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Students' reactions to a studio-based teaching and learning philosophy in a three year IT degree

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***Abstract**: In 1999, the School of Information Mangement & Systems at Monash University began the implemention of a novel approach to the teaching of an undergradtuate information technology degree. This paper reports on components of the evaluation conducted into students' perceptions of the effectiveness of this teaching approach eighteeen months after its implementation. A total of one hundred and three undergraduate students from two hundred and eighty students across the three year levels of the Bachelor of Information Management & Systems, participated in the research. Overall, students preferred learning using this type of approach as compared to the standard lecture-tutoria, though this satisfaction was hindered at each year level by students' disappointment over the subject content, and the overall content of the degree. Included in this paper are the findings from the evaluation and insights into various reasons for the the students' reactions to the teaching and learning approach used in the degree.*

***Keywords**: studio-based teaching and learning, portfolio assessment, evaluation, information technology*

Introduction

In 1999, the School of Information Management & Systems at Monash University commenced the implementation of an innovative teaching and learning model, based on a studio-approach, into the Bachelor of Information Management & Systems (BIMS). Commencing in mid-2000, the studio-model was applied to the full year 'studio' unit at each year level of the degree replacing the traditional environment of lecture theatre, tutorial room and laboratory, with a modern teaching space, an integrated curriculum across all core

subjects in the degree, portfolio assessment, and an IT infrastructure designed to support students.

By the end of 2001, the studio-model was well entrenched in the core 'studio' unit at each year level of the degree. This paper reports on students' reactions in the first, second and third year of the degree, in respect to the pedagogy underpinning the teaching and learning within the core units of the degree. The paper highlights students' reactions to the studio-model in comparison to the traditional teaching environments that they experienced in their other units. Additional areas covered in the evaluation though not reported here were the teaching and learning environment; including the physical space, tools and infrastructure (see Carbone, Lynch, Barnden and Gonsalvez, 2002).

Background

The studio teaching and learning approach adapted for use in the BIMS program is based on the Bauhaus School of Design's model for teaching and learning. Of the Bauhaus's numerous aims, three that are of importance here and played an catalystic role in the development of the IT studio-model. The first aim was to encourage the individual artisans and craftsmen to work cooperatively. Secondly, to elevate the status of crafts and every day objects. The third aim was to establish contact with the leaders of industry and craft. These three aims together with the contribution of educational developers at several Australian universities (Jamieson, Fisher, Gilding, Taylor, and Trevitt, 2000) were intrumental in the development of the IT studio-model underpinning the BIMS degree at Monash University.

The IT Studio-Model

The IT studio-model centres around a teaching and learning philospohy that focuses on an integrated curriulum, collaboration, problem solving, professional practice and portfolio assessment, all within an environment that is supportive of this philosophy (see Carbone, Lynch, Arnott and Jamieson 2000).

The teaching and learning philosophy

In constructing the studio experience, professional practice and learning were integrated as far as possible as, by their nature, they complement each other. With this in mind, and the Bauhaus ideologies in the background, the teaching and learning philosophy is based on two main foci; integrating the curriculum across core discipline units, and devlopment of a collaborative environment. The teaching and learning within the core studio unit has a focus on on-going, self-reflective and self-forwarding growth of the student. This is catalysed through students having control, and actively being engaged in their own learning and engaging with the content and processes of learning and assessment, sharing their learning with faculty, awareness of the relevance of the unit content outside the domain of an educational setting, learning-by-doing (Schon, 1983), exposure to experts, and the development of a professional relationship with academics and tutors (Lynch and Penna, 2002).

The success of the studio-model is rooted in team work, not only at the student level, but also at the academic level. The model relies on the expert (or master) working closely with the student to pass on knowledge, skills and professionism. The studio unit is delivered by a team of academics and tutors and external experts where required.

A major component of studio assessment is the development of a portfolio. Portfolios are intended to demonstrate the student's efforts, progress and achievements in a given area, and

give the students an avenue to examine their own learning.. They are usually self-reflected and autonomous (Moran & Robinson 1994; Anderson & Bachor 1998, and Federico 1999).

