VOLUME 20 ISSUE 4

The International Journal of

Learning in Higher Education

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An International Case Study

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THE INTERNATIONAL JOURNAL OF LEARNING IN HIGHER EDUCATION
http://thelearner.com/

First published in 2013 in Champaign, Illinois, USA
by Common Ground Publishing
University of Illinois Research Park
2001 South First St, Suite 202
Champaign, IL 61820 USA

www.CommonGroundPublishing.com

ISSN: 2327-7955

The International Journal of Learning in Higher Education is a peer-reviewed scholarly journal.

Typeset in CGScholar.
http://www.commongroundpublishing.com/software/

E-learning and Sustainability in Higher Education: An International Case Study

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Abstract: The learning management systems (LMS) facility has become an essential tool in teaching and learning processes for higher education, since this tool assists students and lecturers to interact, communicate, collaborate, and corporate, and this can lead to cultivating and improving students' communication skills. Currently, the majority of universities nationally and internationally are using LMS (Blackboard and Moodle) for uploading unit materials, including assessment tasks. This study will assess LMS from a different angle by examining lecturers' and students' attitudes to it as a means of submitting assessment tasks with the traditional method. Using the LMS facility for the submission of assessment tasks can assist students as well lecturers to reduce the amount of materials being used (such as paper) and preserve resources; moreover, the cost of binding and delivery will be reduced or eliminated since all submissions are made automatically. This study provides an answer to the question "Do assessment tasks submissions made via learning management systems (LMS) and email increase sustainability awareness among Information Systems students in Portugal and Australia?" The answer was obtained through informal student feedback (N=63) containing quantitative and qualitative data. The findings indicated that a win-win situation is created since lecturers are delighted that e-learning sustainability principles are being successfully promoted in their teaching and learning approaches, since all communications between students are established via email, blackboard and Moodle forums. Furthermore, the research study confirmed that the uploading of assessment tasks via LMS and email facilities is easier, inexpensive, convenient and less time-consuming compared with the traditional methods of submission and feedback. In addition, this method is more sustainable (as fewer materials are used), practical and cheaper, as these principles are aligned with those of the Sustainability and E-learning (SeL) Model.

Keywords: e-Learning, Sustainability, SeL Model, Portugal and Australia, higher education

Introduction

LMS in higher education has unrestricted possibilities in terms of promoting and improving students' skills, and developing better interaction between lecturers and students or students and students. However, LMS has been put to a new and innovative use, especially in higher education in Portugal and Australia, where students have been asked to upload their assessment tasks to LMS, and later the lecturers' feedback is uploaded to the same tool. This approach is intended to improve the students' subsequent assessment tasks and to raise their awareness of sustainability.

This study aims to examine the challenges that the higher education sector faces in its endeavour to become more sustainable in the practice of teaching and learning, especially in Portugal and Australia. E-learning challenges have several concepts: i.e. 1) fostering e-learning skills in lecturers, and 2) enhancing pedagogic approaches to match the e-learning models. Successfully meeting these challenges will support teaching and learning in higher education and has 'implications for sustainability' (Attwell 2004, 7). These challenges, in order to be met, require time and enthusiasm to work with a 'new collaborative model to devise and implement a strategy, as well as for e-learning development at the practice level, is a particularly challenging target in institutions with long-standing traditions of hierarchy'(Gunn 2010, 100-101). A number of successful approaches have been identified and implemented by talented lecturers looking for clarification to real educational problems. Some of their approaches have been recognized by the

universities, as teaching and learning grants have been awarded to encourage the adoption of these approaches in the future.

These approaches include: firstly, discussion group forums using the LMS - i.e. Blackboard at Curtin University, and Moodle Forums at Universidade Aberta (Portuguese Open University). They are intended to develop individual students' learning skills and to reduce the amount of materials (e.g. hard copies) passing between lecturers and students. The forum encourages collaboration and teamwork, creates connections and links with other students, enables the sharing of information, and enhances communication and interaction between the students and their colleagues and lecturers. These benefits are imperative in developing students' communications skills and their learning of new material, and will assist them to develop their skills as individuals, and be successful and confident in real-life situations in the future.

