

Implementation of Problem-Based Learning Method in Geography Education at the University of Cape Coast: The Educator's Lens on Factors

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Abstract

Problem-based learning (PBL) is one of the innovative pedagogical methods used by universities in teaching geography courses. However, works on PBL as a method of instruction in geography education appears to dwell much on its benefits with less emphasis on factors limiting its effective implementation. This paper intends to bridge this gap by assessing the factors affecting effective implementation of PBL method in geography education at the University of Cape Coast (UCC), Ghana. The pragmatist research paradigm (Mixed method) mainly the Convergent parallel design was employed for the study. Census and purposive sampling techniques were employed whilst questionnaire and interview guides constituted the research instruments used in the study. The study found that large class size, loaded nature of the geography curriculum, traditional assessment (examination) system among others negatively affect the effective implementation of PBL method in geography education. In view of this, it is recommended that the Department of Geography and Regional Planning and the Department of Business and Social Sciences Education should provide support and guidance to students and instructors by setting up a fund where students can be levied as part of their fees or the departments can also use their internally generated funds to support the PBL implementation process.

Keywords: Geography Education, Problem-based learning (PBL), Factors, Constructivism, Implementation.

1.0 Introduction

Education in geography has been necessitated by the fact that individuals need to understand the spatial settings of people and resources around them – people everywhere try to make sense of their lives. They want to know the nature of the world and their place in it. Humans want to understand the intrinsic nature of their home (Ababio, 2012). Ababio explained that geography education is the development, organisation and dissemination of knowledge, understanding, skills and values in geography. This depicts the integrated nature of geography (Waugh, 2009). The nature of Geography as a discipline makes it imperative for the teacher to possess a special body of knowledge, skills and characteristics. The teacher needs to understand the materials he/she teaches, how to teach it and why he/she should teach it. That is, he/she should have adequate subject matter, pedagogic and curriculum knowledge. In addition, the teacher should have a powerful grasp of the ways of teaching geography and the materials for teaching it (Ababio, 2009). This implies that the pedagogical knowledge and strategies to teach the subject is very essential in order to achieve effective and efficient teaching and learning process.

Furthermore, McBer (2000) stressed that the success of every teaching and learning interaction depends on factors such as students' perception towards the learning of the discipline, teacher quality, teaching methods employed by teachers and some environmental factors such as the time allocation for the teaching and learning of the subject as well as teaching and learning aids. This shows that, for effective teaching and learning interaction to take place, the methods employed play significant role. Geography education has "strong traditions of small-group work, both through laboratory and field teaching, and is well placed to try such teaching methods as problem-based learning" (Spronken-Smith, 2005, p. 203). Conferring to Padmavathy and Mareesh (2013), PBL is a learning environment where problems drive the learning. That is, learning begins with a problem to be solved, and the problem is presented in such a way that students need to gain new knowledge in order to solve it.

PBL consists of a multi-phased collaborative approach to education where students gain knowledge as they work in small groups (3-5 students) and attempt to solve a problem carefully-designed by the instructor (Mayer, 2013). According to Mayer (2013), throughout the problem-solving process, students work together, integrating existing knowledge and seeking out new knowledge, all with the help of the instructor. Additionally, in the problem-based learning approach, complex, real-world problems are used to motivate students to identify and research the concepts and principles they need to know to work through those problems (Duch, Groh & Allen, 2001). The key to PBL is that learning, for the most part, is pull-based (students seek the necessary knowledge) rather than push-based (students are fed knowledge by an instructor) (Schmidt, Rotgans & Yew, 2011). PBL enquiry represents a student-focused approach that is also an effective instructional strategy to improve geographic content knowledge (Brickell & Herrington, 2006; Tulloch & Graff, 2007). This is because at the heart of PBL is improving students' problem-solving and analytical skills such as critical thinking. However, works on PBL as a method of instruction in geography education appears to dwell much on its processes and

