Towards Sustainable Assessment: ICT as a Facilitator of Self- and Peer Assessment

Gregorio Rodríguez-Gómez and María Soledad Ibarra-Sáiz

Abstract This study describes an e-assessment experience undertaken at a Spanish university. Students taking the Project Management module undertook e-self-assessment and e-peer assessment, using the web service EvalCOMIX®. The aim of the study was to identify to what extent students valued technological resources designed for assessment and their opinion of participative forms of e-assessment. Four assessment tasks were designed to undertake during one semester. For each task students had to hand in a piece of work or undertake an assignment to be assessed. The students were asked their opinion on this experience. The results of this survey among 108 students showed, firstly, that they valued e-assessment highly. Secondly, it showed that students found these e-assessment formats very useful for the development of skills such as the application of knowledge, arguing a point, problem solving, analysing information, communication, autonomous learning, ethical considerations, creativity, group working, critical and analytical judgement and decision-making.

5.1 Introduction

This study originated from an interest in two key issues in Higher Education: student participation in assessment, specifically self- and peer assessment, and the way information and communication technologies are used in assessment.

The importance of student participation in assessment has been highlighted by many authors, significantly, Brown and Glasner (1999), Dochy et al. (1999), Falchikov (2005), Brown and Pickford (2006), Ibarra-Sáiz et al. (2012), Gielen et al. (2011) or Strijbos and Sluijmans (2010), among others. Sambell et al. (2013) go as far as to suggest student participation in assessment should be a requirement of all university curricula.

This study starts from the premise that not only should university students play an active role in the assessment process but that when they do their judgements are

G. Rodríguez-Gómez (✉) • M.S. Ibarra-Sáiz
University of Cadiz, Puerto Real, Spain
e-mail: gregorio.rodriguez@uca.es; marisol.ibarra@uca.es

M. Peris-Ortiz et al. (eds.), *Education Tools for Entrepreneurship*, Innovation, Technology, and Knowledge Management, DOI 10.1007/978-3-319-24657-4_5

equal to those made by teaching staff, as demonstrated in works by Gessa Perera (2011), Smith et al. (2013) or Boud et al. (2014).

The literature review in Nulty (2011) concludes by recommending that greater use should be made of peer and self-assessment. Having acknowledged the importance of student participation through self-assessment (Boud 1995; Bourke 2014) and peer assessment (Topping 2009, 2010) the next step is to determine how best this can be implemented using technological resources.

The use of technology for innovation is integral to educational practice. McKezee et al. (2013: 20), based on an analysis of three different research projects focused on professional development of the faculty, conclude that 'integrating technology into traditional teaching and learning settings was one of the three most important issues' and they suggest that 'professional educators have always been eager to advantage their students by attempting to add the latest advancement to their instructional practices'. However, as put forward by Whitelock and Basher (2006), from a personal perspective, a variety of barriers may restrict the use of e-assessment, such as the attitude of staff and of learners, training/development issues and changing methodologies. This study focuses attention on student attitudes, since the other barriers could be seen as having been overcome. Appropriate resources were in place to implement e-self- and e-peer assessment; teaching staff were positive and had sufficient training to deliver these assessment formats using technology, and, finally, the suitability of the assessment format had already been established in relation to the specific nature of the assignment and the students. Consequently, the focus was to investigate the confidence, skepticism or preferences that students demonstrated in relation to more traditional methods and consider things from the perspective proposed by Whitelock when recommending 'Let us envisage new forms of e-assessment and then build and evaluate them' (2009: 202) based on the need identified by Haythornthwaite and Andrews (2011): 14 'to situate technologies within their social, political, economic and pedagogical contexts'.

Participation means students should be experts in assessment or, as suggested by Price et al. (2012: 14), 'students need to be assessment literate'. But, within a technology-based context we need to widen the concept of assessment literacy and, as proposed by Eyal (2012), talk rather of 'digital assessment literacy'. In essence, the aim of this research was to analyse students' perception of their involvement in e-self-assessment and e-peer assessment and how they regard using web-based services specifically designed for these forms of assessment. In particular, the study aims to find answers to the following questions:

- To what extent do students feel their involvement in assessment using electronic resources, enhances their skills development and is useful for their future employment?
- Do students feel that their involvement in self- and peer assessment is useful and beneficial?
- How reliable do students think their own and their peers' assessments are?
- How valuable do students think the web-based EvalCOMIX® programme is for e-self- and e-peer assessment?

5.2 Sustainable Assessment and Student Participation

Located within the context of the learning society, Boud (2000: 151) incorporates the concept of 'sustainable assessment', understood as 'assessment that meets the needs of the present and (also) prepares students to meet their own future learning needs'. Consequently, if the objective is for students to be efficient and effective learners throughout their lives they need specific training in assessment so that they can successfully deal with assessing their own performance in both their academic and future working environments, the latter aspect having been endorsed by Boud and Associates (2010) in their set of proposals 'Assessment 2020'.

Falchikov (2005) demonstrated the vital importance of involving university students in assessment processes. This involvement can take place at different times such as when planning assessments, that is to say when determining the type of assignments or tasks that will be assessed, the assessment criteria, the assessment instrument to be used and who will undertake the assessment. It can continue during the development of learning and assessment tasks using self-assessment, peer assessment and co-assessment of the progress that is being made or by evaluating the initial outcomes or work handed in for which students receive feedback to help them improve their subsequent performance. And it can end with the assessment of the final tasks or outputs through self-assessment, peer assessment and co-assessment.

