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# Enhancing Classroom Participation of Students in Practical Courses:The Case of Environmental Science Students' at Kotebe Metropolitan University

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**Abstract**
Practical courses (laboratory based courses) require more engagement of students with a little support than other courses delivered in class room setting. In this research, first year environmental science degree students were selected as studied subjects as they had been constantly observed having low participation in the purely practical course 'practical water, soil and air sampling and analysis (EnSc 1053). In order to enhance these students' participation, a teaching-learning approach different from the usual one is believed to be essential. Consequently, individual work in conducting experiments along with report writing than group work were taken as an intervention/supporting mechanism. The intervention made brought a statistically significant change ($p<0.01$) (16% improvement) on the students' participation. With the existing challenges (large class size, time to cover portion and instructor commitment) it is recommended that individual engagement in each experiment and report writing is a preferable teaching method than grouping to ensure students' participation in practical courses.
**Keywords:** Intervention, participation, practical/laboratory

## 1. Introduction

Classroom participation is very essential for improved learning in all academic endeveours. Class room participation increases the understanding, interest and activity of the learners. Employing active learning strategies is key in enhancing classroom participation. According to Vygotsky's view, learning and instruction challenge the wisdom of traditional pedagogic practice quite significantly (Beck 2001). The traditional pedagogic practice does not allow students to participate; rather it makes them simple observers and listeners from their teachers. The challenge of Vygotsky has of importance on this point. William (1989), however, argues that activity-based learning is influenced by institutional and interactive social factors; whereas Vygotsky's theory characterizes learning as an individual's concrete perception of real world objects. He states, moreover, that cognitive learning takes place through social interactions through which knowledge is internalized.

In addition, Biggs (2003) states that reciprocity is a hallmark of good interaction, especially in pupil-pupil exchange, which enhances learning. This emerges as a common criterion for 'good quality' interaction in arrangement of teaching-learning contexts. Biggs (2003) further suggests that active learners are able to achieve a higher level of engagement and thus a higher level of cognitive learning in their academic work.

Concerning practical courses, different study results indicated that students who are active participants tend to have better academic achievement, compared with students who are passive in participation (Yusof *et al*., 2012). Student participation in science practical class is high when the teacher divided the students into three to five in a group and delegating the work, patrolling and checking the students' progress during practical session, giving out positive rewards and friendly cooperation from lab assistant in monitoring students. The variety of teaching techniques employed by the teachers will encourage the students to be more active, not feel bored or depressed during the class (Nurzatulshima *et al*., 2009).

There was no room for students' participation in the class room with the traditional teaching learning process. They were considered as observers of the teacher where she or he fills them with the knowledge she/he

has. Today's world scholars are against this view. We can employ the constructivists view for learning that students should have to play great role for their own learning and take a responsibility, especially for practical sessions. The arguers of constructivists consider (ideas) should have to be constructed by the learner by themselves, if so education will be very interesting and fruitful. This means that we have to use active learning methods so that students will interact in conducting experiments and reporting observations and results.

Identifying factors that would hinder students' participation in practical/laboratory based classes is found to be essential. This will provide opportunity to practice working and reporting during a task-based lesson. If this is so, then it seems sensible to give students enough preparation time at home and encouraged to actively involve and avoids dependency on other groups.

Above all, the majority of students are passive listeners in their group and their reports are depending on their group leaders. Supporting these students based on identified challenges/factors is essential and triggers this action research.

