



Evaluation of Grade Nine Geography Textbook Vis-à-vis the Key Criteria of Problem Solving Skill Development

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Authors' contributions

This work was carried out in collaboration between the two authors. Author SM did design of the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author AH managed the analyses of the study and the literature searches. Both authors read and approved the final manuscript.

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ABSTRACT

This study examined the extent to which grade nine Geography textbook promotes the development of secondary school students' problem solving skill. The study utilised a framework suggested in the related literature of problem solving for preparing a coding scheme to analyse the textbook. Based on the framework, an overall picture of the representation of problem solving strategies in the textbook was confirmed. The result indicated that grade nine Geography textbook was not sufficient to support students' problem solving skill development. Particularly, the capacity of the textbook in promoting higher order thinking skills using solving multistep and real life problems, the use of graphic organisers, the inclusion of metacognitive strategies and the incorporation of variety of heuristics were limited. Thus, it needs to consider the criteria suggested in the literature of problem solving skill development while revising the textbook.

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1. INTRODUCTION

It is believed that education has been used as an instrument for ensuring the existence and sustenance of the human race. Using their accumulated wisdom, human beings have overcome the recurring challenges they faced in solving problems. In light of this experience and the ever increasing complexities of relationships among persons, the social and the physical world, education is currently pressurised to cultivate the problem solving skills of the young mind more than ever. Simply put, the dynamic nature of the problems humans face in the contemporary world demand promoting problem solving skills. It is now becoming difficult, if not impossible at all, to solve today's challenges with the knowledge acquired in the past.

Consequently, problem solving is now regarded as one of the most important competences of the twenty-first century. As a result, modern schooling should largely invest in this core competence. In line with this, it is underscored that solving problems is nowadays becoming the most effective way of developing creative thinking and places it on the very top of the list of all learning competencies [1]. The emphasis on this skill helps to tackle on the problem faced by most students where they often fail to relate what they learned in classrooms to the world beyond the school walls [2]. Thus, it responds to the more and more complex demands of modern society.

Problem solving is defined as the process of bridging a gap between what is perceived as problematic situation and the ideal state. It is a process of escaping undesired circumstances and thereby to arrive at an intended goal. For this to happen, an individual requires to engage in higher order thinking.

It is largely believed that the demands of real life problem solving skills can be systematically taught in classroom situations (e.g., [3]). Put in another way, our mind can be trained for skills in problem solving. There is a significant correlation between cognitive performance on hypothetical social problems and ratings in social adjustments in later life [4]. That is, to successfully solving problems in the classroom can correlate to self confidence in solving problems outside the classroom as well. Furthermore, teaching for

problem solving results in improved understanding, more enjoyable learning, develop valuable research skills, achieve higher-order learning outcomes and perform better academically [3].

This demands the restructuring of curricular materials in such a way that support cultivation of problem solving skills. Having appropriate teaching materials like teachers' guide and students' textbook is pivotal in the context of the current Ethiopian schools. The related literature (e.g., [5]) offers two alternatives: the inclusion of subjects that particularly aim at teaching problem solving skills as contents; and organising textbook contents along problem solving lines. While the former approach might seem a snap shot, the latter offers repeated opportunities for development of problem solving skills. The consecutive occurrence of such opportunities across subjects of the curriculum and under diversified contexts is crucial.

In light of today's largely agreed teaching paradigm, i.e., constructivism, the relevance of organising textbooks in ways that support knowledge construction and problem solving could not be overemphasised. Several studies (e.g., [4]) support the role textbooks play in this regard. Studies (e.g., [6]) generally revealed that textbooks affect, to a varying degree, not only what teachers teach, but also how teachers teach. Textbooks are usually believed to affect classroom practice at least in the Ethiopian school contexts since most teachers use their textbook as a daily guide for organising their teaching, both with respect to the teaching content and the teaching methods [7]. Teachers only rarely deviate from it. Hence, high-quality textbooks can be powerful catalysts for improving learning for students and teachers alike [8].

Textbooks in Ethiopia have been considered as are permanent companion of students and serve as a self-teaching device. It is clearly indicated by Akalewold [9] that the nature of classroom transaction is strongly dependent on textbooks. As such, textbooks are key components of the intended curriculum in the Ethiopian educational context. They are the major written source used by teachers in deciding how to present a topic to their classes. Likewise, researchers have paid growing attention to the study of textbooks with a

focus on their influence on teachers' teaching practice [6]. Evaluation of textbooks is one of the mechanisms used to understand the effectiveness of curricula [10].