In line with the reference framework and principles put forward by Nicol (2007, 2009) relating to assessment in Higher Education, aimed at encouraging student reflection on their own work and the work of others and, as shown by Vermunt (2013), to help them become independent learners, student involvement within this current study has focused on self- and peer assessment because, as suggested by Smith et al. (2013: 44) 'To become self-regulated learners, students need to be able to judge their work, identify its merits, locate its weaknesses and determine ways to improve it'.

5.3 Technologies for Assessment

Initial attempts to incorporate technology into assessment processes meant, to some extent, a conceptual backwards step to earlier stages of development in assessment. Boud (2007) revealed that the key discovery in the field of assessment in the 1960s was the incorporation of the progress that came from educational measurement, integrating the concepts of reliability and validity and the rapid spread of test type exercises and objective exercises. When technology became widely used in Higher Education, especially through Learning Management Systems (LMS) like Blackboard® or Moodle® in the initial decade of this new millennium, multiple choice objective tests again became fashionable as rapid and effective assessment formats.

This led to a seemingly paradoxical and contradictory situation because the theoretical and conceptual developments achieved in relation to assessment in Higher Education from the 1980s to now have insisted on the need to design authentic tasks (Ashford-Rowe et al. 2014) with a clear aim to achieve sustainability (Vermunt 2013; Boud 2000) which require students to produce outcomes or undertake tasks of a complex nature which demand equally complex assessment techniques and instruments.

Following this line, innovative proposals have been made in recent years for using technology in assessment processes which are both more advanced and more valuable than the classic notions of 'true or false' or multiple choice questions. Of particular importance are the contributions from Davies (2009), Willey et al. (2009), Loddington et al. (2009) or Liu and Li (2014), as well as those delivered by JISC (JISC 2010; Winkley 2010).

In this study EvalCOMIX® web service for e-assessment was used to facilitate self- and peer assessment. EvalCOMIX® has been developed to facilitate the design of assessment and enable two main activities to be carried out. Firstly, the design and management of complex assessment tools such as checklists, rating scales, semantic differential questions or rubrics (Fig. 5.1) with comments and observations. Secondly, integrated within an e-learning environment such as Moodle®, it allows these assessment tools to be used for self-, peer and tutor assessment (to review or mark) and to provide immediate feedback (Fig. 5.2).

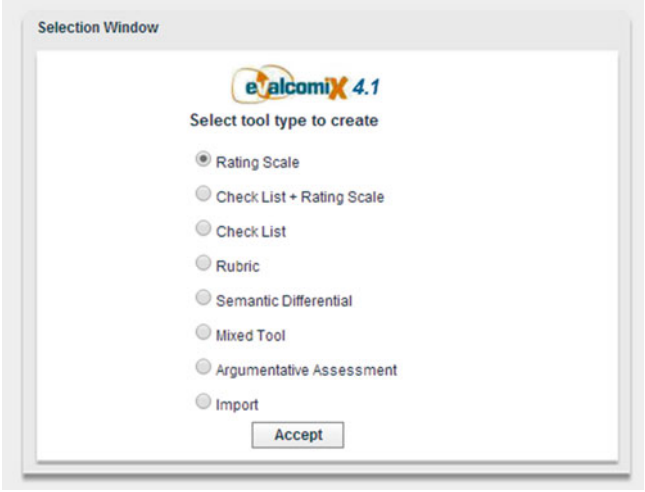

Fig. 5.1 EvalCOMIX® interface to the design and management of assessment tools

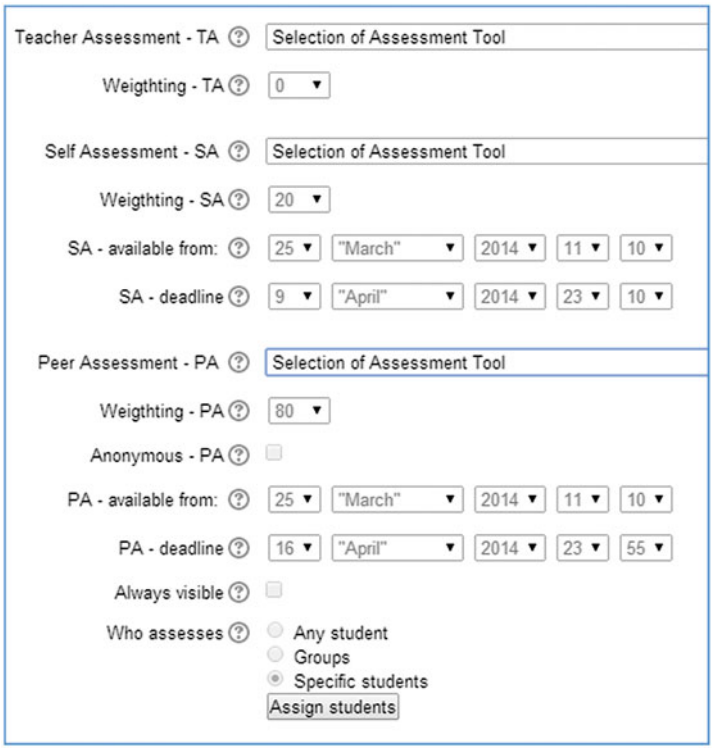

Fig. 5.2 EvalCOMIX® interface to the design of self-, peer and tutor assessment

5.4 Methodology

A survey was used for this study, based on the logic of a quasi-experimental posttest design. At the end of the academic years 2012/2013 and 2013/2014 students responded voluntarily to a questionnaire on completion of the Project Management module.

