Development of a Postgraduate course in Enterprise Systems Integration: A constructivist self-regulating learning approach

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Abstract

A constructivist self-regulated learning approach was adopted to teach a post-graduate course titled "Enterprise Systems Integration". The course was directed towards middle managers wishing to learn more about enterprise resource planning (ERP) implementations and the integration of ERP's into the enterprise. Course development was based on the assumption that students would be more comfortable acquiring knowledge as they would in practice that is, through the development of personal theories and self-regulated learning. The course focused on the implications of "real world" implementations of ERP and this was reinforced through business leaders presenting guest lectures on key topics. Student reaction to this approach was positive and the guest lecturers agreed that they also benefited from the experience. Students indicated that they needed more "hands on" exposure to the software to help them understand some of the human related problems with ERP implementations. Conclusions from this work indicate that it is important to have a mix of students with "real world" experience and a willingness to become involved in discussions at all levels. In addition, it was concluded that the teaching approach adopted provided a rich environment for enquiry and more closely emulated the learning approach undertaken in the real world.

Key words: self-regulated learning, Enterprise systems integration, post-graduate course

1. Introduction

This paper describes the processes undertaken and the subsequent evaluation of the development of a postgraduate course titled "Enterprise Systems Integration". The object of this paper is to define an appropriate teaching methodology and curriculum that would be suitable for adult students at middle management level or equivalent wishing to learn about enterprise systems integration. The course is designed to be at a Master's level and is part of the University's Masters of Strategic Information Systems Management program (MSISM). This program is designed to target the demand for a quality product from a central business district environment of a major capital city (Brisbane, Australia). The targeted student cohort is that of senior level managers with an expected maximum of 25 students in any given course.

The development of the curriculum was facilitated by the use of existing guidelines developed by [1] from the Association of Computer Machinery and the Association of Information Systems in the United States. It is hoped that the teaching methodology selected and the procedures used by the author to develop the curriculum and present the course can be of assistance to other academics. The selection process for appropriate teaching methodologies and curriculum development is shown in the next two sections of this paper.

2. Review of Related Literature

Day [2] suggests that teachers should instil the concept of lifelong learning into their students and the best way to do this is to have commitment to and enthusiasm for this concept themselves. The author considers that the teaching methodology and curriculum development approach used in this course demonstrates a commitment by himself to lifelong learning and that this commitment can lead

students to an approach that is conducive to continuing inquiry.

3. The Constructivist Approach

The teaching methodology used in this paper is a constructivist, self-regulating adult learning approach. This was considered appropriate for a postgraduate offering by the author. The constructivist pedagogy according to [3] incorporates two factors, the first being that teaching must start with the knowledge, attitudes, and interests of the student in mind. The second is that the teaching must be designed to allow students, through their own experience, to interact with the material in order to *construct* their own understanding. Other definitions of constructivism are described by [4] as "[the] process whereby new meanings are created by the learner within the context of her or his current knowledge". Zimmerman and Schunk [5] provide seven theoretical views on self-regulated learning, each of which have their own concepts on "key processes, environmental conditions and acquired capacities." These different views are directly quoted from [6] and shown below.

- *Operant: stressing self instruction, modelling and shaping of behaviour; emphasising provision of relevant stimuli for learning*
- *Phenomenological: stressing self-worth, subjective experiences, and development of a self-system emphasising personal identity*
- *Information Processing: stressing transformation of information, and self-monitoring with relatively little attention to environmental conditions*
- *Social Cognitive: stressing self-observation and enactive experiences, through social learning: emphasising self-efficacy in learning*
- *Volitional: stressing controlled actions to regulate emotions and environmental conditions.*
- *Vygotskian: stressing inner speech, dialogue, and mediation acquired through a hierarchy of developmental levels.*
- *Constructivist: stressing personal theories, discovery learning, and development of self-regulatory processes based on conceptual change.*

