

## **Feeding Back and Enhancing Authentic Learning in Quality Course Assessment Design: Locating Information Systems Education in Rigorous Educational Research**

Abdul Hafeez-Baig  
School of Information Systems  
Faculty of Business and Law  
University of Southern Queensland  
Toowoomba, Australia  
Email: [abdul.hafeez-baig@usq.edu.au](mailto:abdul.hafeez-baig@usq.edu.au)

Raj Gururajan  
School of Information Systems  
Faculty of Business and Law  
University of Southern Queensland  
Toowoomba, Australia  
Email: [raj.gururajan@usq.edu.au](mailto:raj.gururajan@usq.edu.au)

David Jones  
Faculty of Education  
University of Southern Queensland  
Toowoomba, Australia  
Email: [david.jones2@usq.edu.au](mailto:david.jones2@usq.edu.au)

P. A. Danaher  
Capacity-Building Research Network Faculty Research Centre  
Faculty of Education  
University of Southern Queensland  
Toowoomba, Australia  
Email: [patrick.danaher@usq.edu.au](mailto:patrick.danaher@usq.edu.au)

### **Abstract**

*Locating information systems education foursquare within rigorous and substantial educational research is crucial if the discipline is to receive the scholarly attention that it warrants. One way to do that is to highlight how current information systems course design in Australian undergraduate and postgraduate programs exhibits the strongest possible elements of contemporary learning theories. This paper analyses selected features of the design of an information systems postgraduate course in an Australian university, including the use of peer review of journal entries and writing professional reports to enhance authentic learning and maximise quality assessment design. The analysis is framed by the principles of instructional design theory (Snyder 2009). The authors argue that, by demonstrating theoretically grounded and effective educational practice, the course highlights the value of being located in wider educational research, and of bringing the two fields more closely together.*

### **Keywords**

Authentic learning, educational research, instructional design theory, peer review, quality assessment.

### **INTRODUCTION**

Despite having a sound professional knowledge and ethical base, information systems education has suffered something of an identity crisis related to its profile and visibility (Agarwal and Lucas 2005). Researchers have differed about whether and how such elements as the discipline's diversity (Taylor et al. 2010) increase or decrease the acceptance of information systems education as a scholarly field in its own right, the impact of publishing practices on the discipline's perceived impact (Holsapple and O'Leary 2009) and the place of design-oriented research in helping or hindering the discipline to establish and sustain rigor (Baskerville et al. 2011).

All disciplines are subject to ongoing interrogation about their continuing currency and relevance. At the same time, that interrogation is likely to be of greater interest to university managers when student enrolments are in

apparent decline (Akbulut and Looney 2008). Of course, information systems academics find that they have varying levels of control over factors seen as influencing such enrolments.

One element that academics are able to control – at least to some degree – is the design of information systems courses. They have both the opportunity and the obligation to ensure that courses are designed to be as appealing and engaging as possible, while acknowledging the need to deliver sometimes complex and challenging course content.

In this paper the authors analyse selected features of a postgraduate information systems course in order to evaluate its utility in addressing several of the characteristics proposed by contemporary learning theories as being required dimensions of high quality course design. The analysis is part of a broader and ongoing research project (Danaher et al. 2009; De George-Walker et al. 2010; Gururajan et al. 2011; Hafeez-Baig et al. 2011; Hafeez-Baig et al. In press) linking specific courses with wider debates about educational innovations in course design and delivery and the design and delivery applications and implications of contemporary technologies such as mobile learning devices.

The paper consists of three sections:

- an overview of the course's key features
- an analysis of the course's effectiveness from the perspective of the principles of instructional design theory (Snyder 2009)
- proposed implications of this analysis for evaluating the authenticity and quality of information systems courses and for locating the discipline more broadly within rigorous educational research.

## **OUTLINING THE COURSE'S KEY FEATURES**

The course being analysed here is entitled "Digital Innovation" and is currently delivered by the Faculty of Business and Law at the University of Southern Queensland (see also De George-Walker et al. 2010; Hafeez-Baig et al. 2011). It is a postgraduate course and is fully online. It has been offered for the past five years, and it was developed to assist students to engage with the latest and cutting edge technologies in information and communication technologies and their implications for understanding and implementing contemporary digital innovations. The course has no paper-based aspects; instead all elements, such as the introductory booklet, the study guide and the reading materials, are provided through the course study desk and related hyperlinks. The course is generally offered in two out of three semesters each year, with approximately 100 to 170 student enrolments per annum.

