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Construction and standardization of geographic literacy test for secondary school students

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Abstract

Geographic Literacy is an important part of social science education; there are still few standardized instruments available to evaluate geographic literacy at the secondary school level. The present study aims to create and standardize a Geographic Literacy Test for secondary school pupils. A test framework and established aspects of geographic literacy were used to create an initial pool of multiple-choice questions. A limited sample was used in a pilot research to assess time needs, instruction clarity, and viability. The improved test was subsequently administered to a try-out sample of 100 secondary school students. Item analysis was conducted using difficulty index, discrimination index, and distractor analysis. Based on the results, modest improvements were made to improve item functioning. Cronbach's Alpha was used to determine the test's reliability and the reliability value of 0.73 indicated satisfactory internal consistency. Expert judgment was used to guarantee the test's face validity and content. The completed Geographic Literacy Test has excellent psychometric qualities and can be used to test secondary school students' geographic literacy for research and educational assessment purposes.

Keywords: Geographic literacy; Test construction; standardization; Item Analysis; Difficulty Index; Discrimination Index; Cronbach's Alpha; Secondary school students.

1. Introduction

The modern era's fast paced globalization technological advancement, development; environment alterations socio-politico changes have made it more prominent for people to comprehend their surroundings. People with strong geographic knowledge, skills, and reasoning abilities are needed to address modern global issues like resource management, environmental degradation, and sustainable development. Understanding spatial relationships, human-environment interactions, and the interdependence of local, national, and international locations, cultures, and economies are all made possible by geographic literacy. Global knowledge is essential for informed engagement in society, as **Keeling (2003)** highlights. Thus, promoting geographic literacy in kids is crucial for their development of sustainable viewpoints, spatial thinking, and informed decision-making. Thus, promoting geographic literacy in students from earlier phases is crucial for their development of sustainable thinking, spatial thinking, and informed decision-making. Even though geographic literacy is acknowledged to be important, there are still few systematic and regulated methods for evaluating it in secondary schools, especially in India. This underlines how important it is to create and validate a trustworthy Geographic Literacy Test.

1.1. Concept and meaning of geographic literacy

Geographic literacy has been debated much earlier in the conversation around geographic education, even though the word became better known when the United Nations designated 1990 to be International Literacy Year. The Roper Global Geographic Literacy Survey (2002) and the National Geographic Society's campaign against geographic illiteracy

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in the late 1980s brought it to attention. The term Geographic literacy was used far before from 1990s and has been used in National Geographic Society's "Fight against Geographic Illiteracy" campaign of 1987 that helped enhance people's understanding of geography and motivate them to learn about, take care for and safeguard their local communities and our shared planet. The term gained its importance even more with the help of Roper Global Geographic Literacy Survey (2002) which was conducted by National Geographic Society in nine countries The United States, Canada, Mexico, France, Germany, Italy, Sweden, Great Britain, and Japan. However National Geographic Society does not clearly mention the definition of term Geographic literacy in 2002 but they portrayed it as ability to express knowledge of basic geography subject matter that is ability to i) demonstrate map reading skills , ii) knowledge of place and locations, iii) understanding of human systems, society and physical environment.

1.2. Definitions of Geographic Literacy

Bennett (1997) defined geographic literacy as “the ability to take the basic skills of geography and use them to develop an understanding of the world in which we live.” **Winship (2004)** described it as “the ability to express knowledge of basic geographic subject matter, specifically map-reading skills, place and location knowledge, and understanding of human and physical systems.” The most widely accepted definition was given by **Edelson (2014)**, “the ability to use geographic understanding and design thinking to make long-term decisions. In this study investigator incorporated all the aspects of different definitions of Geographic literacy and will consider the following criteria of geographic literacy as:

i) The ability to express knowledge of basic geographic subject matter, ii) Place and Location Knowledge , iii) Understanding of human systems, society and physical environment (iv) The ability to make informed and sustainable decisions about natural and physical earths system.

1.3. Foundations of geographic literacy

Geographic Knowledge: This dimension includes factual and conceptual understanding of earth’s features, location patterns and processes. **Geographic Skills:** Geography skills enhance geographical literacy, which includes the ability to interpret maps, understand spatial relationships, and communicate geographical information effectively. . Geography skills allow individuals to draw knowledge from various disciplines and apply it in geographical contexts. . (**Mandal, 2012**) **Geographic Thinking:** Geographic thinking skills are closely related to the students' ability to adapt to life, their environment and their observations and, as far as possible, to learn and use ways to achieve results by establishing cause-effect relationships between events.(**Balciogullari, 2017**)

1.4. Components of geographic literacy

Edelson (2014) gave three components of geographic literacy:

Interactions: Understanding of human and environment interactions. A person who is geo-literate is aware that resources are moved and transformed by interacting systems **Interconnection:** To improve understanding of how the world is connected. A person who is geo-literate knows that these systems link people and locations. This implies that events that take place in one area have an impact on other persons and locations. **Implications:** Evaluating the consequences of decisions that affect geography. A person who is geo-literate can make well-informed decisions by applying their knowledge of interactions and relationships.