Secondly, students' assessment tasks are uploaded to the LMS for marking. Lecturers used two methods for marking: 1) adding their comments to the softcopy version and uploaded it once again to the LMS facility, and 2) using software, i.e. 'Audacity' and 'echo360', to provide feedback for the assessment tasks and upload the MP3 files to the LMS facility. Furthermore, lecturers provide general assessment task feedback for the benefit of the whole class, directly to all campuses, and weekly lecture summaries. This paper provides experimental evidence based on quantitative and qualitative data derived from 63 student evaluations of and attitudes to the following units: Information Systems (IS); Technological Infrastructure (TI); Information Technology Seminar (ITS), Applied Project (AP) and Decision Systems (DS) respectively in Curtin University (Australia), Universidade Aberta (Open University) and ISEG universities in Portugal.

The findings indicated that the approach creates a win-win situation since lecturers are delighted that e-learning sustainability principles are being established in their teaching and learning approaches, since all communications between students are conducted via Blackboard at Curtin University and Moodle forums at Universidade Aberta (Open University), while email is used in ISEG University. Students' assessment tasks are uploaded to the Blackboard facility at Curtin; the Universidade Aberta (Open University) is using Moodle Forums, while ISEG uses email and lecturers' feedback is uploaded using the same tools. This method of submission of assessment tasks leads to a reduction in the use of material resources being exchanged between students and lecturers, and students are pleased that the cost of binding and delivery is reduced, if not entirely eliminated; moreover, submissions are made automatically.

The outcomes from this study will support universities' graduate attributes, sustainability and environment principles and needs, raising students' awareness of e-learning and sustainability aspects, which are essential for their studies as well for their future workplace. Furthermore, this study will make a valuable, significant contribution, in both theoretical and practical terms, to the literature on sustainability, e-learning and higher-education teaching and learning, especially the relationship between sustainability and e-learning, and it establishes a new SeL model. This study is organized as follows: sustainability, e-learning, relationship between e-learning and sustainability, research methods and question, participants, assessment tasks, results, discussion and theoretical and practical significance from this study, limitations and conclusion.

Sustainability

Before discussing the term 'e-learning' we first need to consider the notion of 'sustainability', since these two concepts are related in terms of benefiting human and natural resources that will be needed in the future (Weybrecht 2010). The term 'sustainability' was first coined in 1983 by Gro Harlem Brundtland from the World Commission on Environment and Development meetings. Brundtland's report urged businesses and individuals to progress toward economic development in a way that could be sustained without destroying the natural resources or the

environment for the next generation. Erek et al. (2009, 2) define sustainability as "a survival assurance meaning that an economical, ecological or social system should be preserved for future generations and, thus, necessary resources should only be exploited to a degree where it is possible to restore them within a regeneration cycle". This suggests that businesses, individuals, academics and students must protect the current infrastructure so that it can be re-used by the next generation. The notion of sustainability is highly significant in the 21st century since, increasingly, businesses, individuals, academics and students are now required to think in terms of delivering "solutions rather than products, and seek to define their markets in terms of customer activities and outcomes rather than products and services" (Jeffers 2009, 263).

The integration of sustainability in businesses, education and in individuals' strategies will be highly advantageous in terms of cost reduction, resources preservation, conformity to legislation, improvement of reputation, maintaining happier customers and stakeholders, attracting capital investment and capitalizing on new opportunities (Prahalad and Rangaswami 2009; Sharma et al. 2010; Smith and Sharicz 2011). Finally, Kendall and Kendall (2010) indicated that sustainability will assist businesses, education, stakeholders, individuals and society in general.

Technology and E-learning

To increase innovation, modernization and knowledge in the higher-education sector, technology must be integrated in the teaching curriculum in order for universities to stand up to competitiveness world-wide. Technologies in higher-education have become critical to learning and teaching success. The implementation of technology in higher-education teaching practice requires training and effort on the part of both lecturers and students, since each technology has a different navigation, interface, layout and style, and both lecturers and students (stakeholders) must understand and familiarize themselves with these concepts in order to complete their set tasks effectively and efficiently. Currently, the higher-education sector in Portugal and Australia are using the LMS facility to deliver materials including unit outlines, assessment tasks and lecture notes, and to promote interaction and communication between students and lecturers or vice versa. Using technology in higher-education has various positive impacts from increasing efficiency, performance in learning and teaching process, reduces cost and materials as the majority of students are reading or listening to the lecturers' notes being delivered via various channels (i.e. computer, laptop, mobile, iPhone, iPad) instead of printing. To implement technology in higher education, e-learning plays a major role since it depends on technologies to deliver a collection of resolutions that enhance knowledge and performance.