The teaching and learning environment (or precinct)

The design of the studio precinct includes a number of spaces; the studios themselves, an Internet cafe, a meeting room, and an area for technical support staff. The main teaching space for the studio subject is the 'studio'. There are currently two studio spaces. Studio 1 is the foundation space where basic critical skills can be acquired and developed, and Studio 2 has been designed as a space where more intense teamwork can be undertaken.

The IT infrastructure has been designed to simulate professional practice, and to support the curriculum and the pedagogy of the studio units. Students are encouraged to use information and communication technologies to assist them to collaborate with their peers, and to communicate with peers, tutors and academics. (Lynch 2001).

Research Design

The focus of this research was to investigate BIMS students' perceptions of the studio-model; specifically in the way the studio units (IMS1000, IMS2000 and IMS3000) were delivered, and the environment in which they were delivered. The specific areas of focus for this study were:

- The teaching and learning philosophy, including assessment.
- The teaching and learning environment, including space, tools and infrastructure.

This paper reports on the findings of the first focus area, a paper by Carbone, Lynch, Barnden and Gonsalvez (2002) examines the findings of the second focus area.

Data Collection

The BIMS students were surveyed in the last week of semester 2 2001. Participation in the survey was voluntary and anonymous.

The data collected from this survey contained both scaled response items and open-ended questions. Quantative items employed five-point Likert scales lablelled from lowest or negative responses (Likert of 1), to highest or positive responses (Likert of 5). Qualitative items employed open-ended responses at the end of each section in the survey, and at the completion of the survey.

Data Analysis Methods

The responses were analysed according to means, percentages and two statistical tests using the software package SPSS. A Krusal-Wallis test was used on the three samples to test that several group means were equal in a population, and to determine whether the differences in means between the samples occurred purely by chance or were strongly influenced by a teaching factor. If there were influences, independent group t-test were performed on two samples to determine the year levels in which the significant difference lay.

Student Profile

Student demographic data was collected and is shown in Table 1. Demographic data were gathered to help establish a profile of the students and enable comparisons to be made between responses on the basis of gender and the background of the students within a year level (Carbone & Sheard, in press).

Table 1: Student demographic data

	Responses/ enrolled	gender		Age		National Status		Degree	
		M	F	18-21	>21	Local	Other	BIMS	Double Degree
Ist year (IMS1000)	61/ 115 (53%)	49%	51%	76%	24%	31%	69%	88.5%	11.5%
2nd year (IMS2000)	29/ 109 (26%)	41%	59%	93%	7%	34.5%	65.5%	96.5%	3.5%
3rd year (IMS3000)	8 / 63 (12%)	87.5%	12.5%	85%	15%	100%	0%	100%	0%

Results

The following results reflect the data collected from the teaching and learning philosophy section of the evaluation. Data collected are reported with the students' open-ended comments provided in italics, and the scaled responses have been correlated and tabulated according to year level. The results from the third year cogoth have been generally ignored in the results and findings due to the low number of responses (12%).

The results have been divided into two areas; the teaching and learning approach itself, and the portfolio assessment. Results from the section of the students' level of satisfaction with the studio-approach have also been included as they clarify and add insight into the findings.

The teaching and learning approach

In the questionnaire, indicators and statements relating to the teaching and learning underpinning the philosphy of the BIMS studio units were collected and analysed. The means and standard deviations of the students' ratings are shown in Table 2a and Table 2b. A 5-point Likert scale was used, in Table 2a, 1 indicated = not at all; 2 = seldom (once per semester); 3 = sometimes (more than once per month); 4 = often (more than once per fortnight); 5 = frequently (more than once per week); 6 = don't know or N/A. In Table 2b, 1 indicated = no value; 2 = fair; 3 = neutral; 4 =valuable; 5 = very valuable; 6 = don't know or N/A. The responses from third year students should be dismissed due to the low response rate), their inclusion remains to indicate that all year levels were surveyed.