Periodic evaluation of curricula and curricula materials is one of the many ways to ensure quality education. Textbook evaluation in particular helps to identify the challenges teachers face at grass root level. It helps to identify the things that are missed, inherent strengths as well as deficiencies of the curriculum. It provides information for continuous modification of textbooks and to find out whether or not it achieves the designed goal of the curriculum [3].

Studies on textbook evaluation (e.g., [11]) underline that improvement in the quality of education depends to a greater extent on whether or not relevant and high quality textbooks and other learning materials can be made available to teachers and students. According to Solomon [7], when there are difficulties in the learning process; in most cases, the textbook is the first factor to be held responsible. So, it is possible to say that the problem of textbook quality has important implications to the effectiveness of educational policies.

Cognizant of the necessity of framing the education system to produce problem solver citizens, the 1994 education and training policy of Ethiopia stresses the "development of problem solving capacity and culture in the content of education, curriculum structure and approach focusing on the acquisition of scientific knowledge and practicum" ([12], p4). Nevertheless, as Akalewold [9] argued, though current education and training policy advocates problem-solving method in secondary school curriculum, no subsequent document is available to translate experiences into a material that develops such skills. Similarly, Dawit [4] in his study of social studies and science textbooks of second cycle primary grades (Grade 5-8) concluded that textbooks were poorly aligned with curricula requirements for developing problem-solving capacity.

Other studies conducted by Haymanot [13] also indicated that primary school textbooks are not capable of promoting problem solving skill development of students. The findings revealed that the textbooks were inadequate in supporting problem solving skill development.

Though the effort to evaluate textbooks is becoming more and more acknowledged among the Ethiopian academia, studies which focus on investigating the extent textbook organisations foster problem solving skill among primary and secondary school learners seems yet not exhaustive enough. It seems that to the best knowledge of the researchers no prior studies were conducted on the extent Geography textbooks support the development of problem solving skill. As a result, the primary purpose of this study was to investigate the extent to which grade nine Geography textbook promotes the development of students' problem solving skill. To this end, the content analysis of the textbook was designed to give answer to the following major questions:

- To what extent does grade 9 Geography textbook incorporate contents related to real life problems?
- Does grade 9 Geography textbook include opportunities for students to find out and organize knowledge by themselves (promote knowledge construction)?
- Does the textbook provide students with opportunities to predict and summarize information by posing open ended and process questions that promote higher order thinking skills?
- To what extent does the textbook incorporate graphics intended for promoting problem solving skill development?

2. RESEARCH APPROACH

A mixed research approach was utilised in this study because of the advantage accrued in using both quantitative and qualitative designs. As Creswell [14] noted, though the basis for employing mixed designs are varied, they can be generally described as methods to expand the scope or breadth of research to offset the weaknesses of either approach alone.

As a result sequential mixed methods data collection strategy was used to collect data in an iterative process whereby the data collected in quantitative way was supported by qualitative method. Sequential designs in which quantitative data are collected first can use statistical methods to determine which findings to augment in the subsequent qualitative analysis. Thus, the use of qualitative content analysis in this study has made latent level analysis possible, because it concerns interpretative analysis of the

underlying deeper meaning of the data. Qualitative content analysis goes beyond merely counting words or extracting objective content from texts to examine meanings, themes and patterns that may be manifested or latent in a particular text.

At the same time, the quantitative data has made at a manifest level analysis of the textbook through providing an objective and descriptive overview. Thus, the mixing of qualitative and quantitative methods has made triangulation of the results of the analysis.

3. RESEARCH DESIGN

In this study, content analysis (quantitative and qualitative content analysis) was employed. Broadly, content analysis may be seen as a method where the content of the message forms the basis for drawing inferences and conclusions about the content. Content analysis is defined as a "research technique for making replicable and valid inference from texts to the contexts of their use" [15]. Content analysis of textbooks enhances the effectiveness and quality of textbooks. Content analysis is regarded as a means to gauge instructional method, content structure, the concept and clarity of contents, balance of knowledge, variety of activities, relevant illustrations [16].

Lewy [16] described that after new curriculum, it is essential to undertake regular assessment of its effectiveness on a half year or yearly basis. Moreover, when new textbooks are published, the roles of content analysis of textbooks become more important in maintaining the effectiveness and quality of current textbooks. Lewy also indicated that in many curriculum centers throughout the world, content analysis is regarded as a means to enhance instructional method, content structure, the concept and clarity of contents, balance of knowledge, variety of activities, relevant illustrations and the like.

