NEW ASSESSMENT MODES WITHIN PROJECT-BASED EDUCATION – THE STAKEHOLDERS

Veerle Van den Bergh, Dimitri Mortelmans, Pieter Spooren, Peter Van Petegem, David Gijbels and Gert Vanhournout

University of Antwerp, Belgium

Abstract

Because of an increasing quality concern for higher education, additional attention is being paid to new educational principles with a more student- and competence-centred vision. Project-based education is one of the learning environments congruent with these principles. Ideally, the students in this learning environment are assessed by suitable assessment modes, like peer assessment and co-assessment. This article evaluates this obviousness critically, focusing on how instructors and students perceive these project-based learning environments and group-based assessment methods. The main conclusion is that it seems very difficult to create a complete assessment procedure in which both parties' assessment expectations are being met. This is due to crucial contradictions in opinions about assessment in project-based education.

Introduction

The Changing Context of Higher Education and Project-Based Learning

In line with a rapid evolution towards a global knowledge society, our contemporary job market is making new demands on graduates. Being successful in a job these days often implies being capable of operating in ill-defined and ever-changing environments, dealing with non-routine and abstract work processes, handling decisions and responsibilities and working in teams. Therefore, graduate students need to acquire not only a sound base of
knowledge and higher order skills specific to their domain, but also a number of higher-order skills and attitudes. Any university curriculum needs to be developed from the idea that students are being prepared for a future that is largely unknown (Bowden & Marton, 1998). This changing context of higher education imposed a critical review of the traditional teaching and learning practices (Hart, Bowden, & Watters, 1999). During this process, institutions pay attention to alternative learning methods and environments like project-based learning.

At the same time, the contemporary (socio-)constructivist learning paradigm gives rise to new educational practices and learning environments. Although constructivism can be seen as an "umbrella term" (Gijbels, 2005) or a "broad position" (Fox, 2001; Phillips, 1997), educational theories within this position share the same assumptions about learning: learning is actively constructed by the learner (Birenbaum, 2003; Harris & Alexander, 1998; Tynjälä, 1999). Moreover, learning is seen as a cumulative, self-regulated, goal-directed, situated, collaborative and individually different process (De Corte, 1996). Learning environments rooted in the constructivist paradigm therefore regard student learning as the core issue and define instruction as enhancing the learning process. Project-based learning is a well-known example of a powerful learning environment within the constructivist paradigm (Blumenfeld, Krajcik, Marx, & Soloway, 1994; Thomas, 2001).

Project-based learning can be characterized as a pedagogical innovation which integrates theory and practice by means of problem solving of working life issues (Baert, Beunens, & Dekeyser, 2002; Poell, van der Krogh, & Wildemeersch, 1998; Tynjälä, Väljmaa, & Sarja, 2003). It is a model with learning methods aimed at challenging, meaningful questions or problems and involves students in design, problem-solving, decision-making or investigative activities (Blumenfeld, Soloway, Marx, Krajcik, Guzial, & Palinscar, 1991; Thomas, 2001). Students tackle the core question or problem relatively autonomously in task-oriented groups, with continuous feedback information from the instructors, teachers or tutors (Baert et al., 2002). Projects tend to run over a longer period of time and culminate into one or more realistic products or presentations (Blumenfeld et al., 1991; Thomas, Mergendoller, & Michaelson, 1999).

The Assessment of Project-Based Learning

Lately, much attention is given to the nature of assessment within a constructivist learning environment. In contemporary learning environments, assessment is regarded a building stone for the learning process (Dierick & Dochy 2001), not just the coping stone. It is generally believed and shown that assessment modes have an important impact on the learning process of the student (Gibbs, 1999; Scouller 1998).

This implies that if assessment tools are being used strategically within a learning environment it is possible to gain better learning outcomes. Assessment can thus be used as a tool for learning (Dochy & McDowell, 1997; Sambell, McDowell, & Brown, 1997).

Nevertheless, reconsidering goals, instruction and learning environments without rethinking how to assess those goals can have disappointing consequences. Dierick and Dochy (2001) relate to this as an "auto-dissolving prophecy". They state that an educational innovation will dissolve itself when the assessment is not congruent with the teaching method. It is therefore very important to make the assessment congruent with the
instruction and make the assessment suitable to what students should be learning (Biggs, 2003).

However, recent studies show that even integrated environments sometimes fail to produce the expected learning outcomes (Segers, 1996). It seems that the way in which students perceive their learning and assessment environment has to be taken into account. A student's perception influences the way in which he/she copes with this environment and consequently has an effect on his/her learning results. (Brekelmans, van den Eeden, Terwel, & Wubbels, 1997; Entwistle & Tait, 1990; Fraser, Walberg, Welch, & Hattie, 1987; Segers & Dochy, 2001). This means that investigating student perception of the learning and assessment environment by the students is crucial for the interpretation of these students' learning outcomes (Segers, Dochy, & Cascallar, 2003).

In project-based learning, students have been assessed in a variety of ways: from traditional paper-and-pencil tests to new modes of assessment such as case-based assessment, self- and peer assessment, performance-based assessment and portfolio assessment. According to current literature, traditional assessment methods are considered to be less appropriate to measure the level of understanding and skills students acquire by project-based learning (Dori, 2003; Frank & Barzilai, 2004; Krajcik, Czerniak, & Berger, 1999).

In this study, we explore the perceptions of instructors and especially students who have enrolled in a project-based learning course. Before presenting our research and its results, we will elaborate on project-based learning.