5.5 Participants

The participants in this study were Year 4 students on the Business Administration and Management Degree or the Finance and Accounting Degree who took the Project Management module during the first semester. A total of 73 students took the module in 2012/2013 and 92 students took it in 2013/2014.

At the end of the semester 108 students completed the questionnaire (65.4 % of the total), of which 50.9 % were female and 49.1 % male. 44 students from the 2012/2013 cohort (60.2 % of registered students) and 64 students from the 2013/2014 cohort (69.6 % of those registered) took the questionnaire.

5.5.1 Supervision

5.5.1.1 The Assessment Tasks

Initially the team of academics responsible for the module designed a range of assessment tasks based on the conditions that Ashford-Rowe et al. (2014) consider to be the key elements of authentic assessment:

- An authentic assessment should be challenging
- The outcome of an authentic assessment should be in the form of a performance or product
- Authentic assessment design should ensure transfer of knowledge
- Metacognition as a component of authentic assessment
- The importance of a requirement to ensure accuracy in assessment performance
- The role of the assessment environment and the tools used to deliver the assessment task
- The importance of formally designing-in an opportunity to discuss and provide feedback
- The value of collaboration

In particular, at the beginning of each half-semester, students were shown the learning and assessment tasks that they would be asked to complete: (1) Analyse projects from a methodological perspective; (2) Plan a project; (3) Evaluate projects; and (4) Design a project for an end of course dissertation.

The following skills are developed through these assessment tasks: application of knowledge (AK), arguing a point (AR), problem solving (PS), analysing information (AI), communication (CO), autonomous learning (AL), ethical considerations (EC), creativity (CR), group working (GW), critical and analytical judgement (AJ) and decision-making (DM).

For each task students were offered a guide to their specific structure and characteristics (type, timescale, outcomes, etc.). They were also told who would mark the work or outcomes and given details of the assessment criteria, instruments and timing. Students were therefore able to clarify what constituted a good piece of work and they were offered information on all the different elements of the assessment, which according to Nicol et al. (2014), is an essential aspect. After they had been presented, each of the assessment tasks was modified as a result of the discussions and agreements with the students on the module and the final assessment criteria, methods, instruments and formats were established. Table 5.1 shows the assessment formats and the assessment instruments used in each case.

In accordance with the typology established by Taras (2010) the self-assessments undertaken by the students could be characterised globally as conforming to Tara's model, as the criteria were agreed between the tutor and the students, feedback was given both by the tutor and their peers and the final marks were awarded by the student and their tutor.

Based on the variables that Gielen et al. (2011) consider to be the main characteristics of peer assessment it can be said that in this study the objects of the assessment were both the artefacts (technical reports, essays) and observed behaviours (oral

Table 5.1 Assessment modalities and assessment tools

Tasks and artefacts or performances	Assessment modalities			Assessment tools
	Self	Peer	Tutor	
Project analysis				
Comparative report		X		Rating scale for the evaluation of the comparative report
Report on methodology	X	X	X	Rubric for evaluating methodological reports on professional documents
Oral presentation		X		Rating scale for oral presentations and vivas on the methodological reports
Project planning				
Draft plan for end of course report/dissertation	X			Checklist for planning pre-projects
	X			Rating scale for evaluation reports
Project evaluation				
Report on evaluation of draft plan for end of course report/dissertation	X	X	X	Rating scale for evaluation reports
Design and planning of dissertation				
Design and planning of end of course report/ dissertation	X	X	X	Rating scale for design of the end of course report/dissertation
	X	X	X	Checklist and rating scale for the timeline, Gantt Chart and operational plan

presentation). Furthermore, the assessment was used initially in a formative way, to encourage improved performance, but also summatively.

5.5.1.2 Assessment Tools

The web service EvalCOMIX® was used for all of the assessments with different instruments being used as required. Students could do the assessment either in class or outside class depending on the nature and characteristics of the product or performance being assessed.

5.5.2 Instrument

At the end of the semester the students completed an online questionnaire (Questionnaire on levels of satisfaction of participation in the assessment process) comprising 12 Likert type questions with six levels of response (1 = Totally disagree; 6 = Totally agree), structured as follows:

(1) The *influence* of their involvement in the assessment on their development of skills
(2) The *usefulness and benefits* of self-assessment and peer assessment

(3) The *credibility* students give to self-assessment and peer assessment
(4) The *effectiveness* of the web-based service EvalCOMIX® for undertaking self-assessment and peer assessment

The internal consistency of the online questionnaire was measured using Cronbach's Alpha statistic (0.975). The consistency of the students' responses was also determined by the use of two very similar questions, which produced Weighted Kappa coefficients of 0.55 ($z=5.825$; $p=0.000$***) and 0.64 ($z=6.885$; $p=0.000$***), respectively.

Because ordinal measures were used with a Likert type scale, multidimensional scaling analysis was used -PROXSCAL- (normalized raw stress: 0.09605; Dispersion Accounted For (DAF): 0.90395 and Tucker's Coefficient of Congruence: 0.95077), which all indicate a well-designed model.