3.1 Data Source/Material

Grade 9 Geography student textbook published in 2015 by Pitambra books Pvt Ltd, India was utilised in this study. Geography textbook was chosen by the researchers because of its suitability to link most of its contents to real life problems; be it individual, country or global issues so as to help raise the consciousness of

students and their ability to solve societal problems.

3.2 Sampling Procedure

Purposive sampling Technique was used to choose Grade 9 Geography textbook because of the researchers' proximity to social science background in addition to the suitability of the subject compared to other social science subjects offered in grade nine. Having selected the textbook, comprehensive sampling technique was used to analyse all the four chapters found in the textbook.

3.3 Instruments and Units of Analysis

The units of analysis vary with the nature of data and the purpose of research. Thus, the unit of analysis might be a single word, a letter, a symbol, paragraph, the whole text, a theme, an entire article. In this study, depending on the theoretical framework suggested in the literature e.g., [5,17,18] illustrations (graphics), topics/subtopics, questions (problems), instruction (direction) used in the textbook were used as units of analysis to judge the extent grade nine Geography textbook promotes problem solving skill development. To make the analysis of the textbook to be objective and replicable, checklists were prepared and consistently used by the author throughout the analysis process.

3.4 Data Analysis Technique

Both quantitative and qualitative data analysis techniques were used in this study. Quantitative data were analysed using frequency and percentage while the qualitative data were analyzed through narrative analysis. Having calculated the frequencies, statistical analysis was performed using tabulation and graphical representation.

Obviously, one of the limitations of content analysis is the difficulties arising from ensuring aspects of reliability and validity. In case of content analysis, *reliability* is commonly associated with notions of stability, reproducibility, and accuracy. The researchers attempted to ensure the stability of the process through consistent use of checklists with the intention of ensuring the consistent use of the rules of the coding scheme. Similarly, the researchers tried to ensure reproducibility of

the data through checking the analysis three times.

4. ANALYSIS AND INTERPRETATION OF RESULTS

4.1 General Evaluation of the Textbook

The Ethiopian Grade nine Geography textbook is colourful enough to attract student's attention. It has 205 pages and consists of four units entitled "The Concept Of Geography And Map-Reading", "Physical Environment of the World and Ethiopia", "Human Population and Economic Activities", and "Public And Policy Related Issues In Ethiopia" respectively. Unit one is composed of two sections, while unit two has five. The remaining units, unit three and four, have three sections each.

Every unit has a list of unit outcomes at the beginning and specific objectives are provided at the beginning of each section. This helps students to understand what is expected of them and strive towards attainment of objectives even in the absence of a teacher. Each chapter continues by providing a brief introduction to the main concepts treated under it. What follows is a startup activity which engages students in some thinking;

hence igniting prior knowledge of students regarding the issue. Furthermore, each chapter has a unit summary and review exercises. A glossary is also included at the end of the book.

There are about 709 tasks incorporated in the textbook. From the total of textbook tasks included, in-text questions comprise 34.7% of the total. The activities and exercise questions account for 35.68% and 29.62%, respectively. On average, there are about three problems (1 in-text, 1 activity and 1 exercise questions) on each page of the textbook. The in-text questions and activities are open ended while the problems in the exercise section simply cater for factual (content) information and usually have one correct answer.

4.2 The Use of Real Life Problems as Context

One of the criteria of evaluating textbooks for their potential in promoting problem solving skill development is the extent the topics/contents were presented in contextualized real life problems. To this end, the topics in the textbooks were assessed for their degree of focus on real life problems and students' experience. Table 2 presents the results.