Athanasou [7] also indicates that there are several different theories of self-regulation. He, like [5] has broken these theories into different views. In his case three views, the operant or behaviourist which stresses the links between the environment and its reinforcers, the phenomenological or humanist which stresses the self and self-regulation and the social-cognitive models which attempt to bring the two previously stated theories together as well as stressing the cognitive aspects. Paris and Byrnes [8] describe the constructivist approach to self-regulated learning by first describing the principles of a cognitive constructivist approach. They divide it into six principles of learning whereby people have;

1. An intrinsic motivation to seek information
2. A desire to develop an understanding that goes beyond the information given
3. Mental representations that change with a person's development
4. Levels of understanding that are progressively refined at time goes by
5. Developmental constraints on learning
6. Reflect and reconstruct to stimulate learning

These authors further suggest that the notion of theory does provide a framework for self-regulated learning and that this notion includes aspects such as formulating and testing hypotheses, acquiring new data and solving problems.

Moon [9] describe the constructivist view of learning as emphasising the teachers role as a facilitator of learning and that the learner constructs his or her own knowledge in a network fashion, much like "building bricks in a wall." [9, p,106] describes the approach as "[stressing] the content and organisation of the curriculum as being the basis for learning and implies that knowledge is built from ideas that the learner gradually

assembles." The constructivist approach stresses that the learner becomes more engaged in meaningful learning and that the learner desires to understand the material rather than simply memorising it [9]. This description of the constructivist approach is closely aligned with the desired approach for course development outlined by the author of this paper.

The author's interpretation of these literature suggests that the constructivist approach to self-regulated learning involves allowing students to develop their own theories and through a series of cycles of reflection and reconstruction to develop a solution. This interpretation is similar to the definition of the self-regulating learning approach by [5, p,5] as "the degree that students are meta-cognitively, motivationally and behaviorally active participants in their own learning process." The different views of the self-regulated learning theory are brought to the attention of the reader as background information. Whilst they are of concern for this study, the author wishes to concentrate mainly on the practical application and how an understanding of the basic underlying theory of self-regulation can help students with the Enterprise Systems Integration course. The next section of this paper stresses the practical application of the approach.

The constructivist approach as advocated in this paper has been established as a useful aid for many strategic initiatives that involve business applications, for example [10] describe the role of constructivist learning in scenario planning. [10, p,446] consider that the four critical components of a constructivist learning perspective are "the individual construction of knowledge, social influences on individual constructions, the situatedness and contextual requirements of knowledge construction and the social construction of reality". [10] consider these are key enablers to the desired goal of changing the mental models of participants in scenario planning.

4. Curriculum Development

The philosophies for development of the course curriculum was centred on the principle of constructive alignment [11] whereby the teaching method and course content is closely aligned to the assessment students have to undertake to pass the course. The author believed that because the course was at a Master's level, the principle of constructive alignment had to fit into the type of model for acquiring knowledge that would be undertaken in the work place. Ward and McCormack [12] discuss an adult learning culture consisting of action research, the application of adult learning theory and facilitation in nursing. The intension of [12] was to shift from a classroom model to one that the students could learn at work. This approach is similar to the concepts outlined in this paper and is consistent with the concept of critical reflection as espoused by [13]. Knowles *et al* [14] in their description of the adult learner suggest that small groups of adults can learn by looking at a situation relevant to the subject at hand, use their own experience to understand and analyse the situation and independently use texts and third party information. The models of learning described above were used as the underpinning pedagogy for the development of this course.

The approach espoused in this paper considers the lecturer to be a facilitator of learning as described by [14]. This approach encourages learners to consider alternative perspectives to their own and to challenge their own values and beliefs. The facilitator encourages adults to consider other interpretations of the world and to critically evaluate those that differ from their own. However, [6] cautions that when educators use the self-regulated learning concept they should be aware of how they promote their own professional development as self-regulated learners as this may effect their approach to the promotion of self-regulated learning to students. The author of this paper considers that the constructivist view of self-regulated learning most closely reflects his approach to professional development and lifelong

learning and is the theoretical model most suited to the development of this course.

