

## *Integrating Formative Assessment into University Education*

Nuttanart M. Facundes, King Mongkut's University of Technology Thonburi,  
Thailand

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### **Abstract**

The role of assessment should not only measure if and how students learn, but also enhance learning. With this motivation, formative assessment was studied and integrated into several computer engineering courses at King Mongkut's University of Technology Thonburi. This paper discusses the nature and role of assessments as well as presents the experience of integrating formative assessment into university education.

Keywords: formative assessment, university education, learning

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## **Introduction**

For education at any level, assessment should effectively measure if and how students learn. Generally, there are two types of assessment. Summative assessment (SA) or end-of-semester assessment provides a summary judgment about the learning achieved after some period of time. It can be used to improve teaching and learning but its primary goal is to inform external audiences for certification and accountability purposes. Formative assessment (FA) is to check students' knowledge and performance along the learning process to close the gap between students' current level of understanding and the desired state via various pedagogical actions.

Summative assessment is more common in the university education. However, it does not always reflect what students have actually learned. This is because SA assesses the final product and is thus more product-oriented, whereas formative assessment focuses on the process toward completing the product and identifies areas that may need improvement. This paper discusses the integration of formative assessment (FA) into university education at King Mongkut's University of Technology Thonburi.

## **Role and Nature of Assessments**

Assessment is an essential part of teaching and learning process. Overall, assessment is a way of determining what students had learned. Both summative and formative assessments gather information relating to student's learning but at different points. For university education, summative assessment is more common since the university needs to meet up with standards, certification and accountability. Summative assessment is called 'assessment **of** learning' or something to check if students meet the required standards or criteria. In the meantime, formative assessment is carried out along the learning process to determine how much learning has taken place. FA is, thus, 'assessment **for** learning' (Gipps and Stobart, 1997). It is part of learning process whose function is to provide feedback and help students improve their performance. In other words, FA is forward looking whereas SA is backward looking or judging since FA uses information to adapt teaching so that learning is proceeding to the right direction.

One might question: what is the problem with SA? SA uses formal, standardised tests. But the test content is often too simplistic to represent broad ranges of skills and knowledge that have been covered in a course. Overreliance on testing, for both teachers and students, brings about rote and superficial learning. Also, since summative assessment is more manageable, educators tend to adopt it at the cost of learning.

As for FA, some instructors or educators claim that there is not enough time to incorporate FA into their courses, i.e. they do not have time to assess students along the way since they are afraid of not covering enough of the contents. However, the more they try to cover, the less students are actually learning. Without time to reflect on and interact meaningfully with new information, students are unlikely to retain much of what is "covered" in their classrooms.

## Integration of Formative Assessment

Assessment here is regarded as the way to enhance learning instead of simply measuring or judging students. Apart from helping students to really learn, three major benefits of formative assessment that we consider include: improving equity in student outcomes, raising student's attainment and, most importantly, building 'learning how to learn' skills. These benefits are our motivation to integrate formative assessment into the university education.

Since teaching and learning is a collaborative process, the integration of formative assessment involves both teachers and students. For integrating FA into the courses, the following framework is proposed:

For each class, the learning intention (i.e. what students are going to learn) should be presented clearly to the learners (instead of focusing on the tasks, see Table 1 below). Also, the success criteria (to assess whether and how well students have learned) should be stated and discussed. This is so that students will take learning as their own responsibility, not only something that they have to do to pass the course or to receive the degree. Ultimately, this will bring students to have self-assessment as well as peer assessment which will make them truly learn and achieve in education.

Table 1: Learning Intention (adapted from William, 2011)

<b>Unclear Learning Intention</b>	<b>Clarified Learning Intention</b>	<b>Context of Learning (Task)</b>
To be able to write instructions on how to change a bicycle tire	To be able to write clear instructions	Changing a bicycle tire
To be able to present an argument for/against assisted suicide	To be able to present an argument either for or against an emotionally charged proposition	Assisted suicide
To produce and analyse a questionnaire about movie going habits	To construct and analyse questionnaire data	Movie-going habits
To design an experiment to find out what conditions pill bugs prefer	To design fair tests for scientific questions	Preferred habitat of pill bugs

Now we will turn to consider what constitutes formative assessment. At first, formative assessment was described as mostly relevant to giving feedback to students so that they can improve. Traditionally, in marking system that focused on scores, feedback that the teacher gave was normally too little, too late, too vague and too impersonal. Also, students were mostly interested on the scores they received and ignored any comments or feedback. Therefore, feedback had not been optimally used. William and Thompson (2007) proposed the framework for implementing formative assessment (including providing better, meaningful feedback). This framework consists of: where the learners are in their learning, where they are going and how to reach there. They also recommended that formative assessment should be built up from the following strategies.