1.5. Need of geographic literacy

In this modern and complex world a lot of issues like environmental concerns, social issues military and technological advancements are at its peak. A lot of human issues like pollution, demographic changes and migration are at their peak and right now it is the best time to counter them thus, to deal with these issues well Geographic Literate individuals are must. The need of geographic literacy is discussed below in following points:

i.) Geographic Literacy helps individuals to make well informed decisions. ii.) Helps individuals to understand world’s places, people, environments, and the connections among them. (iii). Equip individuals with skills to critically analyze geographic information, debate issues meaningfully, and participate in solving problems like climate change, migration, and resource management.(iv) Helps individuals understand world events, cultural diversity, and sustainable practices.(v) Geographic literacy is essential for competing in a global economy and addressing challenges at local, national, and international scales. (vi) It helps individuals view, understand, and interact with the world beyond simply knowing states, capitals, or directions. (vii) Helps in having a critical understanding of the connections between human activities and the condition of the world. (viii) In education, it helps in developing students' abilities to analyze current

events, understand cultural differences, and engage thoughtfully in debates about economic development and environmental challenges.

1.6. Need for measuring geographic literacy among secondary school students:

- **Foundation stage of Cognitive Development:** Students do acquire higher-order thinking abilities like spatial reasoning, analysis, and interpretation during their vital secondary school years. Measuring geographic literacy would aid in determining how well pupils are learning these critical cognitive skills.
- **Alignment with curriculum objectives:** Secondary school geography education programs are designed to foster environmental awareness, map abilities, and spatial awareness. Assessing geographic literacy assist in evaluating how well curriculum goals are being met in real-world classroom settings.
- **Understanding of human and physical environment:** Students who possess good geographic literacy are better equipped to understand human settlements, climatic processes, physical characteristics, and human-environment relationships. By determining this literacy, it is possible to see whether students have the knowledge needed to understand societal and environmental challenges.
- **Identification of learning gaps:** By identifying various areas of weakness, such as place-location knowledge, map reading abilities, or spatial understanding, systematic assessment of geographic literacy provides educators and researchers to implement focused educational instructions.
- **Research purposes:** Reliable measurement of geographic literacy provides empirical evidence for educational research, enabling studies related to achievement, attitude, gender differences, school type differences, and instructional effectiveness.
- **Need of standardized assessment tool:** Despite the importance of geographic literacy, there aren't many standardized, context-specific instruments available to assess it in secondary school students. Assessment validity and reliability are ensured when geographic literacy is measured using a correctly developed instrument.

1.7. Novelty of the Study

Table 1 Novelty of Study

Existing Study/Tool	Major focus	Identified research gap	Novelty of the present study
Ropers Global Geographic Literacy Survey(2002&2006)	Assessed Geographic literacy among adults(18-24years)using place location knowledge and geo political knowledge	Not suitable for secondary school students, adult oriented	Development of secondary school students level test empirically standardized on class 9 th students
International Geography Olympiad	International level competitive test that involves written, multimedia and field work components	Too advanced, and time consuming, not feasible for classroom level assessment	Constructed classroom feasible pen paper assessment tool
Mekonon(2020)	Self constructed assessment tool for undergraduate students	Lack of standardization and not based on school level assessment	Development of standardized assessment tool for secondary school students that is supported by item analysis and reliability estimation
Binimelis Sebastián et al. (2024)	Online assessment tool for secondary school students in Spain	Region specific and digitally dependent, non standardized	Context specific aligned with Indian secondary school geography curriculum
Ramadhani et al. (2024)	Based solely on Edelson's(2014) components of Geographic Literacy	Narrow conceptual frame work with limited geographical dimensions	Six dimension based comprehensive framework covering physical, human, spatial, environmental aspects

Soleh et al. (2022)	Focused on factor analysis of geographic literacy in relation to demographic variables	Limited emphasis on systematic tool construction and item analysis used only for descriptive analysis	Present study emphasis rigorous process of tool construction with item analysis, expert validation and reliability estimation
Self constructed tools(1997-2025)	Focused largely on place location knowledge and Ropers Survey	Limited assessment of various geographical dimensions	Integration of blooms taxonomy based cognitive levels assessing conceptual understanding and geographic reasoning

Objectives of the study

- To construct a Geographic Literacy Test for secondary school students
- To ensure representative coverage of key components of Geographic Literacy i.e. map skills, physical geography, human-environment relations, decision making etc. through the test items.
- To standardize the Geographic Literacy Test through Pilot Test and Item Analysis
- To establish reliability of the test using appropriate statistical technique
- To establish validity of the test through expert judgement.

1.8. Delimitation of the study

The present test was prepared with certain delimitations which define the scope of the tool:

a) The tool is delimited to secondary school students only as learners have already been exposed to fundamental geographic concepts in Classes VI–VIII and are competent to exhibit integrated geographic understanding at this critical transitional time. (b) The test intends to measure geographic literacy with reference to following dimensions/ themes (a) earth with spatial explanation, (b) places and regions, (c) physical systems, (d) Human systems, (e) environment and society, and (f) use of geography as stated by National Geographic Society. (c) The test is designed to measure cognitive aspects of the geographic literacy and does not include field work. To ensure feasibility, consistent administration, and objective scoring, affective dimensions and practical fieldwork components were purposefully left out. (d) The content of test was restricted to selected topics of geography curricula from classes 6-8th and includes some general geographic awareness items. (e) The Geographic Literacy test only includes Multiple Choice items only (f) Cronbach's Alpha was used in the study to establish the tool's internal consistency reliability; however, test-retest and inter-rater reliability were not investigated.

