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Promoting Student Engagement within a Practical Class through the use of a Learning Portfolio

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Abstract

This paper looks at an exploratory case-study undertaken to try and investigate student engagement within a practical wood machining class.

Due to the nature of the course and the cohort of students, the current lecturer pedagogic practice has to be behaviourist, but from this a culture of expectancy has developed among the students. It was felt that something had to be done to revitalise student interest in the work they were doing and also give them the chance to address the perceived shortfall in their learning. There was potential for a lot of failures, but also much worse, there was potential for students to engage in unsafe practices with inevitable accidents occurring.

The current teaching practice was examined and analysed with a view to changing and improving it. Within the limited scope for change it was decided to try a viable alternative method of student engagement, whereby they would encompass their learning in a portfolio. The hope here was that through reflecting on work done and machines used, the learning experience would improve for the students due to the higher order thinking skills necessary to produce the broader and deeper knowledge required for the portfolio. This would then in turn foster a more focused learning environment and help to ensure that the students take greater control and responsibility of their own learning going into the future.

The research has produced encouraging signs and it seems to have had the desired effect of allowing the students to gain a broader knowledge of the subject, to back-up practical classroom experiences and also to allow for a further demonstration of learning and knowledge achieved.

Keywords

Learning Portfolio, Student Engagement, Reflection

1. Background and Context

The Dublin Institute of Technology (DIT) has been an integral part of the Irish Higher Education system for more than a century, and is now one of Ireland's largest and most innovative university-level institutions. It is recognised under the 1999 Qualifications (Education and Training) Act as both a provider and an awarding body ranging from level 6 to level 10 of the National Qualifications Framework, and is unique in this regard. With its origins arising from technical schools, the craft trades and apprenticeship programmes have always been a significant component of the work undertaken. The decline in apprenticeship nationally due to the current recession has all but removed one of the traditional routes to employment within the construction industry, and the DIT undertook to develop new courses both to meet the educational requirements for school-leavers to service the needs of industry, and also to make sure that by having a continuous flow of training the experience and skill set of lecturers and trainees who had traditionally been involved with the apprenticeship programmes would not be lost.

It is within one of these new programmes – a level 7 ordinary degree in Timber Product Technology that the research was carried out in the Wood Machining module. The module runs for the full first year of the course and is worth 10 European Credit Transfer System (ECTS) credits, or effectively, one sixth of the entire first year marks. Due to its highly practical content, it accounts for 25% of the first year class contact hours. It is designed to give students both the practical experience of working with the machines and also the theoretical knowledge of machining, with all of the associated legislation and regulations. The ability of the students to safely set up and use machines is crucial, not just for this module or other ones in the course, but also for industry.

The authors of this paper are both lecturers on the wood machining module, and it is their insight into the topic, based on many years experience teaching apprentices, that was used as a back-drop for the research. Any mention of "we" or "our" going forward in the paper can be directly attributed to them.

2. Introduction

The paper focuses on an exploratory case-study undertaken in the wood machining module to further engage students with the topic and take ownership of their learning.

Due to the nature of the wood-machining module and the fact that the vast majority of students have no prior knowledge of working with machines, the lecturer pedagogic practice has to be behaviourist. A very tight reign has to be kept on the students, as the potential for serious accidents to occur is high. As such, each new machine gets fully explained and demonstrated to the students before they are allowed to use them. The students then repeated what they were shown to do, but without reflecting upon it they never retained the information on the machining process, so would quite often have to be shown on several occasions.

Although they were working "hands-on" when they were actually in the workshop, they had no facilities outside of this to practice and develop their skills. There was a student misconception that the module only involved working with machines to produce a finished item or piece of work (which would be the norm in other modules within the course). This misconception was further backed-up by the fact that it was a continually assessed module, and the marks were awarded based on the quality of these finished practical jobs such as a piece of joinery or furniture, and not on the production process to manufacture them.