5.5.3 Data Analysis

IBM-SPSS v22® and ROPstat® were used for the data analysis. First, the Mann–Whitney t-test and *U*-test were used to identify if there were significant differences between the two cohorts. As no differences were found ($p<0.05$) between the students from the first and second cohorts it was decided to continue with the data analysis considering the data from all the subjects as a single group.

To identify any statistically significant differences between the values of the two assessment Methods (self-assessment and peer assessment) the t-test was used on related samples and the size of the Vargha-Delaney A measure was calculated.

5.6 Results

Even when the online questionnaire was concerned with the students' degree of satisfaction with their participation in the assessment process, this study only focuses on the key results relating to self-assessment and peer assessment.

5.6.1 Skills Development

With regard to general skills development it can be seen overall that students gave very positive scores to both self-assessment and peer assessment, both in terms of the consequences they had for their personal skills development and their usefulness and interest.

In Fig. 5.3 it can be seen how both self- and peer assessment has helped a great deal with their skills development [application of knowledge (AK), arguing a point

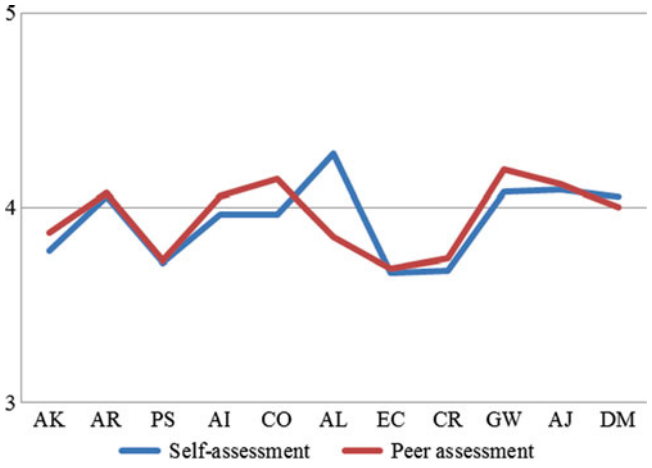

Fig. 5.3 Average scores for the development of skills through the use of self- and peer assessment

(AR), problem solving (PS), analysing information (AI), communication (CO), autonomous learning (AL), ethical considerations (EC), creativity (CR), group working (GW), critical and analytical judgement (AJ) and decision-making (DM)]. In every case the average scores were above 3.6 and in five of them they exceeded an average of 4, specifically in arguing a point (AR), autonomous learning (AL), group working (GW), critical and analytical judgement (AJ) and decision-making (DM).

Statistically significant differences were only found in relation to the skill of autonomous learning (AL) [$t(107) = -4.07$, $p = 0.000^{***}$, $A_{YX} = 0.39$] in that students felt it was self-assessment that was of greater use in developing this skill.

5.6.1.1 Usefulness and Benefit

When asked to what extent these assessment methods could help them in their future professional lives their overall response was very positive. In fact, the responses to all questions of this type gave average scores in excess of 4.

No significant differences were found between the scores given to self-assessment and peer assessment in relation to 'learn how to assess the necessary effort and dedication to complete a task' ($M_{Self} = 4.23$; $SD_{Self} = 1.05$; $M_{Peer} = 4.32$; $SD_{Peer} = 1.15$); 'identify missing information and errors' ($M_{Self} = 4.30$; $SD_{Self} = 1.18$; $M_{Peer} = 4.25$; $SD_{Peer} = 1.18$) or 'analyse one's own work and that of others' ($M_{Self} = 4.34$; $SD_{Self} = 1.09$; $M_{Peer} = 4.32$; $SD_{Peer} = 1.15$). However, students did feel that although self-assessment was the best strategy for 'developing learning from mistakes' [$t(107) = -2.45$, $p = 0.01^{*}$, $A_{YX} = 0.42$], peer assessment is seen as best for 'learning to help others to improve their performance' [$t(107) = 2.45$, $p = 0.01^{*}$, $A_{YX} = 0.57$].

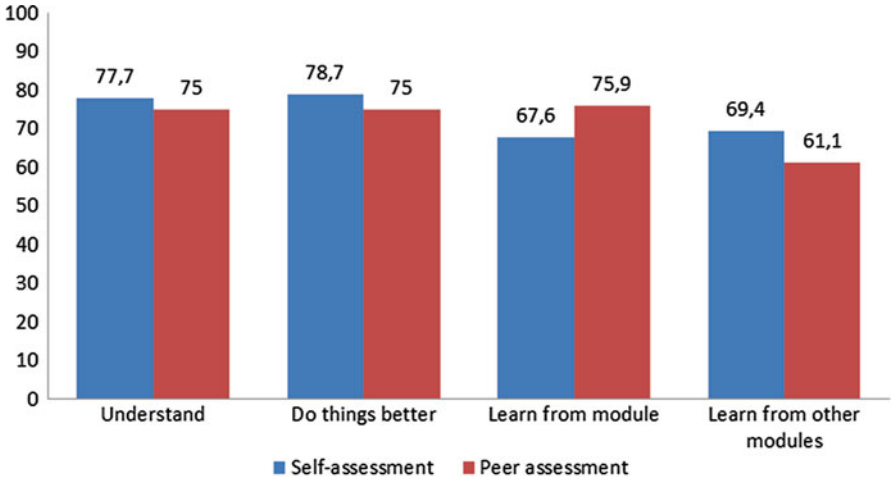

Fig. 5.4 Percentages of the students that valued the use of self- and peer assessment

In terms of the possible benefits of undertaking self- or peer assessment (Fig. 5.4) the average scores were also greater than 4. In fact, for most students, having undertaken self- and peer assessment has helped them to 'better understand how to carry out all the tasks in this module', to 'know how to do things better in subsequent tasks', to 'learn from this module' and 'learn from other modules'.