The course summative assessment previously included six journal entries of 600 to 800 words each that were peer reviewed by fellow students in the course. The journal entries were designed to align with the two major assignments, which took the form of professional reports intended to be submitted to the chief executive officer of a company and which were not subject to student peer review. The peer reviews of the journal entries were moderated by staff members, who sometimes deducted marks from the reviewer if the review were not judged to be of sufficient quality (a development that enhanced the level of detail of the reviews). A compulsory plagiarism check was implemented for all the assessment items before they could be submitted, using software such as "Turnitin" and "Viper". The course has no examination component.

In 2012 the course underwent a major revision to accommodate changes requested by students and staff members. Some of the students' requests included having fewer assessment items, continuing to maximise the quality of the peer review process and increasing the connectivity and the speed of the various online systems in the course. At the same time, students generally considered that the peer review process enabled them to assess their own performance and where necessary to develop strategies to improve their learning in forthcoming assessment tasks. They also perceived that the course facilitated insights into cutting edge technologies and aligned closely with current industry concerns and requirements. As a result of this feedback, the course assessment has been streamlined to reduce the number of journal entries needing to be completed and to allow some choice in their selection and completion.

The course design is centred on three key principles, informed by contemporary learning theories (see also De George-Walker et al. 2010):

- learning by application (students articulate solutions for real-life problems provided to them, and present their solutions by way of a consultant's report, a management report and an analysis component)
- learning by observation (students use the peer review assessment that they receive to benchmark their work against that of other students)

- learning by critique (students are supported to apply what they learn from the peer review process to analyse and to review critically other students' work and to increase their own in-depth thinking about the course).

Figure 1 below provides a visual overview of the course's principal design elements, while Figure 2 outlines the course structure.

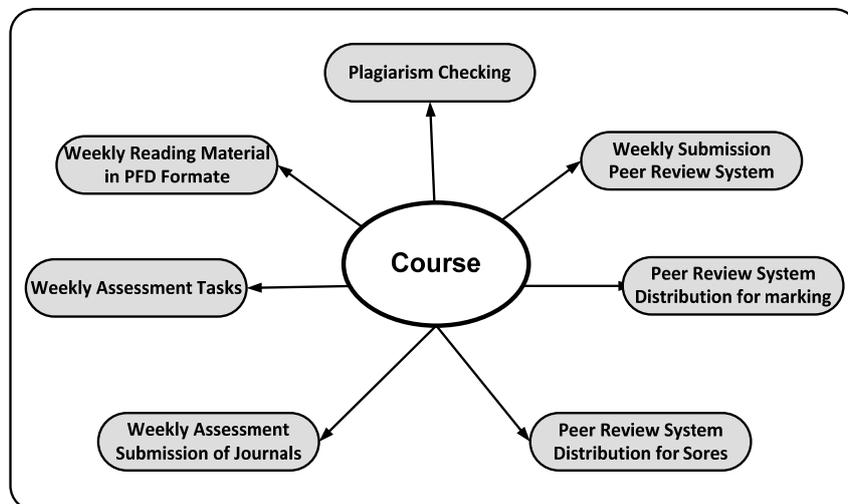


Figure 1. Visual overview of the course's principal design elements.