**Project-Based Learning**

Project-based learning can be seen as a pedagogical innovation which integrates theory and practice by means of problem solving of working life issues (Blumenfeld et al., 1991; Poell, et al., 1998; Tynjälä, et al., 2003). Baert, et al. give a definition that conveys the core of project-based education:

Project-based education is an educational activity in which a group of students – a task-oriented group from one or different years and branches of study, working together during a longer period of time, receiving instructions and feedback from a permanent or different instructors and if necessary from a commissioner of a practical organisation - work on an assignment or (practical) problem acquiring knowledge (including insights and meta-cognition), skills and attitudes. The students make the assignment or problem more concrete, rephrase it and devise a structured approach of the problem. They draw up a potential solution using theoretical and practical knowledge (own translation, from Baert et al., 2002, p. 17).

Students enrolled in project based learning have been evaluated by a wide range of assessment methods. Nowadays, many educators and researchers advocate new modes of assessment that are in line with the educational goals and instructional principles of new learning environments such as project-based learning (e.g., Segers, et al., 2003).
Research Questions

In this contribution, we present and discuss the results of our research on how the assessment modes are being perceived by both the instructors and the students in the course "Student Research", a project-based learning environment. The main reason for choosing this course as a case study was conflicting views on the assessment methods used. The shortcomings of the assessment methods resulted in a research project in which three main goals can be distinguished. The first objective deals with how the factual learning environment is being perceived by both students and instructors. In other words, do the participants indeed see this course as a project-based learning environment? (Question 1)

In the second phase, the current assessment practice is tested on its alignment with the intended learning outcomes in this environment (Question 2). At the same time, the current assessment's positive key features are isolated from its negative traits in order to preserve the former in a future assessment practice. The third research question pays attention to the students' opinion about several assessment modes which are theoretically in alignment with a project-based learning environment such as the Student Research course (Question 3).

The answers to these questions were then used as input to both an improvement of the educational practice of the Student Research Course, and to policy recommendations with regard to project-based learning environments.

The Student Research Course

The Design of the Student Research Course

The Student Research Course (16 ECTS-credits) is an extensive exercise in constructing and conducting a social study in a scientific way. During three semesters, students complete all stages of a real research project in groups of 10 up to 20 participants, under the supervision of one or more instructors. Because of the large group size, a lot of tasks (e.g., review of literature, data collection and analysis, writing research reports) are divided and done in subgroups or by individuals. The students formulate the research goals and questions, design the research methodology, collect and analyze the data and finally report the research results during the first two semesters. In the third semester, they submit their final research report to a jury of instructors and present their work and results to an audience consisting of all instructors and students involved in the Student Research course (Figure 1). In order to manage this, the students need to concretize, combine and apply subject-matter of other courses. This encompasses the subject-matter of the more statistical and methodological research courses as well as the knowledge and skills acquired in other courses.
Figure 1: Schedule of the Student Research Course

**Current Assessment Method of Student Research**

At the end of parts one and two, all the instructors are invited to an assessment meeting. During this gathering, the instructors draw up the balance of the research they are supervising. The instructors do not only share their experiences with and opinions about the quality and dedication of each group, they also propose a grade. Based on the discussions and the comparison between the different researches, the instructors give a group score for each research. As a consequence, an instructor may not return with the grade he or she had hoped receive for his or her group of students. In a second step, every instructor individualizes this group score for each student based on more detailed information gathered during the year (as a result of permanent evaluations). Each instructor decides on the kind of information, the criteria and the procedure he or she uses for this personal assessment.

The final research report of each group is submitted to a jury of instructors. The students also present their research results to an audience of instructors and students. The final score for part three of the course is composed of the jury's grade for the research report on the one hand and the evaluation of the presentation – rated by both instructors and students in the audience – on the other.

**The Future Assessment Method**

To create a sound assessment practice for the Student Research course, it is not only essential to discriminate between the merits and the demerits of this course, but also to distinguish between the benefits and the disadvantages of the current assessment method.
Furthermore, the students' perception of more recent assessment modes must be tapped. The assessment types presented to the students are restricted to the methods and instruments we considered suitable for the Student Research course. These practices can be used in group work, are functional for a wide range of topics and different kinds of research (e.g., content analysis, qualitative analysis) and are not too time-consuming for both the instructor and the student. The investigator described the different assessment methods as the students are not familiar with them. This provided us with information that was very useful for the creation of a sound assessment procedure for the Student Research Course. The following assessment methods were selected and presented to the students.

**Self assessment**

Self assessment refers to the involvement of learners in making judgements about their own learning process, in particular about their achievements and the outcomes of their learning process (Boud & Falchikov, 1989). Students formulate their own learning goals and specify the evaluation-criteria by which the attainment of these goals will be assessed. In this way, students' responsibility and involvement in their learning process is increased (Boud, 1995), thereby fostering their growth as reflective practitioners capable of lifelong learning. Self assessment is mainly used in a formative way (Dierick & Dochy, 2001; Dochy, Segers, & Sluijsmans, 1999).

**Peer Assessment**

Falchikov (1995) describes peer assessment as an assessment method in which groups or individuals rate their peers. For this purpose one can use assessment scales or other instruments that are designed by a third party or by the students themselves (Dierick & Dochy, 2001; Dochy et al., 1999; Topping, 1998). The peers' products as well as their learning processes can be the focus of the assessment. Peer assessment increases the students' responsibility and involvement as it requires them to be fair and accurate in their judgements (Keaten et al., 1993). Moreover, students gain an insight in the criteria determining the quality of their own work. From this point of view, peer assessment is more than a grading procedure. It is also a vital part of the learning process (Somervell, 1993).

