Redesigning and restructuring CSE-110 based on Interactive Learning Pedagogy

Thesis Paper

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Redesigning and restructuring CSE-110 based on Interactive Learning Pedagogy

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DCLARATION

I, Samera Afroge, University ID # 02201159 have completed the thesis on topic, “Redesigning and restructuring CSE-110 based on Interactive Learning Pedagogy”, under **CSE-400** course regarding the partial fulfillment of our undergraduate degree of Bachelor in Computer Science and Engineering.

I, therefore declare that this project has been published previously neither in whole nor in part of any degree except this publication. I also mentioned work found by other researchers by reference.

Signature of the Supervisor

Signature of Author

Acknowledgement

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Redesigning and restructuring CSE-110 based on Interactive Learning Pedagogy

Abstract

Education involves two primary components: teaching and learning. To assess the quality of education, both of these aspects require examination. This thesis paper is the experimental methods of examining to determine the quality standards in education of the freshman Computer Science and Computer Science & Engineering course, CSE-110 that is a programming language. This pedagogy is student-directed, provides incentive and feedback during the learning process, and encourages the experiential development of a number of skills, including team-work, finding and digesting information, peer teaching (teach to others) and reflecting on the learning process. So our goal is to formulate a design of a traditional learning system that can encourage the accumulation of subject knowledge which is perceived to be relevant and that is digested or compiled and organized.

Keywords: Learning Pedagogy, Learning Pyramid, Interactive, and Learning Activities.

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1.1 INTRODUCTION

Day by day the new innovative system is adding new benefits and changing the traditional system. Throughout the university, I have just attempted to design with the help of my instructor the freshman-level engineering course, CSE-110 to emphasize the students' ability to produce quality products. The majorities of courses remain textbook-centered lecture classes, with little or no student interaction, but in this pedagogy help the student to learn their lesson without the traditional lectures. In this system the learners will have to develop a range of skills including being able to work in teams, formulate a problem, find information, explain new information to others, make decisions and reach conclusions, etc - all quite different from memorizing information.

1.2 Context and background

In setting out the rationale for this chapter a number of basic assumptions of interactive pedagogy that create the framework of the course CSE-110 in which it is situated must be stated. The first is to declare some definitions. I declare these as premises. They relate to a definition of teaching, a theoretical paradigm and a view on the nature of the modified system of the teaching endeavor.

1.3 Definition of teaching

“The aim of teaching is simple: it is to make student learning possible.” (Ramsden 1992:5). For the purposes of the thesis of this paper, teaching the course CSE-110 is taken to mean a set of activities that makes learning possible in students. While the aim is simple, the activity is complex because it involves

an array of understandings from discipline perspectives to which students are being introduced and in which they are invited to operate.

1.4 Interactive Learning Pedagogy

The pedagogy supported the traditional approach of teaching through frequent and sustained interaction between teacher and student in class room where professor lecturing and the students watching and listening.

In a traditional view of learning, complex skills can be broken down into simple skills. Each simple skill can be mastered independently, out of context, but only when all components are mastered can more complex thinking skills develop. In this view, the teacher is the active agent, imparting knowledge to the passive learner as though filling an empty vessel. Here teacher is active and learner is passive.

In a constructivist view Learners actively:

- Doing
- Trying
- Making mistakes
- Trying again

Now learners are active.

This pedagogy is divided into these five aspects of learning and planned accordingly. The five planning aspects in learning design are:

1. Learning Outcomes
2. Learners
3. Learning Activities

4. Learning Assessment
5. Learning Resources

The decision making-tools to help determine whether the course is good or bad.

1. Who are the learners or readers?

-The students of first semester of CSE or CS are the learner.

2. What learning goals or information outcomes do we want to achieve?

-The course's main goal is-

- To teach problem solving using algorithm.
- To learn basic structure of JAVA to apply their language of problem solving

3. How will we know when this happens?

-When the students complete the evaluation of task.

1. Learning Outcomes

It describes that what will happen after a unit of learning, which may include a description of the learned behavior, under what conditions it will be accomplished and the level it will be performed at.