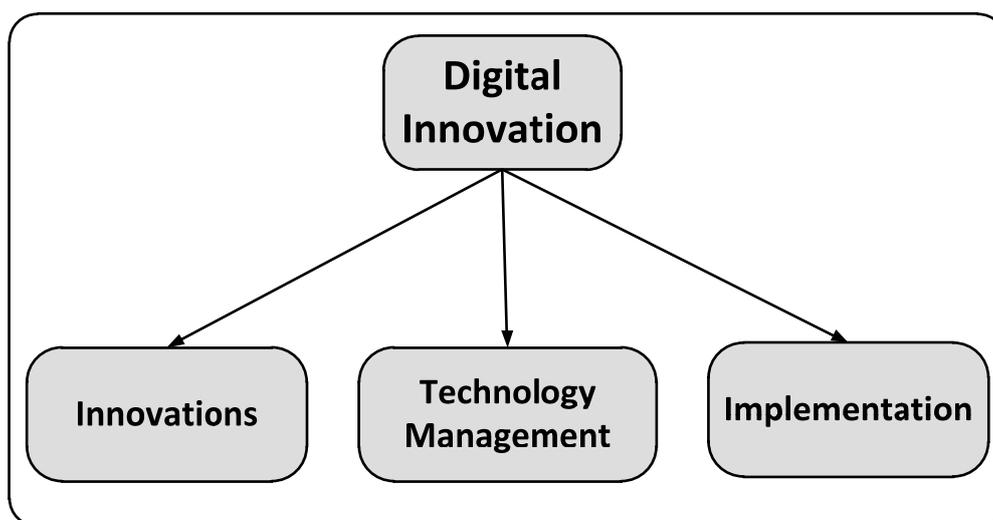


Figure 2. Visual overview of the course's content.

Within the inevitable constraints of time and other resources associated with current course delivery and student assessment in Australian universities, the course has been judged by the staff members who developed and teach it, by the students who complete it, by the school and faculty managers who administer it and by the researchers who have reviewed it (De George-Walker et al. 2010; Hafeez-Baig et al. 2011) to be generally successful in achieving its goals and contributing to students' learning. That judgement is elaborated in the next section of the paper.

## ANALYSING THE COURSE'S EFFECTIVENESS

Several criteria distilled from contemporary learning theories could be deployed to analyse the course's effectiveness. The course has previously been examined (De George-Walker et al. 2010) from the perspective of Graham's (2006) account of the key features of blended learning. It has also been considered (Hafeez-Baig et al. 2011) as part of a broader investigation of the social and technical dimensions of emerging technologies that takes account of how specific technologies afford or constrain certain configurations of learning (Lange 2008), and that recognises the politicised character and the sociocultural status of such technologies (Feenberg 2010).

In addition, the constraints and possibilities attendant on designing and implementing the course have been linked (Hafeez-Baig et al. 2011) with the wider debate about online education constituting a distinctive and potentially transformative learning environment in its own right (Garrison and Akyol 2009; Oxman 2008), while also acknowledging the value of enacting a healthy scepticism about exaggerated claims about the educational impact of particular technologies (Convery 2009).

The analysis presented in the remainder of this section of the paper is informed by the key principles of an instructional design theory articulated by Snyder (2009). Snyder’s focus in elaborating her theory was to promote the creation of sustainable and transformative online learning communities for adults. Her theoretical framework was clustered around three core elements:

- learning communities (“groups of people that share the common interests of learning and sharing knowledge” [p 49])
- adult learning theory (“These theories seek to explain how the process of learning as an adult differs from learning as a child. They focus on describing how various social, psychological, emotional, and physiological factors affect adult learning” [p 49])
- constructivism (“By combining new information with existing knowledge and experience, learners ‘construct’ their own learning. The educator facilitates learning by providing authentic learning scenarios and problems...” [p 50]).

In describing her instructional design theory, Snyder (2009) outlines 13 methods helping to support five values that form the theory’s guiding principles. Table 1 below summarises these methods and values and the relationship between them:

Table 1. A design theory to guide the creation of online learning communities for adults: values and methods (adapted from Snyder 2009, pp 50-52).

<b>Value</b>	<b>Methods</b>
1. Cultivate a learner-centered environment.	Confirm member expectations
	Define and communicate the learning community’s purpose
	Encourage shared authority among learners and facilitator
	Provide multiple ways to learn content.
2. Leverage community synergy	Provide learning opportunities that facilitate communication, collaboration and interaction
	Encourage public sharing of information, knowledge and experiences
	Utilize the World Wide Web as an extension of the learning community boundaries
3. Respect individuality, diversity, and experience	Establish trust and rapport
	Reinforce, recognise, and reward
4. Focus on real-life problems	Offer a flexible learning framework, which enables community members to set and achieve individual goals
5. Promote self-directed learning	Maintain consistency and predictability
	Provide relevant and accessible information
	Allot time for closure and reflection

It is clearly inappropriate to evaluate the course using criteria that were not part of its original design or its subsequent development. At the same time, the theoretical framework, values and methods distilled by Snyder (2009) are broadly consonant with the intentions of the course teaching team members. Moreover, they can be seen as aligned with relevant and rigorous contemporary educational research to which it could be seen as strategic for the information systems education discipline to contribute.

