

Effect on Map Based Learning Activities of the Development of Map Reading Skills among Students at the Secondary Level

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Abstract

Social Science is one of the compulsory school subjects up to secondary level in India. Teachers use several instructional resources to help children construct knowledge. The classroom environment provides students with numerous opportunities to participate in instruction that incorporates a variety of formats and learning tools. Map is an indispensable tool in social science. However, if maps are to be used correctly by the students, it is necessary that they know how to read maps and interpret them, as maps have their own language. Several skills have been identified by people who worked in the area of maps and they have been consolidated by Wilson (1980). Unless these skills are developed in the students they will not be able to make complete use of the maps given in the textbook as well as to go beyond the textbook- the map related problems which they encounter in their daily lives. Therefore, the investigators wanted to find out to what extent the students of class X have acquired the map reading skills and if it is not acquired at satisfactory level, to organise some map based activities to develop those skills among the students.

The objectives of the study were to find the status of acquisition of map-reading skills among the students of Class X; to find the effectiveness of map based activities in developing map-reading skills among the

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students; to compare the effectiveness of map-based activities on boys and girls in developing map-reading skills and to find the effectiveness of map-based activities in developing each of the selected map-reading skills among the students. It was a single group pre-test/post-test experimental design. The sample of the study was 27 students (Boys-15 and Girls-12) of Class X following CBSE syllabus. Tools of the study consisted of pre-test, post-test and learning activities prepared by the investigators. The findings of the study were that there is significant difference between pre-test and post-test mean scores. Therefore, the map-based activities have been effective in developing map-reading skills among the students; there is significant difference between the mean scores of boys and girls on the development of map-reading skills. Boys have scored higher mean than girls and though the map based activities have been effective in developing all the six selected map-reading skills, it has been more effective in improving the skills of symbols, map scale, location and inference when compared with the rest of the skills i.e. direction and colour.

Introduction

Education is one of the Fundamental Rights and it is free and compulsory in India up to the age of 14 years. It is the requirement of the RTE Act (2009), to provide education to all by sending children to schools. Children are facilitated in schools to acquire knowledge and develop skills which are required by them in order to be responsible citizens of the country. They learn several subjects, including Social Science, which every child is required to study as environmental studies at primary level and as Social Science at upper primary and secondary levels.

At secondary level, the major Social Science disciplines include History, Geography, Economics and Political Science. Teachers use several instructional resources to

help children construct knowledge in the classroom. Well-managed classroom environment provides students with numerous opportunities to participate in instruction that incorporates a variety of formats and learning tools. Use of maps is one type of hands-on activity. Map is an indispensable tool in Social Science. In this regard, David (learnernc, 2014) pointed out that a large number of maps is available for teachers because they can easily find visual resources to accompany lessons in Science and social studies. But, at the same time, it also poses a new challenge for educators, because map is now considered more important than ever before, that students develop map-reading skills as it will offer an opportunity to students to enhance

their learning abilities.

Map reading and interpretation requires certain skills, and so it is a part of visual literacy i.e. a set of skills or abilities to effectively interpret the spatial phenomena, and hence form habits of mind necessary to 'read' images and thus contextualise and link the components on the map with the real world. Bednarz et al. (2006) defines visual literacy as not just decoding an image but comprehending it—grasping the image's intended meaning, evaluating it and incorporating it into other knowledge. They further observe that even young children have more ability than many educators in reading and interpreting maps — both, maps for finding the way and symbolic maps. But unless they receive instruction, their development levels off after a certain point. That leaves them susceptible to misconceptions about maps. Lynn (2008), therefore, recommends that teachers aim for diversity in maps and map functions; link maps to the real world and look for opportunities to encourage map-related activities in the classroom.

However, if maps are to be used correctly by the students, it is necessary that they know how to read maps and interpret them, as maps have their own language. Several skills have been identified by people who worked in the area of

maps and they have been consolidated by Wilson (1980). Kochhar (1999) has identified six comprehensive skills which are required for reading maps. They are— orienting the map and noting directions; recognising the scale of the map and computing distances; locating places on the map, reading map symbols; expressing relative location and comparing maps and making inferences. According to her, 'Map Literacy' is essential for understanding the content of the map and everyone needs to understand map language. A study by Kamath (1998) showed that it is possible to develop map skills among the students of class VIII. However, as there was not much research on the acquisition of map-reading skills among the students at secondary level, investigators analysed the geography textbook of Class X (NCERT, 2007) and identified the skills of direction, colours, symbols, map scale, location and inference as necessary skills to understand the maps given in the textbook. Unless these skills are developed in the students they will not be able to make complete use of the maps given in the textbook and will not be able to effectively comprehend the information beyond the textbook—the map-related problems which they encounter in their daily lives. Therefore, the investigators wanted to find out to what extent the

students of Class X have acquired the map-reading skills, and if it is not acquired at satisfactory level then the investigator attempted to organise some map-based activities to develop those skills among the students.