The differences between the two assessment methods are statistically different in only one case. Peer assessment has actually been more useful to students than self-assessment in terms of 'learning from the module' [$t(107) = 2.09$, $p = 0.03$*, $A_{YX} = 0.46$].

5.6.2 Reliability and Confidence in Self-Assessment and Peer Assessment

In relation to how students considered the reliability of these participative assessment methods and their confidence in them they believe that the assessment they make of their peers' work is more 'credible', 'objective', 'provides information' and 'is done in a more rigorous way' than that which they receive from their peers. This indicates a degree of concern about the assessments done by their peers. It is confirmed by the fact that 45.4 % of the students believe that knowledge of or a degree of friendship with their peers has little or no influence on the marks they give them. In contrast, only 26.9 % of the students feels that this knowledge of or the degree of friendship with their peers has little or no influence over the marks their peers gave them personally. As can be seen in Fig. 5.5, when students were asked to evaluate different assessment methods they feel the tutor's assessment is the most rigorous, credible, useful and objective, followed by self-assessment and finally, peer assessment.

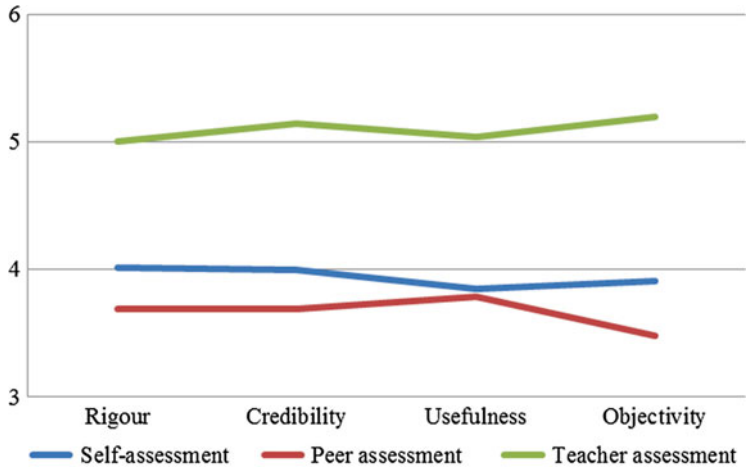

Fig. 5.5 Average scores for the differences between assessment methods

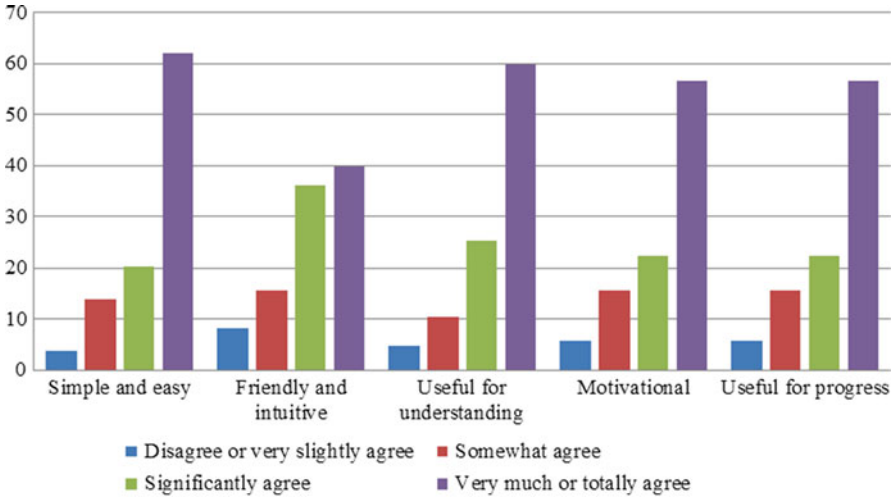

Fig. 5.6 The students' scores in relation to the use of the EvalCOMIX® web service for self-assessment and peer assessment

5.6.3 Technology as a Facilitator

Figure 5.6 shows the results when the students were asked about the use of EvalCOMIX® for self- and peer assessment. It can be seen that the students agreed to a greater extent that using EvalCOMIX® was 'useful by providing in advance an understanding of the assessment criteria and instruments as well as the precise items

that would be assessed' (M = 4.65, SD = 1.09). They also felt that using EvalCOMIX® was 'simple and easy' (M = 4.61; SD = 1.10); 'valuable because the information it provided could be used to improve subsequent tasks or activities' (M = 4.50, SD = 1.14); 'motivational in that you get the self- and peer assessments and the tutor's assessment all together' (M = 4.49, SD = 1.17) and, finally, it is 'a friendly and intuitive environment' (M = 4.24; SD = 1.19).

5.7 Discussion Points

This study has focused on the assessment of activities (e.g. oral presentations) or complex tasks (reports, case studies) which require students to be able to reflect, make judgements and take decisions based on agreed and understood criteria and standards, all of which are vital aspects of self-directed learning and, therefore, of sustainability in assessment.