With regard to the theoretical framework encapsulated by Snyder (2009), all three elements are present in the course design to varying degrees. For instance, while it is inaccurate to assert that the course is automatically a functioning learning community by virtue of being part of an accredited university program of study, it is possible to discern specific ways in which course members exhibit at least some of the characteristics of “groups of people that share the common interests of learning and sharing knowledge” (p 49). Furthermore, the course

has been carefully designed to enhance and promote those “common interests” – for example, the peer review process has been developed and refined to highlight to students how it is in their combined interests to approach the process as seriously and comprehensively as possible, and moreover that doing so ensures that their learning outcomes are maximised in tandem with one another. From this perspective, the students’ success in the course is increased when they learn cooperatively and collaboratively rather than competitively with one another – a key component of effective learning communities (Hrastinski 2009) as well as of workplace effectiveness (Hwang and Arbaugh 2009).

Likewise the course design conforms to several aspects of the two other elements of Snyder’s (2009) theoretical framework. In terms of adult learning theory, the course has been developed explicitly to understand and to engage proactively with the intersection among “various social, psychological, emotional, and physiological factors affect[ing] adult learning” (p 49). For instance, as much flexibility as possible in relation to student choice of assessment items and the topics to pursue in those items has been built into the course, thereby maximising student interest and ownership, within the constraints of a semester of a predefined length and the accompanying bureaucracy of assessment due dates, faculty board meetings to confirm recommended final grades and so on. Similarly, the principle of authenticity (Reeves and Herrington 2010; Whitelock and Cross 2012) has been applied as far as possible to the students’ learning and to the design of the assessment tasks in the course, such as ensuring that the audience for the professional reports (the major assignments in the course) is the chief executive officer of a major information systems company and that the purpose of the reports is to present that officer with carefully synthesised information and to recommend to her/him a particular course of action based on the student’s interpretation of that information. Correspondingly, learning in the course is consciously scaffolded to facilitate students making connections between their prior understandings and new knowledge presented in the course (see also Miyazoe and Anderson 2010), whereby the constructivist dimension of Snyder’s (2009) theoretical framework is fulfilled: “By combining new information with existing knowledge and experience, learners ‘construct’ their own learning. The educator facilitates learning by providing authentic learning scenarios and problems...” [p 50]) With regard to the five values articulated by Snyder (2009), Table 2 below provides specific examples of how the course has applied those values, as well as how it has enacted the attributes of authentic learning identified earlier in the paper:

Table 2. How the course enacts the values in Snyder’s (2009) design theory and maximises authentic learning (adapted from Snyder 2009, pp 50-52).

<b>Design theory value/ Authentic learning attribute</b>	<b>Examples from the course</b>
<p><b>Design theory value</b></p> <p>1. Cultivate a learner-centered environment.</p>	<p>The following strategies proved to be effective in cultivating a learner centred environment in the course:</p> <ul style="list-style-type: none"> <li>• The provision of other submissions for the same assessment items, in order to demonstrate a wide range of diverse yet equally legitimate approaches to completing the task</li> <li>• The provision by peers and by academic staff members of constructive feedback about formative and summative assessment task submissions</li> <li>• The sharing of resources by peers and by academic staff members through discussion forums</li> <li>• The provision of recordings of industry presentations and accompanying analyses, commentaries and reflections.</li> </ul>
<p>2. Leverage community synergy</p>	<p>Even though there was no formal team assessment item in the course, community synergy was explicitly leveraged through the encouragement of and support for students to develop small study groups. Furthermore, various discussion forums created an effective opportunity to learn about and to communicate other issues associated with the course focus on digital innovations.</p>