benefits with less emphasis on factors affecting its effective implementation. For example, Spronken-Smith (2005) did a study on “implementing a problem-based learning approach for teaching research methods in geography”. Pawson et al. (2006) researched on the purposes, benefits and risks of PBL Problem-based learning in geography. Quain (2014) did a study on “Assessing students' attitudes towards geography in a problem-based learning environment”. Mansor et al., (2015) studied managing problem-based learning: challenges and solutions for educational practice. Although Mansor et al. (2015) touched on challenges of PBL, his work focused on analysing studies by other researchers which were all not in the field of geography but rather in the field of engineering, technical and marketing. This shows a knowledge gap on the implementation of PBL in geography education in the context of Ghana where the literature remains elusive. Hence, it was to fill this knowledge gap that this paper was written. This study sought to bridge the knowledge gap in literature by investigating factors affecting effective implementation of PBL method in geography education at the University of Cape Coast (UCC), Ghana. The main aim of this paper is to investigate the factors affecting effective implementation of PBL method in geography education at the University of Cape Coast, Ghana. The recommendation from this study would help geography lecturers and educational planners to strategized the Geography courses or curriculum and ways of mobilising resources to mitigate the factors that affect effective implementation of PBL method. It would also serve as a source of information for planning in-serving training for geography instructors on the effective use of PBL as a method of instruction in geography.

2.0 Theoretical Perspective: Problem-Based Learning as a Method of Teaching

Problem-based learning is based on constructivist assumptions/principles of learning. It can be considered a constructivist approach to instruction, emphasizing collaborative and self-directed learning and being supported by flexible teacher-scaffolding (Schmidt, Loyens, Van-Gog & Paas, 2007). Gravett (2001) points out that when using constructivist or social constructivist approaches, the learner, rather than the teacher, is central to the learning process since the learner participates in acquiring and assimilating knowledge whilst the teacher functions as a facilitator. Also, students are considered to be active agents who engage in social knowledge construction. The PBL assists in processes of creating meaning and building personal interpretations of the world based on experiences and interactions (Evensen & Hmelo, 2000). From the submissions of the constructivist theory vis-à-vis the nature of PBL, it is clear that PBL is entrenched in the constructivist philosophy or theory of learning. This is because both the theory and PBL are student-centred approaches of learning where learners, out of their experiences and exploration, construct their own knowledge with or without the instructor's guidance. From this perspective, feedback and reflection on the learning process and group dynamics are essential components of PBL. Taking into consideration various ideas on PBL, a conceptual framework (Figure 1) was developed to guide the analysis of this paper. This framework comprises a number of activities extracted from a comprehensive review of the literature showing the relationships of the different key constructs, theoretical issues, model and empirical studies on how effectively PBL implementation process influences the teaching and learning of geography.