The curriculum development process started with an analysis of the model curriculum and guidelines for graduate degree programs in information systems developed by [1] from the Association of Computer Machinery and the Association of Information Systems in the United States. This approach was well suited to the author who was inexperienced in the development of enterprise integration courses. The salient points of the MSIS 2000 curriculum are shown below in table one.

4.1 Other factors considered

A suitable textbook that covered all aspects of the outlined curriculum could not be found, however a textbook that covered the subject of enterprise architecture was recommended to the students as third party reference material. This text provided background information and was directed towards building an understanding of the concepts of enterprise integration in that it allowed students to view an organisation holistically. The text was titled "Enterprise Integration" by [15]. The textbook was used in the initial lectures to increase student awareness of the large number of interactions involved with integrating IT into an enterprise. In addition, it was decided by the academic staff that course needed to be pitched at providing relevant industry experience through guest lecturers and encouraging students to find information that related to the theory building, constructivist approach rather than slavishly following a set text.

Table One - Salient points from the MSIS2000 curriculum [1]

Factors to be considered	Suggested practice
Integration can be viewed from three perspectives:	• Integrating the enterprise • Integrating the IS function • Integrating IS technologies
Pedagogical approach	Lectures and Case studies on business process reengineering, enterprise resource planning (ERP) systems, supply chain management, and customer management • Exercises using a visual tool for specification of business processes and enterprise data models • Interaction with an ERP tool (but not ERP systems development, per se) • Student team projects involving, for example, the specification of an integrated business process • Student presentations and industry lecturers
Objectives of the course	To Understand: • The *configuration* of business processes that are necessary to run the corporation and their relationships with legacy systems and other functional applications • How to design an *application architecture* to provide the information needed for decision making and knowledge management and how IS can enable new organizational forms • The concept of ERP and how it is implemented in business processes • The role of collaborative systems in developing more flexible, fast response organizations.
Topics to be covered	• Organizational needs for integration and flexibility and an overview of a typical "business architecture" • The role and content of an enterprise conceptual data model • Generic business processes and the the integration of business, ERP functions/applications • ERP trends and major vendors of software and services and interorganizational systems (supply chain and EDI) • Collaborative systems and knowledge management

4.2 The approach to providing course material

Guest lecturers from business were asked to provide a one-hour discussion on their topic area. The topic areas covered the three main aspects of ERP implementation, namely customer relationship management (CRM), supply chain management (SCM) and Business process outsourcing (BPO). In addition, a guest speaker whose company specialised in assisting other companies handle ERP implementations introduced the course and provided background information to the students.

4.3 Course Objectives

The course objectives were very much a reflection of the objectives outlined by the MSIS 2000 curriculum and the six main objectives are outlined below.

Students are required to have a:

1. A basic knowledge of the configuration of business processes that are necessary to run the corporation and their relationships with legacy systems and other functional applications.
2. Knowledge of how to design application architecture to provide the information needed for decision-making and knowledge management.
3. Knowledge of how IS can enable new organisational forms. The students will be able to identify and describe organisational forms and suggest appropriate systems.
4. Knowledge of the concept and major components of a typical enterprise-wide conceptual database.
5. Be able to describe the concept of ERP, compare and contrast it with other concepts such as joint application development (JAD) and be able to analyse a series of case studies demonstrating the different approaches.

6. Knowledge of the role of collaborative systems in developing more flexible, fast response organisations.

5. Assessment

Three assessment items were set with the first item divided into presentation (25%) and participation (15%). The participation component was designed to ensure that at least the students being assessed actively participated in discussions and asked questions during seminar presentations. Selected students who did not present were asked to participate by asking questions relevant to the subject matter presented. These students were allocated marks up to 15% of the total for the course. The subject matter was revealed to these students one week before their peers' presentation. The assessment schedule is shown in Table two.