Table 1. Types of tasks incorporated in the textbook

Units	Types of tasks			Total
	In text questions	Activities	Exercises	
1	57 (42.22%)	40 (29.63%)	38 (28.15%)	135 (100%)
2	113 (37.05%)	113 (37.05%)	79 (25.90%)	305(100%)
3	67 (35.07%)	73 (38.23%)	51 (26.70%)	191(100%)
4	9 (11.54%)	27 (34.62%)	42 (53.84%)	78(100%)
Total	246 (34.70%)	253 (35.68%)	210 (29.62%)	709(100%)

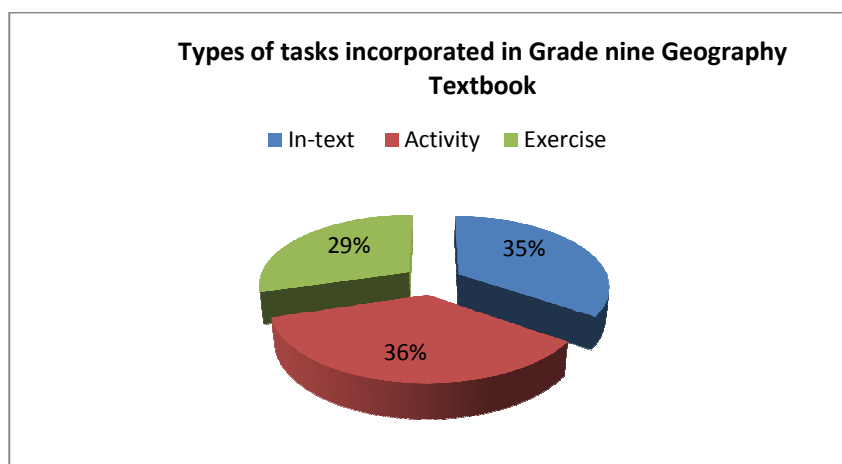


Fig. 1. Tasks incorporated in the textbook

Table 2. Contents of the textbook related to real life problems and students' Experiences

Units	Topics related to real life problems	Topics related to students' personal experiences	Topics with uncontextualized problems	Total number of topics
1	3 (9.38)	2 (6.25)	27 (84.37)	32 (100)
2	21 (38.89)	6 (11.11)	27 (50)	54 (100)
3	5 (13.89)	10 (27.78)	21 (58.33)	36 (100)
4	2 (16.67)	6 (50)	4 (33.33)	12 (100)
Total	31 (23.13)	24 (17.91)	79 (58.96)	134 (100)

The result revealed that 31(23.13%) and 24(17.91%) of the topics were presented in contextualised form addressing actual problems and students' personal experiences, respectively. The un-contextualised contents account 79(58.96%) of the total topics in the textbook. It was also found that there is a variation in the degree of contextualization of topics among the four units. While unit four is the most contextualised unit followed by unit two and three respectively, topics in unit one were the least contextualised. In these units, topics that directly address either real life problem or students' own experience (both combined) account for 66.67%, 50%, 41.67% and 15.63% of their total topics.

The topic "the socio-economic impacts of world villagisation" on Page 124, could have been effectively used for problem situated learning. Students could have been asked to investigate the impact of villagisation at national or local levels and suggest alternative solutions for mitigating its ill sides. Or, at least question 3 of activity 2.33 could have been framed in this way. Similarly, topics "Rural land use versus urban land use" could have been left open for students to investigate and reflect on the realities of their locality/neighborhood or the country. The same is true for "Vulnerability", on page 182. Students could have been given a task to identify the prevalence and/or the vulnerable society in the locality/the country, collect data regarding the causes and suggest solutions accordingly.

4.3 Phases of Learning

Textbooks should explain the learning objectives before the learning process takes place [19]. To analyse the learning objectives, distribution of objectives in the textbooks can be seen. On the other hand, to determine the index of learning objectives of a textbook, the total number of units with objectives are counted and divided by the total number of units with the textbook.

Textbooks that promote problem solving skill development should offer students opportunities for prediction. Students should also be allowed to set purposes of the learning process in all possible ways. This could be manifested by the inclusion of problems (Questions) and setting the specific learning outcomes to be expected from them at the beginning of the topic. Having this in mind, the topics in the textbook were analysed. Accordingly, it was found that 97(72.39%) of the topics had questions and objectives that specifically address them. 23 (17.16%) of the topics have questions but lack specific purposes, topics like "Grid References" and "Magnetic Declination" in unit one, "Winds" in unit two, "Factors Affecting the Quality of Data", "Economic Activities", "Agriculture" and "Trade" in unit three; "Environmental Policy", and "Economic policy of Ethiopia" in unit four could be good examples that lack specificity (hereafter SMART) in the objectives.