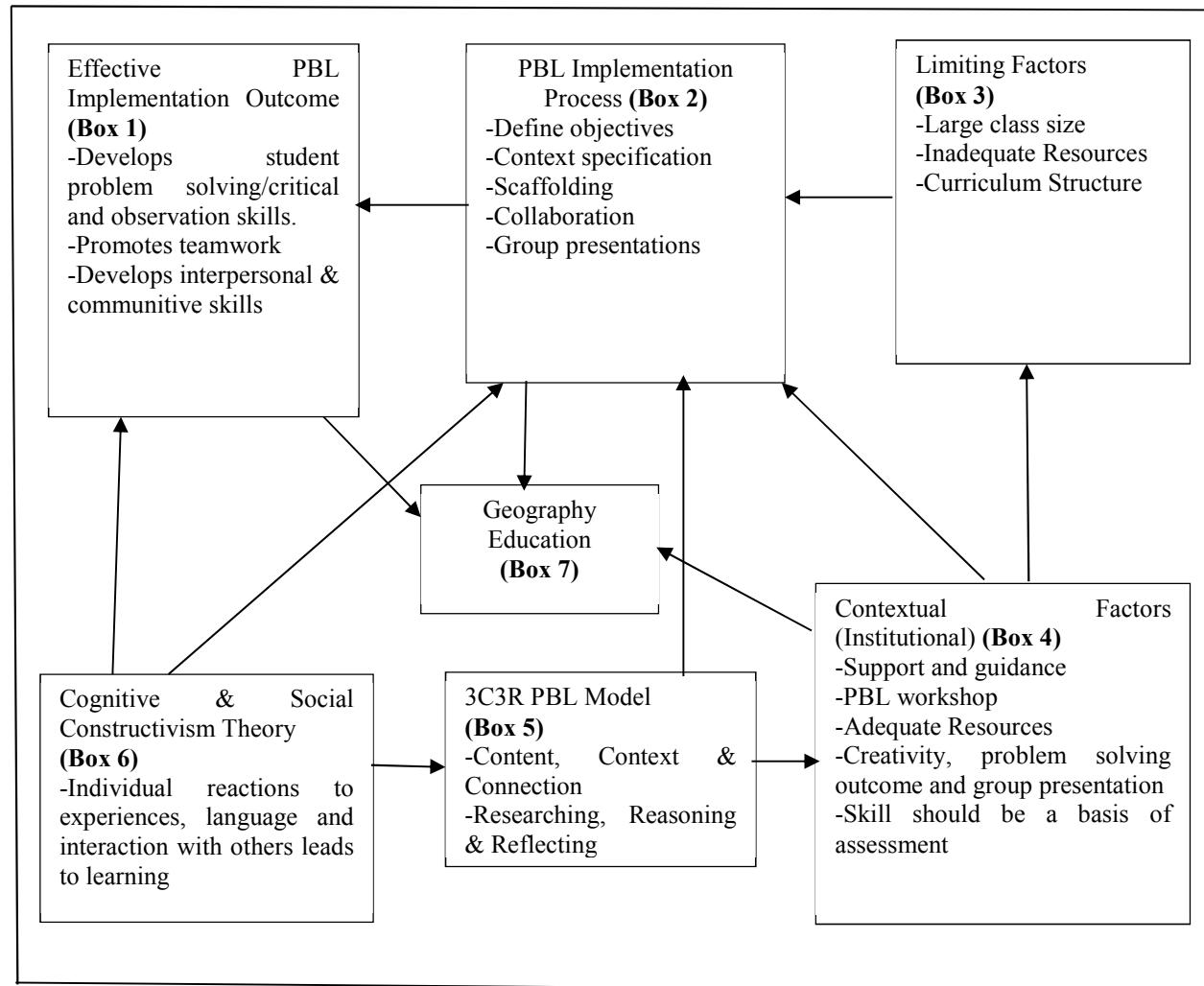


Figure 1: Conceptual Framework for the Study

Author's Own Source (Bentil, 2018).

As presented in Figure 1, effective implementation of PBL method in geography consists of inter-related set of elements which aid its efficacy and vice versa. For instance, the effective PBL implementation process is affected or influenced by certain limiting factors (Box 3). For instance, Egidius (1999) indicated that one of the major problems teachers face using PBL method is large classroom sizes. Studies have shown that due to large number of students in a class, instructors had to divide the class into several small groups and guide all of them at the same time posing difficulties for instructors to monitor each group's progress and problem (Egidius ,1999; Nasr & Ramadan, 2008). Luk (2004) opined that instructors have difficulty in maintaining and guaranteeing the effectiveness of learning with large number of groups in a class. Furthermore, he indicates that teachers see PBL to be time consuming which means that they have to sacrifice their own free time to cater for students' needs. Also, Bonwell (1998) pointed out that due to imposed accountability, the structure of the curriculum and the education system make it difficult for the PBL method to be used effectively.