Example: Considering the Java language course, after learning how to run the program through the steps 1st compile and then run the program, a student will be able to compile the program without any error, following the proper form.

2. Learners

Learners are those who have preferences for learning using different perceptual modalities and different intelligences.

Example: In the course CSE-110, the students are the learners.

3. Learning Activities

The activities of learners that what is done in order to be able to demonstrate they are learning.

Example: The activities, what and how to compile the program, the course teacher has to teach so that the learners can perfectly do the things and get the desire output of the program.

4. Learning Assessment

To evaluate cognitive objectives ask learners to state, describe, or list information, or select from a list or array of options.

Example: In the course CSE-110, checking by using a compiler whether the program has compile error or not.

5. Learning Resources

Learning Resources that cultivate learners inquisitive mind, encourages learning and satisfy all question of the mind of learner and leave some question to enhance creativity.

Example: In the course CSE-110, if a student wants to get an output from a summation of two variables, to run the program perfectly He/she has to know about identifiers, how to declare the variables, about the library functions etc.

From the five factors of learning, “Learning Activity” is chosen for the thesis of this paper to modify the course CSE-110. Learning Pyramid focuses learning activity.

2.1 LEARNING PYRAMIDE

The learning pyramid is an image that maps a range of teaching methods and learning activities onto a triangular image in proportion to their effectiveness in promoting student retention of the material taught.

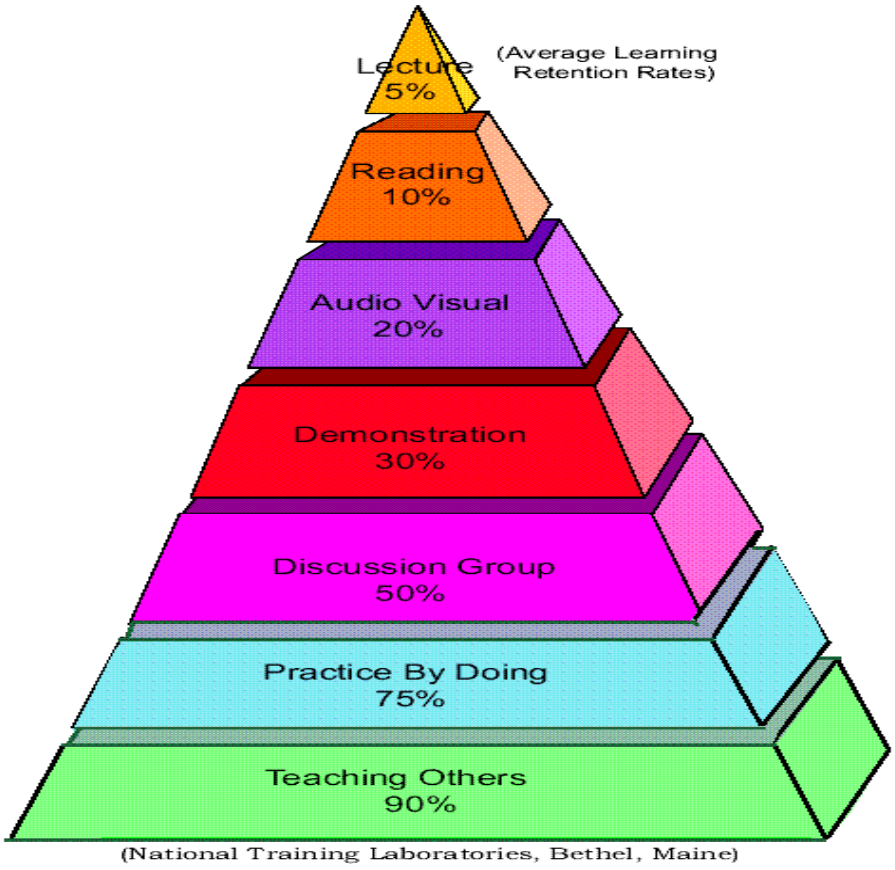


Figure 1: The Learning Pyramid

The percentage of the Learning Pyramid graphically demonstrates the average retention rates by students involved in passive and active learning.