## 2. Methodology

Mixed approach, both qualitative and quantitative methods were applied to collect, analyze and interpret data. The procedures included assessment of overall participation of subject students, student interview (to undergo self evaluation of their participation with the given check list), instructors two session observations, intervention, another two session observation, and finally examination result analysis. The observers were the course instructor (also researcher) and the other researchers purposely available during the laboratory sessions. During observation the same checklist was used before and after intervention to see the variables improved. The important question to be used was 'who are the students participating in the classroom?' The instructor observed and provided the procedures to perform laboratory activities including language inputs for report writing. Students were allowed to reflect on what problems they face and how they solve their problems and what strategies help them to reach their goals. The course instructor thought back to what problems inhibit the students' participation and designed the intervention mechanisms to promote them to participate and then find ways to improve actions and then start to plan again for the next cycle. The subjects of the research study were first year environmental science students registered for the course practical water, soil and air sampling and analysis (EnSc 1053). The class has a total of forty nine students, seventeen boys and thirty two girls, aged between nineteen and twenty years old. A teaching time of three hours was allocated every week.

### 2.1. Proposes Action and Data collection Procedures

In this project, judgment of research outcomes was based on students' work and their target practical performance. The following steps were applied for collecting data in order to increase the credibility.

1. An interview was performed with students to undergo self evaluation with the corresponding justification for low participation. In addition, this will help to critically observe the students perception on class room participation. The investigators instructed the students to choose only one answer which is best to them to avoid interwoven of data.
2. Practical participation of students in each group was identified as those who participate willingly, participate when only questions are directed to the student, and do not participate at all. This will be taken as a base line before any intervention is made.
3. Interventions were made to enhance participation of students. These are
   a) Advise on the purpose of laboratory work
   b) Providing detailed laboratory procedures and come with flow charts individually
   c) Provided samples how to write reports focus on use of English grammar
   d) Support students to work individually with friendly approach (main intervention)
   e) Let the students individually write laboratory lesson reports (main intervention)
4. An observation, which is prepared by the researchers, is made to observe students' interaction and communication both in groups and individually. The observation form contained the expected lists of students' behaviors that happened in the classroom over the period of study in order to evaluate the improvement of students' performance after the intervention.
5. Post interview and observation were made for purposely selected students in order to evaluate the effectiveness of the interventions made during the practical course delivery.
6. Examination results were recorded and analyzed to see the progress due to interventions made
7. Evaluation of the progressed student behavior and the overall performance shown in their examination results attributed to the interventions made was analyzed and reported.

### 2.2. Data Analysis

The results obtained before and after intervention were presented and compared in tabular and chart forms and triangulated with existing similar studies in the area. The paired sample t-test comparison of each of the findings

of the observed behaviors were made using SPSS version 20 software and significant differences of results were considered statistically at $p<0.05$.

## 3. Result and Discussion

### 3.1. Baseline Information on students' participation

Taking the students participation and associated results from different courses delivered in the first semester of 2009 E.C academic year, the overall percentage is summarized in Table 1. As indicated in table 1, only 8.2% of the students have the motivation to interact without any support provided. On the other hand, 18.4% of them were encouraged and requested to participate and provide answers when they are directly asked by mentioning their name or pointed. The majority (73.5%) remain silent even when a question is asked to respond orally. This indicates that students need support and follow up to attain the objectives of a given lesson, and the type of support needs to be explored.

### 3.2. Students' perception and action in laboratory classes

In order to observe students participation in laboratory classes, the students were priorily asked whether they had differentiated role in their respective groups or not. Accordingly, the following data were collected and analyzed. Figure 1 illustrates that 61% of the students were not actively involved in the laboratory activities and report writing. This requires support of students different from the usual practice of providing manuals, giving lecture; let the students work in group and group report writing.

According to the students' response (Table 2), most of the students (65.3%) feel bored attending laboratory classes in the usual way.

The reason for the inactive participation in the practical lesson was generally assessed as group leader domination, laboratory chemicals and apparatus frustration, lack of interest and assuming that practical lessons are not important. It was found that group leader domination is the main constraint (78%) for active participation of students as indicated in figure 2.

Low participation was observed not only in practical sessions but also in report writing. It was observed that 83% of the studied subjects do not participate in report writing when they are provided the task in group. The reason could also be being bored, not to understand within a specified time, low participation in recording data and group leader domination as indicated in figure 3. The major reason for the low participation as discussed by the students (53%) is again domination of the group leaders who write themselves as they lack confidence on others.

