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THE VALUE OF EXPERIENTIAL LEARNING FOR PROVIDING A CONTEXTUAL UNDERSTANDING OF THE CONSTRUCTION PROCESS

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ABSTRACT
This research investigates effectiveness of real site visits within an undergraduate course. Experiential learning is a process of providing education, based on the experiences and observations of real-world examples. Some of the theory of experiential learning has been used to examine whether site visits assist the students learning experience.

The results of the research show that students generally have a positive attitude towards site visits and see them as beneficial. Although the study identified that some aspects of construction technology could be easily replaced by computer simulations and the like, other aspects of the curriculum are more effectively taught by retaining real site visits. The research was intended to provide a more structured approach to determining the value of site-based learning in construction-related courses.

KEYWORDS:
Construction technology, building sites, learning experiences

INTRODUCTION
There are many educational challenges in teaching undergraduates in construction. Lecturers in construction management courses are finding it increasingly difficult to provide students with an effective site-based experience in construction education. For example Kajewski (1999) suggested that large class sizes, tight timetables, busy site
management, distant sites and site safety concerns, have drastically curtailed such useful opportunities for students to gain a real-life appreciation of the construction processes.

Past research has shown that a contextual understanding of the problem is an important step in the learning process (Ramsden 1988). However, lack of exposure to construction sites is impacting on the ability of modern undergraduates to understand the necessary issues associated with construction.

There is plenty of past research (Kejeski, 1999; Kamaraswamy and Kay, 2000) into the benefits of learning by observing real world practices. This mode of learning has traditionally been part of most undergraduate construction courses in the past. However, the difficulties associated with organizing site visits are placing increasing burdens on both staff and students leading to a reduction in overall use of site visits as an educational tool.

EXPERIENCE-BASED LEARNING

Construction has not historically been a scientific-based discipline; instead it is best researched in the “laboratory of the real-world” supported by the application of contemporary theory. For instance, it is commonly believed that successful construction education can be achieved by; constant exposure to current industry practice, awareness of new or innovative approaches, and some academic scholarship that applies contemporary theory to current industry situations. For these reasons it is important for students to be aware of the practices used by industry.

Experiential learning has always been an essential part of the construction education process. As a result providing a context for the growth of the student and the development of the required competencies for practice is a continuing challenge for the educator. Experiential learning processes provided an opportunity for the student to reflect, reason, evaluate and communicate. The process of experiential learning includes immediate concrete experiences, observation and reflection. "Beliefs about ourselves,
others and the world are challenged, changed or reinforced" (Pearson and Smith, 1985-P69).

Experiential learning is seen as a process; constantly modified by the experience. It is a process of exploration, adaptation, inquiry and testing out - a process of discovery. It uses real-life activities and creative and innovative approaches. Working with both hemispheres of the brain is articulated as a foundation approach to learning.

Past research has shown that effective learning occurs when the student is given the opportunity to reflect on their experiences. According to Pearson and Smith (1995) it is not enough to simply experience or observe. Instead, students should be asked to reflect on their own experiences in a session after the observation. This facilitates an increased awareness and understanding of the potency of the activities as therapeutic agents. They are encouraged to reflect on what they have observed and if possible to explain its significance.

A number of researchers have more recently focused upon the importance of engaging the student as an active (Tinto, 1993, 1993; Kift, 2003). Research indicates that when students interact with the learning environment they are more likely to benefit from the experience. Laurillard (2002) supports the learning context as a constructionist activity, by noting that learning is an active process of constructing rather than acquiring knowledge and instruction should support that construction rather than communicate knowledge. There is research evidence that students can benefit from interaction with others who are actively engaged in performing the tasks to be learnt. (Meyers, Whelan et al., 2004-P2) have stressed the importance of educational experiences that “cumulatively develop students higher order thinking and academic skills necessary for (current) and later personal and professional development”.

In summary this research suggests that learning from observation during site visits can be effective because it provides an opportunity for students to observe real world situations and contexts. However, students need to be guided through the process and also need to
be given time to reflect on their experiences. The next section of this paper describes the subject learning objectives, and explains the reason why site-based learning is important.

The subject is undertaken in the second semester of third year and is designed to provide contextual understandings of the information provided in lectures. It is expected that students gain knowledge of context and culture of construction industry. In addition, the site visits can prepare the student for the following year-out in industry where they will be expected to work full-time. It is hoped that site visits decrease student anxiety about facing the "reality shock" of working on site.

During the site visit students are required to reach an understanding of the construction process and to develop some appreciation of the management of a construction project. The site visit provides an opportunity to observe real world examples. Students are then required to undertake an assignment demonstrating their understanding of the construction process. The specific subject objectives include:

- Knowledge of theoretical concepts of construction technology.
- Experience through observation of the construction process.
- Analyze and describe the various roles of the players in the construction process.
- Understanding of the sequence and duration of each construction activity.

The students learning is assessed by an assignment which requires the students to; consider buildability issues, plan construction methods and equipment for a project, determine the position of cranes and lifting capacity required, and demonstrate an appreciation of occupational, health and safety issues involved. The next section of the paper describes the research questions and the methodology chosen.

