The Contribution towards Student Competencies: An Analysis of an Information Systems Business Process and ERP Course

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Abstract

Volatility and change has been the hallmark of technology, and Enterprise Resource Planning (ERP) is not immune to such challenges. Despite these factors, ERP has certain features that make it an excellent vehicle for the pedagogical process. This research investigates the skills imparted by using ERP systems in teaching and compares these against the Information Systems (IS) curriculum and industry needs. The results will be of interest to IS educators involved in curriculum design or considering including ERP systems in their curriculum.

This paper investigates the justification for incorporating a live ERP as a support tool for learning processes. The inclusion of a live ERP is meant to provide students with a certain skills set, thereby improving the understanding of:

- *ERP concepts*
- *business processes*
- *systems thinking*
- *business process change*
- *alternative user interfaces*
- *purchased business software*

This skill set is based on the stated outcomes of a 3rd year IS ERP and business process course (IT Applications course) at the University of Cape Town (UCT) where ERP exposure was progressively increased from 2002 to 2004. The quantitative study uses a survey of the three student cohorts to compare perceived achievement of course objectives. The study finds that an increase in perceived understanding of ERP concepts, business processes and alternative user interfaces and a decrease in understanding of purchased software occurred across the three years. In addition, the findings of this research serve as an indication as to whether the intended course outcomes are aligned with industry requirements and the IS curriculum.

1 Introduction

The Information technology industry is a volatile arena that has doubled its innovative technologies almost every year. As a result, educational institutions have to constantly upgrade their curricula in order to provide appropriate education to their graduating students (Desai & Von Der Embse, 2001). An Enterprise Resource Planning (ERP) system is one technology that has had a major impact on the business world since its emergence into the market in 1992 (Bradford, Chandra & Vijayaraman, 2003) and there is currently a shortage of professionals with appropriate ERP and business skills (Bradford *et al.*, 2003; Peslak, 2005). However, how and why ERP skills are incorporated into the IS curriculum has not been thoroughly addresses by educators (Davis & Comeau, 2004).

The Information Systems Department at the University of Cape Town (UCT) has made substantial changes to the 3rd year ERP and business process course. From 2002 until 2004 the amount of ERP exposure was increased. However, there is no clear indication as to whether the use of a live ERP system in teaching the course and the outcomes thereof, contributed to the competencies of the IS graduates. Therefore the main objectives of this study were:

- To compare the intended course outcomes and the international Information Systems (IS) curriculum.
- To determine whether the intended course outcomes are relevant to recent graduates in the workplace
- To investigate whether students perceived understanding of the stated course outcomes of the 3rd year business process and ERP course increased as the level of ERP exposure increased across the different cohorts.

The study wanted to consider opinions of graduates, and how in retrospect and after obtaining relevant work experience, they rated their understanding of course concepts at the end of a course.

2 Literature Review

2.1 Information Systems Skills required in a changing job market

The IS industry has shifted from employing programmers to employing more business analysts and therefore the assumption that IT professionals will engage in developing custom software is no longer supported by the labour market demand (Green, 1989; Gallivan, Truex & Kvasny, 2004). As IS jobs move from systems development to systems integration, they have become more diversified and generic (Kirkham & Seymour, 2005; Noll & Wilkins 2002).

Interpersonal skills, business analysis skills, understanding of business operations and carrying out enterprise-wide tasks have been identified as the most critical skills that now characterise an IS professional (Gallivan, *et al.*, 2002; Noll & Wilkins, 2002). In 2005 Gartner estimated that process specialists comprised less than 5 percent of the IT department's head count for a typical midsize or large organization and recommended that organizations appoint Process Information Officers in IS to support process owners (Kyte 2005). While Gartner encourages the IT organization to be repositioned as the enterprise process management resource, they acknowledge that this requires "retooling" of the IT workforce (Mahoney 2005).