2.2 Research of the learning Pyramid

The research base for the pyramid is difficult to establish conclusively. It was developed and used by the National Training Laboratory Institute at their Bethel, Maine campus in the early nineteen sixties, when that organization was part of the National Education Association's Adult Education Division. NTL believes it to be accurate but says that it can no longer trace the original research that supports the numbers. NTL acknowledges that in 1954 a similar pyramid, with slightly different Audio-Visual Methods in Teaching by the Edgar Dale Dryden Press, New York Bligh (1998) gives some evidence for the effectiveness of different teaching methods.

The methods included in the pyramid are:

- Lecture
- Student Reading
- Use of Audio-Visual aids
- Demonstration
- Group Discussion
- Practical activity by students
- Peer tutoring by students

In addition to the research base issue, thought was given to the clarity of the terms used. Coffey and Gibbs have reported difficulty in regard to misinterpretation of terms in the context of their repertoire of teaching methods (Coffey and Gibbs 2002). In the context of a practical exercise in a workshop

setting, the clarity issue seemed unlikely to cause problems. Indeed, the generic nature of the items was likely to promote discussion and sharing of experience, a positive benefit in the context.

The pyramid proved extremely useful as a stimulus for reflection and discussion of teaching methods, their uses and relative effectiveness, when used in teaching development workshops with experienced staff and beginning teachers in higher education institutions in Ireland. It was used in a series of workshops with staff in three institutions in Ireland in the course of 2003 and this report is based on these workshops. The groups brought together staff with varying lengths of experience, from different disciplines, including Humanities, Computer Science and Nursing.

2.3 Evidence for the relative effectiveness of teaching methods

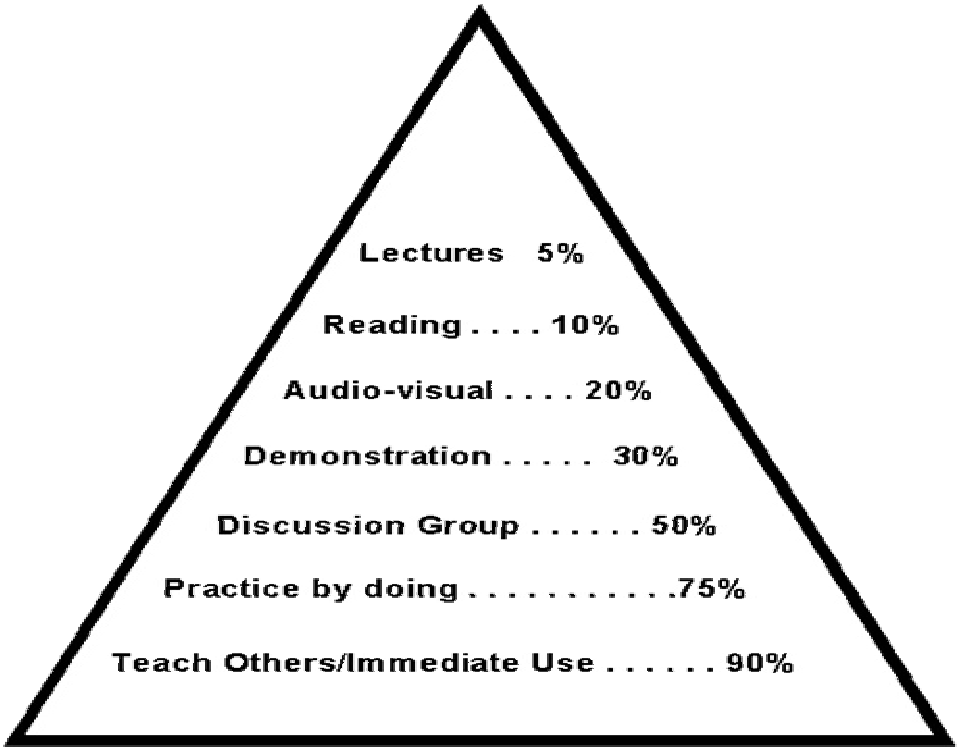


Figure 2. The Learning Pyramid

2.3.1 Lecture 5%

The lecture is the 'worst': on the whole our students cope with this by taking detailed notes, reviewing them just before the exam and committing the information to their short-term memories for and then forgetting most of what they had 'learned' presentation in the exam (or memorized!). Lectures tend to be regarded as 'efficient': one person passing on information to many. As well as giving information of course, it also explain things in lectures, but then it has to ask seriously what is required of the students to pass the assessment.

