Teachers' views on combining assessment elements into a holistic assessment concept

Eva Frühwald, Olof Kolte, Arben Mullai, Joakim Nordqvist and Magnus Persson

Abstract—**Assessments of students' knowledge and skills are sometimes habitually performed, but the design of proper assessment concepts – beneficial to both teaching and learning – ought to be a central issue for all course planners in higher education. The main purpose of this paper is to discuss a variety of assessment elements, as well as ways in which to combine them. It uses experiences from Lund University's Faculty of Engineering (LTH) to provide suggestions and advice for course planners. The discussion is based on the combination of a literature review in the field of teaching and learning, of empirical material obtained from surveys and group discussions with 22 teachers at LTH, and of the authors' own experiences in their capacity as course leaders and teachers. The study reveals a preference for projects and written assessment, as compared with the less preferred individual oral assessment. The paper indicates potential for quality enhancements through the adapted tailoring of assessment elements into holistic assessment concepts.**

I. INTRODUCTION

THE point of departure of this study is the need for guidance that we, the authors, all perceive in our capacity as teachers at Lund University's Faculty of Engineering (LTH) when we are faced with the task of designing, adjusting or just implementing modes of student assessment within courses. To teach students and then assess what they have actually interiorised is not a straight-forward exercise. When choosing between assessment instruments, we have to strike a balance between a multitude of constraints and objectives: for example between, on the one hand, what is practically possible given the group size and the time available to teachers, and, on the other hand, what is effective when it comes to helping both students and teachers to achieve the goals defined in the learning outcomes of the course.

Many courses on university level are assessed by "faculty standards" sometimes based on the implicit assumption that "it has always been like this, therefore it is the best". What we suggest in this study is that it can be useful to consider different types of assessment. A new assessment concept might better inspire and motivate both teachers and students to improve their performance.

This paper is part of an original report [1]. It is based on a combination of literature studies and an empirical study carried out during a pedagogical course held at LTH during 2008.

II. LITERATURE STUDY

Within higher education, assessment has multiple *purposes*. We discern the following three: (i) the pedagogical purpose, with a focus on fostering and encouraging continued learning [2]–[4], (ii) the performative purpose, which is manifested in the official verification and certification of the extent of students' capacities [5]–[7], and (iii) the indicative purpose, which is to evaluate (often quantitatively) the degree of success or failure of the teaching and learning process for a particular edition of a course [8].

One can also distinguish between two different assessment *modes*: formative assessment, used for providing feedback to both students and teachers, and summative assessment, focusing only on student performance. Studies have shown that a formative assessment approach helps student learning [9]–[10].

Alongside the purposes and modes of student assessment, our discussion here also relates to the *quality* of achieved learning, which is often referred to as a progression from surface towards deep learning [11]. Benjamin S. Bloom's "taxonomy of educational objectives" [12] offers a way in which to systematically categorise learning levels in six discrete steps along this dimension, by 1: knowledge, 2: comprehension, 3: application, 4: analysis, 5: synthesis, 6: evaluation [13]. We agree that teaching and assessment, both, should strive to attain deep learning, i.e. a high level on Bloom's scale. Students should, after a course, be able not only to retell memorised facts (having prepared for indicative assessment, possibly only to forget about them shortly afterwards), but also to compare, transfer and synthesize the information that they present.

We note that the Swedish system for higher education is highly modular, consisting of a series of separate courses that are assessed independently of one another. Only in some cases do students have to pass certain courses in order to proceed to subsequent ones. Course assessment elements, appearing to students as an array of often incoherent tests, are carried out consecutively by various academic departments, while

Eva Frühwald, Division of Structural Engineering, LTH
Olof Kolte, Division of Design Sciences, LTH
Arben Mullai, Division of Industrial Management and Logistics, LTH
Joakim Nordqvist, Department of Technology and Society, LTH
Magnus Persson, Division of Water Resources Engineering, LTH

aggregated degrees are awarded by the university or college, based solely upon students' accumulated assessment records [4]. For course assessors, unable to transcend their modules, this design presents a challenge particularly to the implementation of pedagogically oriented and formative assessment concepts that promote learning depth.

III. MATERIALS AND METHODS

As part of a teachers' inspirational course at LTH, we conducted a Participants' Seminar on the topic of student assessment. The attendees (22 teachers, ourselves and instructors included) were presented with a course in Design of Timber Structures (DoTS) [1]. In a first survey, the participants were asked to recommend appropriate assessment elements or concepts for the course, but also to tell what assessment elements they advise against. Here, the teachers had to define assessment elements themselves. After that, they were divided into five groups of 3 to 4 persons and given 30 minutes during which to discuss the applicability of a given assessment concept for the DoTS course, a different one for each group. The groups then presented their findings and opinions to each other. The five assessment concepts were:

- Seminar with oral presentation of design project with 2D- or 3D-visualizations
- Individual oral examination
- Project work, report writing with continuous supervision
- Written home assignment, with feedback-seminar
- Final written examination.

After concluding discussions, all participants were asked again, in a second survey, to individually recommend or advise against assessment elements or concepts for this course.

IV. RESULTS AND DISCUSSION

The results of the two surveys are shown in Table 1. It was made clear both from the surveys and from the general discussion that most of the participating teachers recommend assessment by project assignments, either with or without oral presentation and opposition/defence. It is interesting to see that oral examinations are recommended and advised against by about an equal number of teachers, whereas more teachers are positive to written examinations than against. Many teachers agree that direct communication *is*, in principle, a good method for assessing the knowledge of the students, and they generally approve of the oral assessment concept as such. Still, despite the fact that only a few of the participants actually had any experience with oral assessment, most of them believed that oral examination is a more time intensive activity than written examination. According to a study by Larsson [14], however, oral assessment takes more time than written examination only when the number of students is 60 or more, and it actually takes less time when this number is less

than 30.

