Virtual Learning Environments as Mediating Factors in Student Satisfaction with Teaching and Learning in Higher Education

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Abstract

Virtual learning environments (VLE) have become a standard feature of most courses in higher education, offering the potential to facilitate and improve teaching and learning. Whilst there is an implicit assumption that VLEs benefit student learning, much of the evidence originates from direct questioning of students about their satisfaction with the VLE itself. In order to establish the impact of VLEs on student satisfaction with teaching and learning in higher education, the present study gathered data from a sample of 128 undergraduate students using self-report module evaluation questionnaires (MEQs) completed before and after VLEs were introduced. MEQs were completed in relation one core (Research Methods) and one elected (Health Psychology) module. Results for the core module showed a marked increase in the percentage of students responding as *extremely* or *very satisfied* following the introduction of the VLE compared to the pre VLE period. There was also a fall in the percentage of students responding as *neither satisfied nor dissatisfied*. No clear or consistent change in student satisfaction was evident for the elected module. Improved communication and greater variety of teaching methods were reported by students post VLE for both the core and the elected module. Findings provide some support for the notion that VLEs mediate increased student satisfaction with teaching and learning in higher education, but that their impact may vary according to the course and the perceived utility of the VLE, pre-existing student satisfaction and the effectiveness with which VLEs are blended with traditional approaches to meet student expectations.

Keywords: *virtual learning environments; teaching and learning; higher education; student satisfaction*

1. Introduction

A virtual learning environment (VLE) is a web based software system comprising a collection of tools and applications that enable online communication, collaborative learning, uploading of instructional content, student assessment and feedback and course administration. Originally developed for distance learning but now commonly used as part of a blended learning approach (Hart & Rush, 2007), virtual learning environments remain one of the most significant tools for the development of teaching and learning practices that are able to accommodate the changing landscape of education and pedagogy. Institutional implementation and student engagement with virtual learning environments has been slow (Chua & Montalbo, 2014), but over the past decade there has been tangible endeavour to utilise virtual learning environments to support teaching and learning in higher education (Walker, 2014). Their stated purpose is to support, manage, enrich and enhance teaching, learning and assessment and their anticipated benefits include increased communication, interactivity and incorporation of collaborative pedagogical models, synchronous and asynchronous communication, international information sharing, shared passion and deepening of knowledge from ongoing interaction (Gannon-Leary & Fontainha, 2007). Other benefits commonly cited in the literature include providing a means of improving the quality of learning opportunities and learning outcomes, creating learning environments and learning not dependent on, or without the restriction of, time or space, that they take in to account individual learning needs, promote student responsibility and motivation for the learning process, improved learning in a social setting, provide an enhanced learning environment, foster feelings of connectedness, increase enjoyment and are learner centred (Barker & Grossman, 2013; Downing & Chim, 2004; Jewitt, et al., 2010; Joint Information Systems Committee, 2008; Lee & Lee, 2004; Means, et al., 2009; Wernet, Olliges & Delicath, 2000).

Notwithstanding their reputed potential for assisting teaching and learning, the design of virtual learning environments and the manner in which they are implemented has been left largely up to teachers and academics, resulting in significant diversity in how the student experiences and engages with the VLE. In a recent study examining the implementation of VLEs in schools in the United Kingdom, Read, et al. (2013) reported only limited use of the collaborative learning aspects of VLEs, instead their primary function was as a repository for instructional and assessment materials. As Smart and Cappel (2006) point out, despite its rapid growth, there remains a need for further understanding of student perceptions of e-learning and how best to apply e-learning so that learning is enhanced. Nonetheless, the prevailing expectation of VLEs is one of 'added-value' in terms of teaching, learning and the student experience (Barker & Grossman, 2013).

