity-based training was ineffective for the student teachers in maintaining their acquired mastery level in map reading skills.

INTRODUCTION

In India, Social Science is one of the compulsory subjects taught at the school level where it has been a part of 'Environmental Studies' before the upper primary stage and emerges as a separate subject at the upper primary stage. The social sciences encompass diverse concerns of society and include a wide range of content drawn from the disciplines of history, geography, political science, economics, and sociology (NCERT 2006). Geography is an integral component of Social Science and introduced as one of the disciplines under the umbrella of Social Sciences. Geography is an essential field for every human being because it consists of knowledge of the world around. Knowledge of geography and the ability to think geographically aids the individual in understanding and interpreting the realities of the world.

Geography deals with many components and among the different components of geography, map work stands out very significantly. Hartshorne (1939) states that the use of maps in geographic work is so important that it seems fair to suggest that "if the problem cannot be studied fundamentally by maps, then it is questionable whether or not it is within the field of geography". According to Haggett (1990), "geography is the art of the mappable". Ofomata (2006) opines, "Maps aid the achievement of objectives of geography as the map is the distinctive tool of the geographer". The well-known geographers across the world often define geography around maps and map use.

A map is considered to be a drawing to a scale of the whole or a part of the surface of the earth on a plane surface, and it is a manually or mechanically drawn picture of the earth showing the location and distribution of various natural and cultural phenomena. The most universal use of maps is for locating places and things. A well-prepared map is worth hundreds of pages of a book in many respects. Maps are regarded as an indispensable aid in the teaching and learning of Social Sciences, particularly Geography. Though map reading is primarily taught in Geography, a map is a tool that is used by other disciplines also. Ample maps have been used in textbooks, but unless the students know how to read a map, they will not be able to understand what is being taught to them. Moreover, lifelong learners will come across a variety of maps in their daily life while reading books, newspapers, magazines, watching television or visiting any new place, etc. The use of maps also facilitates the understanding of the Global Positioning System (GPS) and Geographic Information System (GIS), which are the modern navigational technologies that appear in everyday life (Wigglesworth 2003).

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Unfortunately, in India, people do not use maps efficiently. This is because the teachers graduate without gaining map perception and map reading skills. Consequently, every school teacher encounters methodical problems when using maps to try and impart geographical knowledge to their students. Maps, being part of teaching and learning in Geography at all stages, it is important for elementary level student teachers need to have a clear understanding of the basics of maps. Geography being one of the divisions in Social Science is taught by secondary grade teachers at the elementary level and by trained graduate teachers at the secondary level in India. The elementary level student teachers studying Diploma in Elementary Education in the elementary teacher education institutions are going to work as a secondary grade teacher in elementary schools after completion of their teacher education programme. A secondary grade teacher in an elementary school has to teach all the subjects including Social Science.

The researcher taught Social Science to elementary level student teachers for four years at the District Institute of Education and Training, Uthamapalayam, Theni District in Tamil Nadu, India. The researcher observed that the student teachers find geography lessons very difficult to understand, especially the activities related to maps. They do not know even about the latitudes and longitudes. It is because the student teachers were not taught properly about the maps during their elementary and secondary school education.

From the review of past studies, it is found that the map skills of the students are generally weak. Erol (2017) reported that the 7th graders' map literacy levels were mainly at the intermediate level. A study performed by Alhosani and Yagoub (2015) in the United Arab Emirates shows that geographic skills are generally weak among university students. Further, most learners do not perform well in map work because they lack motivation in doing map work, they lack basic skills to map reading, and finally, they lack basic mathematical skills (Mwenesongole 2009). Madiwalar (2012) found that secondary school students generally exhibit poor map reading skills and the teachers and students gave more emphasis to the other contents of geography rather than the contents of map reading skills. It is noteworthy to mention that even some geography teachers do not possess some of the competencies needed to teach map work in secondary schools (Ezeudu and Utazi 2014a).