Table 2a: Students' ratings of the teaching and learning approach

	First Year N=61		Second Year N=29		Third Year N=8	
Question	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
1. In the studio class I used content and skills from other core subjects	3.68	0.94	3.48	0.83	3.75	0.71
2. Group work contributed to my learning	4.02	0.93	4.03	0.82	3.88	0.64
3. When required I collaborated within a group to complete the studio activities	3.90	0.89	4.24	0.87	4.38	0.74
4. Access to the studio spaces was available	3.84	0.92	3.83	0.93	3.50	1.41
5. I gain sufficient assistance from the teaching staff	3.96	0.82	3.79	0.73	3.50	1.41
6. I was required to manage my time when undertaking the studio activities	4.12	0.80	4.00	1.00	3.63	0.92
7. I was required to negotiate involvement with team members when working on activities	4.02	0.91	4.21	0.88	4.38	1.06
8. The level at which the studio activities developed my own skills and knowledge	4.17	0.87	3.90	0.77	4.00	0.93
9. The level which the seminar session prepares you for your studio work	3.57	1.04	3.24	1.30	2.57	1.90

Table 2b: Students' ratings of the teaching and learning approach

	First Year N=61		Second Year N=29		Third Year N=8	
Question	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
10. Multiple teaching staff was valuable	3.85	1.16	3.55	1.06	3.71	1.50

Generally, responses indicated that the students felt that the studio approach was an effective teaching and learning model. The open-ended responses gave a clearer picture of the students' perceptions, and supplied some valuable feedback for futher refinement of the content in the degree. The data in Table 2a/b indicates that there was agreement amongst the students with regard to the importance of group work. This was supported by the students' comments in the open-ended response questions, which at the same time roused additional questions.

- *...There needs to be more incentive for and recognition of project leaders. I appreciate the benefits of team work, but it is difficult to practise / develop/ apply effectively in the student environment.[second year student]*

Students were in favour of the multiple teaching staff approach,:

- *Multiple teaching was valuable, but at times, I found it a little disconcerting when the changeover occurred mid-session. The incoming lecturer was not entirely up to speed on what was happening during the session and this sometimes caused a disruption in concentration. [first year student]*
- *It was great to have staff there to answer our questions but keep in the background and let us learn from our mistakes. They always knew when to step in if things were getting too tough or difficult for us. [third year student]*

Further comments indicated a deeper understanding of the value of the learning experience:

- *I liked the way the Studio subject incorporated and related the learning areas of other core subjects of the BIMS. This makes it seem that the subjects are not separated but relational and hence, easier to understand and apply skills. [first year student]*
- *We should introduce this subject to computing people. ....This subject would give them good practice on how to work with other IT specialists. [second year student]*

Portfolio assessment

In the questionnaire, questions relating to the portfolio assessment asked for responses regarding the self-selection and the mandatory sections of the portfolios, and managing the portfolio itself. During this research study, portfolio requirments differed across each year level. Though each year level had a portfolio value of 80% the proportion of self- selceted and mandatory item, differed between the units.

The means and standard deviations of the students' ratings of aspects of the portfolio assessment are shown in Table 3. A 5-point Likert scale was used, where 1 = very difficult; 2 =difficult; 3 = neutral; 4 = easy; 5 = very easy; 6 = don't know or N/A. Once again responses from third year students should be dismissed due to the low response rate.

Table 3: Students' responses to portfolio assessment

		First Year N=61		Second Year N=29		Third Year N=8	
Question: How would you rate the following?		**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
1.	Deciding which items to submit for the self-selected portfolio	3.05	0.95	3.68	1.22	3.86	1.57
2.	Completing the mandatory portfolio requirements	2.83	0.85	3.00	0.82	4.29	1.50
3.	Representing in my portfolio the level of my skills and knowledge	3.39	1.07	2.90	1.37	3.25	1.16
4.	Organising the portfolio	3.08	0.67	3.25	1.00	3.71	1.38

A Kruskal-Wallis variance test was performed to determine whether the average responses of the three groups of students were significantly different. Results showed a significant difference between the groups in terms of the level of difficulty of completing the mandatory portfolio requirements (X^2 (2,98)=7.67, p<0.05). The first year students found it difficult to manage the self-selection aspect of their portfolios.