**Co-Assessment**

In co-assessment, or collaborative assessment, both the students and the staff participate in the assessment process. This assessment method enables students to assess themselves whilst allowing the staff to maintain a certain degree of control over the final assessment (Hall, 1995). It is not necessary that the students rate their performances, but it is imperative that they participate in the process of clarifying objectives and standards as well as in the development of the assessment procedure. Co-assessment is situated closer to the mainstream educational practices (Sluijsmans, Dochy, & Moerkerke, 1998). It is used more often for summative purposes, whereas self- and peer assessment tend to be used in a formative format (Dochy, et al., 1999).
Performance Assessment

Performance assessment or performance-based assessment requires students to actively accomplish complex and significant tasks, while bringing to bear prior knowledge, recent learning and relevant skills to solve realistic or authentic problems" (Herman, Aschbacher, & Winters, 1992). Although performance assessment is conceivable in many forms, the assessment of complex "higher order" knowledge and skills in a real-world context, generally with open-ended questions, seems a common theme (Baker, 1997; Swanson, Norman, & Linn, 1995). Performance tasks can be used in both a formative and summative format. If performance assessment is used summatively, the final grade is to be based preferably on the completion of multiple performance tasks at different moments (Kind, 1999; Parkes, 2000).

Reflective Journal

Learning journals or reflective journals are used to document students' reflections on the learning process (Francis, 1995). In a reflective journal, students summarise their experiences with, feelings and conclusions drawn about the course, thereby yielding valuable information and improving their reflective ability (Morrisson, 1996). Learning journals can be used to get a grip on the learner's reflective and metacognitive competences (Birenbaum & Amdur, 1999).

The Student Research as Project-Based Learning Environment

The Student Research learning environment is in line with the general characteristics of the so-called "powerful learning environments" as formulated by Decorte (1990). The Student Research aims to improve the student's learning process and supports it with instructions (1); starts from authentic situations or problems (2); enables the acquisition of common learning- and thinking skills in different domains (3); and focuses on cooperative learning rather than individual learning (4). In the Student Research course Dochy et al.'s (1999) 5th feature of powerful learning environments is also included: learning needs an assessment environment which fits its purpose (5). The research presented in this article shows that this final trait is crucial.

We consider the learning environment in this study a good example of project-based education. A comparison of the characteristics of the Student Research with the features of project-based learning environments (based on the definition of Baert, et al. (2002)) easily demonstrates the resemblance (see Figure 2). Unfortunately, this similarity does not only cover the success factors but also the pitfalls of project-based education, which will be discussed when we focus on the question how students and instructors experience the Student Research.
Table 1: A Comparison Between the Characteristics of Project-Based Education and the Student Research Course

<table>
<thead>
<tr>
<th>Project-Based Education</th>
<th>Student Research</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task-oriented group</td>
<td>✓ 10 - 20 students</td>
</tr>
<tr>
<td>Students from one or different years</td>
<td>✓ same year</td>
</tr>
<tr>
<td>Students from different branches of study</td>
<td>✓ political and social sciences</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>✓ communication sciences</td>
</tr>
<tr>
<td></td>
<td>✓ social work</td>
</tr>
<tr>
<td>Longer period of time</td>
<td>✓ three semesters</td>
</tr>
<tr>
<td>Permanent or changing instructor(s)</td>
<td>✓ permanent</td>
</tr>
<tr>
<td>Possibility of a commissioner</td>
<td>✓ yes</td>
</tr>
<tr>
<td>Assignment or practical problem</td>
<td>✓ yes</td>
</tr>
<tr>
<td>Acquiring knowledge, skills and attitudes</td>
<td>✓ yes</td>
</tr>
<tr>
<td>Use of theoretical and practical knowledge</td>
<td>✓ yes</td>
</tr>
</tbody>
</table>

Method

Participants

The participants in this study can be divided into two groups. The first group are students at the Faculty of Political and Social Sciences who are enrolled in the Student Research course. Nine of them were selected by means of a theoretical sampling. To secure a confined yet varied group of questioned students, four conditions were taken into account during the sampling. All students in the sample had to be involved in a different research project. They also had to be represented proportionally with regard to sex, grading and branch of study within the faculty. The second group of respondents consists of the instructors supervising the current research projects within the Student Research course (N = 13).

Instrument

In view of the purpose of this study, a qualitative research design was chosen. To gain a more thorough insight into how a project-based learning environment like the Student Research – the assessment method and other assessment formats included – is being considered by both students and instructors, a qualitative study with in-depth interviews with a rather small group of respondents was considered the proper research method. This research method does not only enable the researcher to pursue some research questions in greater depth, it also creates the opportunity to exchange ideas and thoughts on learning environments and new assessment modes during the data collection. For the in-depth interviews a semi-structured questionnaire was used, based on the literature on project-based learning environments (Baert et al., 2002), assessment modes
(Birenbaum & Dochy, 1996; Segers et al., 2003) and information about the Student Research course at that specific moment.

Results

To clearly structure the results of the study, the result section of this article is in line with the sequence of the research questions listed at the beginning of this article. First, the learning environment itself will be examined. A distinction is made between the positive and negative features of the environment according to students and instructors. Secondly, the same procedure will be used for the current assessment practice. Finally, the results of the discussion with the students concerning the alternative assessment modes listed above will be analysed.