The students were failing to recognise the link between the theoretical knowledge behind the machining process and the practical operation of the process to produce the desired item, something that they could easily have read up on outside of the workshop.

Lack of interest and poor attendance by some students meant that crucial learning was missed, and this could potentially prevent them from completing all necessary coursework. This in turn placed extra pressure on the lecturers to try and help students

to "catch-up" on missed learning, to make sure that everyone had an equal opportunity to learn and practice what they were being shown.

Furthermore, without adequate supervision there was potential for weaker students to tag in behind the stronger students and simply use the set up machines to produce the required product, missing the entire desired learning outcome of being able to correctly set up the machines themselves. It was felt therefore that somehow the process of production rather than the finished article needed to be assessed.

3. Aims & Objectives

The aim of the research was to investigate a viable alternative method of engaging the students. This was something that would encourage students to learn, help them recognise the importance of safe working practices, assist them into the workplace and promote continued learning.

We needed to make the students reflect on work undertaken within the workshop to ensure they had a better understanding of the machining process. The objective was that upon completion of the module the students would be able to demonstrate an understanding and appreciation of the theoretical and practical issues associated with machinery.

> "It is not sufficient simply to have an experience in order to learn. Without reflecting upon this experience it may quickly be forgotten, or its learning potential lost. It is from the feelings and thoughts emerging from this reflection that generalisations or concepts can be generated. And it is generalisations that allow new situations to be tackled effectively." (Gibbs, 1988)

4. Methodology

A case study was chosen as it was felt that this would best illustrate what we were setting out to achieve. It "may be defined by an individual in a particular context, at a

point in time" (Cohen, Manion, & Morrison, 2011). An 'exploratory' case study is defined by Yin (2009) as a pilot to other studies or research questions, and allowed for the development of the research immediately, within the context of what we were trying to achieve within our module and with our students.

The research could potentially have been the first cycle in an action research project but it was felt that without having any prior data to work from, an action research methodology didn't quite fit. The basic action principle underpinning action research "involves identifying a problematic issue, imagining a possible solution, trying it out, evaluating it (did it work?), and changing practice in the light of the evaluation" (McNiff, 2002), and we drew elements of this into the case study.

For us, the 'problematic issue' was the students' failure to fully engage with the topic and we set ourselves the task of trying to address this. Research into what could be done to achieve the aims uncovered potential answers to be found in both Learning Portfolios and Problem Based Learning.

From an academic point of view it was found that "Portfolios have been characterized by some teachers as a worthwhile burden with tangible results in instruction and student motivation" (Sweet, 1993), and would align very well with our desire for greater student engagement.

A benefit of problem based learning is that it ties in with industries' demands of the students: "when problems arise, a theoretical understanding offers you a tool for recognising, analysing and dealing with the issues in a more focussed, logical and effective manner" (Carlile & Jordan, 2005).

It was felt therefore that if we could carefully plan out and somehow align the two, a greater student learning experience would be achieved.

4.1 Methods

The research design used was exploratory in nature. Mixed methods were employed in order to deliver both quantitative statistical data and qualitative information, as assessment results alone couldn't be relied upon to try and measure the effectiveness of the portfolio. This was achieved by way of participant surveys and semi-structured interviews. Observation of students as work progressed was also recorded, although this was already being practiced due to on-going safety requirements.

5. The Project

According to Ferris and Aziz (2005), students in the area of wood machining require more than practical demonstrations and lecture notes; they need to develop their psychomotor and cognitive skills that allow them to operate machines safely (Stuart, n.d.). Although this was being taught, the knowledge wasn't being retained, and this was one of the items the portfolio set out to address. David Kolb has stated that "knowledge results from the combination of grasping experience and transforming it" (Kolb, 1984, p. 41).