A number of the students did not appreciate the opportunities for creative freedom and believed that having the opportunity to self-select items was an indication of a lack of organization in the unit:

- *The layout for the portfolio was not made very clear especially in regards to the group assignments. Looking at past portfolios which were very thick, it was hard to produce a portfolio that was even half as thick, maybe there was a little misunderstanding somewhere. [first year student]*
- *The portfolio was thrown about from day 1. The requirements were very ambiguous and all over the place which was very confusing. [third year student]*

Giving students the opportunity to take control of their learning was perceived by some as being achieved by taking away their support structures and providing minimum instruction:

- *Being a first year I felt there was too much emphasis on own learning, I felt that people would have preferred a helping hand now and then. [first year student]*

Although many first year students found the preparation of the portfolio demanding, the most exciting result was that many students indicated that they developed more understanding of the learning process. They also found it easier to decide which items to submit for the self-selected portfolio and by staggering the mandatory tasks in semester 2, students felt more organized.

- *I know what I am comfortable with in Studio, it was easy for me to prepare the portfolio and the presentation. Also I was organized this semester and that helped a lot. [first year student]*
- *For the next portfolio I'll will manage my time better. [first year student]*

Level of Satisfaction

This section did not directly focus on the main questions of the study, but it was deemed useful by the researchers to included questions that would result in an overview of the students' perception of the studio units, and the degree in general. The means and standard deviations of the students' ratings of the level of satisfaction of the studio at the end of semester 2, 2001 are shown in Table 4. A 5-point Likert scale was used, where 1 = very low or strongly disagree; 2 = low or disagree; 3 = average or neutral; 4 = high or agree; 5 = very high or strongly agree; 6 = don't know. Yet again, responses from third year students should be dismissed due to the low response rate.

Table 4: Students' ratings of the level of unit satisfaction

		First Year N=61		Second Year N=29		Third Year N=8	
Question		**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
1.	My level of satisfaction with this subjects content	3.30	0.80	2.93	1.21	2.62	1.06
2.	My level of satisfaction with my overall course so far BIMS	3.44	0.92	3.04	1.10	3.00	0.76
3.	I preferred learning in the studio environment as compared to the standard lecture/tutorial environment	4.18	0.99	3.76	0.91	3.75	0.89
4.	I prefer to work as part of a team/group as compared to individual work	3.34	1.18	3.62	0.90	3.38	1.19
5.	The pace of the subject compared to other non-core subjects was very slow	2.80	1.08	3.21	0.68	3.25	1.16

A Kruskal-Wallis variance test was performed to determine whether the average responses of the three groups of students were significantly different. Results showed the following significant differences between the groups:

- the students' ratings for their level of satisfaction with the subject's content ($X^2(2,98)=7.48$, $p<0.05$)
- the pace of the subject compared to other non-core subjects ($X^2(2,98)=7.73$, $p<0.05$)

The data in Table 4 indicates that students from each year level preferred the studio-model of teaching and learning than the more traditional model of lecture and tutorial/laboratory. This was evident in the scaled responses and supported by the open-ended responses.

In general, students were dissatified with the subject's content, less so by the first years, and the content of the degree. Though disheartening, this finding was not a great surprise as the academics themselves had made negative comments regarding the curriculum of the degree (Carbone, A., Lynch, K., Gonsalvez, C., and Barnden, A., 2002). The degree is currently undergoing a review of its structure and curriculum.