The Learning Environment (Question 1)

The instructors and students were asked their opinion about the Student Research course. Positive and negative features were listed and framed within findings from other studies (Baert et al., 2002).

Positive features. The authentic asset of this kind of learning environment (Baert et al., 2002), i.e., that education ought to be an – as close as possible – reflection of reality, emerges as the strongest argument in favour of the Student Research. All respondents agreed with this point of view for different reasons. First of all, the students are confronted with a complete research-cycle. This does not only include writing a report, but also the experience of real fieldwork. Secondly, it concerns a real research and not just a task made up by an instructor. Furthermore, the instructors state that the duration of the research (three semesters in contrast to most one-semester courses) creates the opportunity to focus deeper on certain aspects of the study. Finally, there is the argument of the possibility to apply both theoretical and methodological knowledge and course material in an integrated manner. This is a completely different approach compared to other courses in which the assignments are usually isolated and not contextualized. Students think it is interesting to gain hands-on experience, especially in a theoretical environment such as the university. According to them, experience is the best teacher:

It's a different way of studying: it is much more practical and you don't always have to be at your books. (Caro, student)

Instructors also state that students are more eager to give their all for the Student Research than for other assignments and courses. What is more, the course offers an interesting opportunity and is perfect subject-manner for students aspiring to a job in the academic or research world. Both instructors and students agree on the benefits of working in team on the one hand and working independently on the other hand: students do not only learn how to communicate with each other and how to organise their work, they also acquire the skills to deal with conflicts between group members:
Working in a group and learning how to make appointments is a very valuable experience, because everybody has a different way of interpreting and communicating. You have to learn how to express yourself through, for example, e-mails, so that every group member understands you in the way you mean it. (Evert, student)

Working in a project-based environment can be beneficial for instructors as well. It provides them with useful results that can be used for further research and increases their own expertise. Furthermore, it alleviates their workload, for example in the case of a large data collection. However, most instructors suggest that the results obtained via the Student Research do not always exceed or match the effort put into it.

A final advantage of the Student Research learning environment results from the fact that there is an occasion for both parties – students and instructors – to cooperate more closely: they come to know each other better, and become more personally and informally involved.

**Negative features.** The first disadvantage the students think of is the workload. The instructors confirm that the amount of work can sometimes be overwhelming for the students.

First of all, the combination of this class with other courses is difficult, because other lecturers also give assignments or expect group papers and plan examinations. The instructors acknowledge this is a problem and they realise that they ought to communicate more about this issue. Some instructors are even convinced that better overview of the workload of the different research projects is imperative. Instructors who are rather inexperienced are persuaded a partial solution of this problem is possible by, for instance, organising collective meetings during which the instructors are briefed more often. Beside the combination difficulty, students also mention unforeseen circumstances being a cause for the enormous workload they have to bear.

The workload is huge. It often concerns smaller things and stuff we didn't expect. We never know what's next. (Chantal, student)

The workload of the Student Research course is problematic not only for the students but for the instructors too. They have to organise meetings with and give assignments to the students, correct tasks, give feedback, answer questions, etc. Several problems unexpectedly need attention when it comes to the organisation of the Student Research. A few organizational pitfalls referred to by the instructors are: the combination of qualitative and quantitative research in one Student Research; the supervision of the research by a single person; the limited knowledge of specific methods of analysis; an external commissioner and the unexpected circumstances.

The different interpretations between the research projects are another demerit of the course according to both parties. The students argue that there is a difference in supervision and workload: some groups have to sort out everything themselves, whereas other groups are strictly coached; some groups have to work much harder than other groups (sometimes even to receive the same grade). Every instructor is free to choose his or her way of
organising and tutoring and even assessing the research. The instructors and the students feel especially uncomfortable with the differences in assessment depending on the instructor (see below).

Several instructors are disappointed to notice that the quality of the students' work is not always that high, especially regarding writing style, structure and methodological insights. This undermines the assumed win-win-situation for the instructors:

We always assume a win-win-situation, but the quality of the student's work turns out to be much lower than expected. An example are interviews gathered by students, which aren't always that good, but in the end you still have to use those data. (Eva, instructor)

The same observation can be made when it comes to student motivation. Students are not always as enthusiastic as the instructors expect. It is not easy to maintain a high motivation level during the entire research.

The Current Assessment Method of the Student Research (Question 2)

As regards the Student Research case, it is important to make a distinction between how the students and the instructors consider the assessment. This is because the instructors are major determinators of the assessment: they decide and inform the students about the procedure they use to assess them within their class. Several comments by the students refer to a lack of assessment transparency. Apparently, the students only have a vague idea of the evaluation criteria or even the assessment method used by their instructors. Most students don't have a clue either about the instructors' meeting at the end of each semester, or about the determination of the group scores. As they only have it from hearsay, we can conclude that the students are not well informed. Many students emphasize that they would at least like to know the criteria used for their assessment. This would enable them to figure out what trump cards and weaknesses are. Students clearly care a great deal about evaluation criteria and feedback:

The criteria should be communicated very clearly to the students. The instructor should tell you regularly how you're doing, so that you can improve. (Evert, student)

When the functioning of the instructors' meeting is explained to the students, their reaction is positive on the whole. The students think of the system as a guide for the instructors concerning the workload and the coaching of the group. Furthermore, they find it self-evident that the research projects are being compared: if one group puts more work into it than the other groups, students of that particular group ought to receive higher grades. They also believe that the balance report that is based on the instructor's meeting does not necessarily depict the real situation. In many cases the students just carry out the assignments given by their instructors.