The map reading skills enhance the ability of the students to understand and explore occurrences related to the spaces around them. It provides students with the knowledge of the places and the socio-economic processes taking place or having taken place at a particular location. Therefore, map reading skill is very important to the students at the elementary school education level. But, most of the elementary school teachers are not equipped to effectively teach map reading skills and basic components of the map. So, it is essential to equip the elementary level student teachers with map reading skills during their pre-service teacher education programme itself. If they are equipped with map reading skills, they will teach the basic concepts of map reading to the students when they get placed in elementary schools. In this context, the researcher decided to prepare an activity-based training module to improve the map-reading skills of elementary level student teachers. Previous research found that the training programmes could equip the teachers to teach map-related activities effectively to their students (Ezeudu and Utazi 2014b).

The positive results of the studies conducted in the past across the world supported the need for an innovative intervention programme to improve the map reading skills of elementary level student teachers. Hence, an activity-based training programme was conceived to improve the map reading skills of elementary level student teachers.

Objectives of the Study

The major objective of the present paper was to study the effectiveness of the activity-based training programme in improving the map reading skills of elementary level student teachers before and after implementing the activity-based training programme.

Hypotheses of the Study

The following hypotheses were framed for verification.

1. There is no significant mean score difference in map reading skills of elementary level student teachers between pre-test and post-test.
2. There is no significant mean score difference in map reading skills of elementary level student teachers between post-test and retention-test.

MATERIAL AND METHODS

Method

The present study was designed as a single group pre-test and post-test experimental design. The study was conducted in five phases. In the first phase, the module on map reading skills and a test to measure the map reading skills of student teachers were prepared. In the second phase, the developed map reading skills test was administered to the student teachers as a pre-test. In the third phase, the activity-based training on map reading skills, as an intervention strategy, was imparted to the student teachers using the prepared module for five consecutive days. In the fourth phase, the map reading skills test was again administered to the student teachers as a post-test. After the lapse of 30 days, in the fifth phase, the map reading skills test was once again administered to the student teachers as a retention-test.

Variables of the Study

In the present paper, the activity-based training imparted to elementary level student teachers with the help of prepared module on map reading skills was considered as an independent variable whereas the student teachers' achievement in map reading skills was considered as a dependent variable.

Participants

For the experimentation, 67 student teachers pursuing first-year 'Diploma in Elementary Education' from two District Institutes of Education and Training (DIET) were selected as samples using a convenience sampling technique. Out of 67 student teachers, 32 student teachers were selected from the District Institute of Education and Training, Perundurai, Erode district and 35 student teachers were selected from the District Institute of Education and Training, Oddanchathiram, Dindigul district in the state of Tamil Nadu, India. The participants included 10 male and 57 female student teachers.

Research Instrument

The researcher developed the 'Map Reading Skills Test' for the selected map reading skills namely, directions, grid reference, scale, symbols, colours, distribution, and inference. The test contains 15 test items for a total of 60 marks. The test contains the items ranging from one mark to five marks. The content validity of the test was ensured through expert review. Further, a pilot study was conducted with 16 student teachers. The expert review and pilot study provided scope for a slight modification of the test. The test had a reliability coefficient of 0.96, which is significant at a 0.01 level of significance when tested for inter-rater reliability.

Preparation of Module on Map Reading Skills

The researcher prepared a module on map reading skills, which is in the form of 'teacher support material'. The skills that are required to read the maps given in the geography lessons of the Social Science textbooks at the elementary level formed the basis for the selection of map reading skills. Expert opinion was also received for the selection of map reading skills. Considering the objectives of the present paper, only seven skills were considered as essential for inclusion in the training module namely, directions, grid reference, scale, symbols, colours, distribution, and inference. It is not possible to make use of the given map meaningfully without the acquisition of these skills.