2.2 The Information Technology Applications Course

ERP and business process teaching have been incorporated into a third-year undergraduate course in the Information Systems Department at UCT entitled: 'IT Applications'. The process of and costs involved in implementing the system for this course was detailed by Kirkham and Seymour (2005). The following are a list of the intended outcomes of the course:

- Obtain ERP exposure
- Understand ERP concepts
- Understand alternative user interfaces
- Understand supporting purchased business software (customization, integration, maintenance), referred to as "purchased software" in this paper.
- Understand systems thinking
- Understand business processes
- Understand business process change, Business Process Engineering (BPR) and change management

The format of the course over the three year period is detailed in Appendix Table 1. Progressively more ERP exposure was added to the course over a three year period, where:

- Cohort 1 (2002), received traditional instructional method – lectures plus readings/exercises and non ERP based workshops;
- Cohort 2 (2003), received hands-on instructional method– lectures and live ERP based workshops/practicals; and
- Cohort 3 (2004), received hands-on instructional method– lectures plus live ERP based workshops/practicals and an ERP project

Most Positive Aspects Of The Course
Interesting (3), Up to date (2), Assignment Structure (1), SAP exposure (30), Systems thinking (1), ERP assignment (1) SAP workshops (3)
Most Negative Aspects Of The Course (With Suggestions For Improvement)
SAP: wanted more (3), too much theory, want more practicals (2), SAP workshops rushed & confused (3), SAP assignment: unclear (2), more SAP help (1)

Table 2.2: Relevant Evaluation comments of the IT Applications course at the end of 2004

Students on the whole appreciated the ERP experience given on the course, the anonymous evaluation comments given by students at their final lecture are detailed in Table 2.2 and showed that while students found SAP R/3 confusing, they wanted more ERP and practical skills.

2.3 Information Systems Curriculum

The Information Systems (IS) Curriculum is a document developed by professional IS-related associations and reviewed by the academic sector and industry (Hawking, Ramp & Shackleton, 2001). While reviewing the IS curriculum needs to be continual, research shows that the curriculum is never entirely aligned with business/industry needs because IT practice tends to stay ahead of academia (Noguera & Watson, 2004, Bradford *et al.*, 2003). Table 2.3 lists the IS graduate capabilities and the course concepts relevant to the IT Applications course recommended for the IS Curriculum (Computing Curricula, 2005). While Hawking *et al.*, (2001) argued for ERP teaching against this broad curriculum model, it can be noted that purchased applications, ERP and business processes are not listed as course concepts or included as graduate capabilities.

Course Concepts	Recommended Topic weight
Organisational change management	2-2
Systems Theory	2-2
Functional business areas	4-5
Evaluating business performance	4-5
Analysis of business requirements	5-5

Table 2.3: IS Curriculum recommended topic weightings (Computing Curricula, 2005)

IS Graduate Performance Capability	Recommended Value
Define information system requirements	5
Select database products	5
Configure database products	5
Implement information systems	4
Train users to use information systems	4
Maintain and modify information systems	5

Table 2.4: Recommended IS Graduate Capabilities (Computing Curricula, 2005) (0 represents no expectation, while 5 represents the highest relative expectation).

2.4 Support for ERP exposure

The market for ERP systems according to Peslak (2005) has grown significantly in the years prior to 2005. ERP implementations are, however, still costly and time consuming. This is mainly due to the shortage of professionals with ERP skills and knowledge, hence the rapid increase in the market value of skilled professionals (Hawking and McCarthy, 2000; Peslak, 2005).

In an effort to reduce the shortage of trained ERP professionals/graduates ERP vendors have formed strategic alliance programs with Universities around the world (Hawking & McCarthy, 2000). These strategic alliances "provide an academic entity (university, college, school, or department) with a completely functional ERP system for teaching and research" (Noguera & Watson, 2004, p. 57). "The ERP vendor benefits from these alliances by increasing the supply of skilled graduates that can support their product thereby enhancing its marketability" (Hawking & McCarthy, 2000, p.130).

Hawking & McCarthy (2000) suggest that students that had exposure to a live ERP, gained important skills as they were exposed to real world examples of business information systems providing a link between their academic study and industry needs. Many educators have argued that it is not just ERP skills that students gain from ERP system exposure, they are said to be an effective way of teaching business skills and concepts as well as fundamentals of IS critical for the job market (Bradford *et al.*, 2003; Kirkham & Seymour, 2005; Noguera & Watson, 2004) The use of a live ERP system exposes students to current business terminology in a concrete, accessible way, and demonstrates how business processes cut across departmental boundaries (Kirkham & Seymour, 2005).