1. Clarifying, sharing, and understanding goals for learning and criteria for success with learners
2. Engineering effective classroom discussions, questions, activities, and tasks that elicit evidence of students' learning
3. Providing feedback that moves learning forward
4. Activating students as owners of their own learning
5. Activating students as learning resources for one another

Based on these strategies, we have implemented FA into Computer Engineering courses at King Mongkut's University of Technology Thonburi (KMUTT) using various techniques. First, the traditional classroom culture is changed to remove students' fear and make them feel good in learning. For example, in CPE 113 Algorithms and Data Structures course, instead of traditional quizzes, we apply 'anti-quizzes' which have the same characteristics as normal quizzes but instead of quizzes to be done individually, an anti-quiz is something to be done together by students of the whole class, with the help from the teacher in answering questions. Therefore, the purpose of anti-quizzes is not about the scores but the understanding of the learners. Students were interested in this new kind of activity as well as their worriedness about marking or scores from quizzes was removed.

Next, the instructional methods have been varied. Traditional, in-front-of-the-class lectures do not work well with formative assessment. Considering that the purpose of lecture is to deliver information, we apply various approaches to describe new concepts as well as allow students who have grasped the concepts to help their peers. For example, students were asked to volunteer to come to the front of the class, one student after another, and write parts of the solution of the question posted on the whiteboard until the solution was complete. The questions and solutions were used to explain certain concepts instead of lecturing.

Subsequently, we carried out the peer review process in CPE 601 Technical Research Writing course. Peer review as well as self-review methods allow learners to practice meta-cognition or higher order thinking skills such as reflecting and providing feedback and to have autonomy towards their lifelong learning skills. For the review process, first, the guidelines for peer review were prepared and given to the students. This was so that when students did peer review, they did not review freely but followed the guidelines which would make the review useful for both the reviewer and the reviewee. The guidelines consist of questions for the reviewer to answer when conducting the review. For example, the reviewer was asked to list the strengths and weaknesses of the paper and to point out the parts which were not clear or hard to understand. The final question in the guidelines was about what the reviewer has learned from reviewing that would benefit his/her own paper.

After students are equipped with the guidelines, some assignments that were submitted to the teacher for grading were distributed to other class mates as well after deleting the names of the owners of assignment. In this way, students did not feel pressure because they obviously did not know who owned the assignments given to them for peer-review. This review process gave the new perspectives to both the reviewer and the reviewee. The reviewer learned about the things that the instructor looks for in an assignment. As for the reviewee, after reading the results of peer review, students gained new perspectives about the assignments.

Finally, formative assessment has been incorporated and standardized into the computer engineering project course, CPE 401, for the fourth-year students of computer engineering department at KMUTT. Previously, some students procrastinated or worked on their project in the last minute at the end of the semester. This resulted in low quality projects or projects that could have been much better if students had spent more time working on them. Therefore, we apply the idea of formative assessment by dividing the project into smaller assessment tasks or milestones and scheduling frequent meetings between advisor and advisee(s) of the project to provide feedback. The benefits of integrating formative assessment into this course include: distribution of student effort evenly across time according to the assessment tasks, clear communication of expectations to students and providing feedback to help student learn and solve the problems concerning their projects. These methods have been applied successfully for the computer engineering project course for several years now.

### **Conclusion and Suggestion**

In university education, the true value of assessment should be to enhance learning and not simply measuring or judging students' performances. If assessment is for the purpose of meeting standards or accountability, then we should aim to raise the bar for everyone and not only for some students. We believe that formative assessment is the solution. In this paper, the philosophy behind formative assessment was discussed and the experience in implementing FA at the computer engineering department of KMUTT was presented. We hope to have shown that FA is suitable for modern university education and generation-Y learners.

## References

- Black P. and Wiliam, D. (1998). Assessment and Classroom learning. *Assessment in Education: Principles, Policy and Practice*. CARFAX, Oxfordshire, Vol. 5, No. 1, pp. 7-74.
- Gipps, C.V. and Stobart, G. (1997). *Assessment: A Teacher's Guide to the Issues*. 3<sup>rd</sup> ed. London: Hodder & Stoughton.
- OECD (Organization for Economic Cooperation and Development). (2005). *Formative Assessment: Improving Learning in Secondary Classroom. Policy Brief*.
- William, D. (2011). *Embedded Formative Assessment*. Bloomington, IN: Solution Tree Press.
- William, D. and Thompson, M. (2007). Integrating Assessment with Instruction: What Will It Take to Make It Work? In C.A. Dwyer (Ed.), *The Future of Assessment: Shaping Teaching and Learning*. Mahwah, NJ: Lawrence Erlbaum Associates.

**Contact email:** [nuttanart@cpe.kmutt.ac.th](mailto:nuttanart@cpe.kmutt.ac.th)