In line with other studies in this area (Smith et al. 2013; Planas Lladó et al. 2014) it has been shown that students believe their involvement in the assessment process improves their skills development and is useful for their future employment. This perception demonstrates the importance of using self-assessment or peer assessment, as highlighted by Fallows and Chandramohan (2001), as a means of encouraging self-directed learning among university students.

The importance of having trust in the assessment process has been highlighted by Carless (2009): 86, for whom 'Distrust risks undermining the integrity of assessment practices, and may be a particular impediment to current emphases on the need for assessment to stimulate a productive student learning experience'. In this study the evidence shows that the students, despite being trained in how to do the assessment and having participated in it by making their contribution to the final marks, do not have confidence in their peers' assessments nor do they feel they are reliable. This conclusion is consistent with other experiences in similar contexts (Carless 2009). This lack of confidence makes it even more important to deliver training to students on assessment. For years assessment has been, and continues to be, something specific to teaching staff. Research illustrates the value and usefulness of having all stakeholders involved in the assessment process, but to achieve this students need to break with their current mentality, as do tutors, and become confident in themselves and their peers as trustworthy and impartial assessors. Carless (2009: 87) suggests that 'despite this threat, the development of wider assessment literacy, transparency and collaboration have been suggested as strategies to increase trust', something that several others also advocate, as Price et al. (2012), O'Donovan et al. (2004) or Liu and Li, when they insist that 'training should be provided to prepare students with critical assessment skills, and to assist them in switching roles from learners to assessors' (2014: 287).

This study has paid special attention to the analysis of the possible differences that students perceive between self-assessment and peer assessment and, except for a few small discrepancies, and despite the negative attitudes to assessment by peers

reported in some literature (Liu and Carless 2006; Kaufman and Schunn 2011) both assessment methods are perceived by students as valuable and beneficial for their skills development and their future employment, as supported by other works such as Smith et al. (2013: 58) in the degree to which 'helping students to develop their ability to judge their own and other's work will likely enhance their learning outcomes.'

Finally, one of the issues this study tried to address focused on how the students rated using web-based services for the assessment process. Liu and Li (2014): 287 describe the use of Blackboard® to facilitate peer assessment, based on the use of a peer-assessment forum but emphasise the limitations of their research: 'It would be interesting to see if similar findings would be attainable with other facilitating technology tools'. In particular, one objective of this current study was to analyse the use of the web-based service EvalCOMIX® for both self-assessment and peer assessment. The generally positive score the students gave to the use of this web service confirms the results from similar studies in other contexts, for example those obtained by Dermo (Dermo 2009) who stresses the positive attitude of students to using e-assessment.

Currently there are many different technological tools that can be used for e-assessment (Davies 2009; Nicol et al. 2014) and each of them can be either a help or a hindrance, depending on how they are used and what they are used for. Technologies facilitate and widen the possibilities associated with assessment tasks, simplify participative assessment practices and offer opportunities to provide continuous, faster (Williams et al. 2013) and more sustainable feedback (Archambault et al. 2010).

The ease with which students use technological tools and the value they ascribe to them mean it is vital to refocus the study of how technologies are used in the field of assessment, changing their perception from being simply a contributor to the process to being a means in themselves with a clear communicative aim (Haythornthwaite and Andrews 2011: 213). Consequently the next important step will be to undertake an in-depth study of the use of e-assessment to achieve a global, ecological and contextualised understanding of it, because any technological change brings with it social change and vice-versa.

5.8 Conclusions

Through this study the authors have sought to provide evidence of the positive view students have of e-assessment, either self-assessment or peer assessment, and of using web-based services to deliver these processes within a technological context. If these assessment methods were introduced as normal practice into university classes it would create some risk and uncertainty which on occasions might not count on the necessary institutional recognition or support or, indeed, might even be in conflict with the institution. However, as proposed by Sambell et al. (2013: 152), 'assessment should be the point where knowledge, ideas and understanding are

generated and exchanged—a process that is at the heart of the university'. The skills and competencies required in the twenty-first century are continually evolving and so education is still required to focus on developing core transferable skills, among which lifelong learning is considered fundamental. In this context e-assessment must ultimately develop from being a model based solely on the assessment of knowledge revealed by the learner into a form of holistic, authentic and fully integrated assessment (Redecker and Johannessen 2013).

It is important to remain vigilant, though, and cautious about using technology in assessment processes as technology 'per se' does not automatically deliver innovation. In fact, it often means things go backwards. Currently, therefore, the challenge is about developing tools and technological resources which are appropriate and in line with the pedagogic principles governing the implementation of sustainable assessment strategies and ensuring they are used in practice to support student learning. Assessment as learning and empowerment (Rodríguez-Gómez and Ibarra-Sáiz 2015) establishes a new reference point for assessment in Higher Education that is consistent with the context of change, but its full implementation will require a change of mentality on the part of university students and tutors.

Current projects such as DevalS[1] (Rodríguez-Gómez and Ibarra-Sáiz 2014) and DevalSimWeb[2] (Ibarra-Sáiz and Rodríguez-Gómez 2014) which focus on the professional development of academic staff and their training in assessment and on training students as assessors, that is to say on 'digital assessment literacy', will deliver new perspectives on how technology, through using web-based services such as EvalCOMIX® and serious games as training tools, can play an important role in upskilling staff and students as assessors, encouraging at the same time lifelong learning, fostering self-directed learning among students and preparing them for the transition to working life, all of which are key objectives for universities.

