

Chapter 18

E–Assessment of Cognitive Skills in Outcome–Based Education for Object–Oriented Programming: A Graduate–Level Experimental Report

Jeya Mala Dharmalingam
Thiagarajar College of Engineering, India

ABSTRACT

This chapter describes how the Edmodo and Moodle—the open source learning management systems (LMS)—can be used for e-assessment to evaluate the cognitive skills of students in programming paper such as object-oriented programming, where the practical content has programming constructs, debugging code snippets, analysis of results when employing different language constructs to solve the same problem, etc. This work shows (1) how Edmodo could be used to submit the assignments on time with timely reminders, access the external tools, and the analysis of the results to improve the performance assessment online, and (2) how Moodle plays a vital role in making the learning process an easier one. Based on the experience gained on teaching object-oriented programming subject with e-assessment based on Edmodo to help OBE to achieve better results, this chapter provides as a case study for further application and research in this area.

INTRODUCTION

Nowadays, the World is highly technologically advanced and the students or learners are generally highly connected via one or the other gadgets or devices. The problem here is, even though these technological advancements have positive aspects, they are tremendously taking the students' learning time and thus lead to lack of understanding of their subjects. Especially, when it is coming on to the programming language subjects, the teachers' task is highly challenging as it involves the testing of students' cognitive

DOI: 10.4018/978-1-5225-5936-8.ch018

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skills. Generally, the cognitive skills are the core skills the brain uses to think, read, learn, remember, reason, and pay attention. In order to help the students to apply all of their cognitive skills to excel in their subjects, Outcome Based Education (OBE) comes into the picture.

Generally, the components of OBE are Course outcomes, Program outcomes and program educational objectives. To achieve this, it is necessary to modify the teaching and learning process and the evaluation process. For theoretical subjects, the tasks may be less complex as the degree of cognitive level will be lower may be from Remember, Understand and Apply, but as discussed, it is highly challenging for programming subjects as the students have to logically think and write programs to solve the given real time problem. Hence, the students need to be tested based on the higher order cognitive outcomes such as Apply, Analyze and Create levels.

There are different levels of assessments in OBE. They are namely:

- Traditional Assessment
- E-Assessment for Cognitive Skills

In traditional assessment techniques, the teacher will simply provide questions in the form of a questionnaire at the end of each module completion or at the end of each month time to assess the students' test and assign marks for them. Here, the focus is purely on evaluating the outcome of the students in terms of marks and not on how they performed the test in terms of their cognitive skills evaluation. Hence, the traditional evaluation method simply assesses the students' understanding and will award marks based on their answering skill on a given question.

Basically, the traditional assessment techniques will have the technique of teach-test-assess pattern in which the teachers' role is to teach, conduct test and assess the outcome of the student purely based on their remembrance and understanding levels. In some cases, this may extend up to a maximum of applying some concept to a problem given. Hence, this traditional teaching technique will span at two to three months duration practice that consists of two or three formative assessments and finally one summative assessment technique which is conducted only at the end of the semester.

Hence, traditional assessment technique does not focus on students' cognitive skill assessments in terms of analyze, evaluate and create levels. Also, it does not provide a way to assess the students understanding in a continual manner in terms of in-class assessment, quiz or some online code contests, debugging events etc.

E-Assessment for Cognitive Skills on the other hand not only focuses on the primary learning skills of students such as remember and understand but also focuses on apply, analyze, evaluate and creates types of skills of the students or learners. This is generally achieved by means of continual assessments conducted throughout their learning spectrum in their semester. This is generally achieved by means of Learning Management Systems (LMS) tools available online.

The objectives of this chapter are twofold: (i) to provide the impact of the application of ICT tools in enhanced teaching-learning and evaluation processes (ii) to monitor the E-Assessment techniques in order to evaluate the cognitive skills of the students at various levels.

In this chapter, the traditional practices followed in both the teaching-learning process and the evaluation process have been modified using the Learning Management Systems namely Edmodo and Moodle to help the students to achieve the required cognitive level. Their progress has been monitored periodically using these tools and the progress assessment has also been done using them. The Learning Educational Resources (LeDs) in terms of videos, ppts, pdfs and documents have been created and the

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