Given the continuing emphasis on virtual learning environments and the length of time which has now elapsed since their full introduction a little over a decade ago, it is fitting to begin in earnest to evaluate their impact. Although the obvious index by which to measure their impact is academic performance, findings from these studies are mixed, with some authors concluding an overall positive effect of VLEs (Means et al., 2009) and others failing to provide conclusive evidence (Morrice & Demian, 2012). On the basis that student attitudes towards VLEs are likely to mediate engagement with VLEs (Liaw, 2008; Sumak, et al., 2011), one identifiable, measurable and potentially more valuable outcome are students' perceptions of, and satisfaction with, VLEs (Roca, Chiu & Martinex, 2006). In their study investigating whether VLEs had met their aim of 'adding value', Love and Fry (2006) found some evidence of negative student perceptions, with tutors described as using the VLE as an 'online textbook' operating as little more than a 'safety net' and, ironically, that taught sessions added little to what was being provided by the VLE. In a further study examining the perceived usefulness of a VLE in the context of problem-based learning, de Lang, et al. (2006) reported some positive student perceptions in terms of promoting active learning but that this was limited to only certain aspects of the learning process such as tutorial group work. The VLE was however perceived as less useful in other areas, such as self-study, and de Lang et al. concluded that in order to exploit the full potential of VLEs, implementation needs to be selective and deliberate. In their study exploring the value of a VLE for a practice-based nursing course, Lee and Lee (2004) found that students did provide positive evaluations, reporting that the VLE helped them apply learning to practice, meet learning outcomes and increased enjoyment. As is the case with studies examining academic performance, results from studies examining student perceptions of VLE's are again mixed—more positive feedback is reported for elected than core modules (Smart & Cappel, 2006) for example—and far from unequivocal or convincing in terms demonstrating their positive impact (Morrice & Demian, 2012) .

In the main, the studies reviewed employed direct and explicit approaches questioning students on the issue of perceptions of the value of VLEs, thereby compelling students to make specific judgments regarding the VLE. The present study instead adopts an indirect and implicit approach, gathering data using undergraduate students' routine evaluations of enacted teaching and learning at a modular level. Shifts in student evaluations of teaching and learning are used to establish—retrospectively—the impact on student satisfaction following the introduction of VLEs to support delivery of two undergraduate course modules.

The question of how best to evaluate virtual learning environments was raised by Dyson and Campello (2003) in terms of whether process (i.e., *how*) or product (i.e., *what*) of learning is evaluated and whether this should be done from a user (student) or expert (usability expert, teacher) perspective with learner perceptions or learning outcomes in mind. The approach taken in the present study represents a subjective evaluation of *process* according to a student perspective, focusing on learner perceptions. The approach is justified on the basis of the relevance of student perceptions and attitudes to motivation and learning (Smart & Cappel, 2006). Virtual learning environments implemented in the study were created using commercial computer software Blackboard Learn to support teaching in two undergraduate modules, one of which was a core or required module (Research Methods) and the other was an optional or elected module (Health Psychology). Student evaluations of these modules were used to compare pre and post VLE introduction periods. The aim of the study is to establish whether there is any evidence that the reputed benefits of VLEs are reflected in the students' experience of teaching and learning and to identify the specific contributions made by VLEs in the context of teaching and learning in higher education.

2. Method

2.1 Design

This study employed a retrospective mixed measures design (VLE period: pre vs. post; module: core vs. elected). Satisfaction data were gathered using a standard university self-report student module evaluation questionnaire

(MEQ) completed in relation to two undergraduate course modules, one core (Research Methods) and one elected (Health Psychology). The data originated from four separate student cohorts across four academic year periods. These particular modules were selected for inclusion in the study as they both had an identifiable and reliable point at which VLEs were first introduced to support the delivery of the module. This enabled pre and post VLE comparisons of student evaluations to be made. Each module is a taught module and has similar methods of delivery in terms of lecture/seminar format, group work, contact teaching and assessment. The major difference is in terms of student choice, with the student having chosen to enroll for the elected module from a number of possible of option modules, and in terms of subject area.

2.2 Sample

The sample included a total of 128 second year undergraduate psychology students enrolled on a core and an elected module as part of a three year degree programme at a university in the United Kingdom. Whilst no specific sample demographic details were available, the overall programme demographics included a mix of traditional and mature students with a higher female-to-male ratio.