Acknowledgement This work was supported by DevalS Project (Ref. EDU2012-31804) funded by the Spanish Ministry of Economy and Competitiveness.

References

Archambault L, Wetzel K, Foulger T, Williams M (2010) Professional development 2.0: transforming teacher education pedagogy with 21st century tools. J Digit Learn Teach Educ 27(1):4–11

Ashford-Rowe K, Herrington J, Brown C (2014) Establishing the critical elements that determine authentic assessment. Assess Eval High Educ 39(2):205–222. doi:10.1080/02602938.2013.819566

[1] DevalS Project—Developing Sustainable E-assessment—Improving Students' Evaluation Expertise through Virtual Simulations. Ref. EDU2012-31804. Funded by the Spanish Ministry of Economy and Competitiveness.

[2] DevalSimWeb Project—Skills Development through Participatory Assessment and Simulation using Web Tools. Ref. ALFA III (2011)-10. Funded by ALFA Programme of European Commission.

Boud D (1995) *Enhancing learning trough self-assessment*. Kogan Page, London
Boud D (2000) Sustainable assessment: rethinking assessment for the learning society. Stud Contin Educ 22(2):151–167. doi:10.1080/713695728
Boud D (2007) Great designs: what should assessment do? *In International Online Conference sponsored by the REAP Project: Assessment design for learner responsibility* (vol. Glasgow). http://www.reap.ac.uk/reap07/Portals/2/CSL/boud-pres/AssessmentREAPConference07Boud.zip
Boud, D, Associates (2010) *Assessment 2020: seven propositions for assessment reform in higher education*. Australian Learning and Teaching Council, Sydney. http://www.iml.uts.edu.au/assessment-futures/Assessment-2020_propositions_final.pdf
Boud D, Lawson R, Thompson DG (2014) Does student engagement in self-assessment calibrate their judgement over time? Assess Eval High Educ 38(8):941–956. doi:10.1080/0262938.2013.769198
Bourke R (2014) Self-assessment in professional programmes within tertiary institutions. Teach High Educ 19(8):908–918. doi:10.1080/13562517.2014.934353
Brown S, Glasner A (1999) *Assessment matters in higher education: choosing and using diverse approaches*. SRHE/Open University Press, Maidenhead
Brown S, Pickford R (2006) *Assessing skills and practice*. Routledge, London
Carless D (2009) Trust, distrust and their impact on assessment reform. Assess Eval High Educ 34(1):79–89. doi:10.1080/02602930801895786
Davies P (2009) Review and reward within the computerised peer-assessment of essays. Assess Eval High Educ 34(3):321–333. doi:10.1080/02602930802071072, Routledge
Dermo J (2009) e-Assessment and the student learning experience: A survey of student perceptions of e-assessment. Br J Educ Technol 40(2):203–214. doi:10.1111/j.1467-8535.2008.00915.x
Dochy F, Segers M, Sluijsmans D (1999) The use of self-peer and co-assessment in higher education: a review. Stud High Educ 24:331–350
Eyal L (2012) Digital assessment literacy—the core role of the teacher in a digital environment. Technol Soc 15:37–49
Falchikov N (2005) *Improving assessment through student involvement. Practical solutions for aiding learning in higher education and further education*. RoutledgeFalmer, London. http://bscw.uca.es/bscw/bscw.cgi/d206308/CCA_Falchikov_2005.pdf
Fallows S, Chandramohan B (2001) Multiple approaches to assessment: reflections on use of tutor, peer and self-assessment. Teach High Educ 6(2):229–246. doi:10.1080/13562510120045212
Gessa Perera A (2011) La coevaluación como metodología complementaria de la evaluación del aprendizaje. Análisis y reflexión en las aulas universitarias [Co-assessment as a complementary alternative to learning assessment. Analysis and reflection in university classrooms]. Rev Educ 354:749–764
Gielen S, Dochy F, Onghena P (2011) An inventory of peer assessment diversity. Assess Eval High Educ 36(2):137–155
Haythornthwaite C, Andrews R (2011) *E-learning theory and practice*. SAGE Publications, Thousands Oaks. http://www.uk.sagepub.com/books/Book234414?
Ibarra-Sáiz MS, Rodríguez-Gómez G (2014) Formación del profesorado universitario en evaluación: análisis y prospectiva del Programa Formativo EVAPES-DevalSimWeb "Evaluación para el aprendizaje en la Educación Superior." In *Congreso Iberoamericano de Ciencia, Tecnología, Innovación y Educación*. Buenos Aires. http://www.oei.es/congreso2014/memoriactei/1235.pdf
Ibarra-Sáiz MS, Rodríguez-Gómez G, Gómez-Ruiz MÁ (2012) La evaluación entre iguales: beneficios y estrategias para su práctica en la universidad. Rev Educ 359:206–231. doi:10.4438/1988-592X-RE-2011-359-092
JISC JIS (2010) *Effective assessment in a digital age. A guide to technology-enhanced assessment and feedback*. HEFCE, London. http://www.jisc.ac.uk/media/documents/programmes/elearning/digiassass_eada.pdf
Kaufman JH, Schunn CD (2011) Students' perceptions about peer assessment for writing: their origin and impact on revision work. Instr Sci 39(3):387–406. doi:10.1007/s11251-010-9133-6