2. Methodology

2.1. Research Design

The present study employed a **descriptive survey method** because the current study focused on creating and standardizing a Geographic Literacy Test and methodically analyzing student responses for item selection and improvement.

2.2. Population

The population of the present study comprised of class 9th secondary school students with the prescribed curriculum.

2.3. Sample

The construction of the following tool involved a two stage pilot process. In order to evaluate the preliminary test items' feasibility, clarity, and comprehensibility, a small-scale pilot research with 23 Class IX students was carried out in the first stage. At this point, it was only used to improve the test items' instructions and language neither item analysis nor reliability estimation was performed. **Convenience sampling** was used in selecting 100 Class IX students for the main try-out in the second stage, which was based on the students' and schools' desire to participate and accessibility. The final standardized version of the Geographic Literacy Test was created using the responses from this data set for item analysis and reliability estimation.

2.4. Characteristics of the tool

The Geographic Literacy Test constructed for the present study has the following characteristics:

- **Nature of tool:** This tool is a standardized achievement test, designed for measuring geographic literacy among class 9th secondary school students; this tool is focused on both conceptual understanding and application levels.
- **Target Group:** The test is intended for secondary school students.
- **Type of items:** Tool consists of multiple-choice based questions, each item has four alternatives out of which only one is correct. MCQ format was selected to ensure objectivity in scoring and ease of administration.
- **Content Coverage:** The tool covers major dimensions of Geographic Literacy such as:- Place location knowledge, Physical geography, Human geography, Human-environment interaction and Map and spatial skills under the six major themes Given by "**National Geographic Society**" in 1994 as: (a) earth with spatial explanation, (b) places and regions, (c) physical systems, (d) Human systems, (e) environment and society and (f) use of geography.
- **Cognitive Levels:** The items are distributed across different cognitive levels of the Bloom's Taxonomy such as Remembering, Understanding, Applying, Analyzing and evaluation to ensure both lower and higher order thinking skills.
- **Language and difficulty level:** The language of the test is kept simple and age appropriate, with items ranging from easy to moderate levels of difficulty.
- **Scoring Procedure:** Each correct response carries one mark and no negative marking is applied for incorrect responses.
- **Time limit:** The test can be completed within 30 minutes.
- **Objectivity:** Scoring is completely objective based on pre determined answer key. There is no scope of examiner's bias in evaluation.
- **Reliability and Validity:** The tool possesses acceptable reliability and content validity that is established through testing, item analysis and expert judgement.

2.5. Construction of the tool

The construction of the Geographic Literacy Test was carried out in planned and systematic manner to ensure that reliably and validly measures the geographic literacy of class 9th secondary school students. The construction involved the following steps:

- **Identification of test dimensions:** Major dimensions of geographic literacy were identified after an extensive review of related literature along with various previous standardized and non standardized tests some of the tools that were referred were, **Roper's survey of 2002 and 2006, The International Geographic Olympiad(2008)**. After review it was identified that
 - Earth with spatial explanation,
 - Places and regions,
 - Physical systems,
 - Human systems,
 - Environment and society, and
 - Use of geography are one of the major dimensions of geographic literacy as stated by **national geographic society (1994)**. The other dimensions include place location knowledge (plk), physical and human geography, spatial understanding, sustainable decision making and general geographic knowledge etc.
- **Content Selection:** The test's content was mostly taken from the geography curriculum for Classes VI-VIII to gauge students' overall geographic comprehension. A few interdisciplinary items related to economics and history was included wherever relevant to geographic literacy. Many items were included considering general geographic awareness that should be in secondary class 9th students.
- **Initial pool development:** An initial pool of items was developed covering items related to place location knowledge, human and physical geography, spatial understanding and covering the major 6 themes (a) earth with spatial explanation, (b) places and regions, (c) physical systems, (d) Human systems, (e) environment and society, and (f) use of geography, along with general geographic awareness items. Initially a pool of 32 items was developed which was later consulted with subject experts and research supervisor and 30 items were selected and refined to improve relevance and balance across multiple dimensions of geographic literacy.
- **Preparation of blue print:** A blue print was prepared and refined to organize the items systematically across content areas and cognitive levels. Later the blue print used to review, distribute and finalization of items. This blue print is showed in the Table 2

Table 2 Blue Print of the Questionnaire

S.no	Themes	Remembering	Understanding	Applying	Analyzing	Evaluation	Total
1	Earth with spatial explanation	1,2,3&5	4	-	-	-	5
2	Places and regions	Q.no. 10	Q.no.- 6,7,8&9	-	-	-	5
3	Physical systems	Q.no.- 11,12,13	Q.no.- 15	Q.no- 14	-	-	5
4	Human systems	Q.no- 19,	Q.no-17,18&20	Q.no-16	-	-	5
5	Environment and society	-	-	Q.no- 22&23	Q.no 25&21	Q.no-24	5
6	Use of geography	Q.no-30,	Q.no-26,29	-	-	q.no- 28&27	5
7	Total no. Of questions	10	11	4	2	3	30

