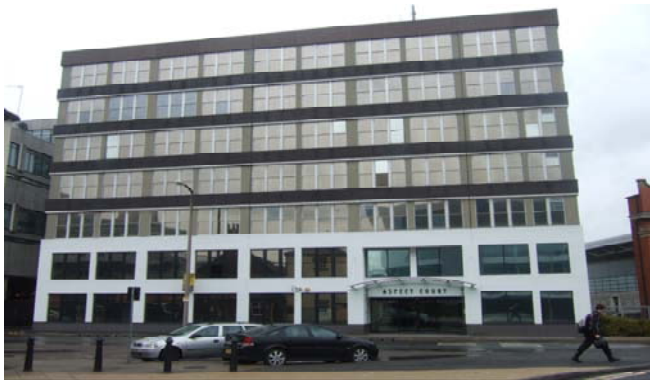
Pedagogy of Using Industrial Simulation in Surveying Education: A Study of Two Models Run at Sheffield Hallam University, 2008/9

SIMON MCLEAN BSc (HONS) MA PGCE MRICS
(CHARTERED SURVEYOR, SENIOR LECTURER IN BUILDING SURVEYING, SCHOOL OF BUILT ENVIRONMENT, SHEFFIELD HALLAM UNIVERSITY, UK, EDITOR JOURNAL OF BUILDING APPRAISAL)



ABSTRACT

- This paper is written from the perspective of delivering vocational education to prospective surveyors. The author is conscious of the desirability of providing surveying students with practical surveying training in addition to academic knowledge and skills. After establishing desirable vocational skills requirements for new entrants to the surveying industry, the paper analyses two industrial simulation exercises delivered to completing surveying students, studying at both professional and technical levels, within Sheffield Hallam University. Both case studies utilise industrial simulation to facilitate both learning and assessment. Current academic literature in respect of using industrial simulation as a teaching method. and the author's personal experience of delivering industrial simulation exercises over many years are used to establish pedagogy for running successful models. Using data produced from these case studies, the author tests this form of teaching and assessment as being potentially suitable for delivering appropriate learning, valid assessment and usable vocational skills, against academic, student focused and industrial criteria. The methodology employed, academic outcomes met, student achievement and student engagement are analysed to establish if these case studies succeeded. The paper concludes that simulation can be a valid tool for delivering teaching, learning, assessment and vocational skills training to surveying students.
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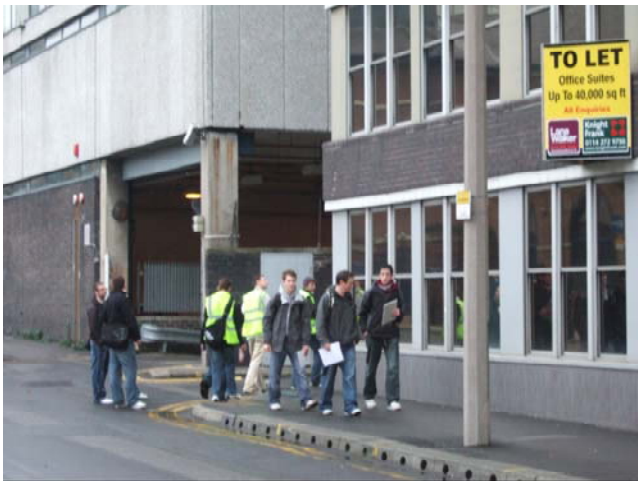
GOING SURVEYING TODAY