Nevertheless, and this has already been mentioned earlier, the students worry about the different assessment methods used by the instructors. They think it is unfair that
depending on the instructor, one group has to work much harder than others. They also
dislike that in some groups all students are given the same grade while in other groups
grades differ and are individualized. In general, most students take it for granted that not
everybody gets the same grade within the group, because some people just work more or
less than the average of the team. The students also recognise that in some cases it must be
really difficult for an instructor to differentiate between the group when the individual
efforts are not known or unclear.

But it's also logical that the research studies are compared. If one group has
put much more effort into it than another, it's reasonable for that group to
receive a higher score. (Caro, student)

Our research made it very clear that the instructors use different techniques to asses their
group during the year. Some assessment criteria are similar while others differ
tremendously. One can observe that the use of the traditional evaluation criteria (e.g.,
written reports, presentations) were much more commonly used than (group)process
evaluation (e.g. contribution during meetings, creativity, autonomy, etc.). One instructor
does not take the process-evaluation into account at all. Of those who do, some see the
evaluation-type as completing an attendance list, while others also include criteria such as
cooperation, creativity, and punctuality in the process evaluation. The integration of these
criteria in the permanent evaluation also differs from instructor to instructor.

All instructors agreed that establishing a group score during the semestrial meeting
did not work as every group just kept their initially proposed grade. The reason for the
abolition of this procedure is the aversion for the underlying principle. While instructors
grade all other courses independently, they have to decide the Student Research course
grades in a group meeting with other instructors. This group-grading system goes against
the instructors' notion of what academic freedom encompasses. What is more, according to
them, it is unfair to compare the research executed by the groups of students. First, because
they deal with different topics, use different research methods, etc. Second, because they
are not transparent enough. Nobody ever knows exactly what goes on within the different
groups.

It's in violation of my academic freedom. What can I say about another
instructor's grades, based on a short presentation in a meeting? Who am I to
say: No, that score is too high!? (Maria, instructor)

Thus, while the students tend to appreciate this meeting because it enforces a certain
control on the instructors, the instructors disapprove of the mechanism for the same reason.
We will come back to this remarkable contradiction concerning the current Student
Research assessment.

However, the instructors' meeting at the end of every semester does not seem very
useful for the assessment. It serves the purpose of sharing information among the
instructors. The instructors agree that the meeting should be used to share information on
the research that are being conducted as well as on the assessment criteria to be used.
To what extent does each Student Research focus on the right competencies or go through every step? Everybody has different views, and thus different (assessment) rules. (Sarah, instructor)

Both the instructors and the students found it unfair that there is such a variety in assessment regarding the research studies. Another evaluation difficulty is mentioned by the instructors. Most of the tasks in the Student Research course are group assignments and make it hard for the instructor to determine each individual's contribution. It is not always clear whether everybody's input in the total amount of work is equal.

A second contradiction that emerged is that although the instructors do not agree with the group-controlled assessment method, most instructors ask for more information and even guidelines regarding the Student Research assessment as well as for assessment criteria. The instructors agree that all researches should be graded by means of the same criteria. The different studies are part of the same course (Student Research), and therefore the skills and competencies to be acquired by the students in the Student Research learning environment are identical. One could say that an imposed system is being replaced by a new "imposed" assessment method. This is why there is a need for the development of a fair and objective method which makes it easier to determine the contribution of each individual to the group.

The instructors and the students do not entirely agree on the assessment manner of the third semester – when the final research report is being read by a jury of instructors and the results are presented to the instructors and the other students. According to the students a jury assessment is very fair and objective. A jury enhances student researches' transparency, at least among the instructors. The students hope that this assessment technique and the transparency that goes with it will lead to an equal workload for each group.

The instructors also appreciate the jury assessment. Although it creates more work for the instructors, the students benefit from it. It gives the students an idea of how to prepare and write a scientific text and motivates them to conduct good and profound research. The fact that each paper is evaluated according to dissimilar standards depending on the demands of different judges is just a marginal comment.

Students as well as instructors find the jury assessment of the presentation a good idea, while the peer assessment raises objections. The respondents fear that the use of this assessment type is not objective.

I don't think that students will be negative toward each other, so I don't think this peer assessment is sensible. (Chantal, student)

According to some respondents it is not wise to involve the younger students in the assessment. Some say that these students are still inexperienced and they have their doubts about these peer students. A more positive comment concerning the peer assessment is the size of the peer group: the bigger the group, the more objective the outcome of the assessment will be.
New Assessment Modes (Question 3)

The final research question deals with the students' impressions of more recent assessment procedures in project-based learning environments. What do they think of the integration of these assessment methods in the Student Research?

**Self assessment.** Self assessment is considered the least professional assessment format for this specific course, at least according to the students who participated in this study. The fact that students are to evaluate themselves does not seem practicable because of subjectivity and incomparability. Students are convinced that dishonesty in one's own favour would not be the rule, but just believe that having an objective opinion about oneself is difficult. They would – consciously or unconsciously – neither give themselves a maximum nor an unsatisfactory mark or evaluation. It is also impossible to compare each individual mark because each grade is given by a different assessor. For example, for one student a 15/20 is a mediocre score, while for another student the same grade may be very high:

This seems difficult, because everybody has different standards for themselves.