Yanping and Wang (2009, 193) define e-learning as "the acquisition and use of knowledge distributed and facilitated primarily by electronic means. This form of learning currently depends on networks and computers but will likely evolve into systems consisting of a variety of channels and technologies such as PDAs." Several studies (Kruse 2004; Moon 2009) indicated (Kruse 2004; Moon 2009) that the adoption of e-learning in higher education has many advantages and disadvantages for both lecturers and students. For the students, e-learning advantages include flexibility, interactivity, availability and self-pacing. However, various studies (Compassioninpolitics 2009; Lim et al. 2011; Morrissey 2012) indicate e-learning can also have its disadvantages including technology glitches, portability, and reduction in social and cultural interaction.

However, from the lecturers' perspective, using an e-learning facility in their teaching and learning process will develop more interaction and communication between students and lecturers through the LMS facility, i.e. Blackboard, Moodle, discussion board or Wiki; however, this facility can occasionally be time-consuming as lecturers may need to undertake some training to familiarize themselves with the new technology.

Indeed e-learning in higher-education plays a crucial role in improving student's communication skills including writing, reading, searching, researching, listening, collaborative, and collaboration for the current study and also the workplace in the future. However, these benefits do not stop here. There are other advantages of using LMS in e-learning: currently, students in several universities in Portugal and Australia are using it to upload their assessment tasks, and later the lecturers provide their feedback to students via tracking, or audio feedback 'MP3'. This situation provides an excellent illustration of e-learning and shows how e-learning and sustainability can be integrated, as uploading assessment tasks via LMS can reduce the use of materials, energy, cost and time. In addition, this experience raised students' awareness of and responsiveness to the current issue of raw material depletion and saving the planet (Philipson 2011; Smith and Sharicz 2011).

Relationship between E-Learning and Sustainability

Recent studies (Dao, Langella, and Carbo 2011; Harmon and Demirkan 2011; Philipson 2011; Smith and Sharicz 2011) indicate that sustainability and e-learning have the same positive aspects in terms of cost, time, preservation of resources and materials, and energy. Weybrecht (2010) confirms that adopting and applying sustainability in businesses, including education, will provide various benefits including reduced costs, preservation of resources, enhanced reputation, differentiation, meeting stakeholders' needs and expectations, gaining profit and new opportunities, and reducing energy and carbon emissions. Several studies of e-learning (Briggs 2008; Compassioninpolitics 2009; Gunn 2010; Little 2010; Rosen 2009; Varlamis and Apostolakis 2006) indicate that using e-learning in the higher education sector will reduce a cost, preserve raw materials, increase competition and innovation, meet stakeholder's needs, be faster and less time-consuming, re-skill and retain employees, increase job satisfaction and reduce carbon emissions and energy expenditure. The current literature review noted that integrating sustainability in e-learning can bring similar benefits to both stakeholders – students and lecturers. Based on the current studies, (Clark 2010; Harmon and Demirkan 2011; Hopps 2011; Issa, Issa, and Chang 2011; Nidumolu, Prahalad, and Rangaswami September 2009 ; Orlitzky, Siegel, and Waldman 2011; Prahalad and Rangaswami 2009) lecturers' perspectives and experiences, Figure 1 illustrates the similarities and dissimilarities between sustainability and e-learning, and this leads to introducing the SeL Model in this study.