Table 3. Topics of the textbook that ask questions at the beginning and set purposes for students

Units	Topics with questions and purposes	Topics with questions but not purposes	Topics with purposes but not questions	Topics without questions and purposes	Total number of topics
1	28 (87.5)	4 (12.5)	-	-	32 (100)
2	43 (79.63)	4 (7.41)	6 (11.11)	1 (1.85)	54 (100)
3	23 (63.89)	10 (27.78)	3 (8.33)	-	36 (100)
4	3 (25)	5 (41.67)	-	4 (33.33)	12 (100)
Total	97 (72.39%)	23 (17.16%)	9 (6.72%)	5 (3.73%)	134 (100)

Nine (6.72%) of the topics lack problems (questions) at their beginning. Topics such as "Composition of the Atmosphere Deflection of winds due to the earth's rotation", "The socio-economic impacts of world villagization" in unit two; "The Main Features of Census", "Densely Populated Regions", and "Sparsely Populated Regions" in unit three; have specific objective at the beginning of their sections but lack a problem (Question) at the beginning. These topics, though they have questions at the end, they do not fulfill the very concept of problem solving. It should be reminded here that the first and foremost component of problem solving development is beginning the instructional process with a problem. The other two units (one and four) fulfill this criterion. Five (3.73%) of the topics lack both specific purposes and problems (questions). Topics of such kind are found in unit two and unit four. Topics such as "Major Elements of Weather and Climate" in unit two; "Sectorial Environmental Policies", "Types of Economic Policy" and "Sectorial Economic Policies" in unit four are typical examples.

In some cases, though the topics were followed by questions, they are immediately followed by description or explanation. This might prohibit students the opportunity to construct knowledge mainly through their own efforts. In unit one, the topic "Meaning of Geography" for instance, is followed by a question "What is Geography?" among others. However, the definitions offered by different scholars are provided immediately under it. The same holds true for the other topics such as "Geography as a science" which is followed by two questions: "What is science?" and "What makes Geography a science?". The limitation here is the two questions are followed by textual information regarding the issue. Asking for examples on the kind of qualities (Observation and systematic record keeping) that make Geography to be considered as science could have been related to students' experience.

Problem solving requires active engagement of learners' preferably in real/contextualized format. Likewise, textbooks that cater for such outcomes should incorporate activity based and student centered teaching/learning methods. The textbook was analyzed whether or not it suffices this criterion. While almost all components provide reading and comprehension as strategy of learning in a form of explanation, the contents also include Cooperative work, project work and case study as major strategies of teaching. The

teaching/learning methods included in the textbook consist of explanation, cooperative activity, project work and case study.

The results indicated that almost all contents (topics) require students to read through the material and answer the questions included in it. To be specific, 30 out of 32 topics in unit one, 51 out of 54 topics in unit two, and all topics in unit three and four (36 and 12 topics respectively) require students to read the material. Simply put, they require students to read so as to answer the questions (Problems). In this regard, they provide complete information on most of the topics. Hence, promote comprehension of contents which indicate a lower hierarchy in the taxonomy of educational objectives. The total number of topics which provide full information account for 129 (96.26%) of the total topics included in the textbook.

As depicted in Table 4, the second most suggested strategy the textbook provides is Cooperative work. In this regard, from the total of 32 topics in unit one, 16 topics incorporate a problem to be addressed through small group discussion. While unit two, three, and four incorporate this technique in 28, 24 and 6 of the total 54, 36 and 12 topics included under each of them, respectively.

Project work, on the other hand, was included to address 11 topics from the total of 134 topics in the textbook. In terms of units, 4, 5 and 2 topics of unit one, two and three respectively require students to produce tangible products either in a form of a written report or a model of some kind through practical engagement. Unit four, however, lacks this teaching strategy. Case study method is also used in two of the four chapters. Unit two and three incorporate case study as a methodology for 7 and 2 topics of the 54 and 36 units included in each of them.

4.4 The Nature of Tasks in the Textbook

Higher order thinking skills in general and Problem solving skill in particular could be promoted when textbook problems offer students to summarise, analyse, apply and evaluate ideas. Likewise, the extent the activities and review exercises in the textbook foster such outcomes were assessed through classifying questions as process and content (factual) questions.

Table 4. Ways contents are presented in the textbook

Ways topics were presented	Units in the textbook				
	Unit 1	Unit 2	Unit 3	Unit 4	Total
	f (%)	f (%)	f (%)	f (%)	f (%)
Explanation	30	51	36	12	129 (96.26)
Cooperative work	16	28	24	6	74
Project Work	4	5	2	-	11
Case Study	-	7	2	-	9
Total	32	54	36	12	134

As presented in Table 5, the nature of questions included in the activities could be classified in to two: Factual and process oriented questions. From the total of 253(100%) questions included in all activities of the textbook, the majority 180(71.15%) address issues that demand students to interpreter, analyze, apply or evaluate ideas. 73(28.88%) of them, on the other hand, simply cater for content oriented (factual) information.