As a result, you won't be able to compare those grades. (Bert, student)

Nevertheless, students think of self assessment as a meaningful manner to discover the internal group dynamics and to reflect on themselves. As mentioned many times in this paper, the respondents are aware of the differentiation and transparency problems that result from group work such as the Student Research. Self assessment could (partly) solve these issues. Finally, self assessment is highly appreciated by the students because it forces students as well as instructors to take time for self reflection and this is not frequently done in regular courses and more traditional assessment methods. As a consequence, students are "believers", yet only in self assessment as a formative instrument.

**Peer assessment.** Students always seem to react with apprehension when a lecturer announces the use of peer assessment, as it is considered highly subjective in two ways; it can be used as an instrument for positive discrimination if students stick together and give each other high grades, but it can also turn out negative if somebody is brought into focus by the others. The fear that goes with this kind of assessment is due to the fact that the instructor is not able to get to the truth:

Peer assessment doesn't seem very objective. According to me, one student just gives a better mark than another student, or when you know somebody, you'll give that person better grades. (Annelies, student)

Students do admit that the principle of peer assessment sounds good, because the method enables a display of the individuals' efforts in the group work and the internal group dynamics. In this way, there is a resemblance between self assessment and peer assessment, yet the latter puts social pressure on, or creates a control system for, each group member.
This pressure experienced by the students stimulates them to work in a cooperative setting rather than in a competitive one.

Students are willing to use peer assessment on certain conditions. Evaluating peers is considered a perfect formative instrument as long as it is used without real consequences. Furthermore, the students are in favour of peer assessment if the evaluation is combined with other, more "objective" methods or if particular security measures are built in.

**Co-assessment.** Students tend to consider collaborative assessment as a combination of self- or/and peer assessment with an additional safety device built in. They have a certain level of input in the assessment, but the final decision is made by the instructor. The latter is seen as an extra safety precaution. According to the interviewed students, this co-assessment is the happy medium between traditional and alternative modes of assessment. They mainly appreciate co-assessment because it gives them the opportunity to defend or justify themselves. Students like to receive feedback from their instructors so they can use this information and improve themselves. Students are convinced that co-assessment cannot be misused like the other assessment modes when it is partly used as a formative assessment by both the students and the instructor during the year and partly used as a summative assessment solely by the instructor at the end of the year. The instructor is in charge of the final decision. And, this is the extra safety the students lack in peer assessment. The only possible abusers of co-assessment, according to the students, are students who are able to mislead the instructor by pretending to be perfect students while being freeriders.

You can justify you work and this might avoid potential discussions afterwards, because you know why you received the grade. The only danger is that one starts selling oneself. (Bert, student)

**Performance assessment.** Students tend to doubt performance assessment because they have the feeling that not enough attention is being paid to the processes during the group work. This does not mean however that they vote down the significance of product evaluation. The product or result must be a part of the final assessment. The students agree that evaluating the product is the only technique for assessing the group work in an objective way. Yet, students regret that the group work is overlooked as well as the extra work certain students put into it as the outcome is considered a result of the collaboration among all the students in the group. Nevertheless they are convinced that the combination of forces leads to a better outcome. Performance assessment should be part of the total assessment, but in combination with co-assessment.

I think, for group work, you have to take more elements into account. You also have to consider the extra work you do, the things you do to help your fellow students. More paper activities is also time-consuming. (Chantal, student)

**Reflective journal.** The final assessment method, the reflective journal, is the evaluation technique students like best. According to them, it gives the instructor better insights into the internal group dynamics as well as into the individual student who writes the report.
Writing a report gives students the opportunity to reflect on all issues and feelings related to the Student Research. On the one hand it enables them to be very open and frank (e.g., assignments that proved to be too elaborate; being surprised by a fellow student in a positive or negative way). On the other hand, completing a reflective journal must be optional. Students must be free to write and decide on what they want the instructor to know. This gives the students the opportunity to give feedback to the instructor and again to justify themselves for certain actions and results:

That sounds interesting, even necessary, because otherwise frustrations might always stay unarticulated. (Annelies, student)

The students consider the reflective journal mainly a formative instrument, but are not against the use of it in the grading system. They do attach two conditions to its use: frequency of use and anonymity. The use of reflective journals must be balanced (not too frequently) and its content can never be released to fellow students (anonymity).

Discussion

Students' and Instructors' Perception of the Learning Environment

While answering the first research question concerning the students' perception of their learning environment, we discovered a high congruence between our results and recent literature. Summarized, the positive and negative features of the Student Research course are fairly typical for project-based learning environments. The major advantages listed by the respondents, correspond with the four arguments in favour of project-based education by Baert et al. (2002; Dochy & McDowell, 1997): the social, pedagogical, professional and motivational argument. Problem-based learning is an activity that simulates a real-life context. This ensures that students recognize the relevance of their academic work (Sambell, et al., 1997). We can also encounter most of the other benefits in Baert, et al. (2002): developing communication skills, working in a team in a more pleasant way, etc.