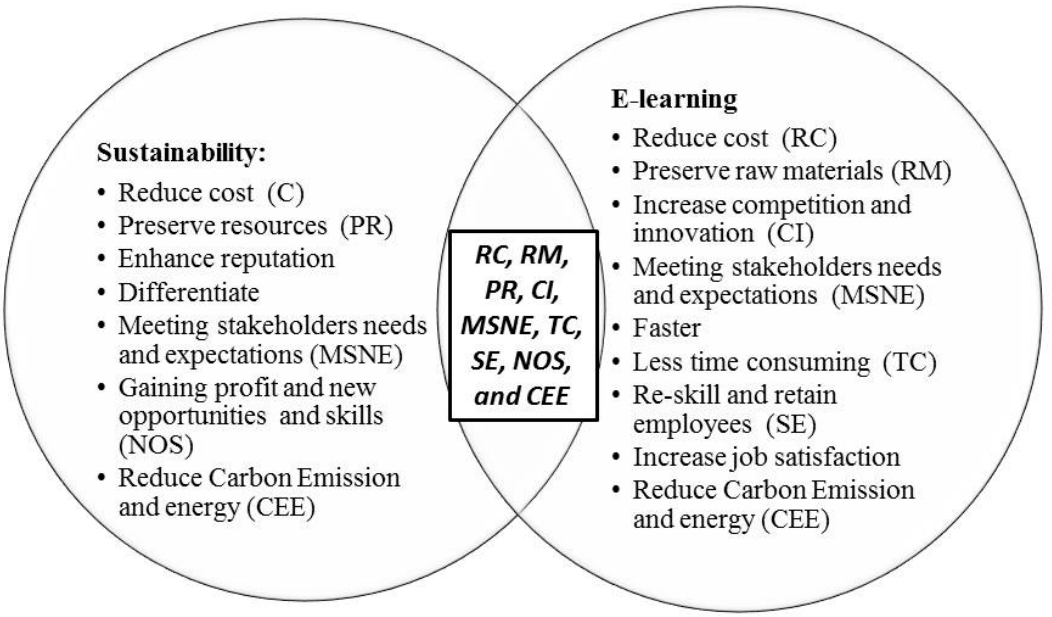

Figure 1: Relationship between Sustainability and E-learning Model (SeL) – Prepared by the Authors

Integrating sustainability in e-learning has various benefits for the students and lecturers simultaneously. Students can upload their assessment tasks to the LMS, without concerns about printing, paper jam, and the delivery process, i.e.: delivering their hard copy to the university. This approach can save time, cost, raw materials and resources, and reduce carbon emission, and its most important aspect is that it raises students' awareness of the concept of "sustainability." As for the lecturers' perspective, using LMS instead of the traditional method will save them time in collecting, sorting hard copies, adding comments and returning the hard copies. This time can be used in sharing their teaching knowledge, learning, marking assessment tasks, and being involved with international and national conferences and journals. This study endeavoured to justify the research questions and change students' attitude to assessment task submission, by asking the Australian and Portuguese students to present their opinions about uploading assessment tasks to the LMS and to raise their sustainability awareness, especially information systems students, as this group should be part to the solution not the problem. Furthermore, this study will confirm whether the similarities in the SeL Model will be substantiated by the Portuguese and Australian students' feedback, and the current literature review.

Research Method and Questions

This study will address the question "Do assessment tasks submissions made via learning management systems (LMS) and email increase sustainability awareness among Information Systems students in Portugal and Australia?" To answer this question; informal student's feedback (N=63) was employed to examine students' reactions to uploading their assessment tasks to the LMS facility, i.e. Moodle Forums and Blackboard as well as email, by asking them "Do you think this method is more sustainable compared with the hardcopy format submission?" The on-line formal feedback contained 11 questions asking students to provide their feedback regarding the unit in general and present their perspective in relation to facilities, which are available in LMS, such as the discussion board. The validity responses to this survey were 100%

and 90% from Portugal and Australia respectively. Based on several studies (Cho, Park, and Han 2011; Graefe et al. 2011; O'Brien and Toms 2010) responding to an online survey is much easier and less time-consuming compared with a traditional method; however, bugs and technology errors will hinder the whole process.

Participants

In this study, the participants are 63 (see Table 1) students from the Open University and ISEG University in Portugal and from Curtin University in Australia. The majority of these students are undertaking a Master Degree in Information Systems. From Curtin University, there are 40 students who are mainly from Australia and Asia (i.e. China, Indonesia, Iran, and Malaysia), of which Asians comprise 90%. From the Portuguese universities, there are 23 students who are mainly from Portugal, Africa and Brazil. It was noted that nationality and culture played an important role in these units (Information Systems, Technological Infrastructure, Information Technology Seminar, Applied Project and Decision Systems) in the exchange of knowledge, skills and experience via the discussion board and the practical exercises.

