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## Editorial

# Refereed publications

Donald G. Perrin.

Publish or perish is the axiom for many institutions of higher education when hiring, and when reviewing faculty for retention, tenure and promotion. Faculty who have distinguished themselves in research and publication, contracts and grants, teaching and public service. Prestigious institutions are particularly demanding in all of these areas. New hires with active research grants and publications are warmly welcomed.

Where to publish? Professional societies in most academic disciplines have refereed journals. Even the most prolific journals publish only a few dozen articles each year. What gets published is determined by editors, reviewers and editorial policies. It is possible for groundbreaking research to not be recognized, and there are varying opinions on what is good research.

A recent study found that there was a 50% change of good research being rejected and a 50% change of poor research being published (Starbuck, 1960). Human differences in goals, interests, standards, and opinions of what readers are seeking have a powerful influence on what is chosen. The number of papers published is limited by available staff, reviewers and budget. An excellent paper may need to be submitted to more than one journal before it is accepted. It is not considered proper to submit a paper to more than one journal simultaneously, so a publication required for retention, tenure or promotion can be delayed with serious consequences for the author.

There are also problems with methodology and content. Research design, statistics and sampling procedures are open to question. Practices known for decades to be defective, such as null hypotheses, continue to be used. *Hypothesizing After Results are Known* (Harking) can bias the literature search and lead to invalid results.

Senior scholars typically have investments in existing methodologies; they are not eager to embrace new practices that could imply that their prominently published works are faulty. (Starbuck, 2016)

Good research should be replicable and achieve the same results. This is especially important in human sciences.

A few years ago, scientists at Thousand Oaks biotech firm [Amgen](#) set out to double-check the results of 53 landmark papers in their fields of cancer research and blood biology to make sure that research on which Amgen was spending millions of development dollars still held up. What they found was startling: . . . only six could be proved valid. Similarly, a group at Bayer HealthCare in Germany found only 25% of published papers on which it was basing R&D projects could be validated. (Hiltzik, 2013)

This has led to a reexamination of research methods and should be extended to all disciplines.

Researchers are rewarded for splashy findings, not for double-checking accuracy. . . Eisen says the more important flaw in the publication model is that the drive to land a paper in a top journal — Nature and Science lead the list — encourages researchers to hype their results, especially in the life sciences. Peer review, in which a paper is checked out by eminent scientists before publication, isn't a safeguard. Eisen says the unpaid reviewers seldom have the time or inclination to examine a study enough to unearth errors or flaws. "The journals want the papers that make the sexiest claims," he says. "And scientists believe that the way you succeed is having splashy papers in Science or Nature — it's not bad for them if a paper turns out to be wrong, if it's gotten a lot of attention. (Hiltzik, 2013)

Michael Hiltzik, Science has lost its way, at a big cost to humanity. [articles.latimes.com/2013/oct/27/business/la-fi-hiltzik-20131027](http://articles.latimes.com/2013/oct/27/business/la-fi-hiltzik-20131027)

William H. Starbuck: 60<sup>th</sup> Anniversary Essay: How Journals could improve research practices in social science. *Administrative Science Quarterly*, Vol 61(2)165-183

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**Editor's note:** As new technologies are developed, we are presented with new opportunities and constraints to be explored. Just as people teach with many different styles, available learning management systems may adapt better for different subject matters, teaching styles and student populations. Economic factors and technical support also play a role in the selection process. This paper was presented at the Multidisciplinary Academic Conference on Education, Teaching and E-Learning in Prague, Czech Republic.

## **Learning Effects of Using Learning Management System (Moodle) by Students of Arab Open University**

**Khaled Ibrahim Al-Ajlouni**

**Jordan**

### **Abstract**

The current study aimed at identifying the learning effects of using the learning management system (Moodle) by students of Arab Open University. Selected sample were students of the second semester of the school year 2013/ 2014, at the Arab Open University, and from all possible disciplines. 1247 male and female students responded to the study's instrument. The instrument, constructed to help achieve the goals of the study, was a questionnaire, that aimed at studying the effects of using the learning Management System by students of Arab Open University. The questionnaire consisted of (51) items distributed into six themes, which are: planning the learning process, experiences and skills of learning, learning activities, thinking and search methods, academic achievement, and cultural configuration. Validity and reliability of the study was verified. Results revealed that learning effects of students at Arab Open University, using learning management system (Moodle) were moderate on the whole level of the instrument. All themes had moderate effects of using the system. Results also showed no statistical significance to the estimation of effects of using the learning management system according to the variables of gender or the discipline of study.