2.3 Materials

2.3.1 Student Module Evaluation Questionnaire (MEQ)

The questionnaire is used across the University to provide students with the opportunity to evaluate all aspects of the module as they experienced it. Each student completes the evaluation questionnaire anonymously at the end of the taught aspect of the module. Completed questionnaires are submitted to school administration who then forward copies to the module leader concerned. The module leader then compiles a summary of student responses which forms the basis for any action to be taken. The questionnaire consists of both closed-ended Likert-type statements and open ended questions inviting students' comments. Students responded to the following statements along a 7-point Likert scale from extremely satisfied (or very strongly agree) to extremely dissatisfied (or very strongly disagree):

- Overall, how satisfied were you with this module?
- I would recommend this module to a friend who was interested in the course?
- How satisfied are you that the teaching and learning methods used assisted your learning?
- How satisfied are you that the module aims and learning outcomes were clear?
- How satisfied are you that the assessment method(s) used allowed you to demonstrate your learning?
- How satisfied are you that the lecturing staff achieved your expectations?

Open-ended questions asked:

- Please comment on up to 3 aspects of the module which you LIKE
- Please comment on up to 3 aspects of the module which you DISLIKE

2.3.2 Virtual Learning Environment

The virtual learning environment was created using Blackboard Learn, which is cited as the most used institutional virtual learning environment (Walker, et al., 2014). The VLE for both the core end elected module comprised communication tools (announcements, email), collaborative learning (discussion boards), document links (research articles, seminar materials, student quizzes, supporting notes, lecture slides) and hyperlinks.

2.4 Procedure

Module evaluation questionnaire summary reports were retrieved for the selected core and elected module for the final academic year that the modules were delivered without VLE support, i.e., *pre* VLE, and for three subsequent academic years where there was VLE support, i.e., *post* VLE. Module evaluation questionnaire data for the first period following the introduction of VLE support was not included in the study as it was felt that the VLE was not sufficiently developed or implemented to provide a true or reliable reflection of its impact on teaching and learning.

2.5 Analysis

For the purposes of analysis the response categories *extremely* and *very,* and *very strongly* and *strongly,* at either end of the Likert scale were combined, resulting in five response categories. Similarly, responses to questions regarding satisfaction with clarity of learning outcomes, assessment methods and staff were combined. Combining responses and questions provided a more efficient and meaningful basis for analysis and presentation of results. Comparative

analysis is presented across pre and post VLE periods and across module types, core and elected. Inferential analysis is not presented as the data set was considered insufficient to support this level of analysis.

3. Results

3.1 Quantitative Analysis (Core Module)

Table 1. Overall Student Satisfaction Before and After Introduction of VLE Supported Teaching (*Core* Module)

	%				
	Very / extremely satisfied	Satisfied	Neither	Dissatisfied	Very / extremely dissatisfied
Pre VLE Period (*N*=23)	0	52	39	9	0
Post VLE (+ 1 year) (*N*=30)	40	43	10	7	0
Post VLE (+ 2 years) (*N*=48)	38	50	8	4	0
Post VLE (+ 3 years) (*N*=27)	52	19	15	11	4

Each of the post VLE periods show a marked increase of between 40% and 52% in the percentage of students responding as extremely or very satisfied compared to the pre VLE period. This shift is also evident in a fall in the percentage of students responding as neither satisfied nor dissatisfied from 39% in the pre VLE period to between 8% and 15% the post VLE periods.

Table 2. Would Students Recommend the Module to an Interested Friend (*Core* Module)

	%				
	V. strongly/ strongly agree	Agree	Neither	Disagree	V. strongly/ strongly disagree
Pre VLE Period (*N*=23)	0	17	57	17	9
Post VLE (+1 year) (*N*=30)	10	57	23	7	3
Post VLE (+2 years) (*N*=48)	21	46	15	18	0
Post VLE (+3 years) (*N*=27)	30	41	7	15	7

Compared to the pre VLE period, all post VLE periods represent a shift towards positive responses for recommending the module, with an increase in the number of very/strongly agree and agree categories and a decrease in the neither agree nor disagree category in the post VLE periods.

