

Validating Group Learning and its Assessment Techniques

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Abstract

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This paper explores group learning using an enquiry based learning approach. Using this pedagogical approach engages learners to develop 21st century skills such as problem solving, teamwork and communication skills within third level higher education. The development of these skills is embedded across all four years of a Health and Safety Science based Programme. The scenario design and assessment modes are developed to foster authentic and relevant learning.

There is a perception amongst students that group based learning can negatively influence overall academic performance. This paper challenges that perception and asserts that student achievement is reflective of ability, incorporating academic performance and skill set development. This is achieved through courageous and innovative programme design, challenging work based scenarios and aligned assessment techniques.

A two-year study, using quantitative methods, examined student performance across all modules. Results of qualitative research carried out to date indicate that enquiry based learning, as a pedagogical approach, ensures students are more competent and workplace ready. This paper demonstrates that engaging students in enquiry based learning is a sound pedagogical approach and practice for a new decade.

Keywords

Group learning, group assessment, aligned assessment, enquiry based learning, occupational safety and health, student performance, transferable skills, workbased learning.

Introduction

This paper will share the experiences of an interdisciplinary team of lecturers who used enquiry based learning scenarios, based on authentic work place problems, to develop transferable skills and professional competencies among final year students. The learning outcomes were assessed based on the students' application of their knowledge, team working skills and professional competencies. The approach taken to align assessment with learning outcomes will be detailed in this paper. The data presented will validate that the approach taken by the programme creates a safe learning environment for students to achieve generic transferable competencies associated with team work and interpersonal skills coupled with core specific competencies required by the health and safety professional. The findings will show that the constructively aligned approach (Biggs, 1996) allowed the programme team create a learning environment for students to develop the competencies and skill sets required by the 21st century graduate.

An emerging T-shape profile of a 21st century graduate is being used by the European Commission to emphasise the importance of generic transferrable competencies while recognising the significance of specialist knowledge (European Commission, 2010).

A national survey (NAIRTL, 2009) of staff from 38 higher education institutions and students as well as employers in Ireland revealed that "*the ability to apply knowledge in practical situations*" was ranked the most important competence while being able "*to work as part of a team*" was

considered the most important skill set. When asked their opinion on the strategies for developing student competencies over 80% of respondents agreed that *'this training should be embedded through out a student's course'* and approximately 75% agreed that *'assessment of generic competencies should be embedded throughout the curriculum.'*

Background

In 2008 the Occupational Safety and Health (OSH) Programme in Institute of Technology, Sligo sought and received validation to teach one fifth of its programme through Enquiry Based Learning (EBL). Advocates of enquiry/problem based learning as a pedagogical approach claim this way of learning produces independent learners who are motivated to learn, engage in deep learning and develop skills and knowledge for life-long learning and professional work. (Boud and Feletti (2008), Aishe (2005)). Biggs (1999) recognised it as a good example of aligned teaching.

Seven core modules of Occupational Safety and Health-Enquiry Based Learning (OSH-EBL) were designed across all four years of the programme (Appendix 1). Students were required to work within groups to meet module learning outcomes such as generic transferable competencies associated with team work and interpersonal skills, coupled with core specific competencies required by health and safety professionals. This innovation in curricula design allowed a focused and cohesive approach by the programme team in meeting the National Framework of Qualifications (NFQ).

During the design of the EBL modules significant consideration was given to student/ lecturer facilitation ratios and marking schemes. A ratio of 12:1 is applied to all EBL modules to help monitor and regulate individual student participation in the group process. As the students progresses through the EBL modules the weighting of marks shifts from process to product as the student becomes more adept at group work (Appendix 1).