Table Two: Assessment items for the Enterprise Systems integration course

Item	**Word Length**	**Weighting**	**Due Date**
Seminar Presentation		25%	Weeks 4 - 9
Participation (feedback / critique)		15%	Weeks 4 - 9
Essay Assignment	3,000	60%	Week 12

The seminar presentations required students to present and lead discussions on research papers and case studies they read. A peer review process involving the students who were selected to ask the questions was put in place and these students provided a report. This provided peer-based formative assessment of the presentations. This process was used because it closely reflects the work situation of review of an author's work being presented to the editor of a journal or a line manager. The editor (or manager) makes the final decision on whether to publish (or table the report) or not. Formal, summative assessment was undertaken by the lecturer and based on a mutually agreed to criterion-based assessment and the peer evaluations.

The final assignment was an individual student project although group work was encouraged. Students were asked to undertake research into the implications of implementing an enterprise system in an organization or combination of organisations of their choice. Students were expected to relate the six learning objectives for the course with real world implementations of ERP's. The assignment could be a historical analysis of an organization that has already implemented an enterprise system or a present day analysis of what an organization needed to consider prior to implementing such a system.

As with all aspects of the course, assessment item content was subject to individual negotiation and final approval by the course convenor. This negotiation and final approval allowed the student to understand what was required and how well their presentation/essay fitted into the overall objectives of the course as well as allowing them to negotiate outcomes, as would be the case in the real world.

6. Course Content

The content of the course for each of the 13-week semester is shown in table three.

Table Three: Course content

Week	Lecture	Seminar	Assessment

1	Course Overview		
2	Two hour lecture block covering basic theory (Systems analysis)		
3	Two hour lecture block covering basic theory (Failures – Enterprise systems)		
4	Two hour lecture block covering practical aspects of applying the theory		
5	One hour lecture block (About your essay and tutorials) example (Knowledge Management – capturing knowledge)		
6	Customer Relationship Management (CRM).[1]	Between 1 & 3 students each week (depending on student numbers) presenting and leading discussions on research papers and case studies	Students will be assessed on their presentations & critique throughout the semester
7	Guest speaker covering practical aspects of CRM		
8	Supply-Chain Management (SCM)		
9	Guest speaker covering practical aspects of SCM		
10	Outsourcing		
11	Guest speaker covering practical aspects of Outsourcing		Assignment due week 12
12	Discussions about the assignment		
13	Course Review		

7. Evaluation of the course

The course was evaluated through student ratings of 31 questions asked during the formal evaluation of the course, open-ended questions from the student feedback survey and guest lecturers providing their feedback from a series of questions asked about the course.

7.1 Student feedback

As this was the first time the course was offered student numbers were low (n=7). Student feedback was very positive with an overall rating for the course being 4.20 on a Likert score range of 1 to 5 (1 being strongly disagree and 5 being strongly agree). Of the 31 questions asked, 11 were considered by the author to directly relate to the approach taken in this paper. Mean student responses to these questions are shown in Table four.

[1] The first sessions for CRM, SCM and BPO asked the question. What it is and how it relates to the course? The lecturer provided a 15 minute overview followed by student discussion of their experiences with the topic and what sort of questions they should ask the guest speaker

Table four: Mean values on a Likert scale from 1 to 5 for students undertaking the course Enterprise Systems Integration (n=7)

Question	Mean student score

	2003
The aims and objectives of the course were clearly stated at the beginning	4.14
The content was presented in such a way that I could see the relationships among the elements	4.14
The various elements of this course worked well together to help me to learn	4.14
The assessment items formed an important part of my learning experience	4.43
You usually have a clear idea of where you're going and what's expected of you	4.14
As a result of doing this course, I feel more confident about tackling unfamiliar problems	3.86
This course has helped me to develop the ability to plan my own work	4.29
Overall, I achieved the aims and objectives of this course	4.17
In this course, I was encouraged to take responsibility for my own learning	4.14
The aims and objectives of the course were clearly stated at the beginning	4.14
Overall, I was satisfied with the quality of this course	4.20