2.3.2 Reading 10%

Unsurprisingly, the participants in the pyramid consistently rated reading as more highly effective. Discussions centered on whether reading was an active learning method, and more such more effective than other methods.

2.3.3Audio-Visual 20%

The visual image acted as an important stimulus, with participants seeming to plot their experience onto it as onto a map and then finding ways of extending their territory. Although the activities listed were practical, and the introduction to the exercise offered no cue to amore theoretical discussion, the act of ranking the items as a group led the participants into the areas of values and theory.

2.3.4 Demonstration 30%

Working live, students have to solve problems, many of which they have not encountered before. Therefore they will want to learn and demonstrate how to solve problems and become skilled at it, accumulating digested information on the way.

2.3.5 Discussion Group 50%

The practical nature of the exercise, where participants could physically move the items, discuss the order and change the placement was helpful. It was possible to try things out, see how it looked without committing irrevocably to an answer. The physical movement also played a role as the group members walked round their space and repositioning the cards until consensus was achieved.

2.3.6 Practice by doing 75%

Practice by doing is generally more effective than learning by listening or reading is more effective. And when learning is by doing people are more likely to remember what they have learned, and more importantly are more likely to digest or process the information they are receiving and reflect on how they learned, especially if there are incentives for them to do this.

2.3.7 Teach others / Immediate use of learning 90%

According to the research leading to the development of the pyramid, the most effective tool for facilitating student knowledge retention is getting students to actively teach others. People tend to teach in the way in which they were taught. Many teachers use their own experience: they reflect on how they learn or have

learned things, and what they have found to be effective, and they try to apply these principles to how they teach, to help students learn. The teaching methods at the bottom of the pyramid are much more effective in encouraging effective student learning rather than 'remembering'.

3.1 CURRENT SCENARIO OF THECOURSE CSE-110

In the traditional approach of teaching, most of the time, in a typical classroom setting, students are involved only passively in learning is spent with the professor lecturing and watching and listening, i.e., in listening to the instructor, looking at the occasional overhead or slide, and reading (when required) the text book.