Objectives

- To find the status of acquisition of map-reading skills among the students of Class X.
- To find the effectiveness of map-based activities in developing map-reading skills among the students.
- To compare the effectiveness of map-based activities on boys and girls in developing map-reading skills.
- To find the effectiveness of map-based activities in developing each of the selected map-reading skills among the students.

Design of the Study

It was a single group pre-test post-test experimental design.

Sample

An intact group of 40 students (24 boys and 16 girls) of Class X following NCERT's textbook was selected for the study. Though all the 40 students had taken pre-test, only 27 students (15 boys and 12 girls) attended all the classes of map-reading and had answered the post-test too. Therefore, the total sample of the study has been considered as 27 students.

Tool

Three tools were prepared by the investigators:

- Pre-test:** The pre-test consisted of fill-in-the-blanks and short answer type for a maximum of 70 marks. Students were free to take as much time as they wanted as the purpose of the test was to find out how many map-reading skills are acquired by them. The test had items on direction, colour, symbols, map scale and location for 10 marks each and on inference for 20 marks. All the items were based

Table 1

Design of the Study

Pre-test	Treatment	Post-test
Pre-test on map reading skills for one hour	Treatment for ten classes of 40 minutes duration each. Direction-one class Symbols – one class Colours – two classes Map scale – two classes Location – two classes Inference – two classes	Post-test on map reading skills for one hour

on the maps of Africa. Students had to refer to appropriate maps on Africa in their Atlas and answer the questions. Though they were advised to use Oxford School Atlas-Revised 31st Edition, they were also free to use any atlas that was available to them. While correcting the answer scripts, the investigators referred to the atlas used by the students.

- (ii) **Post-test:** The post-test was a parallel test based on the maps of South America.
- (iii) **Activities:** For each of the map-reading skills, the investigators conducted different activities based on the Atlas (Oxford School Atlas, as possessed by majority of the students) referring to the continents of Asia, Africa, North America, Australia and Europe, as they were not a part of post-test. Every student or teams of two were asked to use one atlas. Students had to listen to the guidance given by the investigators, take the help of appropriate maps and complete the learning activity. Students were also encouraged to frame questions for the exercises. They were written on the blackboard. Students were free to approach the investigators any time for help.

Treatment

Based on the performance of the students in the pre-test, the investigators decided to facilitate the students for 10 classes of 40 minutes each towards learning the six selected map-reading skills. As students performed comparatively well in the skills of direction and symbols, one class each was taken to further learn those skills, whereas for learning the other four skills two classes each was taken. The paragraphs below describe in brief the procedure followed by the investigators to assess the map-reading skills of the students.

Direction: The investigators hung on the wall the Political map of India. Students identified the direction indicator on the map and drew the same on the blackboard too. Later, referring to it, students either named the direction of a given state or named the state in a given direction as per the question asked by the investigator. After oral exercises in the class, students were given a few fill-in-the-blanks to be filled in by discussing in teams, based on the map of Africa. This was considered as practice exercise.

Symbols: The pre-test performance showed that students could read symbols to some extent but they did not know about Conventional symbols, Non-Conventional symbols, Index/Legend/Key. Students

identified conventional and non-conventional symbols on the maps after discussing with them in the class and they also analysed the meaning of Index/Legend/Key which they applied to reading of maps. Later, they were given a work sheet with fill-in-the-blanks and match-the-following, to be worked out with the help of an Atlas. Map of Europe was used for developing the skill of symbols.

Colours: Students were able to identify the colours used in the map but the pre-test indicated that many students were not able to read the colours based on the index given in the map. Therefore one class was used to explain how to read colours referring to the index/legend given in the map. A few oral exercises were also done. Another class was used for practising exercises using all shades of colours given in the legend of the map which indicate height of the land above the mean sea level and the depth of water body below the mean sea level. Content was based on the continent of North America.

Map Scale: The performance of the students in the pre-test showed that students hardly had any knowledge of Map Scale. The investigators taught the students about graphic scale and statement scale. Discussion was also held on how these scales help in measuring the direct distance

between places. Students tried to find the direct distance between two points, length of the river, road, coastal line etc. using the measuring scale, divider and thread and calculated the distance, length on the ground based on the given scale of the map. Map of Africa was used for developing the skill of using the Map Scale.

Location: This is the skill in locating a given place, area etc. in relation to Equator and Prime Meridian in terms of latitudes and longitudes or vice versa. Students practised several exercises on extent of a country, state etc. They also identified the nearest latitude and longitude of a given place and when longitude and latitude is given, students identified the nearest place. Map of Australia was used for this purpose.

Inference: This skill involves generalising inference, explaining inference and predicting inference. This can be developed only after learning basic map-reading skills—directions, symbols, colours, map scale and location. In this exercise, in the beginning, a question will be raised by the teacher and students have to respond to it by referring to the appropriate maps. For example, what type of land form is required for growing tea? To this, students will observe a few tea-growing regions in the world, identify

the landform and finally generalise the response. In the same manner they learnt about predictive inference. Map of Asia was used for this purpose.