**Keywords:** learning effects, students of the Arab Open University, Learning Management System, Moodle.

### **Introduction**

Modern trends of educational technology produced new, developed education systems for teaching and learning, which had a massive impact in producing a critical change in the learning strategies and methods, and on conveying scientific contents. It also has an impact on the content and form of the designated curriculum to apply to such trends. Electronic Learning is one of the new trends in educational technology; e- learning is concerned with employing the internet among other multi interactive media in the learning process.

Learning management systems were popular among different education institutions, which was due to the variety of the tools used. This was asserted by many studies: a study by (William and Sunnic, 2007) that underlined the importance of studying tools of learning management system, and its impact on the learning and teaching variables, which is considered a rich area for educational research. The study of (Charles, 2001) observed positive trends for the teaching staff use of the system (Class Wide Peer Tutoring, CWPT) and an obvious improvement in students' performance in the English Language discipline using this system. Similar results were confirmed by the study of (Wanga and Chenb, 2009) which practices the integration of the virtual semester with the e- learning management in the concept "Synchronous Learning Management Systems", which was used in the languages teaching discipline. Furthermore, the study of (Kim & Lee, 2007) asserted certain aspects that affect the competency of the used learning management system: adequacy and simplicity of the designed screens, ease of use of set designed tools, level of

compatibility between the technical management of the system and the academic management, ease of educational management and competency of the system receptivity to download various multimedia files, availability degree of flexibility, interactivity and exams, type of communication means.

The study of (National Institute of Corrections, 2006) recommended the importance of training on the learning management system by the beneficiaries, and presenting a careful description of the inputs and outputs before starting any learning management system by the educational institution. Further technical factors were presented concerning the learning management system, as follows: Application service provider model, compatibility with SCORM standards, Sharable Content Reference Model, availability of technical services for the system, the ability of the learning management system to provide technical usage reports, the availability of tools that fit the cognitive skills of the students, and ease of use. Alharbi (2007) pointed out that learning management systems are divided into two: open source learning management systems, which can be used free of charge with no party entitled to sell, they are also subject to development and modification. Examples of such systems are (A tutor- Dokeos, Moodle). The close source learning management systems, or the commercial ones, are owned and developed by a profit company and authorizes only licensed use. Examples of such systems are (Blackboard, WebCT). The learning management system "Moodle" is considered an open source learning curriculum management system distributed under public license, which is abbreviated with the title General Public License GPL. The system was designed using educational principles to help learners in constructing their learning courses on the web. Moodle are the initials of Modular Object – Oriented Dynamic Learning.

Ashour (2009) referred to some distinctive features of "Moodle" learning management system: a forum where education issues are discussed, also the teacher can receive homework instead of sending it by email, live chatting rooms, possible research of concerned content subjects, as well as the presence of ten virtual templates to change the interface as desired, also, students are granted with the possibility of selecting the appropriate learning method. Alsamerae (2008) confirmed that the learning management system "Moodle" provides interactive tools for the user, the tools that the learner uses while studying, which are:

**Announcements:** this tool allows the student to receive latest news, instructions or announcements sent by teaching staff to the students or some of them. The student clicks the mouse sign on the ads key to reveal a panel that can be listed alphabetically or chronically.

**Calendar:** This tool informs the student with the scheduled events connected to learning subject, and alert student to the time of lectures and web conferences or face to face meetings at the university. The student can add any extra, desired events.

**Tasks:** This tool informs the learner with the assigned tasks, which the student could arrange according to subject or personal point of view. The teacher can send a certain task to only one chosen student or more.

**Evaluation:** this task is concerned with evaluation and grades of the students, either in the interim or the final exams.