The two main disadvantages of project-based learning environments are the workload and the differences between the various projects, particularly with regard to organisation and assessment. The reason for the high workload in this case is the large amount of uncertainty which is inherent to the Student Research course. Furthermore, the perceived workload is not necessarily equal to the actual workload if one knows that one credit equals 30 hours of work. The workload of the Student Research course is higher than that of most other courses. To some extent, one can certainly try to eliminate or diminish these shortcomings, for instance by investigating the effective workload of the Student Research course by measuring the students' study period during the research project. In conclusion, one can say that the Student Research is indeed a good example of project-based education which in this case is mostly beneficial for both parties.
Students' and Instructors' Perception of the Assessment Environment

The students' view on their current assessment environment resulted in some remarkable conclusions. First, students demand more transparency when it comes to the assessment environments. Nitko (1989) developed a series of features creating a sound assessment practice in relation to instruction. One of the main issues is concerned with clarity about the type of decisions (placement, monitoring, attainment, and diagnostic) that are supported by the assessment procedure. Second, the students in this study want more explicitness about the assessment procedure itself. Sambell et al. (1997) stated that the students in his study felt that openness and clarity are fundamental requirements of a fair and valid assessment system which makes it possible for the students to know how to direct their efforts. Finally, the students would like the instructors to assess more uniformly, which is actually inherent to the rather traditional assessment methods (Dochy & McDowell, 1997). They even consider it to be obvious that the instructors differentiate within and even between the groups, as long as the assessment is objective. One of the reasons why students, in contrast to their instructors, appreciate the present system is that they think of it as a way to control the instructors. In all, students mention three required features as constitutive of a fair assessment method: objectivity (all students start with the same opportunities), transparency (all information is clear and accessible to all students) and standardization (the instructor is able to justify his assessment and able to refer to detailed rating instructions).

The instructors find the current assessment method outdated and in conflict with their academic freedom because it enables other instructors to interfere in their grading system. Furthermore, a lack of clarity of the Student Research makes it impossible, according to them, to compare the research studies and therefore this method cannot be used in a fair way. Another concern of the instructors is the vague evaluation system. They look for answers on how to assess the students of this course via a fair assessment system, how to individualise the group grade, which criteria to use and how to detect freeriders. It is quite clear that the instructors basically favour the same assessment conditions as the students: objectivity, transparency and standardization.

Evidently, the instructors ask for more guidance and clarity in the assessment. This might, however, contradict their demand for academic freedom. Recently, an assessment format with a set of standard criteria was created and implemented in order to conduct an evaluation on a continuous base in combination with one of the new modes of assessment as described above. This could increase the level of standardization since everybody uses a similar assessment method without the need for strict external supervision. Further research will show whether or not we have succeeded in creating a better assessment instrument.

With respect to the purpose of assessment, students feel that assessment is not only a useful grading instrument, it is also as a tool to inform students about their work and skills. In more traditional learning environments assessment often only takes place at the end of the course by means of an examination whereas in constructivist learning environments, assessment methods should be integrated in the learning process. The aim of the latter is to observe the qualitative change(s) in the students' knowledge levels. Thus, assessment has to be both formative and summative. Knight even states that the use of self-, peer- and co-assessment is not only useful for good formative assessment, but actually necessary.
because these instruments would be the only valid ways to assess the learning processes (Knight in Dochy & McDowell, 1997). This brings us to process- and product-evaluation (see also Hall & Hall, 2004) which are, according to the students, of equal significance.

**Students’ Perception of New Assessment Modes**

We could have made a list of the assessment modes used in this research and then checked the ranking. A more useful method however, is to recapitulate briefly which arguments according to the students are vital for assessment (see Table 2).

Table 2: Positive and Negative Features of Assessment Modes (Self-, Peer-, Co-, Performance Assessment and Reflective Journal) According to the Students

<table>
<thead>
<tr>
<th>Positive</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Self assessment</strong></td>
<td><strong>Self assessment</strong></td>
</tr>
<tr>
<td>Self reflection</td>
<td>Subjectivity</td>
</tr>
<tr>
<td>Internal group dynamics</td>
<td>Incomparably</td>
</tr>
<tr>
<td><strong>Peer assessment</strong></td>
<td><strong>Peer assessment</strong></td>
</tr>
<tr>
<td>Internal group dynamics</td>
<td>Positive discrimination</td>
</tr>
<tr>
<td>Social pressure</td>
<td>Negative discrimination</td>
</tr>
<tr>
<td><strong>Co-assessment</strong></td>
<td><strong>Co-assessment</strong></td>
</tr>
<tr>
<td>Possibility of two-way feedback</td>
<td>Risk of communicative free riders</td>
</tr>
<tr>
<td>Summative assessment by the instructor</td>
<td></td>
</tr>
<tr>
<td><strong>Performance assessment</strong></td>
<td><strong>Performance assessment</strong></td>
</tr>
<tr>
<td>Significance of product evaluation</td>
<td>Insignificance of process evaluation</td>
</tr>
<tr>
<td><strong>Reflective journal</strong></td>
<td><strong>Reflective journal</strong></td>
</tr>
<tr>
<td>Self reflection</td>
<td></td>
</tr>
<tr>
<td>Internal group dynamics</td>
<td></td>
</tr>
<tr>
<td>Possibility of two-way feedback</td>
<td></td>
</tr>
<tr>
<td>Grading option</td>
<td></td>
</tr>
</tbody>
</table>

First, students believe that there should be more two-way feedback: from instructor to student and vice versa. Students want to be able to account for their actions and to acquire skills, which is only possible if they are well informed. Thus, one could say that the students prefer the combination of both formative and summative assessment. Second, they do not want to be assessed merely on their final output, but also on how they reached it. Both process and product-evaluation are important from the students’ perspective (see also Hall & Hall, 2004). Segers and Dochy (2001) concur since they claim that social interaction is a tool for effective cognitive and meta-cognitive learning. This means working together successfully is a crucial goal of powerful learning environments. Consequently, assessment of the group process as well as of individual contributions is important. A third and final requirement is the reliability and objectivity of the assessment
methods used. Co-assessment is much more popular than other forms of assessment. A possible explanation is that collaborative assessment, as well as combinations of different assessment types, seems to ensure a higher degree of reliability and objectivity.