Table 6 presents the nature of questions incorporated in review exercises. The result indicated that the majority 182(84.65%) of the questions address content (factual) information. The proportion of questions that require students to interpret, analyse, and evaluate is 33(15.35%).

4.5 The Use of Graphic Organizers

Graphic organizers in problem solving oriented textbooks serve many functions. Nevertheless, their primary role should be to facilitate thinking. A problem oriented textbook may provide

incomplete or semi-complete graphic organisers to fill by the students themselves. Another alternative could be to ask students to produce their own graphic organisers to show their understanding of the cycles, processes and relationships among concepts. Due to these benefits of graphic organisers, the textbook was analysed for the adequacy, variety and the ways of use of organisers. The two preceding tables (Table 7 and Table 8) present the results obtained from the analysis.

As presented in Table 7, a variety of graphic organisers such as maps, charts, graphs, and tables were incorporated in the textbook. The three most frequently used graphics include sketches/drawings, tables and pictures/photos with a frequency of 38, 26 and 21 respectively. The least frequently utilised graphics was pie chart. When units are compared, unit two ranks first in using 77 different types of graphics, while unit four stands last with only 2 graphic organisers.

Table 5. Types of questions incorporated in the activities of the textbook

Type of questions	Units in the textbook				
	Unit one	Unit two	Unit three	Unit four	Total
	f (%)	f (%)	f (%)	f (%)	f (%)
Content (Factual) questions	12	22	29	10	73 (28.88)
Process questions	30	85	47	18	180 (71.15)
Total	42	107	76	28	253 (100)

Table 6. Classification of summary questions/ exercises into process and content questions

Type of questions	Units in the textbook				
	Unit one	Unit two	Unit three	Unit four	Total
	f (%)	f (%)	f (%)	f (%)	f (%)
Content (Factual) questions	35	68	46	33	182 (84.65)
Process questions	3	13	8	9	33 (15.35)
Total	38	81	54	42	215 (100)

Table 7. Types of graphic organizers used in the textbook

Types of graphics	Units in the textbook				Total
	Unit one	Unit two	Unit three	Unit four	
Maps	4	12	2	-	18
Flow Chart	1	-	2	1	4
Pictorial Data (Combined)	1	6	1	-	8
Pictures/Photos	2	10	9	-	21
Tables	7	12	7	-	26
Sketch/Drawings	2	35	1	-	38
Line Graph	1	2	1	-	4
Bar Graph	2	-	-	-	2
Pie Chart	1	-	1	1	3
Total	21	77	24	2	123

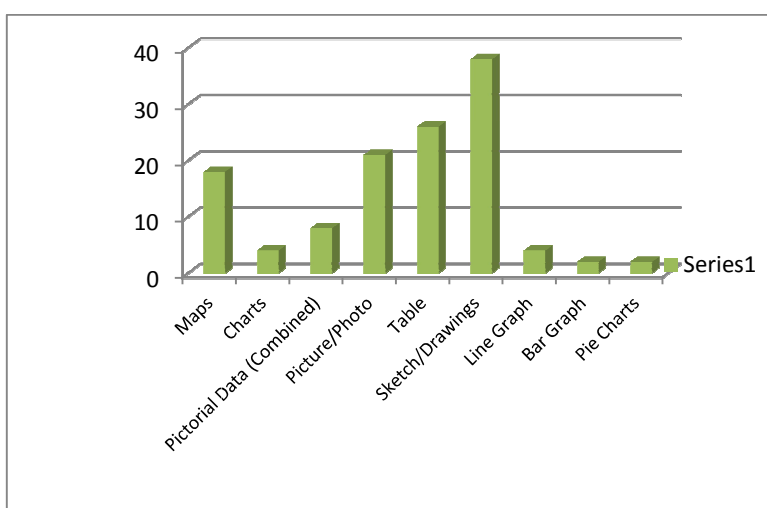


Fig. 2. Graphic Organizers Used In the Textbook

In context of problem solving skill development, it is not the frequency of use that matters, but rather the ways they were used. Hence, graphics should mainly serve as a thinking tool rather than as a decorative tool. As such, the purposes/functions the graphic organisers serve in Grade nine Geography textbook were analysed. But, this time the counting included not only those vivid graphics included in the textbook, but also verbal instructions in activities and exercises that require students to draw/produce their own graphics from the raw data given to them. Accordingly, Table 8 presents the findings regarding the purposes the graphics served.