**Users' manual:** this tool guides students participating in the course to get to know each other.

**Address book:** it's a personal book, where the student lists data concerning people to communicate through the system. User manual could list hundreds of learners, but the address book connections are added only by the learner.

Hence, education development in general and university education in particular depends on the availability of the rich, durable, and integrated informatics knowledge. In addition, the need arises to an optimal, skilled employment of the system. Classroom learning methods in higher education are expected to change, since the skills of electronic learning are realized in higher education. Education at universities began to seek to achieve the optimal investment of time, effort and energy of students seeking information through the Internet, and other learning management systems, forms, tools and techniques that contribute to improving the educational process.

### **Problem and questions of the study:**

One of the basic objectives of Arab Open University is to apply to the latest technologies worldwide. Educators were concerned with learning management systems (LMS) with its different forms like "Moodle", which represents a challenge to higher education. The researcher observed that quantities development in technology is accompanied by a qualities development in the competence of teachers and faculty members and students on the use of modern technology. Thus, Arab Open University seeks to apply a learning management system with the least cost possible, so they decided to use "Moodle" which is an open source system. The system was modified to comply with the needs of the university before being used. The problem of this study was to define the learning effects of applying such a system by students of Arab Open University. The study seeks to answer the following question:

What do students of the Arab Open University think of the learning effects of using the learning management system "Moodle"?

Are there any statistical significant differences in the learning effects of using the learning management system "Moodle" by students of Arab Open University, according to gender, and discipline variables?

### **Significance of the study:**

Highlights positive, as well as negative learning effects of students at Arab Open University using a learning management system. Results will be used to undertake the steps, and recommendations that ensure to achieve positive learning effects, and reduce the negative ones.

The study is concerned with the Learning Management system "Moodle", which is the latest technological trend in education.

This study may contribute to the development of training programs for faculty members, and students to use and employ technology in the process of learning and teaching.

This study may contribute in defining the physical demands, educational software, and infrastructure required for the development and modernization of learning management systems in university teaching.

### **Procedural definitions:**

The researcher explained the following concepts:

**Learning effects:** they are the positive and negative results of planning and academic achievement of students at Arab Open University, using the Learning Management system "Moodle", and how this affects their activities, learning and research skills.

**Learning management system:** An internet, software application that manages the learning process electronically, through an integrated software system, and is responsible for the e-learning process management. It includes: keeping and managing records of students' data, scheduling

courses, learning contents is available in different forms (text, picture, audio, video, and cartoons) on the discipline site, through using LMS "Moodle".

**Moodle:** A form of an open source, learning management system, used at Arab Open University. It is provided for free use of universities, schools and business. Also, Moodle is used to locate, and produce online courses, and support traditional face to face courses.

### **Study limitations**

The study was limited to students of Arab Open University during the second semester of the academic year 2013/ 2014, registered in e- courses of various disciplines offered by the university.

Results of the present study were partly confined because of the nature of the study procedures, in terms of study tool's design, validity, and reliability.

### **Learning Management Systems- LMS:**

LMS is a software package that stores educational content and management, with an interaction between faculty member and the learner on exercises, drills and evaluation among other applications. These are applicable, technological programs depending on the internet, and used in planning, executing, and evaluating a certain learning process. The system provides the faculty member with a method to construct, present the content, observe the learners and evaluate their performance.

Also, the system provides learners with the ability to use interactive features such as topics discussion sessions, video conferences, and discussion forums (Ashour, 2009). There are multiple similar names to learning management systems. Those systems are complementary despite the slight difference, as pointed by Alsamerai (2008):

**Learning Content Management System - LCMS.** This system focuses on the learning content, it provides educational authors, and designers with scientific tools that enable them to create, develop, and modify the learning content to become more affective in terms of quick access to the texts, and media needed to build learning content.

**Course Management System – CMS.** This system contains a software package that allows a dynamic and renewable design of the web sites, and for multimedia applications. Some of the many functions of this package are: it allows a group of learners to participate the work on the same files and documents. It also allows structuring the learning content or curriculum by providing discussion forums and blogs.