Table 1: Participants – Portugal and Australia

University	***Unit***	***Students #***
Universidade Aberta - Open University – Portugal	*AP*	*13*
ISEG – Portugal	*DS*	*10*
Curtin - Australia	*IS*	*13*
Curtin – Australia	*TI*	*12*
Curtin – Australia	*ITs*	*15*

Prepared by the Authors

In Australia, the Information Systems (IS) unit primarily focuses on human-computer interaction and usability. Technological Infrastructure (TI) is about Local Area Network, whereas the Information Technology Seminar (ITS) unit is about Sustainability and Green IT. As in Portugal, the Applied Project (AP) unit focuses mainly on learning concepts and related tools in ERP, CRM, Portal, and Balanced Scorecards, developing e-commerce websites, and producing a business plan for an e-commerce initiative. The Decision Systems (DS) unit is primarily concerned with providing an introduction to decision theory and also various decision systems such as Decision Support Systems (DSSs), Expert Systems (ESs), Neural Networks (NNs) and also Groupware and Group Decisions Support Systems (GDSs).

Assessment Tasks

The assessment tasks for the IS unit are: individual assessment task (40%), reflective journal (45%), contribution to group discussions (15%); TI unit assessment tasks are: mid-semester test (25%), presentation and report writing (35%) and final exam (40%). As for the ITs unit, the assessment tasks are: three journals (30%), individual presentation and report writing (55%), Wiki contribution: 15%. For the AP unit, the assessment tasks are: individual activity (10%), group activities (50%), and final work (40%). The assessment tasks for the DS unit are: two

presentations (35%), individual work (25%) and final test (40%). These assessment tasks have been developed based on the desirable university graduate attributes and business' needs. All these assessment tasks are uploaded and evaluated by using the LMS facility to address the research study.

Results

Integrating sustainability in higher education is essential among Information Systems students in Portugal and Australia in order to develop a relationship between e-learning and sustainability and to raise students' awareness of their moral responsibilities toward the environment. Furthermore, this study aims to examine and assess students' reaction to uploading assessment tasks via an LMS facility such as Moodle Forums, Blackboard and email. The lecturers used the LMS facility to upload assessment tasks and lecture notes and to develop interaction and discussion between students and students, and students and lecturers. To conduct the research study, the lecturers asked their students to upload their assessment tasks on the LMS with specific deadlines for each.

The advantages of using the LMS facility are obvious, especially for the lecturers. Firstly, it saves lecturers time otherwise spent in collecting and sorting hard copies, adding comments and returning the assessed hard copies. Secondly, since the lecturers' feedback is uploaded via the LMS facility utilizing audio or traditional feedback, this teaching approach is considered more sustainable, easy to manage, and less time consuming compared with the traditional method. To address the study's research question, an online survey was conducted in Portugal and Australia to examine the attitudes of students in three universities.

The study findings from the universities in Portugal and Australia concurred that uploading and submitting assessment tasks through LMS and email is more sustainable, practical, and less costly. The students from the three universities uploaded their assessment tasks which were later marked by the lecturers. Subsequently, the lecturers uploaded their feedback to the LMS or via email, which allowed students to access the lecturers' feedback, take note of comments and suggestions, and thereby improve their next submission. The Open University students in Portugal made the following observations about uploading their assessment tasks via Moodle:

> *"This method is incomparably more practical and sustainable".*
>
> *"As I am against paper waste, I make a compliment to the present form".*
>
> *"With Moodle forums, sending the assignment [assessment task] to the lecturer and colleagues is simple and practical".*
>
> *"This is the preferable method, since we can access with relative easiness and the times we want, and is easily transported, whilst the printed assignments [assessment tasks] occupy physical space, are sometimes not practical to transport and normally only one copy is made available".*
>
> *"Yes this method is more efficient and enables a better flexibility"*

Portugal's Open University student feedback obtained in the current study (Best 2009 ; Philipson 2010; Philipson 2011) indicated that integrating sustainability in the e-learning system is easier, practical and sustainable compared with the traditional methods of submitting work and assessment tasks

Furthermore, the second university in Portugal "The ISEG University" asked their students to upload their assessment tasks via emails not Moodle. Later, the lecturer marked and emailed his feedback to their students via the same "email" tool. The online informal feedback indicated

that students agreed and confirmed that using technology such as email for the submission of assessment tasks will conserve raw materials such as paper and binding and reduce energy and carbon emissions; these findings are supported by those in the literature (Dao, Langella, and Carbo 2011; Gomis et al. 2011; Gunn 2010) as well as the ISEG students.