As presented in Table 8, graphic organisers in Geography textbook were used for three purposes. The majority 100(74.07%) of the graphics served illustrative function. The second

function for which the graphics in the textbook served was assessment function. This function accounts for 32(23.70%) of the total graphics included in the textbook. This means that they were used as part of the activities included in the textbook. The graphics were used to measure students' grasp of the material already learned. In this way, students were asked to interpret information provided in graphics in verbal form as well as to produce graphics such as bar charts using raw data given in the textbook. The third function graphics served in the textbook was to record prior knowledge at the beginning of topics. Nevertheless, it is only 3 (2.23%) of the time the graphics included in the textbook served this function.

The graph showing interdependence in the ecosystem could be left open for students to show the relationships among the major

Table 8. Extent of use and purposes of graphic organizers in the textbook

Purpose/Function	Units in the textbook				
	Unit 1	Unit 2	Unit 3	Unit 4	Total
	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i> (%)
Record prior knowledge at the beginning	2	1	-	-	3 (2.23%)
Self-assessment strategy (Part of an activity)	4	22	6	-	32 (23.70%)
For further illustration of textual information	18	61	19	2	100(74.07%)
Total	24	84	25	2	135(100%)

components of the atmosphere. Since the concept is already treated in lower grades, it could have been safely done by students. On page 5, the graphic illustrating the branches of Geography could have been left incomplete so that students could fill the omissions through reading the information provided in text immediately under it. Had it been done in this way, it could serve students to engage in some sort of thinking.

The topic "statistical diagrams" presents "bar graphs", "line graphs" and "Pie chart". Nevertheless, the pictures were used only for illustration purposes. Had it been the interpretation and characterisation of the diagrams were left open to be mainly identified by the students themselves, it may add up to students' problem solving skills.

4.6 Collaborative Learning

One of the core elements of a textbook that promotes problem solving skill development is the extent it offers students a room for collaborative learning. In this regard, the instructions in the activities incorporated in the textbook were analysed. Table 9 presents the results.

Table 9. The extent the activities promote collaborative learning

Types of tasks/activities	<i>f</i>	%
Group Tasks	35	46.7
Pair work	15	20
Individual Tasks	2	2.6
Not indicated	23	30.7
Total	75	100

As depicted in Table 9, out of the total 75 instructions in activities of the textbook, 35(46.7%) were tasks to be done in small group, while 15 (20%) were tasks to be done in pair. Tasks which clearly tell students to perform on individual basis account for 2(2.6%) of the total

instructions. It should be noted here that there are about 23 (30.7%) tasks which do not state the basis they should be done. Nevertheless, since small group tasks and pair work were clearly specified, a reasonable guess could be the text writers left them to be done individually. Nevertheless, it should be clear that the instruction should be precise and comprehensive at the same time. Here it is also important to mention that the writer of this paper analyzed the nature of questions in the review exercises incorporated at the end of each section and unit. It was observed that the exercises simply tell the kind of behaviour expected from students, but not whether they should perform them individually, in pair or in small groups. Most of the in-text questions also do not specify how it should be answered: individually, in pair or in small groups.

4.7 Metacognition

The extent the textbook incorporated metacognitive strategies (i.e., thinking about thinking) deemed necessary for promoting students problem solving skill development was analysed using the guide lines outlined below:

- Asking students to list down what they already knew about the topic
- Asking students what they want to know about the topic
- Asking students to state from where and how they could obtain the information needed
- Asking students to predict the solution without carrying out the procedures (heuristics)
- Asking students to draw a scheme or a figure related to the topic (Graphic organisers)
- Listing the procedures to be followed to solve the problem along with justifications (Do their planning)
- Asking students to check that their plan is accurate

- Asking students to check that their procedures are accurate and sensible (Reflection)

The qualitative analysis revealed that the use of metacognitive strategies as a self-questioning or self-evaluation tool (using in-text questions) is sufficiently used throughout the textbook. The problems (questions) do not explicitly demand students to relate the new problems they are given with the ones' which they have already solved. There is no ample opportunity for students in the textbook which ask them what they might want to learn in each topic in advance. There is no explicit/implicit strategies included in the textbook which aims at helping students develop planning, monitoring and evaluation skills. Though there are end-of-chapter questions as self-assessment tools, there is no technique incorporated in the textbook for promoting in-depth self-reflection.