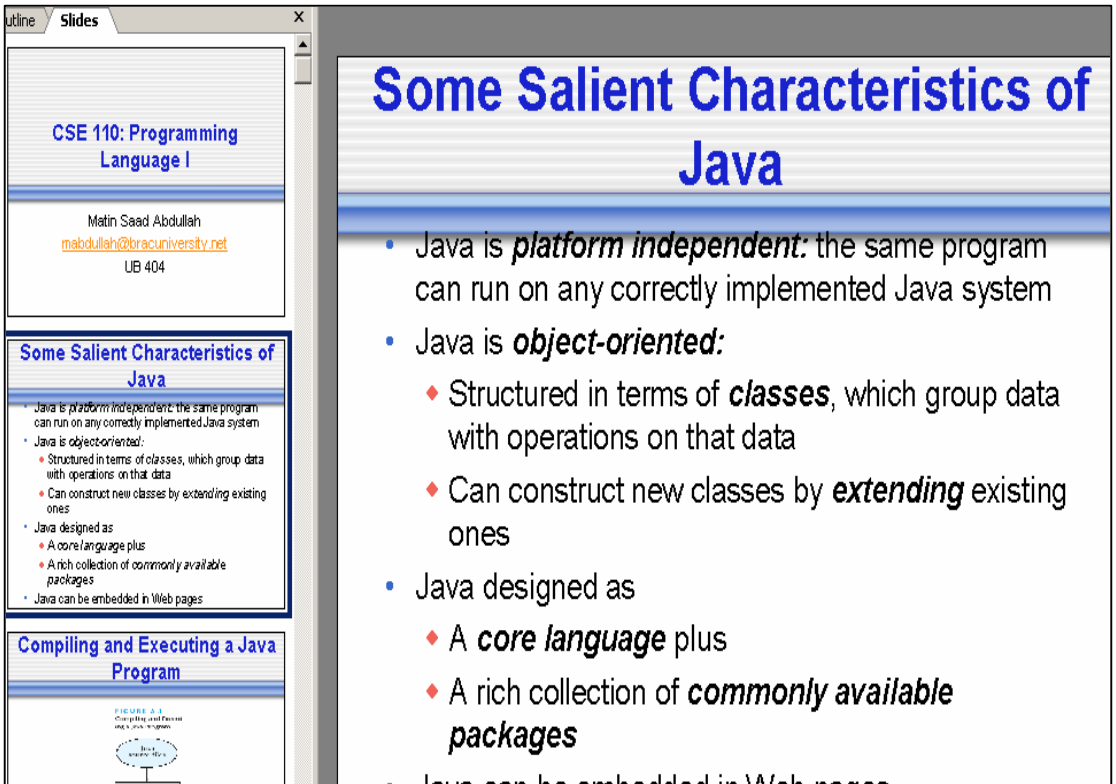
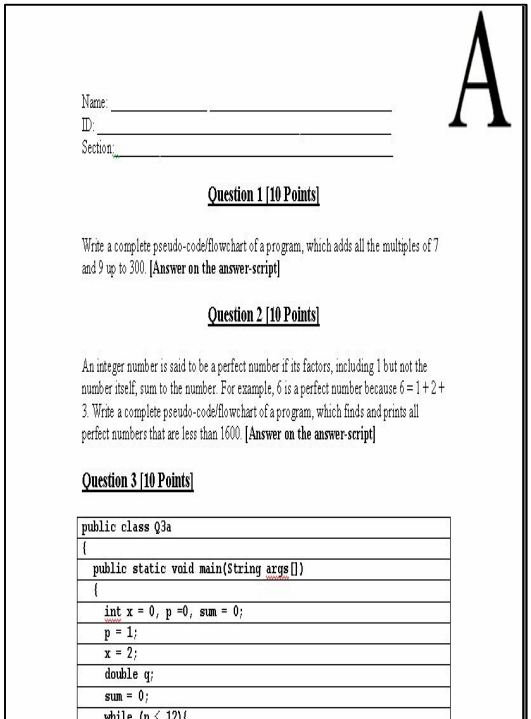


Figure 3: Lectures

3.2 Lectures

The lectures are enhanced with overheads, videos, and in-class demonstrations to which the students are generally receptive. Unfortunately, given the significant amount of content to be covered during class time, there is very little time left for group discussions interaction that could have not created a more active, or participatory learning environment. Moreover, students are reluctant to ask questions or to share their relevant experiences during class time, even when encouraged to. There is also homework or assignment, which is given to the students according to the regular class.



A

Name: _____
ID: _____
Section: _____

Question 1 [10 Points]

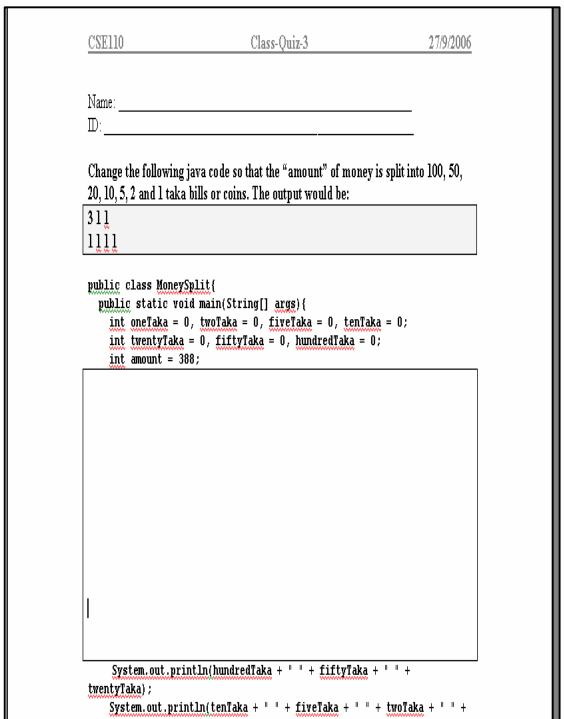
Write a complete pseudo-code/flowchart of a program, which adds all the multiples of 7 and 9 up to 300. **[Answer on the answer-script]**