The questions relating to taking responsibility for their own learning and whether assessment items formed an important part of the overall learning experience scored very highly at 4.14 and 4.43 respectively. The question "This course has helped me develop the ability to plan my own work" scored very highly at 4.29. The question regarding student confidence in tackling unfamiliar problems had a relative low score. This was thought to be a reflection of the level of experience of students undertaking the course. The intended cohort of students was to be middle level managers with significant work experience. Only three students really fitted this profile, two of which had significant information technology experience, the third had middle management experience in government organisations. The course was new and some existing, newly graduated students with little work or life experience requested to do the course as an elective

7.2 Student Comments on the course

Students' comments were focused on how they valued learning about enterprise integration concepts and this is exemplified through student comments such as "I've learnt a multitude of aspects on enterprise integration and gained vast knowledge on BPO [Business process outsourcing] SCM [Supply Chain Management] EAI [Enterprise Integration Applications] and CRM [Customer Relationship Management]".

The student presentations brought out recent subject matter based on their independent research from library resources and the Internet. The students considered the best aspects of the course as providing guidelines on how to present academic material, the up to date presentations given by both students and guests and the links to practical applications that the guest lecturers brought to the course. Some of the negative aspects were concerned with the presentations students had to do and the concern that there was no practical "hands on" use of an ERP such as SAP or Peoplesoft. Another student felt that there should have been more theory and fewer presentations. This comment was probably more an indicator of the student's lack of understanding of the objectives of the course. One student was concerned about the structure of the course but no additional comments were made on this point. Table five shows the student responses to open ended questions regarding the most valuable things learnt, the best aspects of the course and things that needed improvement.

Table five - Student responses to open-ended questions from the student feedback survey

What are the	**What where**	**What aspects of**

most valuable things you have learned.	**the best aspects of this course.**	**this course are most in need of improvement..**
ERP concepts How ERP related to technology and business strategy	ERP interesting	Structure of the course
I have learned the enterprise integration, ERP, CRM, SCM and my interested aspects	How to present the academic material. Plan on working on my assignment	
I do learning lot of thing before I haven't known. The lecturer really help us to learning	Just everything	Assignment is better than presentations, I really don't know how to speak in front of the people
ERP, ESI knowledge gained		Cut down presentation – more theory.
Giving presentation. Certain critical aspects of Enterprise resources	It dealt with the latest technologies in the field of information systems. With respect of an 0rganisation insight.	While studying this latest technologies what I did find was missing was some practical studies.
I've learnt a multitude of aspects on enterprise integration and gained vast knowledge on BPO SCM EAI and CRM	The link to practical application. The guest lectures on industry specifics was very interesting	More coverage of practical EAI implementation methodology etc.

7.3 Guest Lecturer feedback

The four guest lecturers were also asked several questions about their thoughts on the course. Three speakers replied to the questions and their responses are shown below in tables six, seven and eight.

Table six - Guest speaker number one's feedback

Question	Guest speaker 1
1. What do you feel are the benefits of being involved in the delivery of a postgraduate course such as this?	*Experience some insight into what students are learning and to provide some real/industry examples first hand to the students and engage their views relative to this i.e. some stimulating conversation.*
2. What outcomes did you expect?	*Didn't have any expectations other than to ensure that I provided some benefit to the students.*
3. Did you feel that these expected outcomes were achieved?	*I think so but no real mechanism put in place to obtain such feedback*
4. Do you think the students understood what you were talking about?	*I think/hope so but no real mechanism put in place to obtain such feedback*
5. Do you think the students asked relevant questions?	*Yes, I was impressed at the level of interaction and 'character' of questions and responses put forward in general. There were however, some students who didn't make comments or ask questions.*
6. If Q5 and Q6 were not as you would have expected, what do you think the barriers were to effective communication?	Not answered