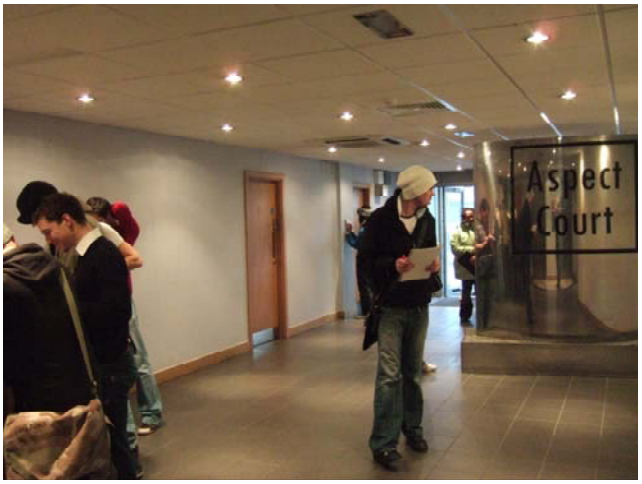
4 STAKEHOLDERS TO BUILDING SURVEYING EDUCATION

- In delivering under and post graduate surveying education the course must satisfy a number of stakeholders. The first is the university who require that the degree in all its parts is delivered to a comparable academic standard to all its degree programmes, is of a standard comparable with similar degrees offered by other institutions and fully meets the academic and quality regulations it lays down for degree provision. The second would be the accrediting body the Royal Institution of Chartered Surveyors (RICS), who lay down regulations governing the content of the courses that they accredit for graduate entry on to the APC process. A third body would be industry as without the realistic prospect of graduate employment vocational surveying courses would face decline. A final body are the student customers of the university. Module outcomes are generally pre-set, and any industrial simulation based assessment must pass both internal and external scrutiny so that it demonstratably meets the academic requirements of module and level of study and is presented to students in a way which is consistent, fair and unambiguous, in line with quality regulations.

ADVANTAGES OF USING ENQUIRY BASED LEARNING FOR VOCATIONAL EDUCATION

- Facilitates the acquisition of factual knowledge within the context it is to be used
- Encourages mastery of general concepts and principles in a ways which allows their transfer to new situations
- Encourages the use of previous knowledge to solve problems
- Offers prompt student feedback
- Encourages students to learn how to learn and to become life long learners
- (Bradbeer 1996)
- Students are more likely to engage with the learning as it is perceived as being relevant to their own needs
- Students can expand their knowledge by researching their own interests
- Working within, and communication to, a group improves a student's employability
- Self directed learning develops key skills and original thought processes.
- (CEEBL 2009)
- things a learner has discovered through experience are more likely to be retained,
- (Park et al 2003).

ASPECT COURT, SHEFFIELD



ASPECT COURT INTERNAL

CASE STUDY 1, ASPECT COURT

- In this case study industrial simulation was used mostly as an assessment activity to support a regime of traditional teaching and practical tutor led demonstrations. The activity was however specifically designed to allow students with scant experience of surveying fieldwork opportunity to perform such work. The activity required students to respond to a specific client brief and perform a number of stock building surveys upon a vacant office block, previously used by H M Passport Office. The building while simple by design had a number of unusual features attributed to its previous user, which had to be assessed in terms of the stated needs of the prospective occupier. Survey types required either by professional obligation or consequential to the terms of the supplied client brief included, measured survey, condition survey, appraisal of suitability for purpose, Type 1 Asbestos survey, assessment of potential dilapidations liability, audit of fire provision and an access audit for disability. The choice of building ensured that none of these surveys required a complexity beyond a newly employed surveyor's abilities. The assessment outcome was a bespoke survey report written to an, RICS, industry approved format which addressed the express requirements of the client, all statutory obligations and the requirements of professional surveyor status.

GOOD PRACTICE

(STUDENTS START BY CHECKING THE ASBESTOS REGISTER)

HOW REQUIREMENTS FOR SUCCESSFUL SIMULATION WERE MET

	Requirement	How Met
1	Students need full support before during and after the simulated activity	- Students were given the brief early and allowed time to allow them to be fully prepared. - The building chosen was one which once belonged to the university was well documented. - Students had access to qualified technical support on and off site. - A debrief session post event reinforced key issues, pre completion of the assessed work. - Students worked on the practical tasks in small groups, - The weighting of the assessment was designed not to confer disadvantage to non-experienced students, with only 20% available for proof of technical surveying abilities.
2	Tutor's role must not diminish following the change to facilitator	- Tutor adopted the role of health and safety officer on site, a role with authority, but outside the simulation - Tutor ensured a discreet but still leading role as the senior colleague from whom technical advise could be sought.
3	Simulation must be realistic and the roles capable of conceptualisation	- Building is an actual property for commercial lease. - Brief is realistic in terms of the nature of the client's business and appropriate for the building. - Student roles appropriate for the level of work expected in the first year of practice life. - Simulation used real life personnel from the building.
4	Students need adequate prior learning, basic under-pinning skills and access to any required information	- A demonstration practice building survey was run pre-event - Classroom discussions on professional conduct were run - Access to current information and written guides on surveying were made available on a learning portal