**RESEARCH QUESTIONS AND METHODOLOGY**

The research aims to investigate the quality of the learning experiences and explore the perceptions of a cohort of construction students in the third year of their degree. After reading the literature mentioned above, a mini-workshop comprising the authors, and the
teaching and earning coordinator generated a set of survey questions. The study explored the following questions:

- To what extent do students perceive that site visits are useful in assisting their learning compared to lecture-based experiences?
- If difficulties are apparent, what can be done to reduce the negative impacts?
- Do students with previous site experience derive the same benefit from site visits as those without site experience?

A number of research instruments were examined, but in the end a questionnaire was chosen as the method most likely to achieve the best results. This was due to the time-constraints and the number of students enrolled in the subject. An expert on research design, at the University of Melbourne, assisted with the design of the research instrument.

There are many advantages of questionnaires, including; there is generally an absence of interviewing bias, and the respondent is free from any pressure of being observed, and possibly answer the questions more honestly (Malhotra 1993). This is particularly important because the students need to be sure that their responses do not form part of the assessment for the subject.

Care was taken with formation of questions to create a non biased survey to ensure respondents were not influenced in anyway. The general instructions provided with the questionnaire included an introduction to the questionnaire's purpose, assurance of confidentiality, and how and when to return the questionnaire. The questions were grouped into sections, to help structure the questionnaire and provide a flow, and both positive and negative items were intermingled to avoid leading the respondents.
RESULTS

The students visited four different construction sites over a nine week period. Sites were selected at the appropriate stage of construction. The survey evaluated the experiential learning experiences for each of the individual site locations. Each site was focused on a different topic within the subject.

The results of the questionnaire are summarized below (Table 1), the results show that students generally find the site visits to be *Useful* to their learning. When asked how students rate the construction site visit experience the results showed that most enjoyed the experience. All scores shown in Table 1 are above a score of three (3) out of five and therefore indicate that student’s perceived that the site visit to be at least *Useful* to *Very useful*.

<table>
<thead>
<tr>
<th>Question</th>
<th>Mean Score*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Was the site visit useful in improving your understanding of the topic</td>
<td>3.4</td>
</tr>
<tr>
<td>Was the site visit better than viewing an overhead projected presentation</td>
<td>3.3</td>
</tr>
<tr>
<td>Was the site visit better than viewing a slide presentation</td>
<td>3.2</td>
</tr>
<tr>
<td>How would you rate the site visit experience overall</td>
<td>3.4</td>
</tr>
</tbody>
</table>

* Likert Score from 1 (*Not useful*) to 5 (*Very useful*)

The students were also asked to comment on the benefits of the site visits; many interesting responses were given. The comments were divided into two groups, those which were generally positive about the visit, and those that were negative. In other words, comments that indicated that the site experience enhanced student learning was classed as positive and those comments that were critical of some aspect of the experience were considered negative. Typical comments and anecdotes provided by students are included in Table 2.
Table 2 - Typical examples of supportive and critical comments

<table>
<thead>
<tr>
<th>Positive Comments</th>
<th>Negative Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Getting out (of the lecture theatre) and having a look at what happens on site helps; better than following lectures.</td>
<td>It is difficult to attend site visits, when there are lots of assignments, the travel time takes up too much time.</td>
</tr>
<tr>
<td>Seeing the actual size and dimensions of portal frames, ground slabs and tilt up panels gave me a good understanding of what was presented in lectures.</td>
<td>Transportation to site was a problem, particularly for overseas students without cars; busses should be provided.</td>
</tr>
<tr>
<td>Site visits are good for the people who want to be involved in the industry (in the future). I found it interesting and informative.</td>
<td>If the group is smaller you can get more out of the site visit.</td>
</tr>
<tr>
<td>Site visits are good, but should be done in conjunction with lectures</td>
<td>Smaller groups would be better. It was hard to take notes, if you weren’t in the front you can't hear.</td>
</tr>
<tr>
<td>Being able to see the construction sequence happening is very helpful.</td>
<td>I left early for the floor slab (site visit) and waited for over an hour without anything happening.</td>
</tr>
</tbody>
</table>

THE VALUE OF PRIOR WORK EXPERIENCE TO LEARNING

The next section of the survey probed students about their expectations for the visit before actually attending the site (Table 3). This question was included in the survey to determine if students with previous site experience looked forward to site visits or not. It should be noted that of the total 80 responses; 46 students (58%) had no experience, 17 students (21%) had less than 4 weeks experience and only 17 students (21%) had more than 4 weeks experience. The majority of the students (79%) had little or no experience of construction sites, and could not be expected to have any first-hand knowledge of the context of construction.
The results in Table 3 show that most students with at least 4 weeks of experience generally have a positive view about site visits; they seem to look forward to it. The students with no experience have the least interest in site visits prior to actually doing the visit. A total of 18 of 46 students with *No experience* said that they had only *Some interest* or *No interest* in site visits.