<p>3. Respect individuality, diversity, and experience</p>	<p>Trust and support were established through:</p> <ul style="list-style-type: none"> <li>• Providing explicit instruction about and support for students providing, and respond to, quality feedback from their peers</li> <li>• Enabling and encouraging students to post additional reading materials to the discussion forums, thereby respecting and building on their respective individuality, diversity and experience</li> <li>• Creating opportunities for students with current or recent industry experience to share that experience with fellow students.</li> </ul>
<p>4. Focus on real-life problems</p>	<p>Learning experiences and assessment tasks were designed to focus on real-life problems of direct relevance to students:</p> <ul style="list-style-type: none"> <li>• Students were encouraged to choose their own business environments and to identify problems and possible solutions in those environments as a framework for engaging with the learning experiences and assessment tasks.</li> <li>• The academic staff members and the students identified issues associated with the latest digital innovations as a means of addressing the identified problems and possible solutions in the selected business environment.</li> <li>• Those digital innovations were incorporated into the accompanying business models and strategic directions proposed for the selected business environment.</li> </ul>
<p>5. Promote self-directed learning</p>	<ul style="list-style-type: none"> <li>• Activity-based teaching was an important component of the course, whereby students were provided with videorecordings of industry presentations on particular topics, and they then uploaded their responses to specific questions about the recordings one week later.</li> <li>• Learning and reflection were promoted through peer reviewing of the activity-based assessment items.</li> <li>• Students were also assisted to acquire knowledge about digital innovations in contemporary business environments through linking academic publications with current practice.</li> </ul>
<p><b>Authentic learning attribute</b> Drawing on real-life principles, strategies and examples</p>	<p>Students were required to select a business environment to be able to explore and analyse the digital innovations occurring in that environment.</p> <p>Students were also required to select a real-life business organisation to investigate the investigation of issues associated with “Technology Management”, “Technology Integration”, “Strategic Planning” and “Implementation” for the relevant digital innovation/s.</p>
<p>Building on students’ prior and current formal and informal learning experiences</p>	<p>The course is organised around the selection of real-life businesses in the for-profit or not-for-profit environment. The assessment items are sequenced and structured to build on students’ prior and current knowledge, including their formal and informal learning experiences, with assignment questions being open-ended and encouraging a diversity of authentic experiences and responses.</p>
<p>Providing scaffolding and other support for students to construct their own learning</p>	<p>Students were assisted explicitly to integrate the formative and summative feedback about assessment items into completing the subsequent item/s.</p> <p>They were also supported with strategies for reviewing scholarly publications in the digital innovations domain and integrating the</p>

	knowledge gleaned from those publications into understanding the selected business environment.
Linking assessment tasks with real-life audiences and purposes	In the two major reports, students were required and supported to communicate an argument and accompanying specific propositions to the selected business environment, with the managers of that environment as the audience receiving the argument and propositions.

More specifically, systematic efforts have been made in the course design and delivery to “*Value # 1: Cultivate a learner-centered environment*” (p 50) through such strategies as making explicit the students’ and the staff members’ separate and shared roles and responsibilities and reinforcing how enacting those roles and responsibilities will help to maximise students’ learning and their successful attainment of the course objectives. Similarly, “*Value # 4: Focus on real-life problems*” (p 51) has been addressed by ensuring in each offering of the course that the most up-to-date technologies and the associated commentaries on them by well-regarded researchers are included in the course readings and are assessed by the students in their peer-reviewed journal entries. In addition, “*Value # 5: Promote self-directed learning*” (p 51) is enacted by means of linking the peer review process with the professional reports and highlighting to students throughout the course specific strategies that they can deploy to fulfil the formal requirements of the course while at the same time broadening and maximising their learning outcomes by acquiring current and up-to-date knowledge about particular technologies and how those technologies are managed and marketed by contemporary businesses in this complex and constantly changing field.

In terms of the various instructional design theory methods encapsulated by Snyder (2009), several of them resonate strongly with the design and delivery principles deployed for the course being analysed here. For example, “*Establish trust and support*” (p 51) is facilitated by promoting from the outset of the course a strong online presence for students and staff members alike, so that effective and sustainable interaction patterns are mobilised and respective roles and responsibilities are clarified. Similarly, “*Define and communicate the learning community’s purpose*” (p 51) is actioned by means of the course outline and the summative assessment items, and also by reinforcing and supporting the students’ attainment of the course objectives and their own learning goals. Furthermore, “*Provide learning opportunities that facilitate communication, collaboration, and interaction*” (p 51) is exemplified in the peer review process, because students are both required and enabled to exhibit these strategies for engaging with the course material, thereby communicating, collaborating and interacting with their fellow students as well as with the course staff members. Moreover, “*Provide relevant and easily accessible information*” (p 52) is addressed through the use of current hyperlinks in the course readings that are updated at the beginning of each new semester of course delivery. Finally, “*Reinforce, recognize, and reward*” (p 52) is attained throughout the course via constant encouragement and positive reinforcement as they grapple with sometimes complex concepts and associated empirical case studies, and by means of highlighting and sharing (with appropriate student permission) examples of particularly effective and innovative student engagement with the course content.