In agreement to Luk, Mansor et al., (2015) mentioned challenges related to teaching of process skills, difficulty in monitoring group progress and participation, especially during self-study time, student attitude, wide array of curriculum that needs to be covered, role changes, lack of resources, especially computers and reading materials, can impede the effectiveness and understanding of PBL. Additionally, there are high costs associated with the PBL implementation process especially when many students are to travel to distant places to study a given phenomenon. This makes PBL a very costly method to be used by teachers in teaching geography since the subject by nature require many fieldtrips (Omoro & Nato, 2014). Reithlingshoefer (1992) stressed that the traditional assumption of students that their teachers are the main disseminator of knowledge challenged the effective use of the PBL method. He explained that most of the students might have spent their previous years of education assuming their teacher as the main disseminator of knowledge. Therefore, due to this understanding about the subject matter, students may lack the ability to simply wonder about something in the initial years of problem-based learning. This is supported by the findings of Wee (2000) which indicated that students at

Temasek Polytechnic found the PBL curriculum confusing, uncertain and ambiguous. This is because under conventional teaching methods, students look up to their teacher as content provider and endorser of knowledge. With PBL, students are required to identify problem statements and proceed to answer them.

One of the major problems a teacher working with PBL faces is with the manner of assessing the students' work and progress (Pagander & Read, 2014). To accomplish this, teachers need to use methods other than simply providing the student with an exam which will test their rote knowledge of a subject, or giving them a grade on a paper written. MacDonald (2005) described that "the assessment phase should focus on evaluating acts of creativity, problem-solving, self-management, and teamwork" (p. 5). However, it takes much more effort and practice from the teachers to be able to apply the different methods of assessment in a correct and functional way.

The submissions above suggest a critical look at this situation to ensure that the environment, which is the true laboratory for geography students and teachers, is regularly visited and used for their search or experiment to achieve maximum output or performance of the students. This is why the researcher sought to find out whether such situations exist among University of Cape Coast geography students. Hence, the framework suggests that contextual factors (Institutional) (Box 4) such as support and guidance from administrators, PBL workshop or seminars for lecturers and students, and restructuring the assessment system to focus on PBL ideas of assessment would help to remedy the limiting factors to ensure effective use of PBL which would result in the realisation of the benefits the method offers in its use as studies have revealed that PBL promotes the development of critical thinking, observation, problem solving, interpersonal skills, teamwork and lifelong learning [Box 1] (Sendag & Ferhan-Odabasi, 2009; Benson, 2003).

3.0 Approach and Methodology

The pragmatist research paradigm (mixed method approach) guided the study. Convergent parallel design under mixed method research was employed. In convergent parallel design, the results or data are merged by comparing, interpreting and discussing them by stating the degree to which they converge, diverge or are related (Plano-Clark & Creswell, 2011). The study employed this design in order to merge both quantitative and qualitative data for discussion and interpretation to get an in-depth information about the topic under study.

Students and lecturers constituted the target population of the study. The accessible population were Level 300 and 400 B.Sc. Geography and Regional Planning students of the Department of Geography and Regional Planning (DGRP) and Level 300 and 400 B.Ed. (Geography Major) students of Department of Business and Social Sciences Education (DBSSE). Geography lecturers using PBL method were also involved in the study. The preliminary data gathered from the two Departments as well as student records office of the University of Cape Coast indicate that there are 44 level 300 and 57 level 400 B.Sc. geography students in the DGRP and 43 level 300 and 42 level 400 education geography students in the DBSSE. Hence, all the 186 geography students were included in the study. Thus, census approach was used to get the respondents of the study. Bhanu (2011) held the view that however accurately a sample from a population may be generated, there will always be margin for error, whereas in the case of census, whole population is taken into account and as such it is most accurate. Besides, purposive sampling techniques was used to sample two (2) lecturers (one each from DGRP and DBSSE). The lecturers were selected on purpose because they were using the PBL method in teaching geography.