Question 2 [10 Points]

An integer number is said to be a perfect number if its factors, including 1 but not the number itself, sum to the number. For example, 6 is a perfect number because 6 = 1 + 2 + 3. Write a complete pseudo-code/flowchart of a program, which finds and prints all perfect numbers that are less than 1600. **[Answer on the answer-script]**

Question 3 [10 Points]

```
public class Q3a
{
  public static void main(String args[])
  {
    int x = 0, p =0, sum = 0;
    p = 1;
    x = 2;
    double q;
    sum = 0;
    while (p < 12){
```



CSE110 Class-Quiz-3 27/9/2006

Name: _____
ID: _____

Change the following java code so that the "amount" of money is split into 100, 50, 20, 10, 5, 2 and 1 taka bills or coins. The output would be:

```
3 1 1
1 1 1 1
```

```
public class MoneySplit{
  public static void main(String[] args){
    int oneTaka = 0, twoTaka = 0, fiveTaka = 0, tenTaka = 0;
    int twentyTaka = 0, fiftyTaka = 0, hundredTaka = 0;
    int amount = 388;
```

```
    System.out.println(hundredTaka + ' ' + fiftyTaka + ' ' +
twentyTaka);
    System.out.println(tenTaka + ' ' + fiveTaka + ' ' + twoTaka + ' ' +
```

Figure 4: Midterm **Figure 5: Quiz**

The given figure 3, Figure 4 and figure 5 are described the current situation of our teaching system, how our students are gathered their required knowledge through the course by regular lectures, weekly quizzes, middle of the course Midterms, and semester final. There is also a weekly lab session and a project for final.

3.3 Quizzes and Midterm

There are minimum six quizzes are taken and from those, best quizzes are counted. After every quiz class teacher give the solution of the quiz so that the student can solve his/her mistake. After midterm the course teacher also give the solution of the midterm.

3.4 Labs

There are maximum ten labs in the whole course and a lab project is given to the students through the whole course. Labs are going through according to the class lecture. After finishing the required topics the lab tasks are set. There is also homework, which is given to the students according to the regular class.