Mc Grath et al (2009) captured the perceptions across all student groups and among all 14 lecturers involved in the OSH-EBL modules during the first year the change in curricula took place as part of a broader action-based research project. The findings from the student groups showed an overall positive perception of OSH-EBL and its benefits in terms of skill development and learning but more negative perceptions related to assessment of group work and adapting to working in groups, the findings reflect that which is already widely reported in the literature (Savin-Baden 2000;

AISHE, 2005). The lecturers' perceptions were gathered after semester 1 through the use of interactive clickers and 75 % indicated that '*marking students progress*' was the most demanding element of OSH-EBL with over 50% wanting more support in '*developing assessment criteria*'. Significant staff development, focus groups and training took place which allowed lecturers to further develop tools for assessing groups and primarily to gain confidence in their ability to align assessment with learning outcomes. Interestingly when asked '*How do you think EBL will impact on our students?*' 50% indicated it would give them an edge over other graduates.

Aligned Assessment

The B.Sc. (Hons) Degree in Occupational Safety and Health is a semesterised 4 year programme where all EBL modules are mandatory and assessed through 100% continuous assessment (Appendix 1). The programme has adopted a laddering approach to skill set development and competencies with the expectation that 4th year students have the necessary experience and skills to manage the group process.

In the fourth year of the B.Sc. (Hons) two modules, 'OSH-EBL & Workplace Studies' and 'OSH-EBL 6' are taken. Students progressing onto the Level 8 must complete a 20 week work placement between years 3 and 4 which is assessed as part of the learning outcomes in the former module. The focus in year 4 is on the management of occupational safety and health and develops the student from novice practitioner toward expert. The facilitating team (lecturers) are also the course lecturers and ensure that scenarios are related to prior experience with opportunities to integrate and apply new knowledge in a professional context. (O'Loughlin 1992; Glasersfeld, 1995). A facilitation ratio

The learning outcomes for the 'OSH-EBL & Work Place Studies' module required that on successful completion the learner was able to:

- Participate constructively in an OSH role in a workplace environment.
- Plan for the effective implementation of OSH incorporating business implications.
- Develop and deliver training programmes.
- Communicate and defend findings on the resolution of complex OSH problems.

- Collaboratively solve OSH problems and reflect on the learning experience.

Using random selection, students were assigned to small groups of 4/5 at the beginning of the semester. Two complex scenarios, simulating work based activities and practices, were presented to the groups over an 8 week semester. The groups were required to assume the role of occupational safety and health managers in the resolution of the issues presented and assessment was aligned to meeting task objectives using a variety of formats (Figure 1).

Figure 1: OHS-EBL & Workplace Studies Module Year 4

B.Sc. (Hons) Occupational Safety and Health

Marks		Aligned Assessment encompassed the following
Product Mark 50%	All group members receive the same group mark	Presentation to CEO & Finance Director Summarised Consultants Report Training Session for employers Question & Answer Session Peer Assessment Time Management
Process Mark 25%	Group Mark	E-management of Records
	Individual Mark	Individual Learning Log
		Self & Peer Assessment
Workplacement Mark 25%	Individual Mark	Attendance Moderated Supervisors Feedback Workplace Report Presentation to Peers

The assessment of the learning follows the principles developed by Macdonald and Savin-Baden (2004) where the activities assessed are mainly *'process-based professional activities underpinned by appropriate, knowledge, skills and attitudes'*. Reflection takes place at the end of each scenario cycle by both the student groups and facilitating team which feeds into a continual improvement process.

OHS-EBL 6 Module

The learning outcomes for the OSH-EBL 6 Module required that on successful completion the learner was able to:

1. Develop professional competencies relevant to the management of OSH.
2. Source information and plan for effective project management.
3. Communicate and defend findings on the resolution of complex OSH problems.
4. Collaboratively solve OSH problems and reflect on the learning experience.
5. Accept responsibility for the work of self and others.

This module is completely based on ‘real’ workplace practice. In collaboration with industry partners in the Northwest students integrate and apply the course knowledge in the development of a safety management system for the company to implement. To date partners were medium sized enterprises including a civil engineering (quarrying) company and a large manufacturing facility. The entire class group is collectively responsible for producing a single safety management system by working with company management and employees. Subgroups are formed by randomly assigning students into small groups of 4/5 at the beginning of the semester. These subgroups are each responsible for producing a part of the management system (micro level) which must feed into the overall management system (macro level). This mirrors the real life experience of health and safety project management. Figure 2 reflects the aligned assessment of the module.