> *"We save money, paper and time. It also can be sent to several people. It is a saving in resources and at the same time we use more technologies. Having in mind environment it's an added value".*
>
> *"I think that the fact that we send the assignments [assessment tasks] via email is a positive aspect since that besides being more "environmentally friendlier" it's also easier both for students as well for the lecturer"*
>
> *"I think that the e-mail format is more sustainable, quicker, saving resources".*

By the same token, Curtin University students added their voice and perspectives to those of the Portuguese universities in relation to the assessment tasks submissions via LMS or email. The Australian students corroborated and confirmed that by adopting this approach in their units, they were able to submit their assessment tasks for less cost in terms of raw materials, effort and time; most importantly, this method of submission is more sustainable compared with the traditional approach. These arguments are supported by the current literature (Attwell 2004; Orlitzky, Siegel, and Waldman 2011; Smith and Sharicz 2011; Walck 2009). Students from Curtin confirmed that:

> *"It is more sustainable and simple, but this is required high availability of access from blackboard. No need to print it out, saving paper, money, energy, and time! Sure. Save money on printing and ecologically correct".*
>
> *"Yes it's sustainable, because am sure the assignment [assessment task] is uploaded, at times never reaches the lecturer".*
>
> *"Hard copy is a pain, filling in the cover sheet. Binding or stapling in the end it's costly. Definitely, less argument on submission times, Non wastage of paper, No need to run around finding assignment [assessment task] drop box".*
>
> *"This method is easier, cheaper, less time consuming and it's green :)".*
>
> *"Excellent! Very up-to-date method!"*
>
> *"[This Approach] is more convenient than having to come in person especially if it's raining like today!"*
>
> *"It gives us more time to finishing up and submitting the assignment [assessment task] efficiently"*
>
> *"Eliminating avoidance because such printers fault, traffic jam and etc".*
>
> *"Definitely, especially for IT student, this way is more technical compared to the old method"*

Overall, the study findings from the three universities in Portugal and Australia confirmed the study objectives, aims and research question, and verified that the submission of assessment tasks via LMS or email is a more sustainable approach compared with the traditional methods as

both stakeholders -students and lecturers- will benefits from this process in relation to the cost, time, raw materials and resources.

Finally, the same online informal feedback of students from the three universities indicated that they were pleased and satisfied with their lecturers' teaching and knowledge, as well as the lectures as the mean for both questions ranged from 4.00 – 4.50. This result confirmed (see Table 2) that a good relationship developed between lecturers and students, with the latter showing positive attitudes to unit materials and teaching.

Table 2: Students Feedback (Lectures and Lecturer) – Portugal and Australia - Prepared by the Authors

Question	***Unit***	***Strongly Disagree***	***Disagree***	***Neutral***	***Agree***	***Strongly Agree***	***Responses #***	***Mean***	***SD***
Overall I am Satisfied with the ***Lectures***	*IS*	*0*	*1*	*1*	*5*	*6*	*13*	*4.23*	*0.93*
	TI	*0*	*0*	*0*	*6*	*6*	*12*	*4.50*	*0.52*
	ITs	*1*	*0*	*1*	*8*	*5*	*15*	*4.07*	*1.03*
	DS	*0*	*0*	*0*	*10*	*0*	*10*	*4.00*	*0.00*
	AP	*0*	*0*	*3*	*6*	*4*	*13*	*4.08*	*0.58*
Overall I am Satisfied with the ***Lecturer***	*IS*	*0*	*1*	*1*	*2*	*9*	*13*	*4.46*	*0.97*
	TI	*0*	*0*	*0*	*6*	*6*	*12*	*4.50*	*0.52*
	ITs	*1*	*0*	*0*	*3*	*10*	*14*	*4.50*	*1.09*
	DS	*0*	*0*	*0*	*5*	*5*	*10*	*4.50*	*0.53*
	AP	*0*	*0*	*3*	*6*	*3*	*12*	*4.00*	*0.55*

Students from Portugal and Australia were very generous in sharing the following comments regarding their lecturers. ISEG students appreciated their lecturer for:

> *"Availability, effort to show real examples, worrying with students in relation to the unit's contents understanding by students"* .
>
> *"Helpful, knowledge of the themes and most important, knowing to tell when not knowing and trying to understand what the student has discovered"*.
>
> *"Quick availability to answer any doubts, good relationship with students, practical examples when explaining the unit contents"*

The Open University students in Portugal were given the opportunity to comment on their lecturer:

> *"Clarity of the aspects transmitted, availability, competency demonstrated in the know. How about the contents taught"*

> *"It's a lecturer who is present. This means that answers quickly the questions posed. And continues to support students"*

Finally, Curtin's students expressed their views of their lecturer's teaching:

> *"Very well organized lecturer, She uses a very clear and constructive method when explaining the material (e.g. use of examples to clarify things to students)"*

> *I like how she gives support to the students about each task, and she take bound that by helping us as well on how to use "EndNote""*

> *"She is really professional and helpful. I like her casual way of teaching and yet working"*

> *"She's knowledgeable about the field, Very Punctual with time, Approachable and willing to go to a step further to assist, Loud and clear in the seminar, friendly and helpful and engage"*

Discussion, Theoretical and Practical Significance

This experience proved to be most interesting and was an outstanding achievement from the lecturers' perspective, as students indicated that the submission of assessment tasks via LMS and emails is more practical and relevant to their studies. This study is unique and feasible from the lecturers' perspective, since the method saves time that would otherwise be used for collecting and sorting hard copies, adding comments and then returning the assessed hard copies to students. To allow the lecturers to work smarter not harder, this approach was introduced in Portugal and Australia to minimize the time needed for the assessment task process, and most importantly, it saves on the cost of raw materials such as paper. This experience can be implemented in any school, and higher education as well as businesses, since it encourages reflection on whether uploading assessment tasks via LMS and emails can change students' mindsets and transform them into advocates of sustainable development now and also for the workplace in the future. Academics in Portugal and Australia should take a leading role in transforming society's and students' critical thinking about using e-learning and promoting the relationship between sustainability and e-learning to benefit and assist both stakeholders.

There is now an urgent call for sustainable development, and universities must raise the awareness of students regarding their moral responsibility to contribute to sustainable development and to guide them on the path towards a sustainable future. This study made an attempt to respond to this call by asking students to submit their work and assessment tasks via LMS and emails. The similarities with the SeL model were confirmed by the students' feedback in Portugal and Australia as well as by the current literature review (Attwell 2004; Gunn 2010; Philipson 2011). This study made a new and significant theoretical and practical contribution from Portugal and Australia to recognising the relationship between e-learning and sustainability. The implementation of the SeL model will guide and assist researchers and academics to exploit the benefits offered by e-learning and sustainable practice in higher education and in the education sector in general. Furthermore, the SeL model presents an ideal and standard that emphasizes the relationship between e-learning and sustainability and identifies their similarities and differences.

Limitations

This study was limited to 63 students from three universities in Portugal and Australia. The rationale behind this study, which is part of a collaborative research project undertaken by two

lecturers from Portugal and Australia, is to examine students' reactions toward the submission of assessment tasks via LMS and emails. From the online informal feedback, there is a strong agreement from the three universities that using LMS and other facilities, including email, for the submission process is more practical and sustainable compared with the traditional mode. Further research with larger and more diverse groups of students is required in the future to strengthen the research findings.

Conclusion

LMS facility such as Moodle and Blackboard, and email. The study findings and the current studies indicated that the use of an LMS facility, including email, is practical, realistic, workable, easy, and easier and cheaper compared with the traditional method. The adoption of this method in Portuguese and Australian universities, especially among Information Systems students, confirms the research aims and objectives and meets the stakeholders' – students and lecturers- requirements. This study is limited to 63 students from three universities, and is a collaborative research project undertaken by two lecturers in Portugal and Australia. In future, further research should be carried out with a larger and varied number of students in both countries to strength the research findings and the same study should be conducted in other countries as well.

Overall, this study made an additional and valuable contribution to the current literature on sustainability and e-learning by releasing the new SeL model, which summarizes the differences and similarities between sustainability and e-learning. Furthermore, this study responds to the call from researchers, academics, businesses and individuals at all levels to create a more sustainable world. It must be recognised that universities world-wide play a major role in transforming the attitudes of various stakeholders, including students' critical philosophies and work ethics. Finally, we – the lecturers– should and must raise the awareness among about students of their moral responsibility to contribute to a more sustainable life, and guide them to a better, practical and sustainable future. Most significant of all, Information Systems students and academics should be part of the solution not the problem.

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The International Journal of Learning in Higher Education is a peer-reviewed scholarly journal.

ISSN: 2327-7955

ISBN 000-0-00000-000-0