Table 3. Students Satisfied That Teaching and Learning Methods Assisted Learning (*Core* Module)

	%				
	Very / extremely satisfied	Satisfied	Neither	Dissatisfied	Very / extremely dissatisfied
Pre VLE Period (*N*=25)	4	36	32	24	4
Post VLE (+1 year) (*N*=27)	41	41	14	4	0
Post VLE (+2 years) (N=48)	27	53	10	10	0
Post VLE (+3 years) (*N*=27)	46	31	0	19	4

Post VLE periods show an increase on the pre VLE period in the percentage of students who are very or extremely satisfied that the teaching and learning methods assisted their learning. The percentage of students neither agreeing nor disagreeing has also decreased from 32% in the pre VLE period to 0% in the post VLE (+3 years) period.

Table 4. *Student Satisfaction with Staff, Assessment Methods and Clarity of Stated Module Aims (*Core* Module)

	%				
	Very / extremely satisfied	Satisfied	Neither	Dissatisfied	Very / extremely dissatisfied
Pre VLE Period (*N*=25)	8	39	31	18	3
Post VLE (+1 year) (*N*=30)	43	44	8	5	1
Post VLE (+2 years) (*N*=48)	37	45	13	4	1
Post VLE (+3 years) (*N*=27)	37	44	6	9	4

***pooled responses from 3 separate questions*

Student responses relating to issues of assessment, staff performance and module aims show an increase in the percentage of students who are very/extremely satisfied and satisfied and a decrease in those students who are neither satisfied nor dissatisfied and dissatisfied in post VLE periods as compared to the pre VLE period.

3.2 Quantitative Analysis (Elected Module)

Table 5. Overall Student Satisfaction Before and After Introduction of VLE Supported Teaching (*Elected* Module)

	%				
	Very / extremely satisfied	Satisfied	Neither	Dissatisfied	Very / extremely dissatisfied
Pre VLE Period (*N*=13)	85	15	0	0	0
Post VLE (+1 year) (*N*=20)	60	30	10	0	0
Post VLE (+2 years) (*N*=19)	26	42	11	21	0
Post VLE (+3 years) (*N*=31)	55	45	0	0	0

Table 6. Would Students Recommend the Module to an Interested Friend (*Elected* Module)

	%				
	V. strongly/ strongly agree	Agree	Neither	Disagree	V. strongly/ strongly disagree
Pre VLE Period (*N*=13)	77	23	0	0	0
Post VLE (+1 year) (*N*=18)	56	33	6	6	0
Post VLE (+2 years) (*N*=19)	21	32	26	16	5
Post VLE (+3 years) (*N*=31)	58	39	3	0	0

Table 7. Students Satisfied That Teaching and Learning Methods Assisted Learning (*Elected* Module)

	%				
	Very / extremely satisfied	Satisfied	Neither	Dissatisfied	Very / extremely dissatisfied
Pre VLE Period (*N*=13)	62	31	7	0	0
Post VLE (+1 year) (N=20)	45	55	0	0	0
Post VLE (+2 years) (*N*=19)	21	32	21	21	5
Post VLE (+3 years) (*N*=32)	47	34	19	0	0

Table 8. *Student Satisfaction with Staff, Assessment Methods and Clarity of Stated Module Aims (*Elected* Module)

	%				
	Very / extremely satisfied	Satisfied	Neither	Dissatisfied	Very / extremely dissatisfied
Pre VLE Period (*N*=13)	63	25	12	0	0
Post VLE (+1 year) (*N*=19)	45	47	8	0	0
Post VLE (+2 years) (*N*=19)	20	42	28	9	1
Post VLE (=3 years) (*N*=32)	54	43	3	0	0

**pooled responses from 3 separate questions*

Tables 5 to 8 do not suggest a clear or consistent shift in student responses following the introduction of a VLE to support delivery of the elected module. In fact the percentage of students responding as extremely/very satisfied is lower in each of the post VLE periods compared to the pre VLE period.