Questionnaire and interview guides were the research instruments used to collect data from the respondents. Twelve (12) items were on each questionnaire which was made up of both closed-ended and open-ended questions. Section A dealt with the demographic data and the section B dealt with issues on factors affecting effective implementation of PBL in Geography education. Additionally, it was designed on a five-point Likert scale responses in a descending order from "Strongly Agree, Agree, Neutral, Disagree and Strongly Disagree". The use of questionnaire provided a wider coverage and guaranteed confidentiality and anonymity of the respondents since it was generally self-reporting (Leedy & Ormrod, 2005). Besides, semi-structured interview guide was used to conduct two focus group discussions for selected students from the two departments (one focus group discussion for each department) to probe further into some issues which the questionnaire was not able to provide. Another semi-structured interview guide was used to conduct in-depth interview for two lecturers. This was done in order to have much information and broader overview of the topic under study to draw informed conclusions. Referring to Twumasi (2001), interview provides the interviewer the flexibility and certain confidential information which might not have been obtained from using questionnaires. The use of these two tools was to enable the investigator to overcome the limitations associated with the use of single data collection instrument.

The data collection for both departments (DGRP & DBSSE) was done from the 20th March to 17th April, 2017. Out of the 186 questionnaires administered on the students, 170 were retrieved and this had a return rate of (91%). According to Dillman (2000), return rate from seventy percent (70%) is classified as a good and acceptable return rate. In addition to the questionnaire, eight (8) students each from DGRP and DBBE were

selected for two different focus group discussion on 20th and 21st April, 2017 respectively with each discussion lasting for about 35 minutes. Also, the lecturers' interview was done from 24th -25th April, 2017. A tape recorder was used to record the responses of the discussions and the lecturers' interview while some were written on a paper.

In terms of data analysis, the questionnaires were sorted, edited, coded and analysed using the IBM SPSS (version 22.0). Descriptive statistics tools were used in analysing the data into frequencies and percentages, means and standard deviations. the qualitative data recorded from the focus group discussion and the lecturers interview were transcribed. Creswell (2008) notes that "transcription is the process of converting audiotape recordings or field notes into text data" (p.246). Thematic analysis was used to analyse the qualitative data. Thus text data was generated in pre-set themes according to the research questions/hypotheses and discussed.

4.0 Results and Discussion

Concerning the demographic data of the respondents (students), it was found that 109(64.1%) of the respondents were males whilst 61(35.9%) were females. This denotes that most of the students involved in the study were males. This difference could be ascribed to the fact that there are more males than females in both departments reading B.Sc. Geography and Regional Planning as well as B.Ed. Social Sciences (Geography Major) and in the University of Cape Coast at large. Regarding the departments and the programmes students are reading, 87(51.2%) of the respondents were from the Department of Geography and Regional Planning [DGRP] and reading B.Sc. Geography and Regional Planning whilst 83(48.8%) of the respondents were from the Department of Business and Social Sciences Education [DBSSE] and B.Ed. Social Sciences (Geography Major).This implies that majority of the respondents involved in the study were from DGRP and reading B.Sc. Geography and Regional Planning. This difference could be attributed to the fact that the number of level 300 and 400 students reading B.Sc. Geography and Regional Planning from the DGRP was more than respondents reading B.Ed. Social Sciences from the DBSSE.

5.0 Factors affecting effective implementation of PBL method in geography education at the University of Cape Coast

In finding out the factors affecting effective implementation of PBL method in geography education in the study area, the students' views on the subject matter were sought. The analysis and discussion of the study's finding focused on mean and standard deviation values which had the following interpretations. For mean values, responses between 1.0–2.4 were concluded to be Strongly Disagree, 2.5–2.9 to be Disagree whilst 3.0–3.4 denoted Not Sure. In addition, 3.5–4.4 signified Agreed whilst 4.5–5.0 indicated Strongly Agreed. Concerning the standard deviation, values below 1 then means the responses are homogenous but in case the values are above 1, then there is a heterogeneous response. Table 1 presents the students views on factors affecting effective implementation of PBL in geography.