- **Expert review and content validation:** The items and blue print were reviewed by subject experts and research supervisor and necessary modifications were made.
- **Pre- pilot study/ small scale pilot:** The preliminary form of the test was administered to 23 students of class 9th who were feasible to researcher from the nearest school to examine the practical feasibility of the test/tool. This stage was used only to refine the items of test, language, removing ambiguous words and due to this many questions were re framed, a few items (four items) were replaced to improve clarity language and suitability for class 9th students.
- **Main try-out:** The revised form of the test was administered on class 9th secondary school students which were selected through convenience sampling. A sample of 100 students was used to administer the test. The administration of the test was carried out under standardized conditions and permissions from head of institutions were taken prior to administration of test. Researcher .The responses obtained from this formed the basis of item analysis and reliability estimation of the test.
- **Item Analysis:** On the basis of data obtained by pilot testing. Item analysis was conducted in order to appraise effectiveness of different items.

Step 1: For item analysis researcher arranged the scores obtained in decreasing order to create two groups namely upper group (Ru) and lower group (RL). Marks obtained by top 27% of students were included in upper group and marks obtained by lowest 27% of students were included in lower group respectively.

Step 2: Calculation of difficulty value/ difficulty index: The difficulty value of each item was calculated to evaluate what proportion of students answered the item correctly. For this the responses of upper group (Ru) and lower group (RL) were considered. It was calculated by the following formula:

$DV = \frac{RU + RL}{N}$, Where DV = Difficulty index of item, RU= No. of students in upper group who answered items correctly, RL= No. of students in lower group who answered items correctly, N= No. of students in upper and lower group

Interpretation: On calculating difficulty indices for 30 items only 2 items fall under poor category(Above 0.80) i.e.6.67%, 16 items fall under good category(0.20 to 0.50) and 12 items fall in range of 0.50 to 0.80 that is best category covering 40% of items respectively. The poor items namely item no 1 &2 were slightly changed (i.e. options and wording of items were changed) under expert guidance. The exact distribution of the items is shown in Table 3, 4, 5 and 10.

Table 3 Interpretation of Difficulty Value

Difficulty Index	Quality of items
Below 0.20	Very Difficult
0.20 to 0.50	Good
0.50 to 0.80	Best
Above 0.80	Poor item/ very easy

Table 4 Distribution of items based on Difficulty Index

Difficulty Index	Quality of Item	Total Items	Percentage
Below 0.20	Very Difficult	-	-
0.20 to 0.50	Good	16	53.33
0.50 to 0.80	Best	12	40
Above 0.80	Poor item/ very easy	2	6.67

Table 5 Difficulty Values of Items of Geographic Literacy Test

S.NO	DV	Frequency	Item No.
1	Below 0.20	-	-
2	0.20 to 0.50	16	3,5,10,11,13,17,18,19,21,22,23,24,25,26,29
3	0.50 to 0.80	12	4,6,7,8,9,12,14,16,20,27,28,30
4	Above 0.80	2	1&2

Step 3: Discriminatory power of items: The discriminatory index tends to measure or provide us information about to what extent items are capable to discriminate between high and low achievers. It ranges between 0 to 1 A good item is capable of discriminating between those who score high (top 27% cases) and who score low on the test (bottom 27% cases). On the basis of discriminating power, items are classified into:

Positive discrimination: when percentage of correct answers is higher in upper group than in lower group.

Negative discrimination: when percentage of correct answers is in high proportion in lower group (bottom 27% cases) than higher group (top 27% cases). The investigator has used following steps for calculation of discriminatory index. Scores were organized in descending order with top 27% were formed in upper group and bottom 27% were formed as lower group, following formula was used to calculate discriminatory power:

$DP = \frac{RU - RL}{N/2}$ Where, DP = Discriminatory Power, RU= No. of students in upper group who answered items correctly, RL= No. of students in lower group who answered items correctly and $N/2$ = Half of No. of students in upper and lower group

Interpretation: After conducting discriminatory analysis of the items 3 items namely (1,5&15) were performing poorly which were revised and minor changes were made to them under the experts guidance. One item (item no.11) performed worst and had a negative value was retained due to its conceptual importance in representing the core dimension of Physical Systems therefore it was also revised under experts guidance. See Table 6, 7, 8 and 10 for detailed analytics.