3.3 Qualitative Analysis (Core Module)

Table 9. Comparison of Students 'Dislikes' Pre and Post VLE Introduction (*Core* Module)

Student Dislikes	Pre VLE	Post VLE
More support (e.g. assignment, missed lecture)	✓	✓
More detail re SPSS and statistics	✓	✓
Room changes (e.g. suitability, disruption)	✓	✓
Time slot	✓	✓
Seminars (e.g. poor attendance)	✓	✓
Communication with students	✓	×
Need more printed materials and handouts	×	✓
Too much emphasis on Blackboard	NA	✓
Too much information on Blackboard	NA	✓
Organisation of Blackboard	NA	✓
Blackboard unreliable	NA	✓
Lecture notes on Blackboard so lost motivation to take notes and concentrate during lecture/seminar	NA	✓
Working on own on Blackboard is boring	NA	✓
Need all lecture notes on Blackboard	NA	✓

NA = Not applicable

Table 10. Comparison of Student 'Likes' Pre and Post VLE Introduction (*Core* Module)

Student Likes	Pre VLE	Post VLE
Module organisation	✓	✓
Thorough / detailed / depth of understanding	✓	✓
Good links between lectures and seminars	✓	✓
Assessments and assignment support and feedback	✓	✓
Good supporting notes	✓	✓
Relaxed approach	✓	✓
Applied and relevant	✓	✓
Staff	✓	✓
Variety of teaching methods	×	✓
Developed confidence	×	✓
Enjoyable and interesting	×	✓
Blackboard (content, for reference, helped understanding)	NA	✓

NA = Not applicable

Comparison of students' reported likes and dislikes pre and post VLE for the core module (tables 9 1nd 10) indicates improved communication with students, increased enjoyment, interest and confidence and greater variety of teaching methods post VLE. The VLE itself it also noted as a positive by students. Negative comments post VLE include organization and reliability of the VLE, inconsistent content and over emphasis on the VLE, the VLE reduced motivation in lectures and seminars and learning within the VLE was isolated and boring.

3.4 Qualitative Analysis (Elected Module)

Table 11. Comparison of Student 'Dislikes' Pre and Post VLE Introduction (*Elected* Module)

Students Dislikes	Pre VLE	Post VLE
Not enough assignment support	✓	✓
Room changes (e.g. suitability, disruption)	✓	✓
Timing (e.g. too long - lecture *plus* seminar)	✓	✓
Seminars (e.g. poor attendance)	✓	✓
Student diversity (lack of previous knowledge)	✓	✓
Need more variety of teaching techniques	✓	×
Limited books on the subject	✓	×
Cancelled / postponed lectures	✓	×
Lecture notes not always on Blackboard	NA	✓
Lectures (taking notes, involve students more, too much information, provide handouts)	×	✓
Some transparencies not clear	×	✓
Some topics covered elsewhere	×	✓
Seminars (not always useful)	×	✓
Punctuality of some tutors	×	✓

NA = Not applicable

Table 12. Comparison of Student 'Likes' Pre and Post VLE Introduction (*Elected* Module)

Student Likes	Pre VLE	Post VLE
Content	✓	✓
Structure and organisation	✓	✓
Teaching (e.g. informative, helpful)	✓	✓
Seminar and group work (e.g. well structured, interactive, useful)	✓	✓
Variety and range of topics	✓	✓
Interesting	✓	✓
Understandable	✓	✓
Staff (e.g. supportive, students-tutor interaction)	✓	✓
Assessment (e.g. no exams, support, timing)	✓	✓
Good use of Blackboard	NA	✓
Clear and available supporting notes and material	×	✓
Variety of teaching methods, styles and approaches	×	✓
All relevant to course	×	✓
Making notes [rather than being given handouts]	×	✓

NA = Not applicable

As with pre and post VLE comparisons for the core module, tables 11 and 12 indicate improved communication with students and greater variety of teaching methods post VLE for the elected module. Increased enjoyment, interest, confidence and the VLE itself, which were reported for the core module, are not reported for the elected module, although improved resources and course relevance is. Similar to the core module, negative comments for the elected module post VLE include inconsistent content and seminars judged as less relevant. Lack of printed materials and the need to make notes are also reported as negative aspects post VLE. Negative comments regarding over emphasis on the VLE, organization and reliability of the VLE and isolation and boredom working within the VLE, that were reported for the core module, are not reported for the elected module.