Before concluding the seminar, we asked the participants in an open poll which of the five assessment concepts presented by the groups they would recommend for the DoTS course. The results were as follows (number of votes in parenthesis, teachers were allowed to vote for more than one concept):
1) Seminar with oral presentation of design project with 2D- or 3D-visualizations (15)
2) Project work, report writing with continuous supervision (11)
3) Written examination at home, with feedback-seminar (9)
4) Individual oral examination and Final written examination (5 votes each).

TABLE I
RESULTS OF THE POLLING SURVEYS AT OUR PARTICIPANTS' SEMINAR.

Assessment elements	Recommended assessment elements		Assessment elements advised against	
	First survey	Second survey	First survey	Second survey
Project assignment	4	4	0	0
Project assignment with seminar / presentation	7	5	0	0
Meeting	0	0	1	1
Problem based learning	0	0	1	0
Group work / group assessment	0	0	1	1
Seminar in small groups with presentation, student and teacher opponents	1	1	0	0
Seminar in large group	0	0	1	0
Laboratory experiment	1	0	0	0
Oral exam	4	2	3	2
Written exam (optionally with feedback seminar)	7	5	3	4
Written individual home assignment	2	1	3	2

It is interesting to see that of the approximately 22 voting teachers (including course teachers and authors of this paper), many chose to vote for several assessment concepts (total of 45 votes), i.e. they recommend a combination of assessment elements.

In reality, DoTS course students have for many years been assessed in a final written examination (5/6 of the grade) in combination with a written project report (1/6), supplemented by a compulsory laboratory test with a written report (fail/pass). The outcome of the discussion and the poll was that the current main assessment form (final written exam) only came on fourth place as a "preferred mode of assessment". Most teachers instead preferred more active assessment forms like project work in combination with presentation seminar. However, there was a great discrepancy between the teachers' opinions, showing the complexity of selecting assessment concepts.

V. Conclusions

The results of our investigations show that the participating teachers were more positive to project assessment and written examination than oral assessment.

We recommend a variation of assessment methods along the way to graduation. Course coordination and management within and, when possible, across course modules are key words here. There is, however, also a risk of "over management", leaving little room for the students to do anything outside the small outlined path through the course curriculum. The focus of the assessment method should be to encourage deep learning. A formative assessment with constructive feedback should be preferred over a summative approach, but the teaching resource is a limiting factor, especially in larger courses. Various types of group feedback in seminar form could be a solution.

We find that it is not meaningful to make any general recommendations other than that the assessment method in a course needs special attention when planning courses. The assessment method should be selected with much care. It can be very useful to combine assessment elements into a holistic assessment concept.

References

[1] E. Frühwald, O. Kolte, A. Mullai, J. Nordqvist and M. Persson, "Combining assessment elements into a holistic assessment concept," working paper prepared during the pedagogical course "Teaching and Learning at University – inspiration for experienced teachers" at LTH, 2008. Available for download at www.lu.se/lund-university/research/publications-and-dissertations.

[2] C. Rust, "The impact of assessment on student learning" in *Active learning in Higher Education*, Vol. 3, pp. 145–158, 2002.

[3] G. Gibbs and C. Simpson, "Conditions under which assessment supports students' learning" in *Learning and Teaching in Higher Education,* No. 1, 2004–05, 2005.

[4] Å. Lindberg-Sand and T. Olsson, "Sustainable Assessment? Critical Features of the Assessment Process in a Modularised Engineering Programme," in Paul Trowler (ed.): *A Socio-Cultural Approach to Teaching, Learning and Assessment*, 2008.

[5] L.-O. Dahlgren and A. Fejes, "ECTS-skalan. Att mäta eller mota lärande?" in *Pedagogisk forskning i Sverige*, Vol. 10, No 1, 2005.

[6] M. Lejk et al., "A Survey of Methods of Deriving Individual grades from Group Assessments" in *Assessment and evaluation in Higher Education*, Vol .21, No. 3, 1996.

[7] HEO [Higher Education Ordinance], Högskoleförordningen, SFS 1993:100, Swedish Parliament, 1993.

[8] G.J. Cizek, "When Teachers Cheat" in *Streamlined Seminar*, Vol. 21 (2002–2003), Issue 1–2, 2002.

[9] U. Ellervik, "Morot och piska. Aktionsforskning kring kontinuerlig examination," *LTH:s Inspirationskonferens*, 2006.

[10] H.L. Roediger and J.D. Karpicke, "The power of testing memory: Basic research and implications for educational practice" in *Perspectives on Psychological Science*, Vol. 1, No. 3, pp 181–210, 2006.

[11] J. Biggs, *Teaching for Quality Learning at University*, The Society for Research into Higher Education & Open University Press, Second Edition, 2003.

[12] B.S. Bloom, *Taxonomy of educational objectives: the classification of educational goals*, New York: Longmans, Green, 1965.

[13] L.W. Anderson et al., *A Taxonomy for Learning, Teaching, and Assessing – A Revision of Bloom's Taxonomy of Educational Objectives*, Addison Wesley Longman, Inc., 2001.

[14] R. Larsson, "Muntlig tentamen, redovisning av ett försök och jämförelse med skriftlig tentamen," unpublished manuscript, 2001.