Investigating current object oriented programming assessment method in Malaysia’s universities

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One of the most influential programming paradigms today is object oriented (OO) programming and it is widely used in education and industry. Recognizing the importance of equipping students with OO knowledge and skill, it is not surprising that most Computer Science degree programs offer OO-related courses. Deciding how to assess each student’s programming skill is one of the biggest challenges for educators who teach programming courses. Traditional approach of assessment of object oriented programming courses provides a method for assigning numerical scores to determine grades. This approach rarely reveals information about how students actually understand and can program with OO characteristics or apply their OO knowledge to solve programming problems. This paper summarizes current trends in educational assessment and relates these to the assessment of student outcomes in OOP courses. The method used for this investigation is by conducting surveys amongst OO programming educators in a few Malaysia’s universities. Results from this survey, it shows that there is a need to have a better assessment approach in trying to better understand and facilitate the quality of assessment for OO programming.

1. Introduction

Object oriented programming is one of the important courses in computer education and present unique challenges with regard to teaching, learning and assessing student progress. Assessing students in educational system is a practice that ensures a degree of accomplishment through educational process (4). By doing assessment, we will know the level of knowledge and skills that students have acquired, their strength and weaknesses as well as the effectiveness of the curriculum. Thus assessment is an important element in most of education programs.

Deciding how to evaluate each student’s programming skill is one of the biggest challenges for educators who teach programming courses (1). There are numerous techniques to evaluate students programming skills. The traditional approach to assess students programming skill consists of written exam and programming assignments. Normally, educators give programming assignment to test student program writing abilities, and they give a written exam to test how much students understand the concepts of OO. Students will be given a grade based on their answers. The problem with this approach is that grades do not reflect the actual programming skills that the students have acquired. Quite often students get good grades but still have problems with actual programming.

This paper reports work to investigate the current approach for assessment in object oriented programming courses. A brief introduction regarding to assessment will be discussed in the first section. This will followed by the discussion on the methods used to identify current assessment techniques applied in most of Computer Science educations program at Malaysia’s universities.

2. Assessment Concept

The term “assessment” is often used in different contexts and means different things to difference people. Assessment is an ongoing, systematic process that involves establishing clear and measurable expected goals of students learning. Assessment also refers to the concept of gathering, analyzing, interpreting and applying information. According to American Association of Higher Education, assessment is a systematic process of looking at student achievement within and across courses by gathering, interpreting and using information about student learning for educational improvement. The result for assessment is usually used for continous improvement of teaching and learning. Assessments disclose and close the gap between curricular goals and student outcomes.

Assessment can be divided into formative assessment and summative assessment. These two categories of assessment are distinguished by the point at which the assessment occurs in a program. Formative assessment is usually being carried out at the beginning or during a program. It provides the immediate proof for student learning in certain course or certain point in a program. One of the examples for formative assessment techniques is classroom assessment. This technique is used to collect feedback on how well the students are learning what they are being taught. The purpose of classroom assessment is to provide faculty and students with information and insights needed to improve teaching effectiveness and learning quality.

Another type of assessment is known as summative assessment. Summative assessment is used to check the level of learning. It is usually being carried out at the end of the
program in order to generate a grade that reflects the student’s performance. The most common techniques of summative assessment are the final written examination. Students will be given a grade based on the correctness of their answers.

2.1 Purpose of assessment
Why do we conduct an assessment? Assessment serves several purposes. The main idea of assessment should be to improve student learning (3). Other purposes of assessment include:

- To identify problems within a particular curriculum and establish an emphasis of particular skills areas within the curriculum. Such assessment can indicate the degree of success of a program or to foster continuous improvement.
- To provide information to students about how well they have learned a particular topic and where they are having difficulty.
- Students learning studies can be used to communicate learning achievement for specified outcomes. Students can determine their overall strengths and weaknesses in learning the course.
- To provide information to educators about individual students’ understanding on particular topic

Regardless of the specific purpose of an assessment, incorporating an assessment program in classes offers a way to reflect about what are we doing and to find out what is really happen in classes. It provides a systematic way to gather and evaluate information to be use to improve our knowledge on students in particular courses. By using assessment, we can help students at assessing their own skills and knowledge.

The next section in this paper will discusses about current assessment techniques in most of the programming courses in Malaysia’s universities.