While more tertiary institutions are implementing live ERPs (Guthrie & Guthrie, 2000; Beccera-Fernandez, Murphy & Simon, 2000; Bradford *et al.*, 2003; Davis & Comeau, 2004; Grandzol, 2004), an effective model for integrating ERP into the curriculum has not been identified (Noguera & Watson, 2004) and the challenge these institutions face is how to facilitate curriculum development, delivery, and assessment around ERP systems (Noguera & Watson, 2004). In addition, Noguera & Watson (2004) state that while current integration efforts by other universities provide evidence of benefits that accrue from integrating an ERP into the academic environment, "educational benefits of instructional uses of ERP systems are established on the basis of anecdotal statements from faculty and students rather than on empirical and objectively measured data, secured by educational research" (Noguera & Watson, 2004, p. 57). This research attempts to identify these educational benefits from the literature. Figure 2.1, illustrates the hypotheses that are tested in this research.

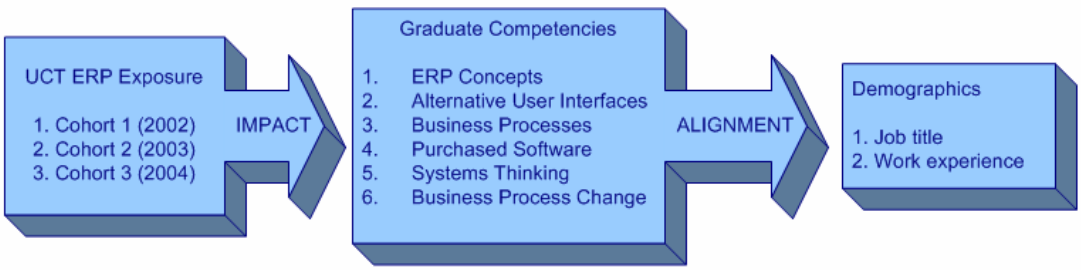

Figure 2.1: Hypotheses for this research

2.4.1 Enterprise Resource Planning Concepts

Many authors argue that students need to gain hand-on experience with the software in order to understand and master the concepts inherent in ERP systems (Scott, 1999; Watson & Schneider, 1999; Hawking & McCarthy, 2000; Grandzol, 2004; Noguera & Watson, 2004; Peslak, 2005). Actual usage of an ERP increases students understanding of the complexity and integration of the systems and raises an awareness of the risks and costs involved during an ERP implementation (Beccera-Fernandez *et al.*, 2000; Grandzol, 2004). One of the main reasons for implementing an ERP system into the curriculum is to improve student's understanding of ERP concepts (Hawking and McCarthy, 2000; Grandzol, 2004).

2.4.2 Business Processes

Information systems specialists should be able to analyze information requirements and business processes and be able to specify and design systems that are aligned with organizational goals (Computing Curricula, 2005). According to researchers, a live ERP plays a more pertinent role in enhancing student's understanding of business processes (Davis & Comeau, 2004; Guthrie & Guthrie, 2000; Joseph & George, 2002). Students are able to understand how business processes work within and across functional areas of an organization and it leads to a deeper understanding of the links of technology with those business processes (Boykin & Martz, 2004; Grandzol, 2004;

Guthrie & Guthrie, 2000; Bradford *et al*., 2003). By performing cross departmental transactions, students are also exposed to the business process focus of ERP systems.

2.4.3 Systems Thinking

Systems' thinking focuses on how the thing being studied interacts with the other constituents of a system- a set of elements that interact to produce behaviour (Kirkham, 2005). In systems' thinking, the focus is on the larger wholes and hence the understanding of a system grows (Checkland, 1999). It has been suggested that ERP systems provide a holistic view of the business enterprise and hence epitomise the spirit of systems thinking (Watson & Schneider, 1999). By integrating ERP theory with hands-on experience with an ERP application, key concepts of system's theory is better understood by students (Boykin & Martz, 2004; Bradford et al., 2003; Joseph & George; 2002).

2.4.4 Business Process Change

Defined as "the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service and speed", by Hammer & Champy (1993, p. 32), BPR was said to be a chance for organizations to 'start over' (Hammer & Champy, 1993). All ERP implementations involve some level of business process change, BPR or change management (Watson & Schneider, 1999; Grandzol, 2004). Bradford *et al*. (2003) state that ERP systems embed the notion of best practices, and when implemented, students gain knowledge of a more controlled method of technology enabled reengineering. They can identify that a change to a business process in one area of the organization has a rippled effect through the entire organization (Joseph & George, 2002; Grandzol, 2004).