Table seven - Guest speaker number two's feedback

Question	Guest speaker 2
1. What do you feel are	*The most important benefit is to be*

the benefits of being involved in the delivery of a postgraduate course such as this?	*able to contribute to profession. If we are to have these students as our future colleagues then we hope that they have the best IS e ducation possible. Also IS is an applied field so practical input is important. It also is good in terms of developing future IT professionals and in this sense it enhances one's reputation.*
2. What outcomes did you expect?	*I expected the majority to appreciate the information provided and possible one or two students to be inspired and curious.*
3. Did you feel that these expected outcomes were achieved?	*To some extent.*
4. Do you think the students understood what you were talking about?	*To some ex tent. They lacked enough domain knowledge to fully understand the nuance of the topic. I would note however that if they had IT industry work experience, as one or two did, then they found it interesting.*
5. Do you think the students asked relevant questions?	*Yes.*
6. If Q5 and Q6 were not as you would have expected, what do you think the barriers were to effective communication?	*Exposure of the students to the IS industry.*

Table eight - Guest speaker number three's feedback (questions 1 and 2)

Question	Guest speaker 3
1. What do you feel are the benefits of being involved in the delivery of a postgraduate course such as this?	*From my perspective in industry it is always difficult to link theory with practice and yet without such a link I don't feel students get a good well - rounded education which prepares them for the work they will be required to do. Having practitioners come to the students helps reduce this gap, albeit in a small way. Anything which can help on this front has to be g ood for educational outcomes but I accept this would be difficult to assess given present assessment methodologies i.e. it is a strategic outcome which students may not even recognise and if they do, it may not be until well after they are in the job or in the shortest time frame how they got a job as a result of using information gained from such a lecture. From my perspective, I get a better appreciation of where students are at from the types of questions they ask.*
2. What outcomes did you expect?	*Firstly, the best outcome for me is to be challenged by questions from students in such a way that I walk away with a new insight or at least come to understand that I have a blind spot. If the students or lecturers had insights on how I could address such a weakness then it would be great.* *Secondly, I hope to gain insight not only about the content but the method of delivery - this can help me improve as a presenter and give me an edge if I have to present the same or similar material elsewhere.* *Finally and at a more personal level I feel I have an obligation to put into the community and this is why I did not ask for money even though it was offered. I am therefore intrinsically motivated. This is simply about being internally consistent with my values.*

Table nine - Guest speaker number three's feedback (questions 3 and 4)

3. Did you feel that these expected	*Not really:* *A) Students did not really ask probing questions - I need to let them know it is*

outcomes were achieved?	*OK not to be polite. This o f course assumes they understood what I was on about.* *B) Didn't get any suggestions on how to improve delivery. I think this is where the lecturer can help by asking students for impressions once I have gone and getting suggestions while things are fresh in their minds* *C) Perhaps I need to do a whole lot more community work to increase my self esteem*
4. Do you think the students understood what you were talking about?	*Not really: Which surprised me given they were post graduates and my content was a balance of theoretical and practical issues. I put this down to two things. Firstly they were IT specialists whereas my talk was on soft issues which IT specialists need to be across. I therefore assumed a level of theoretical background, which was not present. Secondly they were overseas students which raises questions about were they here on merit or to make money for [the university] who like all universities these days have to raise a lot of revenue. Finally, from an improvement perspective I think it is bec ause IT courses do not have the requisite competencies e.g. they need to be trained in consultancy skills so that even if they don't understand they have well developed inquiry skills so they can learn - they will face this issue in industry all the time.*