Liu N-F, Carless D (2006) Peer feedback: the learning element of peer assessment. Teach High Educ 11(3):279–290. doi:10.1080/13562510600680582

Liu X, Li L (2014) Assessment training effects on student assessment skills and task performance in a technology-facilitated peer assessment. Assess Eval High Educ 39(3):275–292. doi:10.1080/02602938.2013.823540

Loddington S, Pond K, Wilkinson N, Willmot P (2009) A case study of the development of WebPA: an online peer-moderated marking tool. Br J Educ Technol 40(2):329–341. doi:10.1111/j.1467-8535.2008.00922.x

McKezee CW, Johnson M, Ritchie WF, Tew WM (2013) Professional development of the faculty: past and present. N Dir Teach Learn 133:15–20. doi:10.1002/tl.20042

Nicol D (2007) Principles of good assessment and feedback: theory and practice. In *REAP International Online Conference on Assessment Design for Learner Responsibility.* http://www.reap.ac.uk/reap07/Portals/2/CSL/keynotes/david nicol/Principles_of_good_assessment_and_feedback.pdf

Nicol D (2009) Assessment for learner self-regulation: enhancing achievement in the first year using learning technologies. Assess Eval High Educ 34(3):332–352

Nicol D, Thomson A, Breslin C (2014) Rethinking feedback in higher education: a peer review perspective. Assess Eval High Educ 39(1):102–122. doi:10.1080/02602938.2013.795518

Nulty DD (2011) Peer and self-assessment in the first year of university. Assess Eval High Educ 36(5):493–507. doi:10.1080/02602930903540983

O'Donovan B, Price M, Rust C (2004) Know what I mean? Enhancing student understanding of assessment standards and criteria. Teach High Educ 9(3):325–335. doi:10.1080/1356251042000216642

Planas Lladó A, Feliu Soley L, Fraguell Sansbelló RM, Arbat Pujolras G, Pujol Planella J, Roura-Pascual N, Suñol Martínez JJ, Montoro Moreno L (2014). Student perceptions of peer assessment: an interdisciplinary study. Assess Eval High Educ 39(5):592–610. http://dx.doi.org/10.1080/02602938.2013.860077

Price M, Rust C, O'Donovan B, Handley K, Bryant R (2012) *Assessment literacy. The foundation for improving student learning*. Oxford Brookes University, Oxford

Redecker C, Johannessen O (2013) Changing assessment—towards a New assessment paradigm using ICT. Eur J Educ 48(1):79–96

Rodríguez-Gómez G, Ibarra-Sáiz MS (2014) Desarrollo de la competencia evaluadora en estudiantes universitarios a través de juegos de simulación. In *Congreso Iberoamericano de Ciencia, Tecnología, Innovación y Educación. Organización de Estados Iberoamericanos*, Buenos Aires. http://www.oei.es/congreso2014/memoriactei/1240.pdf

Rodríguez-Gómez G, Ibarra-Sáiz MS (2015). Assessment as Learning and empowerment: towards sustainable learning in higher education. In M. Peris-Ortiz & J. M. Merigó Lindahl (eds) *Sustainable learning in higher education. Developing competencies for the global marketplace*. Springer International Publishing, pp. 1–20. doi:10.1007/978-3-319-10804-9_1

Sambell K, McDowell L, Montgomery C (2013) *Assessment for learning in higher education*. Routledge, London

Smith CD, Worsfold K, Davies L, Fisher R, McPhail R (2013) Assessment literacy and student learning: the case for explicitly developing students "assessment literacy". Assess Eval High Educ 38(1):44–60. doi:10.1080/02602938.2011.598636

Strijbos JW, Sluijmans D (2010) Unravelling peer assessment: methodological, functional, and conceptual developments. Learn Instr 20:265–269.http://hal.archives-ouvertes.fr/docs/00/70/38/95/PDF/Strijbos_Sluijsmans_2010.pdf

Taras M (2010) Student self-assessment: processes and consequences. Teach High Educ 15(2):199–209. doi:10.1080/13562511003620027

Topping KJ (2009) Peer assessment. Theory Pract 48:20–27

Topping KJ (2010) Methodological quandaries in studying process and outcomes in peer assessment. Learn Instr 20:339–343

Vermunt J (2013) Sustainable assessment revisited. *In EARLI 2013 Symposium Facets of sustainability in higher education* (vol. Munchen). http://www.earli2013.org/programme/proposal-view/?abstractid=1065

Whitelock D (2009) Editorial: e-assessment: developing new dialogues for the digital age. Br J Educ Technol 40(2):199–202. doi:10.1111/j.1467-8535.2008.00932.x

Whitelock D, Basher A (2006) *Roadmap for e-Assessment*. JISC, Milton Keynes. http://www.jisc.ac.uk/media/documents/programmes/elearningpedagogy/roadmapeassessment.doc

Willey H, Howard M, Hutchinson G (2009) *SPARK-plus self and peer assessment guide v 1.7*. UTS, Sydney

Williams B, Brown T, Benson R (2013) Feedback in the digital environment. In: Boud D, Molloy E (eds) *Feedback in higher and professional education*. Routledge, London, pp 125–139

Winkley J (2010) E-Assessment: evaluation, vision and plan. In *Assessment Symposium 2010*. Where next for assessment in a digital age*?* The Teaching Grid, University of Warwick, 20th April. http://www.jisc.ac.uk/media/documents/programmes/elearning/john winkley.ppt