After the finalisation of map reading skills, they were sequenced and task analysis was done by identifying learning objectives and writing activities for each of them. The initial draft of the training module was edited and tried on a small group of student teachers. It was also referred to subject experts. The final draft of the training module was prepared by incorporating the changes suggested by the experts and was intended to overcome the difficulties faced by the

student teachers during the field practice. The final draft of the training module on map reading skills was subjected to validation through an experiment, which was a major objective of the present paper.

Implementation of Activity-based Training Programme on Map Reading Skills

The prepared module was used to implement the activity-based training programme to improve the map reading skills of elementary level student teachers for five consecutive days in the selected teacher education institutions. Each map reading skill consisted of varying teaching points and activities, in other words, some topics required more time than the number of teaching periods, whereas some could be completed in the time required or were completed before the time required. In each teaching period, one or more activities were completed, which were related to the map reading skills in focus.

During the teaching and learning process in each period, the student teachers' learning was monitored throughout and at the end of each of the learning activities as well. The responses given by the student teachers were supervised by the researcher to monitor the learning outcome for each activity relating to any map reading skills. If the student teachers met with difficulties, the researcher guided the student teacher accordingly and had them repeat the activity. Upon completing each activity, the learning outcome of the student teachers was assessed through interactions with them. Before proceeding to the next map reading skill, the student teachers were given feedback on their performance in a full-group setting.

RESULTS

This section describes the results obtained through establishing the effectiveness of activity-based training on map reading skills of elementary level student teachers through pre-test, post-test, and retention test scores. These scores were obtained through the administration of a test on map reading skills, which was analysed and described using inferential statistics. The data were analysed for the total achievement scores employing the paired-samples '*t*' - test using the Statistical Package for Social Sciences (SPSS) Version-22.

Assessing Normality of the Data

One of the assumptions for most parametric tests to be reliable is that the data is approximately normally distributed. The normal distribution peaks in the middle and are symmetrical about the mean. So, the normality of the data was tested before proceeding to the statistical analysis.

The Shapiro-Wilk test was employed to test the normality of the data collected. The results of the normality test are presented in Table 1. The null hypothesis of the Shapiro-Wilk test is that the data is normally distributed. The *p*-value of 0.108 suggests that the data is approximately normally distributed. So, the null hypothesis is retained at the 0.05 level of significance. Based on the results of the Shapiro-Wilk test, it can be concluded that the data is normally distributed. Hence, the parametric test is appropriate for data analysis.

Table 1: Shapiro-Wilk Test of Normality for gain score of map reading skills test

Statistic	*df*	*Sig.*
0.970	67	.108

Testing of Hypotheses

The paired-samples '*t*'-test was employed to test the framed null hypotheses and the results are presented in Tables 2 and 3.

The data presented in Table 2 shows that the mean post-test score (46.16) was very much higher than the mean pre-test score (11.97) with a mean difference of 34.19. This indicated that there was an improvement in post-test scores after the treatment. Further, the obtained mean difference was found to be statistically significant as evident from '*t*'- value of 82.67, which was computed at a 0.01 level of significance ($p<0.01$). Consequently, the stated null hypothesis is rejected, which means that there was a significant difference in map reading skills of the student teachers between pre-test and post-test. This indicated that the imparted activity-based training on map reading skills using the

Table 2: Mean, Standard Deviation and '*t*' values for pre-test and post-test scores of map reading skills

Phases of the Test	*N*	*M*	*Mean Difference*	*SD*	*df .*	*t*	*Sig. (2-tailed)*
Pre-test	67	11.97	34.19	3.05	66	82.67	.000
Post-test	67	46.16		3.24			

Table 3: Mean, Standard Deviation and '*t*' values for Post-test and Retention-test scores of map reading skills

Phases of the Test	*N*	*M*	*Mean Difference*	*SD*	*df .*	*t*	*Sig. (2-tailed)*
Post-test	67	46.16	4.00	3.24	66	13.20	.000
Retention-test	67	42.16		3.96			

prepared module was effective in improving student teachers' map reading skills.