3. Method
There are several ways to gather assessment information, and it is recommended that multiple methods be used to provide more complete representation of students learning (2). For this research, we would like to investigate the current assessment approach applied by most of computer science faculty in Malaysia’s universities. We choose to use questionnaire as it is a method for the elicitation, and recording, and collecting of information. The advantage of using questionnaire is that it gives you feedback from the point of view of the user. If the questionnaire is reliable, and you have used it according to the instructions, then this feedback is a trustworthy sample of what you (will) get from your whole user population. Additional advantages are that questionnaires are usually quick and therefore cost effective to administer and to score and that you can gather a lot of data using questionnaires as surveys. And of course, questionnaire data can be used as a reliable basis for comparison.

We have distributed a few questionnaires among object oriented programming educators in few universities around Malaysia. The main purpose of this survey is to investigate the current approach applied by these universities when conducting assessment for their object oriented programming courses. Among universities that participate in this survey are as follows: University of Malaya (UM), National University of Malaysia (UKM), International Islamic University (IIU), University of Science Malaysia (USM) and University of Technology Malaysia (UiTM). A few educators who involved in teaching object oriented programming has been identified to take part in this survey. They were given a set of questionnaire related to object oriented programming courses.

The questionnaire has been divided into four parts. In part one, it consists of questions regarding to profile of the educators. While part two, questions related to object oriented programming courses and assessment are being asked. Questions on the need for object oriented programming skills assessment are being asked in part three. This is followed by other comments on object oriented programming skills assessment in part four.

4. Result and Discussion
It has been found that all universities offer OO programming courses in their computer science education programs. All faculties introduce procedural programming first followed by OO programming and C++ and Java as the programming language (figure 1).

![Figure 1: Programming languages used](image)

Based on the survey, we have found that most of the universities applied both summative and formative assessment. There are four (4) types of assessment method that is currently applied by most of the computer science faculty: written examination, practical examination, programming assignment and viva.

a) Written examination
This is a traditional written examination covering the concepts of object oriented programming. The examinations include multiple choices, true/false or structured questions and it is done under comparatively short timed conditions. Major criticism for this type of assessment is because of the relatively short time allowed, answers may unavoidably be apparent and not all the learning outcomes may be assessed.

b) Practical Examination
In practical exam, students are required to write applications in a controlled environment and they must work individually. This approach requires students to be able to apply concept and technique in object oriented that they have learned during the class. Thus, through practical examination, the actual programming skills can be determined.

c) Programming assignment

Programming assignment is type of assessment where it gives the opportunity to the students to implement techniques of programming explained in class. It also provides the opportunity for the students to practice their programming skills. Assignments may be done individually or in groups. Students is also allowed to refer to external outsource. The major problem with this technique is that it is subject to plagiarism.

d) Viva

Other technique that is being used is viva. Viva is the techniques of assessment where the students must answered the questions orally. In a comparatively short of time, it is possible to ascertain both what the student knows and the depth of understanding. But the problems with this type of assessment is that it requires one-to-one meeting with the students and for programming courses it is quite difficult to evaluate their programming style or programming skills thru answering the questions orally.

Summarization of the techniques of assessment for object oriented programming courses that has been applied by most of the universities in Malaysia can be referred in Table 1.

<table>
<thead>
<tr>
<th>Type of assessment</th>
<th>Universities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>UM</td>
</tr>
<tr>
<td>Written examination</td>
<td>Yes</td>
</tr>
<tr>
<td>Practical Examination</td>
<td>Yes</td>
</tr>
<tr>
<td>Programming assignment</td>
<td>Yes</td>
</tr>
<tr>
<td>Viva</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Table 1: Assessment Techniques in Malaysia’s Universities

For future work, based on the result from this preliminary investigation, we would like to investigate more on what is actually OO programming skill and what is the best way to assess these skills by developing appropriate framework. We will conduct a thorough document analysis and interviews with OO expert to identify OO programming skills.

5. Conclusion

Educators perform a variety of assessments in order to determine what students understand. Summative assessment determines what student has learned during a course, while formative assessment is an ongoing process where teachers want to know the student’s current understanding. In our current work, we would like to investigate the current approach of assessment adopted by most of computer science universities in Malaysia. We are also exploring the problems with current assessment method for object oriented programming courses. From this preliminary investigation, we have found that most of the educators agrees there is a need to have a framework for assessing OO skill rather than represent students ability to understand the concept of OO using grades and marks.

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References