The authors acknowledge that Snyder’s (2009) instructional design theory is just one of countless potential evaluative frameworks for analysing the course under review here. On the other hand, they assert that there is sufficient convergence between the theoretical framework, values and methods adumbrated by Snyder on the one hand and selected elements of the course on the other to demonstrate a range of contemporary good educational practice, including through the principles of feedback back on students’ assessed work and enhancing their authentic learning as a result of quality course assessment design. In addition, the course is confirmed as taking its place in broader efforts to locate the information systems education discipline ever more strategically and sustainably within the purview of rigorous educational research. At the same time, the authors accept that the material and continuing constraints attending any current course design and delivery, such as scarce resources (particularly time), must be recognised as an enduring limitation of both the course and the discipline’s contribution to such research.

## **IMPLICATIONS FOR EVALUATING INFORMATION SYSTEMS COURSES AND LOCATING THE DISCIPLINE MORE BROADLY**

This section of the paper widens the lens of the preceding analysis by pondering its potential implications for evaluating the authenticity and quality of information systems courses more generally and also for locating the discipline within rigorous educational research. One way to do this is to explore some additional synergies between selected elements of the design and delivery of the course analysed in the previous section and contemporary educational research. This helps to establish the course’s educational effectiveness more widely, and it also identifies other aspects of that research, in addition to Snyder’s (2009) instructional design theory

outlined above, that information systems education researchers might wish to investigate further (see also Arbaugh et al. 2009).

On that basis, it is noteworthy that the student peer review process that is central to the course's design and delivery accords with other educational research confirming that peer review can contribute positively to students' learning outcomes. For example, Cole et al. (2012) demonstrated that with appropriate training students can assess fellow students' learning accurately and comprehensively (see also Nagel and Kotzé 2010). In addition, students who exhibit successful prior experience of peer review demonstrate increased acceptance during successive experiences with the peer review process (Bolliger and Shepherd 2010). On the other hand, peer review does not automatically generate increased student learning and engagement (Chen et al. 2009; Cole 2009), and care must be taken to match as closely as possible academic staff members' intentions with students' understandings in such a scenario.

Similarly, contemporary educational research has examined from several perspectives the impact and utility of different types of feedback in the learning, assessment and evaluation cycle, as exemplified in the course under consideration here through its student peer review process and its use of students' evaluations of the course to refine the effectiveness of its delivery. For instance, when it is implemented systematically and when it garners student and staff acceptance alike, student feedback can contribute invaluable to the ongoing enhancement of teaching and learning outcomes in university programs (McNaught 2005). Against this proposition must be set the recognition that teaching and learning are highly complex and multidimensional phenomena, and that to be accurate and effective evaluations of those phenomena need to be equally complex and multidimensional (Devlin 2005).

In addition, the kinds of strategies used in the course under review here articulate with contemporary educational research related to the distinctive challenges and opportunities afforded by online learning environments. For example, these strategies accord with efforts to maximise group social structure and associated social connectedness in such environments (Slagter van Tryon and Bishop 2009). Relatedly, effective instructional design principles such as those evidenced in the course have been found to assist students "to integrate, synthesise and construct their understandings in ways consistent with the discipline and the professional pathways on which they had embarked" (Meyers and Nulty 2009, p 565). Furthermore, judgements about educational quality need to be made against the backdrop of the respective educational technologies being deployed, with qualitatively different assessments needing to accompany the use of Web 2.0 technologies (Ehlers 2009). Moreover, the debate about the influence of technology selection on students' learning patterns and outcomes (Tamim et al. 2011) must also be considered.

## CONCLUSION

Locating the information systems education discipline front and centre in rigorous educational research has been argued in this paper as one of the key strategies most likely to enhance the discipline's profile and to enable it to have the widespread and continuing influence that it should have, given its current profile and standing. This is consistent with an equivalent proposition that information systems education researchers should maximise their links with other disciplines such as community informatics (Stillman and Linger 2009) and network analysis (Oinas-Kukkonen et al. 2010).

The paper has analysed the selected course in terms of its specific elements, including a student peer review process and professional reports as well as ongoing course design and delivery refinement based on student and staff reflection and feedback, vis-à-vis the principles of instructional design theory as elaborated by Snyder (2009). That analysis was used to underpin assertions about authentic learning and quality assessment, not so much to make particular claims about the course as to demonstrate one possible approach to locating an information systems course in the wider field of educational research, and simultaneously to highlight some of the benefits of bringing the two disciplines of information systems education and educational research more closely together.

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