4.1 MAPPING CURRENT STUTAS OF CSE-110 ACCORDING TO INTERACTIVE LEARNING PEDAGOGY

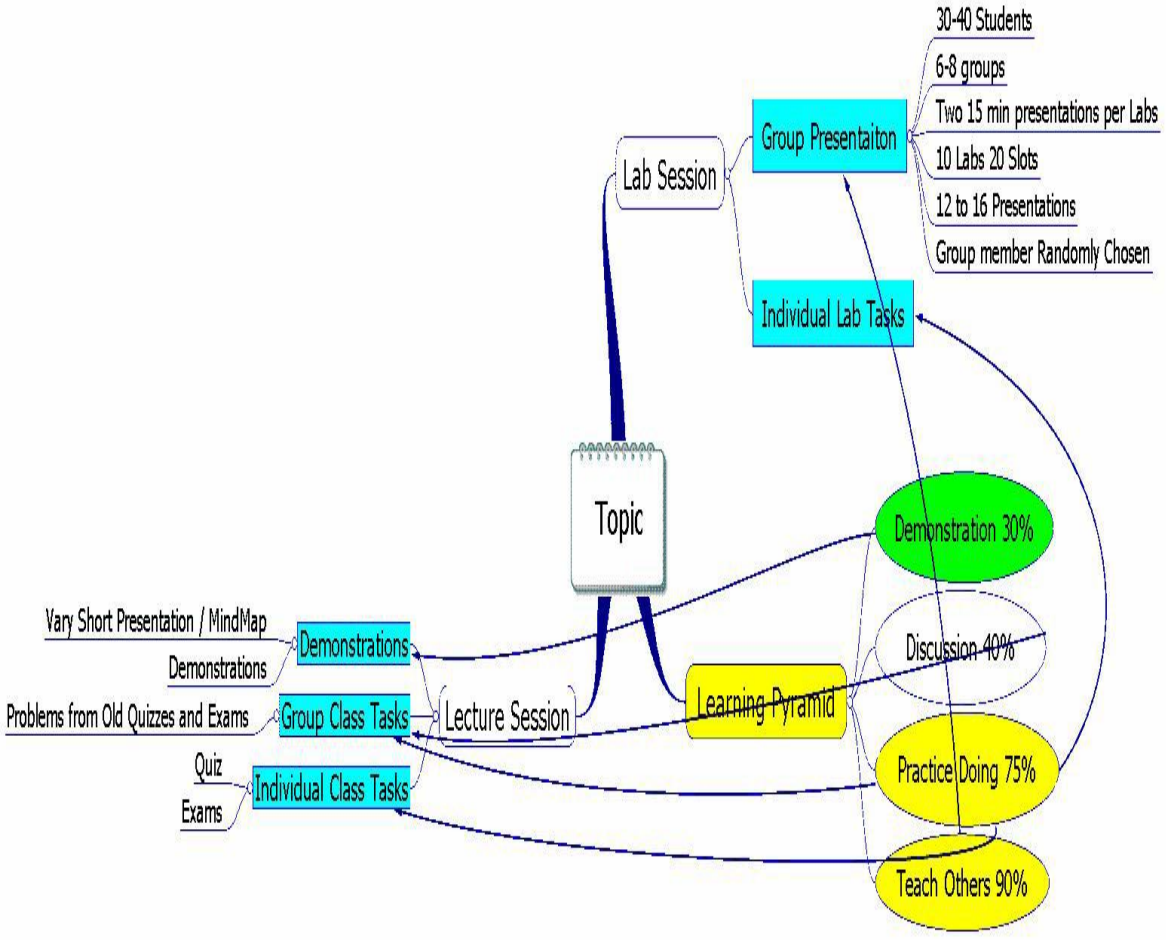


Figure6: Modified Current Status

The current status of the course CSE110 is mapped from the Learning Pyramid that follows the interactive learning pedagogy. Figure6 shows the mapped design of the system where a broad topic is considered the whole scenario. Four activities of Learning Pyramid are considered for this system Demonstration, Discussion, Practice by doing and teach others.

4.2 Lecture session

There will be no lectures in this pedagogy. Instead of lectures there will be three activities Demonstration, Group Class Tasks and Individual Class Tasks. For demonstration it can be adopted a very short presentation or mind map and demonstration. It is under the activity of demonstration. Group Class tasks can be adopted problems from old quizzes and exams. It is under the activities of Demonstration and Practice by doing. And for Individual Class Tasks can be adopted quizzes and exams. It is under the activity of Practice by doing.

4.3 Lab session

The lab session is divided into two activities, Group Presentation and Individual Lab Tasks. There are some activities in Group Presentation like there will be 30-40 students which are divided into 6-8 groups and the members will be chosen randomly. There will be two 15 minutes presentation and ten labs for twenties slots. Group presentation is under Teach Others activity, which encourages students to digest information so that they can present it to the group and can also be explained and used confidently. Individual lab tasks are the activity under practice by doing teaching tool, which help the students to digest or process the information that they are receiving and reflect on how they learned, especially if there are incentives for them to do this.