4. Discussion

Despite advances in the development and application of virtual learning environments and common assumptions regarding their positive impact (Gannon-Leary & Fontainha, 2007), results from evaluation studies are mixed (de Lang et al. 2006; Love & Fry, 2006; Means et al., 2009; Morrice & Demian, 2012) and Smart and Cappel (2006) highlight the need for a better understanding of user [student] perceptions and more effective design and application of VLEs. The present study sought to evaluate the impact on student satisfaction with teaching and learning following the introduction of a VLE to support the delivery of two undergraduate modules, one core and one elected. Whilst studies evaluating VLEs commonly employ a direct questioning approach evaluating the VLE itself, data gathered in the present study relate instead to student satisfaction with teaching and learning and thus, it is argued, provide a more authentic and meaningful insight in to the impact of VLEs.

In general, quantitative findings supported the notion that VLEs impact positively on teaching and learning. Self-report student satisfaction relating to overall satisfaction with the module, teaching, learning and assessment methods, teaching staff, clarity of learning objectives and willingness to recommend the module to a friend interested in the course increased for the core, but not the elected, module following the introduction of the VLE. The increased satisfaction seems to be largely accounted for by a shift in those students responding in the 'neither satisfied nor dissatisfied' category in the pre VLE period to the 'satisfied' or 'very/extremely satisfied' in the post VLE periods; an indication perhaps that the effect was strongest for those students holding ambivalent attitudes towards their teaching and learning experiences. There was relatively little impact on the percentage of students who were dissatisfied or very/extremely dissatisfied pre and post VLE.

Although student satisfaction was, overall, as high for the elected module (higher in some instances) as it was for the core module following introduction of the VLE, post VLE periods in fact showed a fall in satisfaction levels compared with the pre VLE period. Previous studies have reported differences in student response to VLEs, with more positive feedback reported for elected than core modules (Smart & Cappel, 2006). Smart and Cappel explain the effect in terms of the underlying perceptions of relevance of elected courses which may motivate students to invest the increased effort required for e-learning. In the present study however, the positive effect was noted for the

required [core] module and not the elected module. One possible explanation is that the VLE was most useful and needed—in both perceived and actual terms—in the context of a subject area (research methods) commonly perceived by students as difficult and associated with high student anxiety. It can be argued that providing support and the opportunity for collaboration—via a VLE—will have more impact on a course that is both applied and that has a tendency to evaluate poorly. The possibility that findings are simply an artifact of the very high satisfaction levels reported for the elected module in the pre VLE period should not however be overlooked. What this does indicate is that student satisfaction can be achieved without VLEs, at least in elected modules, and that the introduction of VLEs has the potential to impact differentially on student satisfaction dependent up on the course being delivered and pre-existing student satisfaction. Differences in the degree to which VLEs impact student satisfaction across courses suggest the need for pragmatism when implementing VLEs, a conclusion already drawn by de Lang et al. (2006), who suggested that implementation should be selective and deliberate in order to exploit the full potential of VLEs.