Table 6 Discriminatory Index on the basis of Ebel’s guidelines (1979)

Discrimination Index	Quality of item	Total items	Percentage
Above 0.40	Excellent	14	46.67
0.30 to 0.390	Good	6	20.00
0.20 to 0.29	Mediocre	6	20.00
Below 0.20	Poor	3	10.00
Negative Value	Worst	1	3.33

Table 7 Discriminatory Index on the basis of Ebel's guidelines (1979)

Discrimination Index	Quality of item	Frequency	Item No
Above 0.40	Excellent	14	3,4,6,7,9,10,12,16,22,23,26,27,28,29
0.30 to 0.390	Good	6	19,19,20,21,25,30
0.20 to 0.29	Mediocre	6	2,8,13,14,17,24
Below 0.20	Poor	3	1,5,15
Negative Value	Worst	1	11

Table 8 Distribution of discriminatory power of items of the geographic literacy test

Discrimination Index	Quality of item	Frequency	Item No
Above 0.40	Excellent	14	3,4,6,7,9,10,12,16,22,23,26,27,28,29
0.30 to 0.390	Good	6	19,19,20,21,25,30
0.20 to 0.29	Mediocre	6	2,8,13,14,17,24
Below 0.20	Poor	3	1,5,15
Negative Value	Worst	1	11

Step 4: Distractor Analysis: Distractor analysis was conducted by the investigator to determine the quality of the options and effectiveness of the incorrect options. "Distractor discrimination indices (DDI) were calculated for each incorrect option using the following formula:

$DDI = \frac{RL - RU}{N/2}$, Where RU= No. of students in upper group who answered items correctly, RL= No. of students in lower group who answered items correctly and $N/2$ = Half of No. of students in upper and lower group

The summary of the distractor analysis of each item and options is given below in the table, showing each distracters ability to be functional or non functional. A distractor was considered functional if it was selected by 5% or more of the total respondents. Table 1.6 shows distractor effectiveness of items and options of the tool.

Interpretation: Distractor analysis was conducted and after interpreting the items 49 distractors came out to be functioning and 41 came out to be non- functioning, based on the data obtained items were retained with suitable remodification and replacement of distracters with suitable options .After conducting the distractor analysis for every items, Items with 2 distractors functionally properly were retained (i.e. options were not revised) and in items where only one or no distractor was functioning were revised too under experts guidance. There were many items in which no changes were made because of its relevance to the content and dimensions of the test. Details Analysis is shown in Table 9.

Table 9 Distractor Analysis

Item No	Correct Option	Distractor 1/option name	Distractor 2/option name/no	Distractor 3/option name/no	Functional/Non Functional
1	B	a= 0.12	C=0.037	D= 0	A, Functional & Non functioning- c&d
2	A	B=0.37	C = 0.074	D= 0.12	D= functioning only
3	C	A=0.18	B=0	D=0.29	D functioning, A&B non functioning

4	C	A=0.23	B=0.074	D=0.14	A&D functioning
5	A	B=0.073	C=0.074	D=-0.14	No functioning distractor
6	C	A=0.14	B=0.23	D=0.14	All Functioning
7	A	B=0.25	C=0	D=-0.12	Only b, functioning
8	C	B=0.25	A= 0.074	D=-0.12	Only b functioning
9	A	B=0	C=0.074	D=0.25	Onlt d functioning
10	A	B=0.23	C=0.23	D=0.074	A&b functioning
11	A	B=-0.074	C=0.29	D=0.25	Only d functioning
12	A	B=0.23	C=0.074	D=0.12	B&d functioning
13	C	A=0.12	B=0.037	D=0.14	A&d functioning
14	B	A=0	C=0.25	D=0.037	C functioning
15	A	B =0.18	C=0.23	D=-0.23	B&c functioning
17	C	A=0	B=0.14	D=0.14	B&d functioning
18	D	A=-0.037	C=0.037	D=-0.29	No functioning distractor
19	C	A=0.18	C=-0.074	D=0.14	A&d functioning
20	B	A=0.18	C=0.074	D=0.12	A&d functioning
21	C	A=0.037	B=0.18	D=0.12	A&d functioning
22	C	A=0.29	B=0.23	D=0.074	A&b functioning
23	B	A=0.18	C=0.37	D=-0.12	A&c functioning
24	B	A=0.037	C=0	D=0.18	D functioning
25	D	B= -0.23	A=0.037	C=0	All non functioning
26	C	A=0.12	B=0.48	D=0.074	A&b functioning
30	B	A=0.14	C=0.12	D=0.074	A&c functioning

2.6. Reliability of the tool

Internal consistency reliability of the Geographic Literacy Tool was established during the pilot study stage through using “**Cronbach’s Alpha**” to determine the test’s internal consistency. The reliability coefficient obtained was **0.73** indicating **acceptable internal consistency**. Based on data and results obtained through item analysis minor modifications were made to improve clarity, functioning, sequencing of selected items.

2.7. Validity of the tool

The establish content validity of the test was established by presenting blue print and test items to the subject experts and research supervisor who examined the items in respect of relevance, content coverage, language difficulty and suitability for the target group , based on their suggestions minor modifications were made to test items. Similarly Face Validity of the test was ensured by examining whether the items appeared to be appropriate, clear, concise and easily comprehended by the secondary school students. The format, instructions and language level of the test were found adequate.