	to two. The first is around content and how deep or shallow the questions showed a desire to generate a richer discourse about the material. Secondly if they could not do that they did not seem to ask bus iness type questions, rather they seemed to be fascinated by technical questions - a weakness IT types tend not to want to correct i.e. IT serves the business but as an industry they seem to prefer that industry fits in line with their technology.
6. If Q5 and Q6 were not as you would have expected, what do you think the barriers were to effective communication?	*What went well :* *A) Video was successful in conveying comprehensive information on the case study. With modern university teaching methods bringing such material into the classroom is one of the few options to get students to real like situations.* *B) Having a practitioner in the class doubtless helped for similar reasons and had the bonus of allowing direct interaction and the chance to get instant feed back.* *What could be improved* *A) The warm up or lack thereof students get before the guest lecturer arrives e.g. were supply chains discussed and were the issues involved covered so students could focus their thinking on the night.* *B) Mirror image of a from lectu rer's perspective i.e. while some slides on the book being used were sent they were so abstract as to be useful. A copy of the book, and course content from week to week may have helped or maybe I needed to have a detailed discussion with the lecturer on learning objectives, what had been covered to date etc, in order to better mesh with the overall course. However this said it must be remembered guest lecturers generally don't have that sort of time available.*

Table ten - Guest speaker number three's feedback (questions 5 and 6)

5. Do you think the students asked relevant questions?	*By and large no for the reasons already covered above. However I think this raises questions on what basis I decide the questions were relevant. I think it is down*

All guest speakers saw some benefit in being involved in the course from being able to contribute to the profession to gaining some insight into what students were learning (tables six, seven and eight). Guest speaker number three considered a major benefit to be enabling practitioners to talk to students reduces the gap between theory and

practice and helps link the theory to the practice. When asked about the outcomes they expected from working with the course, speaker's one and two responded by expressing hope that they provided some benefit to the students and that they inspired students. Speaker number three expected to be challenged by student questions. Speaker number three also provided some insights into why he felt that the expected outcomes were not achieved. He felt that the students did not ask probing questions and he did not get any feedback on his presentation. The author suggests that this could be a reflection of the previously described cohort of students undertaking the course for the first time (only three having the expected level of experience to be involved with the course).

Speaker three was also concerned that the students may not have understood what he was talking about. He made the observation that some of the students were more concerned about the information technology or technical aspects of his talk. Speaker two thought that the students "lacked the domain knowledge to fully understand the nuance of the topic" he was describing. Guest speaker one was not sure and mentioned that he had no real mechanism to obtain such feedback. On the question of whether students asked relevant questions, both speakers one and two thought they did, however speaker three did not. Speaker three then raised the question as to what is the basis for deciding whether questions were relevant or not.

8. Discussion

This object of this study was to define a teaching methodology and curriculum suitable for adult students at middle level management level or equivalent wishing to learn about enterprise systems integration. The author believes that students at a postgraduate level need to learn in the same way they would in the work environment. The literature suggests that a teacher should be comfortable with the approach and that it should reflect the professional development approach adopted by him or her self. The author considered that a constructivist self regulated learning approach was appropriate. This approach is designed to allow students to construct their own understanding based on their own experience and their interaction with the subject material. This approach is encouraged in the enterprise systems integration course through students being able to do independent research and obtain relevant information from peers. It is the belief of the author that the use of a set text at the postgraduate level is inappropriate as it encourages the type of dependent learning (from the one source) that characterises students working at an undergraduate level.

The self-regulating aspect of student learning infers that the students actively seek information and are active in their own learning process. The author suggest that this is best achieved through a combination of external influences from guest speakers, active seeking of relevant material and peer learning. Parr and Townsend [16] explored the dynamics of peer group influences from a social constructivist perspective. In their comparison of what they termed the "tutorially configured" or formal versus the "ambient" or informal environments, they found that informal talk between students in the ambient environment was a very important aspect for "mutual support and their acquisition of new knowledge." These authors go on to suggest that this informal talk promote "cognitive restructuring, cognitive rehearsal, co-construction of ideas between peers, and perhaps internalisation of problem-solving strategies and activation of inert knowledge."