Figure 2: OHS-EBL 6 B.Sc. (Hons) Occupational Safety and Health

	Marks	Aligned Assessment
Product Mark	70%	
	All class members	Safety Management System Document
	receive the same	Presentation to Company Management
	group mark	
Process Mark	30%	
	Group Mark	Time Management
		E-management of Records
	Individual Mark	Individual Learning Journal
		Self & Peer Assessment
		Attendance Moderated

Our findings will show that this innovative pedagogical approach adopted throughout all years of the course has produced the T-shaped profile of a 21st century graduate as discussed above. The development of this learning environment has allowed students to develop the skills and competencies identified in the NAIRTL survey (2009). Our assessment of the learning outcomes

has shown that students have “*the ability to apply knowledge in practical situations*” and the ability “*to work as part of a team*”.

Daniel McMonagle, operations director of McMonagle Stone (industry partner during OSH-EBL 6) commented on his experience of working with the fourth year IT Sligo students:

‘The students demonstrated that they understood the needs of our business and devised an applied Safety Management System. This ensures that my business continues to be compliant but beyond that, it contains suggestions for future improvements and for a positive and safe working environment. (Sligo Champion 2010).

Research & Findings

Prior to the implementation of OSH-EBL as a pedagogical approach, a survey of students was carried out to determine their perceptions to group work. This showed that 70% of students believed that group work has an overall negative impact on their academic performance. To investigate the validity of this perception the programme team carried out a quantitative analysis of fourth year results for 2009 and 2010 as this is their award year.

Quantitative Findings

A paired samples t-test was used to compare the students average mark with EBL included and with EBL excluded. For the 2009 cohort it was found that there was a difference in the average marks with EBL included when compared with the average mark with EBL excluded ($t=2.626$, $p=0.015$, $df=22$, $n=23$). A 95% confidence interval for the difference in the average mark showed that the average mark increased by between 0.14 and 1.17 marks when the EBL mark was included. These findings demonstrate that EBL has not negatively impacted on the student’s overall academic performance.

For the 2010 cohort ($n=30$) the t-test found that there was no difference in the average marks including EBL and the average marks excluding EBL ($p > 0.05$). In 2010 the average mark without EBL included was 61.16 and the average mark with EBL was 61.2. The histograms below (Figures 3&4) show that there is no difference in the distribution of marks.