Problem based learning promotes deeper levels of learning and should help to address this, so a problem based task was designed around one of the practical pieces of work with the following in mind:

- does it allow the student to fully capture the learning?
- is it completely unambiguous so that the student fully understands exactly what they have to do?
- have the students been fully introduced to all machines necessary to produce the job?
- is it realistic in terms of the workload required to produce it versus the desired learning achieved by producing it?
- can the process of making the job be assessed rather than the finished item?
- how can feedback be given?

Within the problem based task the students had to find information, resources and present a solution to a real life scenario that they may face in their work. They had to

work towards this goal in their own time and among their peers. Lecturer guidance and formative feedback were provided during the task as well as constant supervision during the machining processes.

The portfolio was then used to compile all this information in a report. The use of portfolios as an educational tool is nothing new, but it was felt that it could be extremely beneficial within our discipline as "Rather than showing that the learner *knows* what has been taught, the portfolio demonstrates that the student *can do* what has been taught." (Damiani, 2004)

The framework for the portfolio was around Kolb's (1984) Experiential Learning Cycle as this loaned itself to the process of analysing the problem based task;

i. *before production*, to think about what needed to be done;

ii. *during production*, to analyse any problems encountered during the production process and the actions taken to overcome the problems; and

iii. *upon completion*, to reflect on the overall job and see what could be done differently and what was learned from the whole process to carry forward to future work.

As part of the portfolio the student was also required to undertake a study of all the machines used and produce a detailed report about them.

The students were encouraged to document any issues they faced during production and how they overcame them. This allowed them to demonstrate evidence of learning, and enable further reflection on the whole process. The assessment of the portfolio as part of the overall grade for the module ensured that the students had to engage with the process. "Portfolios are a valuable assessment tool because…they can be fully integrated into the curriculum. And…they supplement rather than take time away from education" (Sweet, 1993).

6. Findings

6.1 Assessment Results

The final grade for the module was made up from both coursework *(two finished practical jobs)* worth 67%, and the portfolio worth 33%. A comparison of results is difficult with no prior data available, so this was compared against the total mark that would have been achieved based on 100% coursework *(with the practical job the portfolio was based around assessed and its marks included instead of the portfolio)*

Some interesting observations were made;

- There was no huge variation in the results.
- Out of the class of thirty there was four fails. Had the portfolio not been used this would have risen to seven fails.
- Twelve of the students got their highest mark in the portfolio element.
- The most surprising outcome when comparing the results was that only nine students got a higher mark with the result from the portfolio taken into consideration, with an average reduction of 6.88% across the remaining twenty-one students.

These statistics are of little benefit as they are merely a snapshot of an alternative method of promoting learning of the theory associated with a practical class. By focusing on results they also fail to answer the initial question: *Can student engagement within a practical class be improved through the use of a learning portfolio* but we are hopeful that as we continue with our research it will allow us to build on this data.

6.2 Student Feedback

Without having a mediating group to compare against, student opinion as gathered through the questionnaires and interviews is one of the main gauges of the projects successfulness. This feedback was mostly time related (the fact that the production of the practical project for the portfolio took longer than they had initially anticipated) and perhaps the greatest thing they learned was to fully plan out a project prior to

starting it. A further advantage of the portfolio was that the students now had their own "manual of operations" to refer back to in the future. It was also noticeable to them how they struggled with machines that they had missed some of the previous training on, and the fact that they stated they prefer to seek assistance from each other if they didn't know something rather than ask a lecturer for help is something that needs to be addressed as although peer learning is usually encouraged, within the machining workshop we can't risk one student showing another one something incorrectly. The prevailing student opinion of the portfolio use was positive, but some students perceived the portfolio as extra work being imposed on them due to the fact that it was linked with assessment.

6.3 Lecturer Observations

From a lecturer's perspective, we believe that those who fully engaged with the process benefited greatly from it, as they gained a broader knowledge of the subject to back-up practical classroom experiences. It also highlighted to the students the dangers faced when using the machines and therefore brought about a safer working environment. The culture of expectancy of the students on lecturer help diminished and this gave greater freedom to the lecturers to facilitate learning rather than dictate how things should be done, which allowed for a better overall student experience. It also gave lecturers the opportunity to provide formative feedback to the students on their overall knowledge of the topic rather than just commenting on a single mistake that was being made at any one time. Overall, we would deem it to have been a success and intend to build on it into the future.