The data presented in Table 3 shows that the mean retention-test score (42.16) was lesser than the mean post-test score (46.16) with a mean difference of -4. This indicated that there was a decline in retention-test scores, which was administered after 30 days from the administration of the post-test. Further, the obtained mean difference was found to be statistically significant as evident from '*t*'- value of 13.20, which was computed at a 0.01 level of significance ($p<0.01$). Hence, the stated null hypothesis is rejected, which means that there was a significant difference in map reading skills of elementary level student teachers between post-test and retention-test. However, a close look at the mean scores of the post-test and retention-test reveal that the student teachers were unable to maintain or retain their acquired mastery level in map reading skills up to the stage of retention-test. So, it can be concluded that the imparted activity-based training was ineffective for the student teachers in maintaining or retaining their acquired mastery level in map reading skills.

DISCUSSION

The present research was conducted to study the effectiveness of activity-based training in improving map reading skills of elementary level student teachers. The results reveal that the imparted activity-based training on map reading skills using the prepared module was effective in improving student teachers' map reading skills. In other words, there was a significant improvement in the map reading skill scores of student teachers after the implementation of an activity-based training programme.

The result of the present research is in line with the results of many other research studies. Filgona et al. (2016) reported that there was a statistically significant difference in the mean scores of senior secondary school students who taught topographical maps using a hands-on learning strategy. Ugodulunwa and Wakjissa (2015) found that portfolio assessment helped in improving students' performance in map sketching and location, where the experimental group recorded higher mean gain scores than the control group. Further, Gupta and Tulshiram (2014) reported that the developed map reading skills programme was effective to solve the problems faced by the student teachers in map reading. The results of a study by Amosun (2012) suggest that both cooperative learning and integrated group learning strategies were more effective than mastery learning and individualistic learning strategies in facilitating students' achievement in map work.

Tshibalo (2003) reported that the cooperative learning method has improved the achievement in map work of grade 11 and 12 learners. Livni and Bar (2001) investigate the effectiveness of a newly developed unit for teaching map skills to grade 4 students in elementary schools. The results indicate that the developed new unit for teaching map skills was effective in developing map skills of the students by overcoming continuing teaching difficulties. Moreover, Teck (1989) examined the effects of practical experience and sequential skills on achievement in map

reading among secondary students. The findings showed that practical experience and sequential skills in map reading would have a positive effect on the performance of the students. Based on the results of the present and past studies, it can be concluded that any kind of innovative intervention programme is helpful to improve the map reading skills of the students.

CONCLUSION

The results of the present paper indicated that the mean post-test score was higher than the mean pre-test score with a very high mean score difference. This shows that there was a significant gain in the elementary level student teachers' achievement in map reading skills when given activity-based training using the prepared module. But, in the retention-test phase, the student teachers were unable to maintain or retain their knowledge and skills they had attained during the post-test phase. However, a close look at the mean test scores revealed that the map reading skills of the student teachers improved significantly due to the manipulation of activity-based training given with the help of a prepared module. Hence, it is safely concluded that activity-based training proves useful for student teachers in improving their map reading skills.

RECOMMENDATIONS

Based on the results of the present paper, it is recommended that geography teachers in the schools and elementary level teacher education institutions should endeavour to use activity-based teaching-learning methods as an alternative method to improve map reading skills of the students. The study also recommends that the schools and teachers may consider the prepared map reading skills test to evaluate their students' map reading skills. Further, activity-based teaching-learning methodology should be included in the training of pre-service teachers in elementary level teacher education institutions to enhance students' performance in map-related tasks.

The results of this paper are significant to the students, student teachers, Social Science teachers, Social Science teacher educators, Social Science textbook writers, and curriculum planners. The prepared 'Map Reading Skills Test' will help the teachers working in elementary level schools to find out their students' map reading skills. Furthermore, the prepared activity-based training module will be supportive to in-service teachers at elementary school education level in improving their students' map reading skills. It will further develop their knowledge and understandings in Social Science in general and Geography in particular.

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