### 3.3. Instructors' observations before and after intervention

The instructors' observed the students in two laboratory sessions and their reports. Before this observation, a laboratory manual, and a 30 minute lecture (on each of the sessions) on what to be performed had been given as done usually by most instructors. Finally, the students were allowed to perform the activities with small support of the technical assistant.

For the observations made, the level of participation in percentage of students in each of the enumerated behaviors is reported.

After providing extra interventions (mentioned in the method section), the instructors observed their students in more two laboratory sessions and their reports. For the observations made, the levels of participation in percentage of students in each of the enumerated behaviors were reported as indicated table 3.

As indicated in table 3 students showed improvement in all of the observed behaviors during laboratory classes. The overall participation expected from a student in laboratory sessions is improved by **16 %**, and the percentage of students who responded on the exams which contain similar content with what was done in lab and written in report is progressed by 14%. This could be due to the support/interventions made in order to increase their participation for improved learning. According to the paired sample t-test, the comparison on observed behaviors before and after intervention brought statistically significant difference, except following formats to write report, at 0.05 levels.

### 3.4. Factor Analysis

Based on the students' response and the observations made before and after intervention, the following points are identified as factors that should be considered during practical/laboratory classes. These factors are reported taking other previous studies in to consideration. Other studies reported personality factor (Pajares, 1996; Rahil *et al*., 2006; Maziha *et al*., 2010), perception of class mates (Cayanus and Martin, 2004; Maziha *et al*., 2010), skill and character of instructors (Dallimore et al., 2004; Nurzatulshima et al., 2009; Maziha *et al*., 2010) and environmental factors (Shaheen *et al*., 2010) are the common factors that affect students' over all participation in learning. In addition, the researchers noted that time are the other factor to be considered during the plan of enhancing students' participation, and all the factors are not mutually exclusive. Accordingly, the factors along

 

with the manifestations observed before and after intervention/support are reported in table 4.

### 3.5 Challenges for Future Action

The instructors and technical assistants should make more preparation and action other than assisting students in the usual way. The number of students per session and in a group should be kept as few as possible and laboratory reports should be written individually. Moreover, Students' should come up with adequate preparation, and bring flowcharts to the laboratory for improved participation. Performing these activities could be challenged with large class size, wide lesson portions to be covered and behaviors of instructors.

## 4. Conclusion

Based on the interventions made and the findings, it can be deduced that students' participation and their achievement can be enhanced and improved by implementing individual learning than group work methods.

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Table 1. First year Environmental science students' participation

| Willingly participate | | Participate only when asked | | Silent observers | |
|---|---|---|---|---|---|
| No. | percentage | No. | Percentage | No. | Percentage |
| 4 | 8.2 | 9 | 18.4 | 36 | 73.5 |