The self-regulated learning appears to be a very important factor in this course with student responses to key questions indicating such a learning approach was adopted with ratings associated with this being very high. Concepts such as taking responsibility for their own learning and being able to plan their own work scored very high ratings in the end of semester student feedback survey and there is every reason to

conclude that this is due to the self-regulated learning approach. Hacker *et al* [17] suggests that self-regulated learners have a great deal of control over their learning and that this control must infer some form of critical thinking and self-reflection. A study cited in [17] found "a significant correlation between the amount of reflective conversation and the quality of writing plans" but the study also found that collaboration amongst students did not guarantee that reflection would occur, in fact some student collaboration episodes undermined reflective thinking. These findings can be transferred to this study with better student presentations and final essays being closely related to the quality of writing plans. The findings also provide a cautionary tale with respect to the effectiveness of peer learning and the author acknowledges this.

Individual student learning styles were not accounted for in the design of this course due to limited resources and because students would have to adapt their learning style to the problem at hand anyway in the real world. Vermetten *et al* [18] explored the concept of altering instructional measures to see if it would influence student-learning practices that were based on their natural learning style. They concluded that learning styles were not affected by changes in instructional practice. The [18] study suggests that groups of students with different learning preferences tended to use the instructional measures in different ways to suit their own learning style. Tiantafillou *et al* [19] describes the design and evaluation of an adaptive educational system based on different learning and cognitive styles. This study concentrated on hypermedia systems and was a computer-based solution that depended on the end user entering an instructional strategy that suited his or her self. This approach depended on a well-established and rigid curriculum and was therefore not suited to the self-regulated learning approach outlined in this paper.

Throughout this study the author emphasises the learner-centred constructivist approach. According to [9] this approach requires the teacher to be a facilitator of knowledge acquisition. This approach may cause some concern amongst students who consider the role of a lecturer as being a teacher who should know all about the subject, however this concern can be overcome if the students are made aware of the joint learning approach and how this simulates the real world. This did not appear to be a problem in this study with students quite willing to accept the joint learning approach with the lecturer.

9. Conclusions

A major limitation of the evaluation of this course is the small student sample size. The object of the paper is to work through the teaching methodology and the development of curriculum and to this end, the paper has been able to relate a teaching methodology to curriculum development. It is acknowledged that further work needs to be done with respect to a more through evaluation and this will be a continuing process through qualitative and quantitative methods encompassing the standard student feedback surveys and additional measures such as obtaining more detailed information on individual student learning styles and aspirations.

The guest lecturers all agreed that they gained some benefit from their participation in the course and it appears that they consider being able to contribute to the profession and to help the students is both worthwhile and satisfying. During the presentations all guest speakers mentioned that the students should take advantage of the opportunity to network with potential business partners or future employees. Guest lecturers all seemed to want feedback from students on their presentations and perhaps the present peer review analysis of other student presentations should be extended to guest lecturer presentations. Perhaps the guest presenters could think more about asking the question, ”what can I ask these students to do that might give them a taste of a professional situation?” rather than “what can I tell these students?” It is important that the course contains

feedback mechanisms that allow students to comment on the effectiveness of guest speakers.

Students indicated that they wanted "hands on" experience in the use of ERP software and this was also indicated as desirable in the MSIS 2000 curriculum. This omission was noted and will be rectified in future offerings of the course. However, it is also the teacher's contention that business managers need to be more aware of the business implications and reasons for past failures of ERP implementation. This course was directed more towards this aspect rather than the more technical aspects of ERP usage so anything other than an "end-user" level of interaction with the software would be inappropriate as it could well lead to more of a technical focus as described by guest lecturer number three.

This offering of the course suffered a little because effective discourse was stifled to a certain extent due to only a limited number of students having the necessary work and life experience to ask deep and meaningful questions both during student presentations and guest lecture appearances. If the course is to continue in its suggested form, certain pre-requisites for students need to be enforced. These should include a requirement for students to have substantial work experience at a managerial level.

Overall, students indicated a high degree of satisfaction with the course content and teaching methodology. The teaching model lends itself to encouraging a rich discourse between students, lecturers and the guest speakers and this leads to a greater understanding of the practical implications of ERP implementations.

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