Another eye-catching conclusion concerns the use of self- and peer assessment. The results of this study, as well as the results of the peer grading of the presentations at the end of the Student Research course, make it clear that students feel quite negative towards assessments that include evaluation executed by students. Struyven, Dochy, and Janssens, (2003) confirm this finding. They found that over time, after using these kinds of assessments, perception and attitudes will change for the better.

In students' remarks about self-, peer- and co-assessment, the same criticism keeps on surfacing. Students question the reliability of these assessment techniques. Segers and Dochy (2001) learned that students feel relatively positive towards self- and peer assessment, because it stimulates deep-level thinking and learning, critical thinking and structuring the learning process of the group. However, they also discovered that, although the peer assessment seems to be quite accurate (similar to tutor grading), students have mixed feelings about their capability of assessing each other in a fair way. Assessing themselves is harder according to these students. Brown and Knight (1995) observed the same. Segers and Dochy think that the purpose of the assessment (formative or summative – in this case summative) influences the students' perceptions. Sambell and colleagues (1997) concur, stating that the students in their research also value the activity of self- and peer assessment, but have some concerns about its reliability. The same conclusion can be offered in this article since students indeed value the principle of these assessment types, yet their implementation troubles them. Similar to our findings, Dochy et al. (1999) conclude that self assessment leads to more reflection on one's own work. Furthermore they believe that there are two elements increasing the accuracy of self assessment: time and feedback of the instructors. Peer assessment is found to be sufficiently fair and accurate too, especially as a formative or partly summative instrument. Then again, Dancer and Dancer (in Dierick & Dochy, 2001) mention that peer ratings are based on uniformity, race and friendship (if an extensive training in peer rating is lacking). Topping (1998) concludes that only 7 out of 31 reviewed studies support the hypothesis that peer assessment is neither valid nor sufficiently reliable. Based on the preliminary results of a subsequent phase of this research, we can say that students tend to assess each other quite impartially. However, in cases in which results prove to be exceptionally high or low, students give grades accordingly. As a consequence, peer grading was comparable to instructor grading. This at least was the case for peer assessment in the context of the presentations at the end of the Student Research.

Conclusion

In this study, we took a look at the assessment stakeholders in project-based learning environments and concluded that there is no single answer to the search for a sound assessment method. First, we can say that it is important to opt for an assessment format that fits the characteristics of the particular learning environment. A reading course cannot be assessed in the same way as a group project. Thus, it is meaningful to check – like we did – that method and environment are compatible. Second, it is very difficult to create a
complete assessment procedure which fulfils both the students' and the instructors' expectations towards assessment. This is why some contradictions are inevitable. For example, students demand strict guidelines while instructors want their academic freedom. The third and final conclusion we draw with the aim to create a sound assessment method, is that it relies on many different evaluation aspects. Based on the outcomes of this study, we can state that integrating learning, instruction and assessment is necessary and that one cannot go without another (see also McLaughlin & Simpson, 2004). Future research and practice should therefore focus on the engineering of an optimal mix of learning and assessment environments and, taking into account students' perceptions in the blend of assessment and teaching methods.

References


The Authors

VEERLE VAN DEN BERGH holds a master in communication sciences. Between 2004 and 2005, she was affiliated as a research member at the Faculty of Political and Social Sciences of the University of Antwerp (Belgium). In that position, she conducted research supported by the Foundation for Educational Development (UFOO) of the University of Antwerp. Her research topics concern educational and electronic innovation and evaluation.

DIMITRI MORTELMANS is assistant professor in sociology at the Faculty of Political and Social Sciences of the University of Antwerp (Belgium). He teaches qualitative research techniques and advanced statistics. He is head of the Panel Survey of Belgian Households (PSBH). His principal research interests are in the sociology of family and youth. His main research topics cover divorce, work-life balance and leisure time of youngsters. He is also head of the Innovation and Quality of Education Centre.

PIETER SPOOREN holds a master's degree in educational sciences. Since 2004 he is affiliated as a staff member in the Innovation and Quality of Education Centre at the Faculty of Political and Social Sciences of the University of Antwerp (Belgium). His particular activities are educational innovation and evaluation of the educational process and of educators.

PETER VAN PETEGEM is professor of education at the University of Antwerp, Belgium. He manages the Centre of Excellence in Higher Education (ECHO) as well as the research group Edubron aimed at divergent aspects of education such as performance indicators as a tool for school improvement, the policy making power of schools, school effectiveness, learning styles and conceptions of learning.

DAVID GIJBELS is assistant professor learning and instruction at the Institute for Education and Information Sciences (University of Antwerp, Belgium). He is head of the research group 'Professional Learning' (Pro~L). His research and development interest focus on learning in a professional context (corporate learning) and student-centered learning environments, their assessment and evaluation.

GERT VANTHOURNOUT holds a Master's degree in educational sciences. Since 2004 he has been affiliated with the Centre of Excellence in Higher Education (ECHO) at the University of Antwerp. His activities there include supporting educational innovation and providing staff development courses and sessions for teachers and teaching-assistants.

Correspondence: <dimitri.mortelmans@ua.ac.be>