Figure 3: 2010 SA 4 – Average Marks Excluding EBL

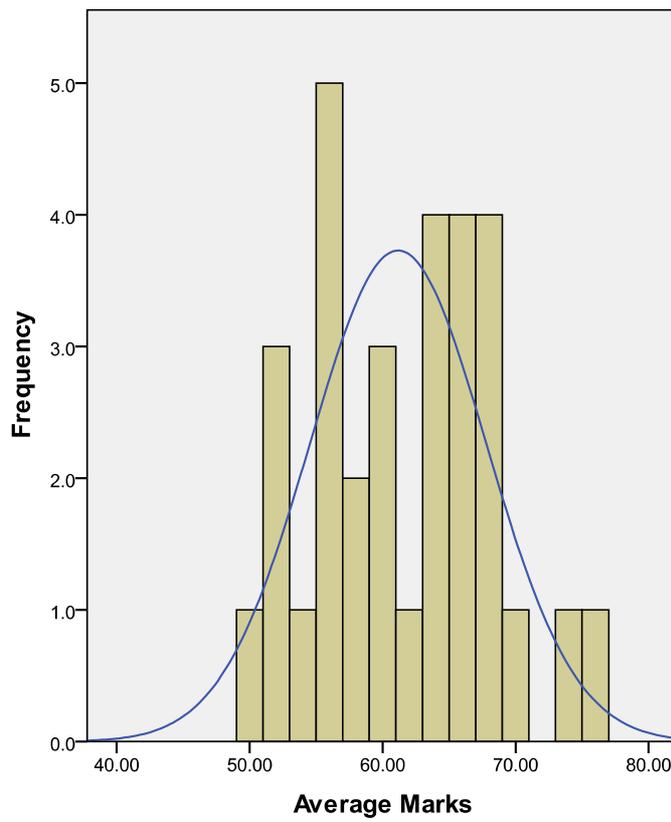
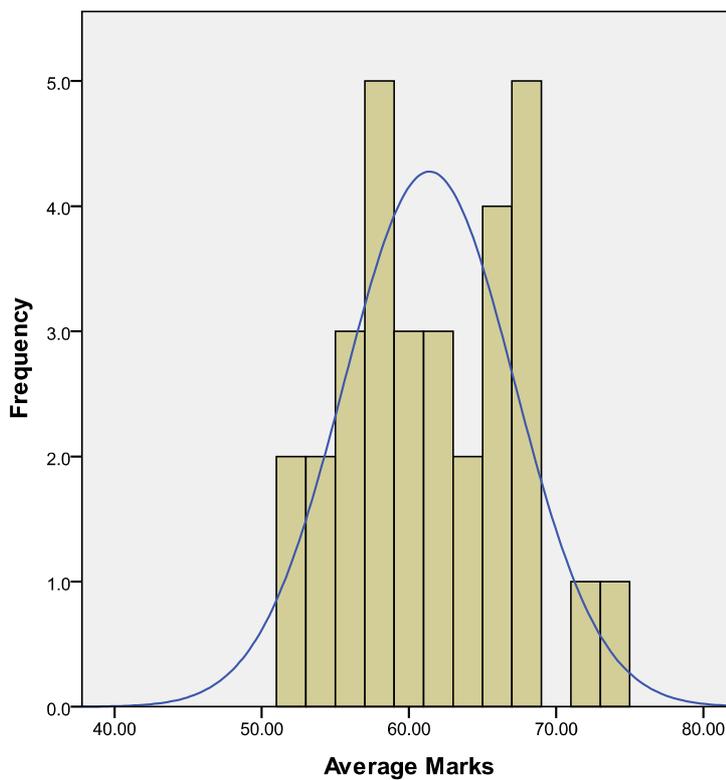


Figure 4: 2010 SA 4 – Average Marks including EBL



Qualitative Findings

Employer Survey of Work Placement Students 2010

A survey was conducted of the 32 employers who had employed our OSH students on work placement over the 2010 summer period. This electronic survey (survey monkey.com) focused on

the employers perceptions of the student's abilities across a spectrum of transferable skills. The findings endorsed the lecturing teams approach to achieving transferable graduate skills and technical competencies through group work using a structured and focused enquiry based learning approach with aligned assessment.

Each table represents the number of respondents (n=30) selecting their preferred rating.

On a scale of 1-5 (1 indicating a poor performance and 5 indicating an excellent performance) please rate Institute of Technology Sligo Occupational Safety and Health students' performance in the following areas:

	1	2	3	4	5
Oral Communication		1	1	6	22
Written Communication			1	6	23
Problem Solving Skills				8	22
Time Management				8	22

OSH-EBL modules have learning outcomes where key transferable skills are assessed such as oral and written communication, the ability of a group to problem solve and time manage tasks. The employers perceptions of the students was that 93% of them were rated good or higher for oral communication skills, 96% were rated good or higher for written communication skills.

100% of the students were perceived to have good or higher problem solving and time management skills.

On a scale of 1-5 (1 indicating a poor performance and 5 indicating an excellent performance) please rate Institute of Technology Sligo Occupational Safety and Health students' performance in relation to their "Interpersonal skills":

	1	2	3	4	5
Ability to work with others		3			27
Ability to listen				3	27
Willingness to accept				3	27

correction

The perceptions sought here relate to the students’ interpersonal skills. These findings suggest that constantly exposing students to team work as part of the curriculum through OSH-EBL modules results in the majority having these skills to a very high standard with an ability to apply them in a work setting.