2.8. Refinement and finalization of the test

After conducting and obtaining data from difficulty values, discriminatory index and distractor analysis, minor modifications were made to the items of the test although no test item was deleted, summary of which is given in the table 10. After conducting item analysis using difficulty index, discriminatory index, distractor analysis, and establishing reliability the final form of the test was prepared. Items that were within the acceptable ranges of difficulty, discrimination and effective distracters were retained while poor and some mediocre items with non functioning distracters were revised, reworded and minimally restructured without hindering the meaning of the questions. Many

of the items were not changed neither their options were changed as they were conceptually aligned with prescribed curriculum content and were adequately representing six dimensions testing geographic literacy. Expert validation confirmed relevance, clarity and appropriateness of items to be conceptually sound therefore no major revisions were made to the items.

The final form of the tool consists of 30 questions (Multiple choice questions) each with four alternatives and one correct response, the test covered different dimensions of geographic literacy such as (a) earth with spatial explanation, (b) places and regions, (c) physical systems, (d) Human systems, (e) environment and society, and (f) use of geography that ensured balanced content representation and appropriate difficulty for secondary school students.

2.9. Final form of the geographic literacy test

Therefore after a systematic process of establishing reliability, validity, item analysis a final form of the test was created, based on the data and recommendations by subject and research supervisor minor modifications were made to the test. The final form of test consisted of 30 multiple choice questions, each having four options. The items represented various dimensions of geographic literacy as specified in the blue print. The finalized test requires approximately 30 minutes for completion. Scoring: Scoring of test would be done in following manner: Each correct response is awarded as one mark, while there is no negative marking, but unattempted questions would not be rewarded. The final form of the test possesses adequate reliability and validity established through a representative sample.

The finalized tool and answer key is shown in Table 10.

Table 10 Difficulty and Discriminatory indexes, Distractor and Finalization of item

Item No	Difficulty value	Discriminatory Power	Distractor Status	Action Taken	Final Verdict
1	0.89	0.14	1 functioning	Options revised	Retained
2	0.89	0.23	1 functioning	Options Revised	Retained
3	0.39	0.48	1 functioning	Options revised	Retained
4	0.5	0.56	2 functioning	Option revised	Retained
5	0.29	0.074	All non functioning	No option revised	Retained
6	0.51	0.51	All functioning	Accepted	Retained
7	0.73	0.40	1 functioning	No option revised	Retained
8	0.51	0.23	1 functioning	No option revised	Retained
9	0.56	0.74	1 functioning	Options revised	Retained
10	0.35	0.40	2 functioning	No option revised	Retained
11	0.45	- 0.056(Negative/worse)	1 functioning	No option revised	Retained
12	0.62	0.40	2 functioning	Options revised	Retained
13	0.34	0.23	2 functioning	No option revised	Retained
14	0.51	0.29	1 functioning	No option revised	Retained
15	0.42	0.18	2 functioning	No option revised	Retained
16	0.64	0.56	All functioning	No change	Retained
17	0.25	0.29	2 functioning	No option revised	Retained
18	0.42	0.34	No functioning distractor	No option revised	Retained
19	0.35	0.34	2 functioning	No option revised	Retained

20	0.56	0.37	2 functioning	Rewording of question	Retained
21	0.46	0.34	2 functioning	No option revised	Retained
22	0.48	0.59	2 functioning	No option revised	Retained
23	0.45	0.45	2 functioning	No option revised	Retained
24	0.48	0.23	1 functioning	Accepted as it is	Retained
25	0.39	0.34	All non functioning	All options revised	Retained
26	0.48	0.67	2 functioning	No option revised	Retained
27	0.63	0.51	All functioning	No options revised	Retained
28	0.51	0.51	All functioning	No change	Retained
29	0.48	0.67	All functioning	No change	Retained
30	0.75	0.34	2 functioning	No option revised	Retained

3. Conclusion

The development and standardization of a Geographic Literacy Test for secondary school pupils was the main goal of the current study. Test blueprint preparation, item writing, feasibility pilot testing, item analysis, and reliability estimation were all part of a methodological process. Item analysis employing difficulty index, discrimination index, and distractor analysis, together with reliability estimation by Cronbach's Alpha, contributed to the refining of the test items. The final test form was thus standardized on the selected sample.

The Finalized Geographic Literacy Test is a good tool for determining geographic literacy in educational research contexts since it shows respectable dependability and sufficient content representation. With room for additional validation on bigger and more varied samples, the tool may be utilized successfully for research and diagnostic purposes.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors declare no conflict of interest.

Statement of ethical approval

Ethical approval for the study was obtained from the concerned school authorities and the research was conducted in accordance with established ethical guidelines.