Table 1 - *Factors Affecting the Effective Implementation of PBL in Geography*

Statement	M	SD
Large class size negatively affects the effective use of PBL in geography.	4.36	0.953
Instructors have difficulty in maintaining the effectiveness of learning with large numbers of groups in a class.	4.22	0.880
The loaded nature of the geography curriculum makes it difficult to use PBL method in teaching.	4.11	0.955
The traditional assessment (examination) system affects the use of PBL in geography.	3.98	1.020
PBL method is time consuming and that makes it difficult to be used effectively in geography.	3.84	1.143
Inadequate logistics affects the effective use of PBL method in geography.	4.39	0.772
The expensive nature of the PBL method makes it difficult to be implemented effectively.	4.05	0.937
The conventional teaching method (Lecture) where students look up to the instructor for knowledge affects the use of PBL.	3.86	1.158
Total	4.10	0.522

Source: Field survey, Bentil (2018) Scale: SA=5, A=4, NS=3, D=2, SD=1.

From the results in Table 1, majority of the respondents agreed that large class size negatively affect the effective use of PBL in geography and their responses did not differ much from one another ($M= 4.36$, $SD= 0.95$). Referring to Mayer (2013), PBL deals with 3-5 members in a group and B.Sc. Level 400 students being 56 in class. This means the instructors need to put the class into 11 different groups which may be difficult to monitor or supervise their progress. That justifies why most of the respondents agreed that instructors have difficulty in maintaining the effectiveness of learning with large numbers of groups in class and their responses

were homogeneous ($M= 4.22$, $SD= 0.88$). This finding is very crucial as it hinders the effectiveness of the use of the PBL method and therefore affecting the realisation of PBL, its beauty and benefits as Luk (2004) opined that instructors have difficulty in maintaining and guaranteeing the effectiveness of learning with large numbers of groups in a class.

Furthermore, the results depicted that the loaded nature of the geography curriculum makes it difficult to use PBL method in teaching and their responses were homogeneous ($M= 4.11$, $SD= 0.95$). This result affirms the views of Bonwell (1998) who pointed that due to imposed accountability, the structure of the curriculum and the education system make it difficult for PBL method to be used effectively. On the statement of whether the traditional assessment (examination) system affects the use of PBL in geography (Table 1), the respondents agreed to the statement but their responses were heterogeneous ($M= 3.98$, $SD= 1.02$). These differences in their responses could be attributed to the fact that B.Ed. Geography Education students write exams at the end of the semester whilst the B.Sc. Geography and Regional Planning Students do not write exams at the end of the semester. This finding supports Wee's (2000) assertion that the traditional assessment system does not aid the effective implementation of PBL method.

Moreover, the respondents agreed that the PBL method is time consuming and that makes it difficult to be used effectively in geography but their responses differed from one another ($M= 3.84$, $SD= 1.14$). This might be as a result of the fact that different tutors handle the B.Sc. and B.Ed. Geography students and their teaching approaches may differ. For instance, the Level 300 and 400 B.Sc. Geography students work on a given problem throughout a whole year without writing exams in the course that the PBL method is used as a teaching approach whilst the B.Ed. Geography students as part of the PBL method write exams at the end of the semester. The differences in responses on time consuming as a factor affecting PBL method did not only emerge from the students but also among the instructors who were interviewed. Whilst an instructor for students offering B.Ed. Social Science (Geography Major) found PBL method as time consuming, an instructor for students reading B.Sc. Geography had different views. For example, the instructor for B.Sc. Geography and Regional Planning students had this to say:

"Time factor is not a problem because they do it for a whole year. The problem has to do mainly with large numbers and not the orientation given on PBL. Basically, PBL goes with smaller numbers and resources. Per my experience, it is better to work with smaller numbers as some students play truancy and do not participate in the PBL in larger groups. Considerably, 30 members in a class/group are ok, because controlling them will be easier as compared to larger groups. Our inability to embark on more field trips is due to large numbers. Inadequate resources (e.g. Finance constraints) also impede organization of more field trips" (Instructor).