On a scale of 1-5 (1 indicating a poor performance and 5 indicating an excellent performance) please rate Institute of Technology Sligo Occupational Safety and Health students' performance in relation to their "Task management":

	1	2	3	4	5
Willingness to take on tasks			3	3	24
Ability to research and source relevant information				9	21
Ability to work on own initiative			3	3	24
Ability to close out on tasks to an agreed timeline				3	27

All workplaces want employees to show initiative, meet deadlines and keep themselves up to date on new developments and information related to the job or task. The 21st century graduate has to be able to meet those expectations and the above data shows that while all our students were given a rating of 3 or above, over 70% were rated as excellent on all ‘task management’ factors.

On a scale of 1-5 (1 indicating a poor performance and 5 indicating an excellent performance) please rate the students ability to “apply their theoretical knowledge” to your workplace.

	1	2	3	4	5
Students ability to apply theoretical knowledge to your workplace				1	16
				4	

One of the main learning outcomes of the OSH-EBL modules and especially in years 3 & 4 is the ability of the student groups’ application and integration of knowledge from all their modules to solve increasingly complex work based scenarios/problems (higher order cognition). Employers rated 53% of the students as excellent at this with the remaining 46% rated as very good. This result

reaffirms that each individual student after year 3 display significant competence in this as perceived by employers.

Could you please rate the “overall performance of the IT Sligo student” in relation to your expectations prior to their commencement of work.

	Below Expectation	Satisfied Expectation	Exceeded Expectation
Rate the overall performance of the student in relation to your expectation prior to their commencement of work		6	24

While 100% of students satisfied their employers’ expectations over 80% of them exceeded the employers’ expectations. This result can be interpreted as an endorsement of the ITS Occupational Safety and Health Students’ and hence the programme outcomes. The methods adopted by the programme to create an engaging learning environment, appropriate learning outcomes and aligned assessment has developed in students the competencies and skill sets to satisfy employers expectations in all cases and to even exceed it in 80% of cases.

Qualitative Findings –Student Achievements

- In open competition for summer placements/internships ITS OSH Students secured 7 out of a total of 9 opportunities with blue-chip organisations.
- A multidisciplinary team of ITS students (including OSH students) came first in the Health and Safety Authority (HSA) National Competition, ‘Safety in Design’.
- A second multidisciplinary team from ITS reached the final of the competition.

Conclusions

This research demonstrates that overall academic performance is not negatively effected by group based learning.

Preliminary findings suggest that a direct correlation between student performance in group based learning and traditional assessment modes exists. Further research is required in this area.

This programmes innovation in curricular design and aligned assessments have developed professional competencies and transferrable skill sets in the student.

Group based learning using ‘simulated’ and ‘real’ work based scenarios develops competence in students and makes them workplace ready.

This method of learning and assessment allows higher order cognitive learning to take place through solving complex problems incorporated into the scenarios.

The programme lecturers believe that structured group learning, is a sound pedagogical approach for the 21st century.

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Appendix 1

Layout of EBL Modules in the B.Sc. Occupational Safety & Health Programme

Year	Semester	Module Title	Timetabled Hours	Credits	% Marks
1	Semester 1	OSH EBL 1	5Hrs	10 Credits	Process 60%
	Semester 2	OSH EBL 2	5Hrs	10 Credits	Product 40%
2	Semester 1	OSH EBL 3	5 Hrs	5 Credits	Process 60%

					Product 40%
	Semester 2	OSH EBL 4	5Hrs	5 Credits	
3	Semester 1	OSH EBL 5	5 Hrs	5 Credits	Process 40%
4	Semester 1	OSH EBL & Workbased Studies	3 Hrs	5 Credits	Product 60%
	Semester 2	OSH EBL 6	3 Hrs	5 Credits	Process 30%
					Product 70%