References

- [1] Keeling DJ. Global ignorance – geographic illiteracy. Echo. 2003 [cited 2026 Mar 24]. Available from: <https://people.wku.edu/david.keeling/echo.pdf>
- [2] Bennett WM. Development of geographic literacy in students with learning disabilities. Washington (DC): U.S. Department of Education; 1997. Report No.: ED418034. Available from: <https://eric.ed.gov/?id=ED418034>

- [3] Winship JM. Geographic literacy and world knowledge among undergraduate college students [thesis]. Virginia: Virginia Polytechnic Institute and State University; 2004. Available from: <https://vtechworks.lib.vt.edu/server/api/core/bitstreams/8a2f6c3a-c9cf-491f-924c-4cf9a2c6eff9/content>
- [4] Edelson D. Geo-literacy: preparation for far-reaching decisions. Washington (DC): National Geographic Education; 2014 [cited 2026 Mar 24]. Available from: <https://education.nationalgeographic.org/resource/geo-literacy-preparation-far-reaching-decisions/>
- [5] Mandal S. Learners of geography today: skills and competences for today and tomorrow. Indian J Spatial Sci. 2012;3(1).Article2.Available.from:https://www.researchgate.net/publication/303540262_Learners_of_Geography_Today_Skills_and_Competerences_for_Today_and_Tomorrow
- [6] Balciogullari A. Geographical thinking approach in geography education. In: Research highlights in education and science. Çukurova: ISRES; 2017. p. 26–27. Available from: https://www.isres.org/books/chapters/Research_Highlights_in_Education_and_Science_2017_4_18-12-2017.pdf
- [7] RoperASW. National Geographic—Roper 2002 global geographic literacy survey. Washington (DC): National Geographic Education Foundation; 2002. Available from: <https://www.roperasw.com>
- [8] International Geography Olympiad. Framework of evaluation [Internet]. 2008 [cited 2026 Mar 24]. Available from: <https://geolympiad.org/document-library>
- [9] Mekonnen FH. What is the level of geographic literacy among undergraduate students of Bahir Dar University? East Afr Soc Sci Res Rev. 2020;36(1):97–114. Available from: <https://www.ajol.info/index.php/eassrr/article/view/193175>
- [10] Binimelis Sebastián J, Gómez Gonçalves A, Gómez Trigueros IM, Muntaner Guasp JJ. Geographic literacy in third-year compulsory secondary education students. J Balt Sci Educ. 2024;23:1119–1120. <https://doi.org/10.33225/jbse/24.23.1119>
- [11] Ramadhani A, Ruhimat M, Sugito NT. Students' geographic literacy abilities. Edunesia J Ilm Pendidik.2024;5(2):669–686.
- [12] Available from: <https://www.semanticscholar.org/paper/Students%27-Geographic-Literacy-Abilities-Ramadhani-Ruhimat/968d8243dbb05b2bc33aef68a1922d90c6b7fc33>
- [13] Soleh TA, Ruhimat M, Yani A. Factor analysis: geographic literacy level of high school students in North Bandung area. Int J Res Rev. 2022;9(12):519–528. doi: <https://doi.org/10.52403/ijrr.20221257>

Appendix

FINAL FORM OF GEOGRAPHIC LITERACY TEST

This questionnaire is designed to measure geographical literacy among secondary school students.

GENERAL INFORMATION

NAME: - AGE:-

CLASS: - SCHOOL:-

GENDER: - MALE/FEMALE AREA: - RURAL/URBAN

GENERAL INSTRUCTIONS

- ✓ *This questionnaire consists of 30 questions.*
- ✓ *Put a (✓) next to any one option given below.*
- ✓ *All your responses will be kept confidential and used for research purposes only.*
- ✓ *Please try to answer all the questions.*

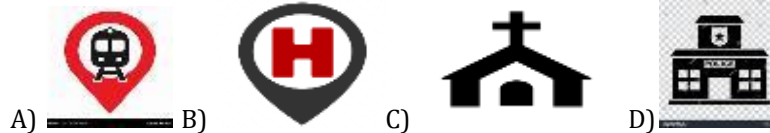
✓ *There is no time limit to complete the test, but it should generally take 20–25 minutes.*

DIMENSION - A: EARTH WITH SPATIAL EXPLANATION

Q1. Which of the following tools can be used to find exact locations on Earth?

- A) Compass (B) GPS (C) Seismograph D) Altimeter

Q2. Which of the following symbol can be used to represent a Church?



Q3. Which map is used for studying landforms?

- A) Political B) Climate C) Topographic D) Road Map

Q4. What do the concept of latitude and longitude helps us in?

- A) To count the number of people in a city B) Determining time zones C) Locating places exactly / accurately
D) Predicting natural disasters

Q5. A row of houses built along a river, road or canal in a straight line is an example of:

- A) Temporary settlement B) Cluster settlement C) Dispersed settlement D) Linear settlement

DIMENSION - B: PLACES AND REGIONS

Q6. Which of the following is a human factor that affects the arrangement of settlements?

- A) Climate change B) River formation C) Road network & railways D) Seasonal wind direction

Q7. Which of these could be the basis for creating a cultural region?