7. Conclusions and Future Work

The research demonstrated how the use of a learning portfolio can increase student participation in the learning process, while also allowing for a greater depth of knowledge being achieved. The area where this was most notable was peer collaboration and discussion as the work progressed. This was further encouraged by the formative lecturer feedback where we not only got the students to question their own work, but also analyse the processes and methods used by their peers.

It was a challenge to structure the learning portfolio in such a way that it could fully address all of the potential issues associated with using it. In any assessment system there will be flaws, but we believe that by introducing the portfolio element to the course it allows for an opening up of the current pedagogy and enables the students to demonstrate a fairer reflection of their overall knowledge and abilities rather than just focusing on a finished item.

> Reflection is an important human activity in which people recapture their experience, think about it, mull it over and evaluate it. It is this working with experience that is important in learning. (Boud, Keogh, & Walker, 1985)

While undertaking the research we were surprised when we discovered colleagues also starting to use portfolios to back up learning in a similar discipline as although traditionally lecturers tended to work in isolation we had assumed that within the modern collegial environment there was greater cross-collaboration between colleagues. We would hope to change this and indeed through this paper and our findings to date we hope to stimulate a broader discussion on the topic and continuing research in the area.

We intend to review both sets of research and see if there may be potential to somehow standardise a portfolio to use on all practical work which will achieve the goals of all parties while presenting the same structural format to the students. Another item to be considered going forward was that attendance and punctuality remained an issue with some of the students, and although this was something the portfolio was never designed to address, it may be considered during re-design.

By its very nature, the portfolio allows for reflection of the carried out tasks, with the overall goal of understanding and improving what has gone before. The research indicates that the facilitation of this type of learning can help foster a more focused learning environment and help to ensure that the students take greater control and responsibility of their own learning going into the future.

References

Boud, D., Keogh, R., & Walker, D. (1985). *Reflection: turning experience into learning.* London: Kogan Page.

Carlile, O., & Jordan, A. (2005). It works in practice but will it work in theory? The theoretical underpinnings of pedagogy. *Emerging Issues in the Practice of University Learning and Teaching* (pp. 11-26). Dublin: AISHE.

Cohen, L., Manion, L., & Morrison, K. (2011). *Research methods in education.* London: Routledge.

Damiani, V. (2004). *Portfolio Assessment in the Classroom.* Retrieved September 3, 2013, from www.nasponline.org: http://www.nasponline.org/communications/spawareness/portfolioassess.pdf:

Ferris, T., & Aziz, S. (2005). A psychomotor skills extension to Bloom's taxonomy of education objectives for engineering education. (Doctoral dissertation, National Cheng Kung University Tainan).

Gibbs, G. (1988). *Learning by doing: A guide to teaching and learning methods.* Oxford: Further Education Unit.

Kolb, D. A. (1984). *Experiential Learning: experience as the source of learning and development.* New Jersey: Prentice Hall.

McNiff, J. (2002). *Action research for professional development - Concise advice for new action researchers.* Retrieved November 4, 2013, from www. jeanmcniff.com: http://www. jeanmcniff.com/ar-booklet.asp

Stuart, A. (n.d.). A blended learning approach to safety training: Student experiences of safe work practices and safety culture. *Safety Science , 62 (to be published February 2014)*, 409-417. Retrieved November 4, 2013, from http://www.sciencedirect.com/science/article/pii/S0925753513002300

Sweet, D. A. (1993). *Student Portfolios: Classroom uses.* US Department of Education: Office of Research.

Yin, R. K. (2009). *Case study research: Design and methods* (Vol. 5). California: Sage.