HOW ACADEMIC &VOCATIONAL TARGETS WERE MET

	Assessment Outcomes	How These Were Met
1	Carry out a Building Survey of a traditionally constructed commercial building and critically appraise its condition.	Aspect Court is a vacant commercial office property currently offered for lease, and requiring some element of conversion and adaptation to meet future tenant requirements. Students surveyed it in the role of a graduate fee earning surveyor.
2	Analyse the condition of a building, formulate and communicate an appropriate course of action to a client.	Students will as graduate surveyors perform an inspection which will include at least 5 different stock surveys and audits. A report to a given client brief will be written to industry accepted format and standards.
3	Identify and apply to a given context, the legal rights and obligations of property owners, leaseholders and tenants.	Included in the client brief are concerns over shared obligations, dilapidation liabilities, requirements for disabled access, and costs of making fit for purpose.
4	Apply the design process to a given scenario and critically evaluate design options	Students will suggest design solutions to meet specific client accommodation requirements and particular access issues.
5	Demonstrate an understanding of current topical issues within the profession.	By adoption of a professional role students become obligated by professional actions and current liabilities such as identification of potential Asbestos
	Vocational Requirements	How These Were Met
1	Perform stock surveys in industrial settings	Surveys exactly mirror those to which a young fee earning surveyor may be expected to undertake.
2	Apply current statutory obligations to a given scenario	The brief or previously stated surveyor obligations include all the major statutory obligation facing a surveyor and his/her client
3	Write professional reports to industry accepted standards	Report to be written to previously discussed industry accepted format.
	Skills Training	How Achieved
1	Working in a team	Surveys, and prior research were undertaken in small teams

ACHIEVEMENT AND SATISFACTION DATA

TOTAL No STUDENTS	70%+	60-69%	50-59%	40-49%	REFER/DEFER
66	10	20	18	14	4 Only 1 did survey

- Student achievement in terms of grades was in line with other elements of assessment for this module, i.e. a researched technical paper and a formal examination. The primary purpose of undertaking such an industrial simulation exercise was to add vocational skills value, not specifically to test PBL's ability to raise achievement levels, however it was important that the industrial simulation did not detract from academic achievement which might have been gained by traditional assessment methods, and the author is confident from the data produced that this did not occur. Whilst no formal written feedback was taken specific to this activity student feedback through staff/student course meetings, and later through the whole module feedback exercise was positive in respect of the value of this activity. Part of the scaffolding provided was a post survey debrief when students could air problems before writing up the report. No major difficulties were aired during this session.

SUMMARY

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CASE STUDY 2, SIMULATED WORK EXPERIENCE

- Activity took place at two fully risk managed heritage centres, each with ongoing property development and maintenance projects. Student activity directly reflected work required by these projects. The nature of tasks was set at technician level. Students would in unsupervised teams gather information as part of a larger surveying task or work directly with an existing construction professional on a more complex task. The nature of enquiry reflected Blooms Taxonomy to stage four, (Anderson & Krathwohl 2001).
- Professional support and participation included current or recently practicing construction professionals namely Site Engineer, Construction Manager, Building Surveyor and Quantity Surveyor, all with practice experience as a RICS or Chartered Institute of Building, (CIOB), professional members. Unsupervised tasks included completing an access audit Performa, completing a health and safety audit, performing a measured survey, completing a maintenance assessment Performa, gathering photographic information for assessment of cultural significance, and performing a simple site evaluation. Supervised work included assisting in estimating cut and fill volumes for required site levelling, setting out proposed buildings from an existing plan, setting out the access road, a development appraisal and a condition survey. In line with likely technician level output, students were not required to produce client reports, but merely provide field notes and illustrations that could be used in the generation of client and internal reports. Assessment consisted of producing these field notes, a set of researched reports based upon the nature of the professional disciplines the tasks related to and a reflective diary covering their experiences whilst undertaking the work. These were in line with the pre-stated outcomes for the module. Underpinning theory for each task had been imparted within other module outcomes and teaching, and the basic vocational skills tested within another project based modules. More specialist material was made available on the university's learning portal. A pre-activity assessment briefing was conducted, to ensure full understanding of the simulation.
- Conscious efforts were made by the supporting professionals to show students actual site practices rather than running a purely text book activity, and events like a group builder's breakfast and client briefing by officers of the heritage trust were incorporated to make the activities even closer to an actual industrial experience.