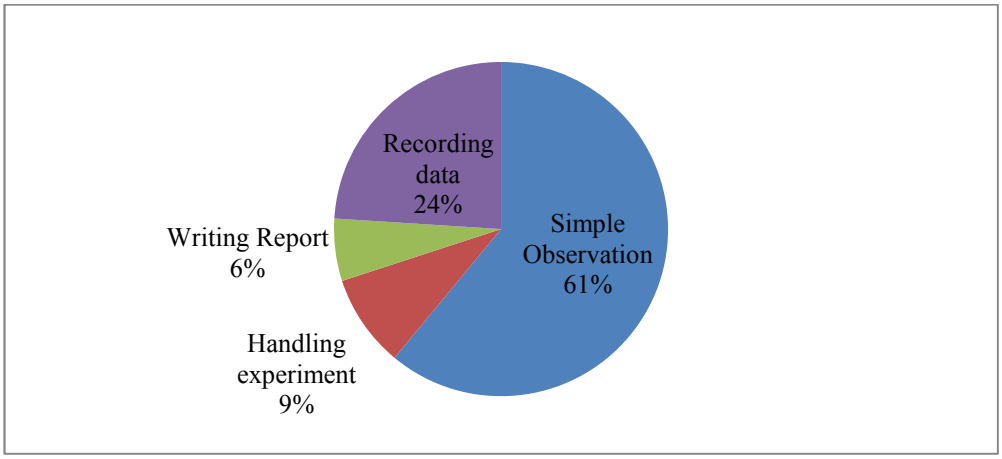


Figure 1. Percentage of students' response on their role perception and action

Table 2. Students' response on their participation during laboratory classes

| SA=Strongly Agree, A=Agree, DA=Disagree, SDA=Strongly Disagree | | | | | |
|---|---|---|---|---|---|
| **No.** | **Question** | **SA** | **A** | **DA** | **SDA** |
| 1 | I feel happy and eager learning practical/laboratory based courses | 12.2 | 22.5 | 63.3 | 2 |
| 2 | Laboratory classes helps to develop skill useful for real life situation | 83.7 | 10.2 | 6.1 | 0 |
| 3 | I am active in conducting experiments in laboratory classes | 40.8 | 10.2 | 51 | 0 |
| 4 | I participate in my group in laboratory report writing | 40.8 | 42.5 | 16.7 | 0 |
| 5 | I attempt to fully understand the objectives and contents of each lesson in laboratories | 26.5 | 59.2 | 10.2 | 4.1 |
| 6 | I share what I understand to my group members. | 4.1 | 14.3 | 73.5 | 8.1 |
| 7 | I ask unclear points from my friends in and out of the group to write a report | 55.1 | 36.7 | 8.2 | 0 |

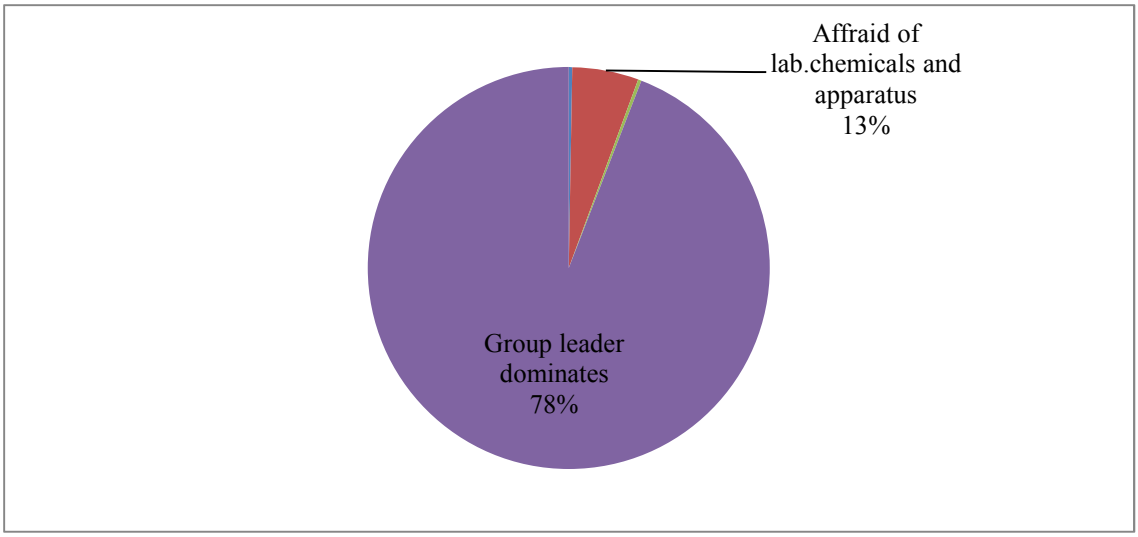


Figure 2. Reason for low participation of students

 