5.1 REMAPPING AND RESTRUCTURING CSE-110 ACCORDING TO OUR FINDINGS

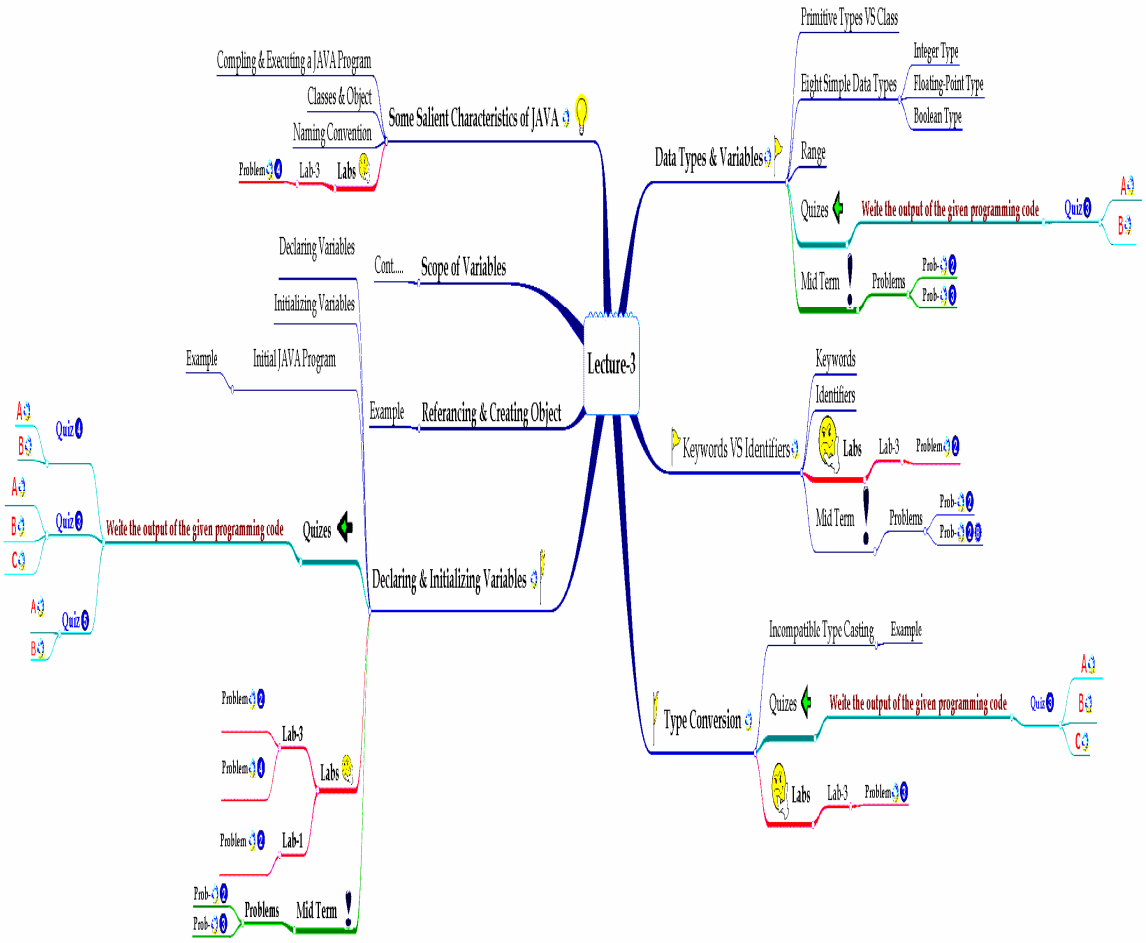


Figure 7: The Map of Proposed Activities

The figurer 7 is the redesigning and restructuring form that is one of the samples of the whole course where students are gone through the presentation with different topics. In this system the previous day teacher will give that short brief of the different topics, the next day the selected presentation groups will present the

topic elaborately which topic is given to them. Besides of these, if a student wants to solve the problem of midterm, quiz or final questions they will have to go through the marking topics and subtopics. They can also use the hyperlink, which are concluded with different topics to get the details.

5.2 Conclusion

The redesigning and restructuring the CSE-110 course will have provided much use of multiple teaching methods and established an effective system to monitor student learning. This pedagogy is student-directed which encourages self-sufficiency and is a preparation for life-long learning, and promotes active and deep learning. One area that the redesigned the course CSE-110 have stressed the use of without traditional lecturing process in education. It often includes or requires peer teaching, which encourages students to digest information so that they can present it to the group with some degree of authority and can also be explained and used confidently. And in the end, this pedagogy encourages, and indeed requires, reflection on the learning process.

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