2.4.5 Supporting purchased business systems (Customisation, integration and maintenance)

A large component of the typical IS curriculum is devoted to the development of information systems and this leaves IS graduates seeing little role for themselves in supporting purchased business systems. An ERP system is a purchased system which can be customized (Watson & Schneider, 1999; Joseph & George, 2002). Students exposed to an ERP system gain first-hand experience of this phenomenon; which then leads to an improved understanding of an integrated business environment (Watson & Schneider, 1999). It could be argued that exposure to an ERP and its customization tools would give students an improved understanding of how purchased systems are customized and maintained.

2.4.6 Alternative user Interfaces

With many tertiary institutions committing to the SAP University alliance, PeopleSoft implementations or Oracle integrations students are exposed to a wide range of interfaces. With the huge market penetration of ERPs (Controllers Report, 2003), there is a demand for students that have ERP experience and therefore experience with interfaces other than Microsoft. Hussein (2003) found that only 17% of 2nd year computer science students at his university were willing to use an alternative development environment to Microsoft. Attributed to this low usage was the unfriendly nature of other interfaces. Grandzol (2004) states that it is therefore important for students to get ERP exposure, as it will ensure that students gain exposure to alternate interfaces, and can then translate these skills into the job market.

3 Research Approach

This study found literature support for ERP exposure increasing IS students' understanding in six areas, namely: ERP concepts; business processes; systems thinking; business process change; purchased software and alternate user interfaces. Hence six hypotheses were proposed to see whether increased ERP exposure did increase student's perceived understanding in each of the six areas (Figure 2.1). As the study needed to find measurable differences in graduate's perceived understanding of course concepts between three cohorts, a quantitative study was needed and the

three cohorts were surveyed. The cohorts consisted of students who completed the IT Applications course in the years 2002, 2003, and 2004.

A questionnaire by Malamoglou, Meyerowitz & Morar (2004) was adapted and used as the main instrument in this research. To pilot the questions, the research team distributed 10 sample questionnaires. This allowed for the identification and elimination of ambiguous questions. Electronic word document copies of the questionnaire as well as the paper-based questionnaires were distributed to the sample population. Figure 3.1 shows a section of the questionnaire.

SECTION C

For each competency category, rate the extent to which you understood the concepts taught in the IT Applications course by placing a tick against the relevant competency.

My understanding of the following on completion of the course	Excellent	Very Good	Good	Average	Below Average
1. ERP concepts					
2. The benefits of ERP systems					
3. The Limitations and risks of ERP systems					
4. The Integration of business processes through ERP					
5. Implementation challenges of ERP systems					

Figure 3.1: Section of questionnaire

4 Data Analysis

4.1 Sampling and Response Rate

The hypotheses were tested through a questionnaire sent out to the three cohorts. Of the students that fell into cohort 1 (2002) and cohort 2 (2003), only 100 e-mail addresses were available out of a possible 183. The 100 students were e-mailed and where telephone numbers were available they were then phoned. Cohort 3 (2004) comprised largely of the 2005 Information Systems (IS) Honours class, therefore data collection was easier as the research group had daily contact with this cohort.

Sample	Maximum No.	Response
Cohort 1	100	13 (13%)
Cohort 2	83	29 (35%)
Cohort 3	59	32 (54%)
Total Sample Size	**242**	**74 (31%)**

Table 4.1: Total sample size and response

Construct/Course Concept	Number of items	Cronbach's Alpha
Enterprise Resource Planning	5	0.96
Business Process	2	0.61
Systems Thinking	3 (2)	0.71 (0.93)
Business Process Change	4	0.81
Purchased Software	3	0.98