5. CONCLUSIONS

Based on the findings, the following conclusions were made:

- The textbook provides sufficient information in almost all topics, which makes students to look for their information within the textbook itself. In some cases, issues that could be obtained from others sources, such as the definition of HIV/AIDS were provided.
- Most of the problems at the end of the chapter (i.e. Review Exercises) are particularly flat routine problems. The problems/review exercises are generally of the "closed type", having only a single solution. None of the problems are open-ended or require a group attempt.
- Generally, the contents in the textbook are fairly well illustrated with diagrams, tables, and charts but they lean heavily on the conceptual side and intended for mere illustration of concepts. The use of graphic organizers in the textbook is insufficient to support problem solving skill development.
- The teaching/learning methods included in the textbook consist of description and explanation, discussion/ cooperative activity, project work and case study. Almost all topics provide reading and comprehension as strategy of learning in a form of description and explanation.
- Some of the activities can be done individually, but most of them require the

students to work in small groups. Though there are some other activities included in the textbooks, they do not clearly specify whether or not they are individual tasks.

- Some of the problems had to be more demanding, requiring extended effort from the students. For instance, the topic HIV/AIDS could be effectively taught in community based contexts in which students may be required to collect data from the nearest health center or hospital.
- Some of the non-routine problems as much they focus on identifying causes for problematic situations, they do not demand students to communicate their solutions. Students had to be encouraged to find multiple solutions to problems.
- Most of the exercises at the end of each chapter emphasize on memorization of factual information and no room was given for conceptual reflections, whereby the student is given the opportunity to reflect on the main ideas developed in the chapter.
- The textbook provides a good foundation for students to develop their abilities in solving routine problems, and is particularly strong in presenting lower order thinking skills. But, it is inadequate in developing students' abilities in non-routine problems such as applying fundamental/theoretical knowledge to solve problems, developing logical and higher-order thinking skills through solving multistep and challenging problems, exposing students to a variety of heuristics, and learning new concepts and algorithms by problem solving.

6. RECOMMENDATION

Problem solving should be looked more as a process than a product and the steps students take in the journey should be valued equally with the conclusions they finally reach. The problems that students have to solve should be grounded in applications of interest to them in their everyday life. Likewise, some alternative problematic areas should be incorporated which are finally to be opted by students.

The textbook needs to incorporate non-routine problems in community based contexts. Students should be exposed to more non-routine problems (e.g., projects), open-ended problems and application problems (especially using authentic

real-life issues in community based situation). The textbook should include practical meta-cognitive strategies to be utilized by the students in their attempt to solve non-routine problems. There should be explicit inclusion of the six key components in Grade nine Geography textbook as in the suggestion in the related literature.

In addition to the regular end-of-section review exercises, the textbook should include manageable number of non-routine problems to be done by students on group basis. These non-routine problems should require more analysis and thinking than mere textbook exercises. Equally important is the deliberate prompts in non-routine problems to help students develop metacognitive skills which is pivotal in problem solving.

Analysis of textbooks is a necessary but not a sufficient condition to understand what really happen in actual classroom teaching. Perhaps the most significant aspect of a textbook is how it is used by the teacher in class. So, how a teacher emphasizes problem solving using the textbooks matters the most. Textbooks as intended curriculum are only one of the many factors that affect teachers' teaching practices in classrooms. Therefore teachers should be provided with tailored, practical training on teaching for problem solving skill development. It should also be noted that the assessment systems in schools should be reviewed for entertaining process oriented behavior of students.

Problems in the review exercises need to be varied, with some being open-ended and some in more applied contexts. The activities, or particularly end of unit exercises, need to encourage students to make full use of available community resources as problem-solving contexts.

In some of the non-routine problems, the students were given no directions about how to proceed or strategies that they may use. They lack adequate support as to how to use metacognitive strategies to solve the problems. It could have been beneficial if practical tips were offered to help students plan, monitor and reflect on the problem solving process. Students should reflect on their problem solving and consider how it might be modified, elaborated, or clarified. Students should benefit from research on metacognition, how to monitor one's own thinking in problem solving situations.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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