WORKING IN THE BLACK COUNTRY LIVING MUSEUM

HOW REQUIREMENTS FOR SUCCESSFUL SIMULATION WERE MET

	Requirement	How Met
1	Tutor's role must not diminish following the change to facilitator	- The tutors maintained the role of the senior qualified professionals with a managerial role in the exercise. - Tutor ran a pre-activity briefing and post activity de-brief, during which parameters for the simulation and assessed output was set.
2	Simulation must be realistic and the roles capable of conceptualisation	- Tasks were commensurate with level of a newly appointed technical surveyor. - Both sites were currently being developed, and tasks were commensurate with that development and maintenance.
3	Students need adequate prior learning, basic under-pinning skills and access to any required information	- Skills required were pre-taught in previous modules. - Skills required had been pre-demonstrated and pre-used in a previous PBL project and were therefore tested
4	Students need full support before during and after the simulated activity	- Students were given the brief early and allowed time to allow them to be fully prepared. - Multiple tutor support was used. - Students had access to qualified technical support on and off site. - Support on site was visible and easily available - Students worked in groups and were not isolated - A debrief session post event reinforced key issues, pre completion of the assessed work.

HOW ACADEMIC &VOCATIONAL TARGETS WERE MET

	Module Outcomes	How These Were Met
1	To gain an insight into the day to day operation of companies operating within the construction and surveying industry	Engaging in real project industrially simulation of tasks likely to be undertaken by technical level employees
2	Develop personal skills and qualities essential for future academic study and/or employment.	Learn new skills by undertaking the tasks or through supervising professional's input
3	To enable students to place their academic studies in the industry	Enable students to use theory gained from other modules in a practical work based scenario.
	Assessment Outcomes	How These Were Met
	Reflect upon professional and personal skill development	Within submission brief
	Identify future personal development requirements	Within submission brief
	Investigate and research a technical topic	Preparation for industrial simulation tasks
	Prepare a professional report	Within submission brief
	Develop referencing Skills	Requirement of submitted material to be referenced in Harvard system.
	Skills Training	How Achieved
1	Working in a team & working under supervision	All work undertaken within teams Current construction and surveying professionals used for supervision of some tasks
2	Use of stock surveying equipment	Distance measures, endoscopes, damp meters, handheld thermal imaging, tapes, 2m rods, torches, binoculars, theodolites, EDMs Levels, etc were provided on site
3	Time management	There was a strictly controlled window for performing the tasks

ACHIEVEMENT AND SATISFACTION DATA

- STUDENT ACHIEVEMENT DATA

TOTAL No STUDENTS	DISTINCTION	MERIT	PASS	REFER/ DEFER
19	6	9	4	0

- STUDENT SATISFACTION SURVEY

- Thirteen of the nineteen students subsequently completed a university student module evaluation survey and module approval was 100% across all major teaching and learning issues.

SUMMARY OF EXERCISE

- In summary this exercise succeeded as it was possible to simulate industrial experience as a teaching activity, and to control the quality of that experience. In contrast the quality of short work experience placements can be variable, and not always of a standard that module outcomes demand. It was also possible to control health and safety issues which had prevented traditional work experience in an industrial setting. Whilst different from case study one in that the simulation replaced the intended learning medium rather than primarily being the assessment medium, it was however appropriate to underpin previously set assessment requirements. Student engagement, participation and achievement levels proved excellent. This was possibly due to support and safety net mechanisms put in place which reflected the nature of the student cohort, as while it is acknowledged that challenge can enhance the learning experience, over-challenge can negate it.

CONCLUSION

- Both exercises showed that the use of industrial simulation can be effective at meeting existing academic outcomes, for both learning and assessment. This is evidenced by academic standards being provably maintained, and the module outcomes fully met. If correctly planned and executed it can engage student interest, and result in high achievement and satisfaction levels. as evidenced by documented student achievement and satisfaction data. Educational literature suggests much greater attention to detail and longer planning than traditional learning activities. Failure to apply this detail can compromise the reality of the simulation, and detract from the academic value Evidence gained from student performance data and subsequent external verification of the process and results would support that this had not occurred. As added value students were able to take their experiences and outputs to prospective employers and talk of work they had undertaken, and of surveying areas they had some degree of practical experience in.
- In a factor consequential to the background of the tutors running these simulations, the exercises proved satisfying to the staff that supported them. Two chartered building surveyors supported the first case study and professionally qualified ex-practitioners from multiple disciplines supported the second. A seldom acknowledged feature of construction and surveying education is that many of those who teach it are current or recently practicing industry professionals. Opportunity to deliver some of those practical skills in an industrial scenario, proved satisfying to the tutor team in both case studies. It could be argued that this form of teaching suits the type of tutor as well as the nature of vocational requirement. Overall based upon these two exercises the author would conclude that the evidence generated would suggest that industrial simulation can be an effective technique for teaching and assessing vocational and in particular surveying education.
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