Table 4.2: Reliability Analysis

Construct	Item	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Enterprise Resource Planning	Concepts	***0.90***	-0.05	0.05	0.13	0.03
	Benefits	***0.92***	-0.15	0.05	-0.00	0.09
	Limitations	***0.92***	-0.01	0.10	0.07	-0.07
	Integration	***0.92***	-0.07	0.07	0.03	0.12
	Implementation	***0.90***	-0.09	0.08	-0.03	0.02
Business Process	IT alignment	0.19	0.06	-0.09	0.18	***0.79***
	Human element	-0.01	0.06	0.04	0.11	***0.87***
Systems Thinking	Hard	0.12	-0.10	***0.93***	-0.03	0.06
	Soft	0.08	0.01	***0.94***	0.04	-0.12
	Apply to process	-0.07	0.03	0.41	0.47	0.03
Business Process Change	Definition	-0.07	-0.03	0.01	***0.85***	0.08
	Role in ERP	0.10	0.30	0.06	***0.68***	0.18
	Process	0.18	0.23	-0.08	***0.80***	0.13
	Aspects	0.04	0.34	0.02	***0.65***	0.04
Purchased Software	Customizing	-0.13	***0.92***	-0.07	0.24	0.03
	Maintenance	-0.10	***0.95***	-0.04	0.19	0.07
	Upgrading	-0.10	***0.95***	0.02	0.19	0.06

Table 4.3: Factor Analysis

4.2 Questionnaire Reliability and Validity Analysis

The various course outcome questions were grouped into constructs except for "alternative user interfaces" which was a single item construct. The constructs with number of items per construct are presented in Table 4.2. To determine the reliability of the questionnaire, the Cronbach's alpha was calculated for each multiple item construct. For all the constructs, the alpha value as shown in Table 4.2 was above the recommended cut-off value of 0.6 as suggested by Tan and Teo (2000). In order to test the validity of the constructs, Factor Analysis using varimax normalized rotation, and assuming an Eigen value of 1, was applied to the five constructs (Table 4.3). Validity is demonstrated when items load at greater than 0.6 on their own factor, and less than 0.6 on all other factors. Five factors were expected to load, corresponding to the five multiple item constructs. The factor loadings grouped as expected, except for item 3 of systems thinking which never loaded. It was decided to remove this question. The new Cronbach's alpha value for systems thinking increased to 0.93.

4.3 Hypothesis Testing

To test the hypotheses proposed, the non-parametric Kruskal-Wallis analysis of variance test was used because of the varied sample sizes across the three cohorts. This method uses data ranking and group medians to indicate whether one of the cohorts differs from at least one of the other cohorts (Siegel & Castellan, 1988). If the group rank average differs, the test-statistic (H) is sufficiently large with a corresponding significant p-value. For significant analysis of variance tests, multiple Kruskal-Wallis comparisons were then performed to find out which groups differ. All tests were conducted at the 95% confidence interval.

5 Results and discussion

5.1 Work Information

The demographic section of the questionnaire was only answered by the 42 respondents who had work experience. While 69% of employed respondents were either consultants or analysts, only

12% were developers. This is in agreement with the change in the IS job market from developers to analysts (Green, 1989; Gallivan *et al.*, 2004). Most of the employed respondents had between 4 months and 10 months work experience. Taking into account the work profile of respondents, analysis of the results was performed.

5.2 Industry alignment

Respondents rated the applicability of the course concepts to their job. The applicability had to be rated on a Likert scale ranging from Not Applicable (1) to Strongly Applicable (5). The means of the ratings are presented and ranked in Table 5.1. For the understanding of course concepts, each item within the course concept was measured using a Likert scale, ranging from Below Average (1) to Excellent (5). In section D of the questionnaire, respondents were asked to appropriate their knowledge gained of the course concepts. Means were calculated in order to observe whether respondents gained knowledge of the course concepts in areas other than the IT Applications course, such as work experience, other courses, seminars and conferences. Table 5.2 shows that respondents obtained most of their knowledge of the various concepts through the IT Applications course and work experience.

Course Concepts	Applicability to job	Understanding
Business Process	3.51	3.52
Alternative User Interfaces	3.42	3.09
Enterprise Resource Planning	3.12	3.65
Systems Thinking	2.94	2.55
Purchased Software	2.81	2.77
Business Process Change	2.78	3.48

Table 5.1: Means across Cohorts

	ERP	BP	ST	BP Change	Alt User Int.	PS
IT Applications Course	47%	37%	50%	52%	29%	47%
Work Experience	43%	59%	41%	37%	52%	53%

Table 5.2: Source of knowledge of course concepts

The mean student understanding of concepts in Table 5.1 ranged from 2.6 – 3.7, suggesting that on average, the course provided respondents with a Good (3) understanding of various concepts. Overall graduates perceived that all concepts were applicable to their jobs. The business process and alternative user interfaces concepts tended to be most applicable; and the business process change and the purchased software concepts tended to be the least applicable. The results show that the skills gained by students through a live ERP are applicable to the job market. This suggests that having a live ERP aligns the curriculum to the requirements of industry.