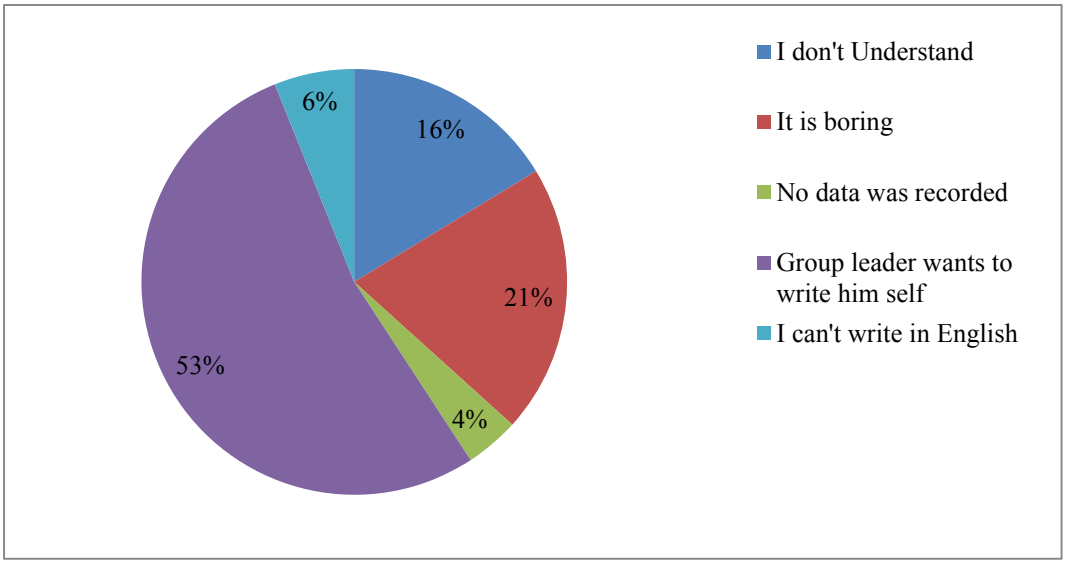


Figure 3. Reason for low participation during report writing

Table 3. Level of participation (percentage of students) in the observed behaviors before and after intervention

| Items | Observed behaviors | Percentage | |
|---|---|---|---|
| | | Before | After |
| 1 | Read procedures on lab manuals before class and able to follow it. | 10.2 | 20.4 |
| 2 | Students' prepare flow charts before class | 0 | 91.8 |
| 3 | Try to listen the orders on what to do. | 71.4 | 93.9 |
| 4 | Being observed to put effort on understanding procedures | 22.4 | 28.6 |
| 5 | Being observed to put effort and apply procedures to perform lab. work | 18.4 | 32.7 |
| 6 | Be able to understand and record observed data | 10.2 | 30.6 |
| 7 | Participate in reflecting the results orally in English | 8.2 | 10.2 |
| 8 | Participate in reflecting the results orally in Amharic | 24.5 | 30.6 |
| 9 | Be able to follow formats to write report | 30.6 | 75.5 |
| 10 | Be able to write report in the appropriate tenses and conjunctions. | 2 | 6.1 |
| 11 | Overall Participation | 19 | 35 |
| 12 | Be able to understand what is written on the report and able to answer similar questions on test and exam. | 18 | 32 |

Table 4. Factors identified and percentage of responses during the study

| S.No. | Identified Factors | Manifestation | % Before | % After |
|---|---|---|---|---|
| 1 | Personality factor | Low competence background; Low self efficacy of students; Lack of interest; High dependency | 79.5 | 63 |
| 2 | Perception of class mates | Group leaders not trust others; expect all laboratory tasks and report roles to be performed by group leaders | 61.2 | 47 |
| 3 | Environmental Factor | Students affected by large laboratory class size and group members | 67.3 | 67.3 |
| 4 | Character of instructor | Being bored to support individuals in a group; unwilling to have individual report; limitation on providing timely feedback. | Qualitative | Qualitative But improved |