This finding indicates that time consuming nature of PBL method is relative depending upon the extent and the course structure to which PBL method is used. Therefore, this finding from students' perspective and B.Ed. instructor supports Luk's (2004) opinion that teachers found PBL to be time consuming which meant that they have to sacrifice their own free time to cater for students' needs whilst it conflicts with the B.Sc. instructor's assertion.

Following the results in Table 1, another factor that emerged was inadequate logistics. Majority of the respondents agreed that inadequate logistics affects the effective use of the PBL method in geography and their responses did not differ much from one another ($M= 4.39$, $SD= 0.77$). This finding was also evident in the in-depth interviews with the instructors who revealed that inadequate resources impede the organisation of field trip in the PBL process. This finding supports the observations of Omoro and Nato (2014) who found that there are high costs associated with PBL implementation process especially when many students are to travel to distant places to study a given phenomenon. This makes PBL a very costly method to be used by teachers especially geography teachers since the geography subject by nature require many fieldtrips. In agreement with this finding, Keller (2002), Hanes and DeLaura (2012) advised that due to lack of instructional tools and models for PBL, those seeking to use and extend the use of this pedagogical method have to develop innovative curriculum, give the educators good training and provide enough resources to support the PBL process.

Owing to the statement that "conventional teaching method (lecture) where students look up to the instructor for knowledge affects the use of PBL", the respondents agreed to the statement but their responses differed from one another ($M= 3.86$, $SD= 1.15$). This could be due to the fact that majority of the respondents (Students) were used to the lecture method than the PBL method and their orientation about it may have contributed to their differences in responses as Reithlingshoefer (1992) stressed that one of the factors affecting the effective use of Problem-based learning is the traditional assumption of students that their teachers are the main disseminator of knowledge. In addition, Wee (2000) found that some students see the PBL curriculum as confusing, uncertain and ambiguous and therefore prefers the conventional teaching methods, where they look up to their teacher as content provider and endorser of knowledge. Hence, this might be a probable reason for the difference in the students' responses on the conventional teaching method (lecture) as a factor that affects the PBL discussed above.

The overall responses on the factors that affect the effective implementation of PBL method in geography had a mean and standard deviation of 4.10 and 0.52 respectively. Hence, it can be inferred that majority of the respondents agreed to the statements that sought their responses on the factors that affect the effective implementation of PBL method in geography and most of their responses were homogenous.

6.0 Conclusions

Based on the study's findings and the literature, it can be concluded that large class size, inadequate resources (time, logistics and money), loaded nature of the geography curriculum, traditional assessment (examination) system, are conventional teaching method (lecture), are some critical factors affecting effective implementation of PBL in geography education at the University of Cape Coast. Therefore, the full beauty and purpose of the use of PBL method may not be achieved if these limiting factors are not critically looked at. This is because the environment which is said to be the laboratory of geography is not regularly visited, it makes the teaching of the subject abstract, thereby, affecting the academic performance negatively. Also, if PBL assessment which emphasizes evaluating acts of creativity, problem-solving, self-management, and teamwork are sacrificed for only paper and pen exams due to time and logistics factors, the true beauty and benefit of the PBL method is forfeited and not achieved.

7.0 Recommendations

Based on the findings and the conclusions that have been drawn, the following recommendations are made to ensure effective implementation of Problem-based learning in geography education in the study area.

1. Problems presented to students to solve by instructors must be clearer and free from ambiguity. There should be clear guidelines and explanation to students about what they are expected to do during the problem solving process.
2. The departments should (DGRP & DBSSE) should make conscious effort to let either two or more lecturers to handle the courses that are taught through PBL method. This will help reduce the difficulty of the supervision and guaranteeing the progress of the group task.
3. The departments (DGRP & DBSSE) should provide support in terms of resources (time, financial and logistics), and guidance to students and instructors to aid the effective implementation of PBL method in teaching. A fund could be set up for such a purpose where students can be levied as part of their fees or department using it internally generated fund to promote effective use of the method.
4. PBL assessment system which is based on evaluating students'/groups' creativity, self-management, teamwork, presentation skills, problem solving outcome among others, should be adopted.

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