5.3 IS Curriculum alignment

IS Curriculum Concept	Recommended weight	Course Outcomes
Configure database products, Maintain and modify information systems	5	Purchased Software
Functional business areas, Evaluating business performance	4-5	Business Processes
Systems Theory	2-2	Systems Thinking

Table 5.3: IS Curriculum Concepts and related course outcomes

Neither purchased applications, ERP nor business processes are explicitly listed as course concepts or included as graduate capabilities in the IS Curriculum (Tables 2.3 and 2.4). However in Table 5.3 some of the IS Curriculum concepts and their recommended weights are equated to the stated course outcomes. It can be noted that the students surveyed found systems thinking applicable to their jobs and therefore the low weighting given to systems theory in the curriculum could be questioned. The fact that business processes are not mentioned in the curriculum is disappointing.

5.4 Variances in understanding of course concepts across cohorts

The Kruskal-Wallis analysis of variance test results are presented in Table 5.3 for all course concepts with the significant values indicated in bold. In Table 5.4 only the significant multiple comparison test results are presented. Each course construct is discussed in this section, along with box and whisker plots. The box and whisker plots depict the median by a small box, whilst the 25% to 75% interval is represented by the larger box.

Course Concepts	Test – Statistic (H)	p-values
Enterprise Resource Planning	**21.45**	**0.0000**
Business Process	**6.03**	**0.0491**
Systems Thinking	2.52	0.2832
Business Process Reengineering	2.08	0.3527
Non–Microsoft Interfaces	**8.35**	**0.0153**
Purchased Software	**11.04**	**0.0040**

Table 5.3: Kruskal-Wallis analysis of variance test

Course Concepts	Cohorts	Test – Statistic (z')	p-values
ERP	1 and 3	4.330578	0.000045
ERP	2 and 3	3.070402	0.006413
Purchased Software	2 and 3	3.123463	0.005362

Table 5.4: Kruskal-Wallis multiple comparison test for constructs

5.5 Understanding of ERP concepts

Figure 5.1 shows that the understanding of various ERP concepts improved from cohort 1 to cohort 3. The Kruskal-Wallis tests confirm that the improvement is significant with the improvement from cohort 2 to cohort 3 also being significant. Therefore the increased level of UCT ERP exposure has a positive effect on the understanding of ERP concepts in agreement with other studies (Beccera-Fernandez *et al.*, 2000; Grandzol, 2004). The next sections test the six hypotheses to see whether increased ERP exposure positively increased students' understanding of the six course outcomes. It must be noted that while ERP exposure increased from cohort one to cohort three, there were other changes in the course that could have affected students' learning as shown in Appendix Table 1.