The next stage of the analysis of the survey recoded the students in Table 3 into two groups; those with *No experience* and those with at least some site experience. In this case the independent sample t-test shows that a significant difference exits between the two groups. The t-test results (See Appendix) show that this is significant at the 95% level, the Variances are highly significant $f = 13.331$ Sig 0.000, and the therefore the Equal Variance is Not Assumed ($t (78) = -2.556, p< 0.013$). This suggests that work experience is a distinguishing characteristic between those students that find site visits interesting and those who do not.

A similar question to the one above asked about student preferences for site visits compared to classroom-based learning. The results show (Table 4) that the students who prefer lectures over site visits are those with the least previous work experience.

This result shows that students that have at least some work experience are in a better position to learn from site visits compared to those who have had no site experience. The
next section of the paper discusses the consequences of this find for staff, students and the university.

Table 4 – Impressions of usefulness of site visits compared to class-based learning experiences

<table>
<thead>
<tr>
<th>Student Impressions * Construction Site Experience Crosstabulation</th>
<th>Construction Site Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No Experience</td>
</tr>
<tr>
<td>Not very helpful at all</td>
<td>Count</td>
</tr>
<tr>
<td>Prefer Classroom experiences</td>
<td>Count</td>
</tr>
<tr>
<td>Somewhat Helpful</td>
<td>Count</td>
</tr>
<tr>
<td>Greatly Useful</td>
<td>Count</td>
</tr>
<tr>
<td>Total</td>
<td>Count</td>
</tr>
</tbody>
</table>

DISCUSSIONS AND CONCLUSIONS

The value of experiential learning has been undervalued by educators in construction management programs. This is primarily because it is time consuming and difficult to organise. Instead, lecturers have been encouraged to develop virtual approaches to teaching construction technology, using photographs, movies and computer simulations. Nevertheless, there is still a belief that real world learning experiences are an important step in developing the necessary skills in construction students.

Students with at least some site-based experience are in a better position to appreciate the on-site educational experience, compared to those without any previous site exposure. The implications are that site visits should be introduced as early as possible in the course. This introduces the contextual difficulties associated with construction sites early and maximizes the time available for more valuable learning experiences.
As previously mentioned, the organization of site visits has become much more difficult over the last seven years. Since 1997 the University of Melbourne construction management course has more than doubled in size, and much higher levels of occupational health and safety have been introduced. This has meant that site visits have become less frequently used; other forms of teaching utilizing; movies, slides and computer simulation has increased.

However, it is believed that site visits can still provide important educational experiences for construction students. It has become obvious that site visits need to be better organized and structured. This research has shown (Table 2) that many aspects of the site visits are not well liked by students, this included; noisy environments, large groups, long travel times and distances.

Many of the construction sites were not near any form of public transport, and this impacted negatively on some students. Site visits take up longer amounts of time particularly when the sites are far from the campus, and this also means that timetabling for site visits becomes more difficult. One student suggested (Table 2) that busses should be arranged for students without cars. This research supports the use of guided bus trips because it is likely to improve the educational outcomes for students. However, this adds significantly to cost to the university of provide site visits as part of the curriculum.

The use of guided bus trips seems like an excellent idea and would also allow the students time to hear audio and/or view videos while travelling. In addition, the return journey allows an opportunity for students to undertake post-visit activities and possibly complete a diary of the visit. Past research has suggested (Kolb, 2004) that it is appropriate to provide an opportunity for students to reflect on their experiences through a debriefing session. This should occur after the site visits and requires the student to “unpack” their experiences.

The research identified that site visits need to be better organized and structured. Also, that there were a number of negative aspects of site-visit learning experiences, this
included; noisy environments, large groups, travel times and distances. Nevertheless, site visits are an important educational opportunity for construction students. These implications may lead to the development of specific subjects devoted entirely to site visits.

Real-world site visits are important experience to construction management students. This aspect of the course should become an essential part of the educational opportunities offered. It may even be worth suggesting that external review bodies encourage site visits become as part of the course accreditation.

REFERENCES


APPENDIX

Students who find that site visits are of interest.

Group Statistics

<table>
<thead>
<tr>
<th>Evidence of Work Experience</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interest in Site Visits</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Experience</td>
<td>46</td>
<td>2.717</td>
<td>1.1088</td>
<td>.1635</td>
</tr>
<tr>
<td>Some Work Experience</td>
<td>34</td>
<td>3.265</td>
<td>.6656</td>
<td>.1141</td>
</tr>
</tbody>
</table>

Independent Samples Test

<table>
<thead>
<tr>
<th>Interest in Site Visits</th>
<th>Levene's Test for Equality of Variances</th>
<th>t-test for Equality of Means</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>Sig.</td>
</tr>
<tr>
<td>Equal variances assumed</td>
<td>13.331</td>
<td>.000</td>
</tr>
<tr>
<td>Equal variances not assumed</td>
<td>-2.745</td>
<td>75.198</td>
</tr>
</tbody>
</table>