Analysis and Interpretation

The collected data of pre-test and post-test was tabulated and mean, SD and t-values were calculated. Tables 2 to 4 give the details—

Table 2
Mean, SD and t-value on development of map-reading skills

<i>Test</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>t - value</i>
<i>Pre-test</i>	27	24.85	6.78	3.01*
<i>Post-test</i>	27	34.81	15.81	

*Significant beyond 0.01 level

Table 2 shows that there is a mean

Table 3
Mean, SD and t-value on development of Map reading skills of girls and boys

<i>Gender</i>	<i>Pre-test</i>				<i>Post-test</i>		
	<i>N</i>	<i>M</i>	<i>SD</i>	<i>t - value</i>	<i>M</i>	<i>SD</i>	<i>t - value</i>
<i>Girls</i>	12	17.25	7.34	1.94*	21.91	7.65	3.30**
<i>Boys</i>	15	30.93	9.47		45.13	13.80	

*Not significant

**Significant beyond 0.01 level

difference of 9.6 between the pre-test and post-test. The obtained t-value is 3.01. For the t-value to be significant for d.f. 52 at 0.01 level table value is 2.68. As the obtained t-value (3.01) is greater than that, it is concluded that there is significant difference between the pre-test and

post-test means beyond 0.01 levels. In other words, map-based activities have been effective in improving the performance of the students significantly when compared with their earlier performance.

The investigators wanted to find out whether gender plays any role in the performance of the students. Hence, an attempt was made by the investigators to see whether there is significant difference between girls and boys in the development of map-reading skills. Table 3 gives the details.

Table 3 shows that in the pre-test boys have secured higher mean than the girls. But the obtained t-value is only 1.94. For d.f. 25, t-value to be significant at 0.05 level the table value is 2.06. As the

obtained value based on pre-test is less than the table value, there is no significant difference between the girls and boys in the acquisition of map reading skills. But a look at the performance of boys and girls in the post-test shows a mean difference of 23.22 (33.17 per cent). This shows

that boys have performed better than girls. For d.f. 25 the obtained t-value to be significant at 0.01 level, the table value is 2.77. As the obtained t-value is 3.30, it is concluded that there is significant difference between the girls and boys in the development of map reading skills.

Table 2 and 3 show that the map-based activities have been effective in the development of six selected map-reading skills together, among the students. An attempt was made to find out to what extent the map-based activities have been effective in developing each of the map reading skills separately among the students. Table 4 shows the pre-test and post-test mean (in percent) and the mean difference for each of the map reading skills.

Table 4 shows that after the treatment, there has been an

on the skill of inference and next on the skill of location. In case of skills of symbols and map scale, the increase of mean score has been 15.15 per cent and 12.40 per cent respectively. With regard to direction the mean difference is only 4.50 per cent and this may be due to inadequate practice exercises. For developing the skill of colours, though two classes were used it seems to be insufficient to get enough practice in developing the skill as there were different shades of different colours. Therefore, the result is only an increase of mean score by 1.30 per cent, the least mean difference when compared with the rest of the skills.

Findings of the study

The following were the findings of the study—

Table 4

Pre-test and Post-test mean difference of the students on each of the map reading skills (in percent)

<i>Map Reading Skill</i>	<i>Pre-test Mean</i>	<i>Post-test Mean</i>	<i>Mean Difference</i>
<i>Direction</i>	62.55	67.05	4.50
<i>Colours</i>	47.80	49.10	1.30
<i>Symbols</i>	53.90	69.05	15.15
<i>Map Scale</i>	9.30	21.70	12.40
<i>Location</i>	41.05	64.40	23.35
<i>Inference</i>	32.65	64.40	31.75

increase of mean score by 23.35 per cent under location and an increase of mean score by 31.75 per cent under inference. The highest influence of the treatment has been

- There is significant difference between pre-test and post-test mean scores. Therefore, the map-based activities have been effective in developing map-

- reading skills among the students.
- There is significant difference between the mean scores of boys and girls on the development of map-reading skills. Boys have scored higher mean than the girls.
 - Though the map-based activities have been effective in developing all the six selected map-reading skills, it has been more effective in improving the skills of symbols, map scale, location and inference when compared with the rest of the skills i.e. direction and colours.

Educational Implications

The study has shown that it is possible to develop map-reading skills among secondary level

students. Map-reading skills are transferable, and teachers play a pivotal role in developing this skill among the students. Meanwhile, it is also necessary to see that the students are given sufficient time to practise the skills. If possible, self-learning materials may be developed on the basis of a standard School Atlas and allow students to learn on their own with minimum guidance by the teacher. While in the process of developing the map-reading skills or after the development of the skills, they have to be rightly used by the teachers while discussing the map-based content in the class or outside. This will help students to strengthen the acquired map-reading skills.

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