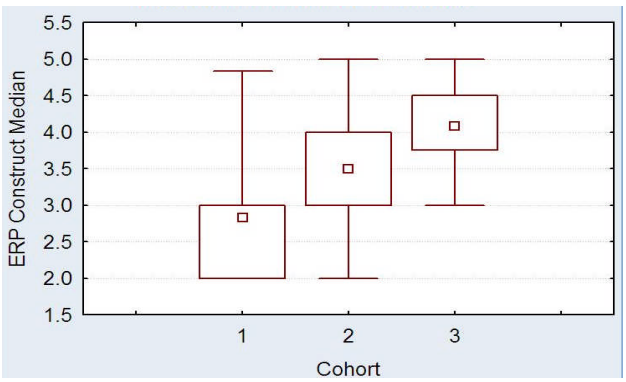

Figure 5.1: ERP Box and Whisker

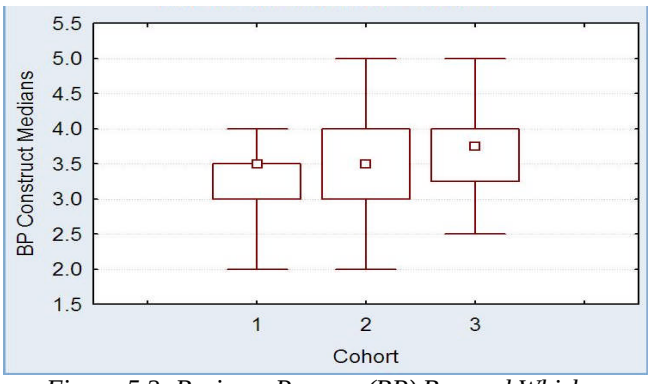

Figure 5.2: Business Process (BP) Box and Whisker

5.6 Understanding of Business Processes

Figure 5.2 shows an improvement in the median from cohort 1 to cohort 3. The Kruskal-Wallis test confirms that this is significant and hence the increased level of UCT ERP exposure has a positive effect on the understanding of Business Processes. This is in agreement with other studies (Boykin & Martz, 2004; Bradford *et al.*, 2003; Joseph & George; 2002).

5.7 Understanding of Systems Thinking

Figure 5.3 shows an improvement in the median of Systems Thinking from cohort 1 to cohort 3. The Kruskal-Wallis tests however show that this improvement is not significant and therefore there is insufficient evidence to reject the null hypothesis. A possible reason for this could be the reduction in the number of lectures and group-work devoted to systems thinking (Appendix Table 1).

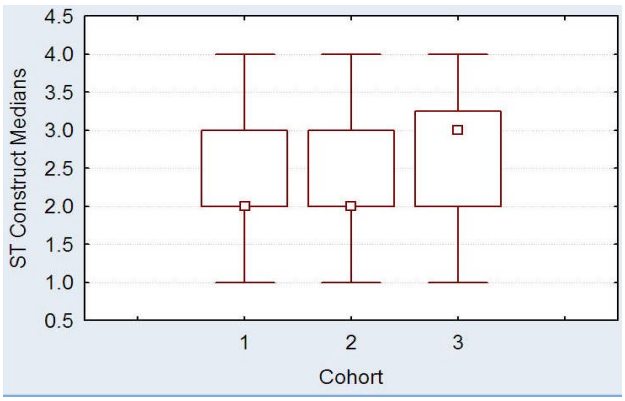

Figure 5.3: Systems Thinking (ST) Box and Whisker

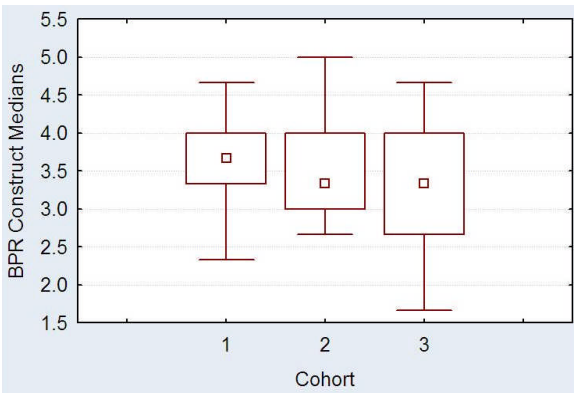

Figure 5.4: Business Process Change Box and Whisker

5.8 Understanding of Business Process Change

The Kruskal-Wallis test shows that the difference in perceived Business Process Change understanding across cohorts is not significant and therefore there is insufficient evidence to reject the null hypothesis. The level of ERP exposure at UCT has not affected students understanding of Business Process Change. A possible reason for this could be the reduction in the number of lectures and group-work devoted to BPR from cohort 1 to cohort 3 (Appendix Table 1). In 2002 the class was given a BPR case study in a tutorial yet in subsequent years this was discontinued.

5.9 Understanding of Alternative user Interfaces

Figure 5.5 shows an improvement in the median from cohort 1 to cohort 3 and the Kruskal-Wallis analysis of variance provides sufficient evidence to conclude that the level of UCT ERP exposure has a positive effect on the understanding of Alternative user interfaces.