Qualitative findings supported the quantitative findings, adding further insight in to the mechanisms by which VLEs may impact positively on student satisfaction with teaching and learning. Open-ended teaching and learning module evaluation questions asking students to nominate 'likes' and dislikes' suggested improved communication with students and increased variety of teaching and learning methods (core and elected modules), increased enjoyment, interest and confidence building (core module) and increased resources and perceived relevance (elected module) following introduction of the VLE. Qualitative findings also highlighted some negative comments indicating areas of resistance following the introduction of the VLE for both the core and elected module. These included inconsistent content, poor reliability and conflict between VLE and traditional approaches that affected student motivation. Reed and Watmough (2015) have noted the need for minimum standards for the implementation of VLEs to avoid student dissatisfaction, while Rogers (2004) reported that despite the majority of students recognizing a positive impact of VLEs, a minority of student still favour traditional approaches to teaching and learning. This highlights the need for more effective blending of VLEs with traditional approaches to avoid students perceiving conflict between the two as reported by Love and Fry (2006), who found that students perceived taught sessions as adding little to the provisions made within the available VLE.

Although the study offers an important insight in to the possible impact of VLEs on student satisfaction, there are clear limitations that need to be considered in the context of the findings of the present study. Whilst the introduction of a VLE to support teaching and learning may have contributed to an improved student experience, there are many potential confounding factors that limit the degree with which firm conclusions can or should be drawn. Measuring the impact of VLEs indirectly through student teaching evaluations is, it is argued, a more meaningful approach to evaluation. It is not however entirely satisfactory given the many factors that could be—and are likely to be—reflected in such general teaching evaluations. The study is also limited in terms of limited sample information available. Individual differences such as previous experience using VLEs and computer and Internet user self-efficacy (Cassidy & Eachus, 2002; Eachus & Cassidy, 2006), approaches to learning and self-regulation (Cassidy, 2011) are likely to play a part in the efficacy of VLEs (Selim, 2007) and serve as examples of a range of potentially relevant factors that should be taken in to account in evaluation studies.

Understanding in detail the principal factors that determine the efficacy of VLE implementation and engagement in higher education continues to be a key area of investigation in the field of educational technology and one that requires further empirical study. What the present study does provide is evidence supporting the need to consider, carefully, the design and implementation of VLEs within a context-specific or situation-specific framework. Virtual learning environments certainly have a universal appeal but their benefits may be dependent on a number of context-specific factors—including course type and existing levels of student satisfaction—which constitute critical success factors for improved learning. Irele (1999) refers to self-motivation as one critical success factor for on-line learning and it should be acknowledged that there may also be critical success factors with specific relevance to the design and implementation of VLEs (Salim, 2007). As McCormick and Li (2006) have pointed out, the effects of technology are dependent on both the tools, and more importantly, the pedagogical implementation.

In terms of future directions, research concerned with the application and impact of virtual learning environments will, by definition, involve evaluation studies. What is critical is that such studies are sensitive to the contextual factors related to each VLE implementation and that evaluation measures are both rigorous but, at the same time, relevant and meaningful. Dyson and Campello (2003) provide a discussion of approaches to and measurement of the impact of VLEs and it is suggested that a clear and agreed framework for evaluation needs to be established to facilitate a concerted initiative for evaluation research. A lack of consensus in approach to evaluation is likely to undermine the means with which we are able to demonstrate the relevance of VLEs to education and pedagogy and

will invite criticism.

5. Conclusion

Findings showed that students reported being more satisfied in a number of areas of teaching and learning following the introduction of a virtual learning environment to support delivery of undergraduate modules. The present study offers insight beyond studies that focus purely on evaluation of the VLEs per se (e.g., Chua & Montalbo, 2014) and suggests that VLEs may well be delivering the anticipated or reputed benefits and impacting positively on teaching and learning (Barker & Grossman, 2013; Gannon-Leary & Fontainha, 2007; Lee & Lee, 2004) in higher education. However, improved satisfaction was only reported for one of the two modules studied and there was evidence of a negative response by some students to the introduction of the VLE. Thus, a universally positive effect cannot be assumed and VLE design and implementation needs to be pragmatic and sensitive to the contextual demands of any particular learning instance. The exact nature of VLEs will continue to evolve and this should align with relevant and rigorous impact evaluation studies. It is suggested that assessing the impact of VLEs via the student experience of teaching and learning may offer a more sensitive and authentic indicator of the degree to which VLEs support and enrich learning in higher education.

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