There was much agreement by the first year students with respect to their satisfation with the course, and preference to learning in this type of environment as compared to the standard lecture tutorial. Supporting comments included:

- *I preferred the learning environment of the studio as it promotes interactivity amongst students which mimic the workforce environment. [first year student]*
- *I really like the Studio environment as compared to standard/lecture/tute, since it really makes it interesting to attend. Even three hour session fly by just like that. [first year student]*

Second year students also expressed a level of satisfaction with the studio-model, but there was greater variation in their comments, and it did not suit the learning style of all:

- *Studio was one of my favorite subjects, purely because of the structure. [second year student]*
- *I find the studio very useless and would much prefer the old structure of it with subjects of programming rather than the way things are currently. [second year student]*

An interesting comment from a third year student indicates dissatisfaction, but is more likely a result of the general misunderstanding about the intent of the studio approach:

- *Whilst I can not stand the format of a lecture the set out of studio has made a lot of room for people to become slack, thus making team work more difficult. It led to*

slowing down the pace of the subject as everyone spent much of their time waiting for others. [third year student]

Concluding Remarks

The teaching and learning approach behind the studio-model provides students with an opportunity to develop strategies to cooperate, collaborate, and yet be individual, all within an integrated curriculum structure.

The responses highlighted the success of the studio integration with content from the other core units within the degree, and that students are obtaining a more 'rounded' and a more comprehesive understanding of what they could encounter when employed in the workforce. It is interesting to note that there was evidence in the responses that the students saw that it was important to develop strategies and skills in collaboration and communication as requirements for working as an IT professional.

Negative responses in this section alluded to the apparant lack of organisation often perceived with the implementation of a new degree program, novel teaching approach or technology. A number of respondants from each year levels commented on their need for more structure and less self-directed learning. This, amongst other responses, has lead the studio teaching team to clearly define an integrated, though flexible, curriculum for each of the studio units, and a full review of the degree is being undertaken in 2002. Evidence also points to the assumption by the studio teaching team that the third year students had previously acquired the skills associated with time management, inter-personal skills and teamwork skills. For this cohort of students, the assumption was detrimental to the success of acceptance of the studio-approach, as these students felt that an absence of formal instructions in these skills was a major pitfall in the unit. This has been remedied by the inclusion of a 'professional development' stream in the third year studio curriculum.

The portfolio assessment is an important aspect of the studio-model. In general, responses from participants indicated that the students found it difficult to manage the self-selection aspect of their portfolios, and continually wanted guidance. Research conducted by Akar (Akar 2001) indicates similar findings in that students find it difficult to self-select items, are frustrated in the initial stages of implementation and frequently demand guidance by the academic in charge. Nevertheless, the questionnaire responses have made it evident that there was an ommision of clear guidelines and more importantly, consistency for the portfolio assessment across the second and third year studio classes. This yet again, highlights not only the need for structure, but for the studio teaching team to work as a team. However, to maintain the underpinning philopsphy of the studio-model, there needs to be a balance between structure/control, and individuality/creativity, and for students to understand the continuum.

Though responses from the third year cohort was low (12%) and have generally been dismissed as insignificant, they did highlight some difficulties with the program. These students were the first cohort to experience the studio environment, and as such they suffered from the teething problems which so often plague a new degree let alone one that uses a novel philopsohy and extensively relies on technology. The first eighteen months of their three year degree was delivered without any studio infrastructure and no studio precinct; it was like learning to ride a bicycle without a bicycle. Delays and unfulfilled promises in the early days adversely affected the perceptions of this cohort. Being the first they were also the "guinea pigs" upon which the studio teaching team experimented in efforts to get the studio experience right. Nevertheless, a number of the same students commented that it was a shame the *full* three years did not use a more comprehensive studio-model.

The studio approach to teaching and learning in an undergraduate IT degree is still novel. Findings from this evaluation and others will be used to inform the studio teaching team to further refine, develop and enhance the Bachelor of Information Mangement & Systems, and possibly other degrees. Further studies will more fully examine issues such as gender, cultural background, collaboration and skills development within the IT studio-model.

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