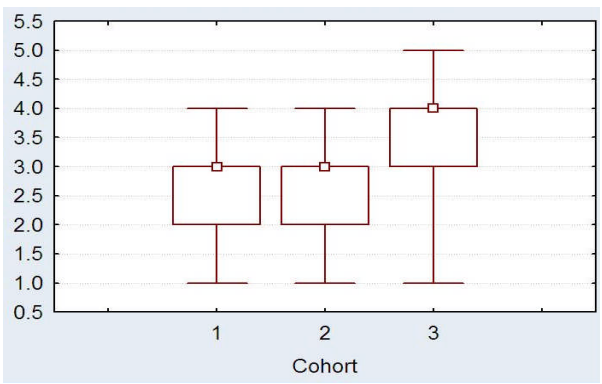

Figure 5.5: Alternative User Interface Box and Whisker

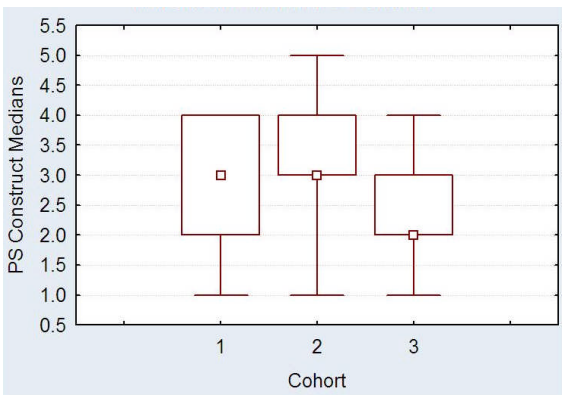

Figure 5.6: Purchased software (PS) Box and Whisker

5.10 Understanding of Purchased Software

Figure 5.6 shows a decrease in the understanding of purchased software from cohort 1 to cohort 3. The multiple comparison test shows that the decrease from cohort 2 to cohort 3 is significant. The Kruskal-Wallis analysis of variance provides sufficient evidence to conclude that the increased UCT ERP exposure has a negative effect on the understanding of purchased systems. This finding is surprising and requires further analysis. It might be that increased access to SAP R/3 has left students with increased appreciation of its complexity and size as well as an increased acceptance of their limited understanding. Comments made by students in Table 2.2 would support this.

6 Conclusion

This research paper, through its review of past and present literature has identified that the field of Information Systems (IS) has shifted from a technical skills focus, to a more analytical focus. This shift has seen many academics justify the inclusion of ERP systems into their curriculum. The skills that students gain from ERP systems are seen to be in alignment with the requirements of industry, thereby improving the marketability of students. In contrast the IS curriculum (Computing Curricula, 2005) does not explicitly mention business processes or ERP.

This study compared graduates' perceived understanding of six concepts expressed in the course outcomes. The graduates had completed the 3rd year IS ERP and business process course at the University of Cape Town (UCT) course from 2002 to 2004 in which ERP exposure was increased in each subsequent year. The graduates who were predominantly consultants and analysts rated their understanding of all course outcomes as good on completion of the course. Industry alignment was found to be good, with business processes and alternate user interfaces being found to be most applicable. The findings question the low weighting of systems theory in the model IS curriculum (Computing Curricula, 2005).

An increase in student perceived understanding of ERP concepts, business processes and alternative user interfaces was largely attributed to the increased ERP exposure in the course. In contrast, no significant change in students' perceived understanding of business process change and systems thinking could be found. A surprise finding that needs more investigation was that students' perceptions of their understanding of purchased business systems decreased with increased ERP exposure. These findings will be useful to IS educators considering including ERP systems in their curriculum.

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8 Appendix

	2002	2003	2004
Course Format	38 lectures 4 workshops 42 group presentations 1 essay	34 lectures 8 workshops 2 essays	26 lectures 9 workshops 1 essay 1 SAP Project
ERP Concepts Purchased software	6 lectures and 4 group presentations on ERP concepts and products ERP Case study workshop	15 ERP Lectures, including lectures on Concepts, Technical features, reporting and lectures on select SAP R/3 business processes.	13 ERP Lectures, including lectures on Concepts, Technical features, reporting and lectures on select SAP R/3 business processes. 1 ½ ERP Case study workshops
ERP & alternative user interface exposure	NONE	4 SAP R/3 Workshops	4 SAP R/3 Workshops 1 SAP R/3 Project
Business Processes (BPs) and BP change	2 lectures on BPs ½ workshop on activity diagrams 1 group presentation on activity diagrams 4 lectures on BPR, change and change management 4 Group presentations on BPR BPR case study tutorial	1 lecture on BPs One process modelling workshop 3 lectures on BPR	1 lecture on BPs 1 ½ process modelling and redesign workshop 3 lectures on BPR
Systems thinking	1 lecture 1 Group presentation	½ lecture	½ lecture

Appendix Table 1: Format of the IT Applications course over a three year period