- A) Common religion and festivals B) The length of a river C) The height of a mountain D) Having the same average annual rainfall

Q8. Two cities are on opposite sides of a river but trade with each other. They are part of the same region because of:

- A) Physical connections B) Political differences C) Economic connections D) Cultural diversity

Q9. What does it infer when people call a place "Holy Lake":

- A) Cultural and religious meaning is linked to physical features B) Physical features have no names C) The name was given for administrative reasons only D) Governments name places

Q10. Desert is characterized by:

- A) Scanty vegetation B) Heavy precipitation C) Low evaporation D) Abundance grasslands

DIMENSION -C: PHYSICAL SYSTEMS

Q11. The breaking down of rocks into smaller particles because of wind, water, etc. is known as:

A) Weathering B) Erosion C) Sedimentation D) Deposition

Q12. The largest hot desert ecosystem in the world is:

A) Sahara B) Gobi C) Antarctic Desert D) Kalahari

Q13. Mahogany and rosewood trees are found in

A) Mangrove forests B) Tropical deciduous forests C) Tropical evergreen forests D) Montane forests

Q14. In a mountainous region, deforestation is leading to frequent flooding downstream, what do you suggest to address this issue

A) Encouraging urban development in mountain regions (B) Plant more trees and use forests in a careful, sustainable way (C) Building more factories (D) Diverting rivers through concrete channels

Q15. A riverbank changes shape after monsoon floods due to:

A) River erosion and deposition (B) Tectonic movements (C) Ocean currents (D) Land subsidence

DIMENSION -D: HUMAN SYSTEMS

Q16. A river passes between two countries, causing continuous conflict, what geographic and political decision should both countries adopt?

A) Encourage people to re locate (B) Investment in water storage system & water agreement between both countries (C) Military campaigns (D) Building dams only

Q17. Which of the following is an example of cultural exchange?

A) Migration from one place to another (B) Birth rate changes in country (C) Spread of food habits around the world (spread of pizza from Italy around globe) (D) Trade between two countries

Q18. Which of the following can cause changes in habitation patterns over time?

A) Natural disaster (B) Demographic pattern (C) Industrial growth (D) All of the above

Q19. Which one of the following industries is known as a sunrise industry?

(A) Iron and steel industry (B) Cotton textile (C) Information technology (D) Jute industry

Q20. Why do you think that powerful Nations' have tendencies to interfere in others Nations' matters?

A) To host events (B) To control land, influence politics, create turmoil (C) For constructing infrastructure (D) Encourage sports

DIMENSION -E: ENVIRONMENT AND SOCIETY

Q21. Cities A and B are built by the side of river. City A redirects the river and builds concrete walls to prevent flooding. City B builds houses on stilts, leaving the river unchanged, which city modifies the environment, and which adapts?

A) City A shows adaptation; City B shows modification (B) Both City A and City B show modification (C) City A shows modification; City B shows adaptation (D) Both cities show adaptation only

Q22. Farmers in a hilly region are struggling with soil erosion, leading to reduced crop yields, which strategy would be best for sustainable farming?

A) Increasing deforestation to make more farmland (B) Using heavy machinery to level the land (C) Constructing terraces to slow water runoff and reduce erosion (D) Relying on fertilizers to restore soil nutrients

Q23. A country is planning to expand its transportation network through a dense rainforest, what is the most **sustainable strategy** for this?

(A) Clearing large sections of the forest (B) Construction of elevated roads or tunnels (C) Ignoring the need for expansion (D) Relocating local communities

Q24. A nation relying on coal is experiencing severe air pollution, what is the best long-term solution for sustainable development?

A) Shut down of coal plants immediately (B) Invest in renewable energy while gradually reducing coal usage (C) Increase coal extraction to boost production (D) Installing air purifiers in major industrial cities

Q25. Which of the following practices will conserve LPG in your kitchen?

- i) Soaking rice for some time before cooking it.
- ii) Cooking food in a closed pan
- iii) Cutting vegetables into medium or uniform sizes to reduce cooking time
- iv) Cooking food in an open pan kept on low flame
- v) Cooking on high flame

A) i , ii, iii B) iv & v C) v only D) All of the above

DIMENSION – F: USE OF GEOGRAPHY

Q26. What could be a reason for the development of the Indus Valley Civilization near the Indus River?

A) Presence of mountains (B) Landscape of the area (C) Easy access to water, fertile lands and trade routes (D) Availability of forests

Q27. In a country that is Japan which is along tectonic plate boundaries, what should the planners prioritize for future development?

A) More sports stadiums near fault lines. (B) Strong earthquake-resistant infrastructure and emergency planning. (C) Relocation of all cities inland. (D) Ban on construction of all tall buildings.

Q28. Imagine you are a geographer designing a plan for a sustainable city, which of the following should be your top priorities?

A) Expansion of highways and increasing car usage (B) Integrating green spaces, renewable energy, and efficient water management (C) Cutting down forests to make space for factories (D) Eliminating public transportation to reduce congestion

Q29. How does geography help in disaster management?

A) By predicting and preparing for natural disasters (B) By completely preventing all natural disasters (C) By ignoring the need for disaster management (D) Ignores safety and focuses only on making maps

Q30. Which physical feature protected ancient India from most of the northern invasions?

A) Thar Desert B) Himalayan Mountains (C) Western Ghats D) Deccan Plateau

A(3) ANSWER KEY OF THE TEST

ANSWER KEY

ITEM NO	CORRECT RESPONSE
1	B
2	C
3	C
4	C
5	D
6	C
7	A
8	C
9	A
10	A
11	A
12	A
13	C
14	B
15	A
16	B
17	C
18	D
19	C
20	B
21	C
22	C
23	B
24	B
25	D
26	C
27	B
28	B
29	A
30	B