**E- Learning Platform:** Learning management system are programs that work as distributors, which means it's executed on a web, not on a pc. The program works as the model of client- server. The platform stands at the server side and is supervised by a specialist in networking. For the faculty member and learner to use the platform, it is often necessary to have a web browser program. E-learning platform consists of an operating system, server apps, browser program, running database systems, among other programs to prepare the content such as: Simulation, Flash, and Photoshop.

**Virtual Learning Environment - VLE.** Virtual learning environment simulates reality and is produced by programs (tools) of virtual reality, which is located on specific sights on one of the online networks.

**Interactive Learning Frameworks systems:** where the faculty member interacts directly with learners and with another teacher at the same time. This includes teaching through direct Joint interactive conferences, audio and video, screens and electronic panels.

**Collaborative Learning Environments:** this type of environments has the privilege of allowing a group of students to accomplish specific learning tasks through connecting to the network, and benefit immediate, mutual practical experiences.

**Online Learning Environments:** this learning environment allows students to sit at their computers at the same time to run discussions, and conversations among themselves and the teacher through chatting rooms, or receiving lessons through virtual classrooms (Alsalloum and Radwan, 2011).

After presenting some definitions of learning management systems, the researcher points that LMS are applied programs, or technologies depending on the internet, to be used in planning, implementation and evaluation of a specific learning task. LMS often provides the teacher with methods to create the content, to observe students' participation, and evaluate their performance. Furthermore, LMS allows a student to use interactive features such as discuss issues, video conferences and discussion forums.

Many educators indicate that a learning management system consists of the following themes: admission and registration, e-learning courses, virtual semesters, electronic tests, electronic homework, discussion forums, e-mails, and electronic monitoring. Learning management systems are divided into two types according to their source, either commercial or free. There a permanent support for the paid programs in the commercial LMS, the free LMS can be developed and modifies by the user. Following is a review of the commercial and free learning management systems (Hashim and Mulembwa, 2012, Alsamarae, 2008 ; Alsalloum and Radwan, 2011 ; Ashour, 2009 ; Fictumova, 2010 ; Abd Almajeed, 2008 ; Abu Khotweh, 2011).

### **Commercial programs of the learning management systems:**

They are named owned systems, and developed by a profit company and use only allowed when licensed. Examples are mentioned by (Hashim and Mulembwa, 2012).

**Webct:** this system was developed at British Columbia University. It started as a system that provides teaching content through the internet into a system to manage and provide teaching sites, an entire web site to provide instruction support services for learning courses, In addition to training and consultant services. The system has been currently integrated with Blackboard system to benefit from features of both systems.

**Blackboard:** this system offers more than hundred patterns of buttons and templates, providing support for various file formats like MS-Word or PDF for electronic publishing. It also provides an effective system to save and retrieve grades of students, in addition to providing tests models designed by a faculty member. The system has an interactive tool called "Announcement", where the learner interacts with the content of the system. Announcement includes: Advertisement, Calendar, Tasks, Grades and Address Book.

**Examine Program to manage e-learning:** this program owns the same features and implementations provided by any developed learning management system. It is easy to be used by teachers and learners. Tools and applications of the system are compatible with global standards for e-learning, which focuses on the ability to work with other systems, and low cost due to low price with respect to the license and technical support.

**Schoolgen System:** It is a system to manage the school on the World Wide Web that meets the requirements of school administrators, faculty members, parents and students.

## Open, free systems to manage e learning:

These systems can be used freely, cannot be sold by any party and they are subject to development, and modification by interested parties. Following are examples of such systems as mentioned by (Fictumova, 2010):

**Caroline program for e-learning management:** It is considered an open source system, which means it's not owned, developed or modified by any particular party or company. You can have a current copy of the system from their site on the internet.

**Top Class System to manage e- learning:** all functions of this system appear in front of the user as mini graphics (icons) that symbolize their function. Accordingly this system is based on icons that use buttons.

**A Tutor program to manage e-learning:** It is an open source content, and learning management system that works with online environment. It was designed to be easily accessed and flexible. The system can be installed, or updated within minutes by those in charge. Disciplines can be easily taught through the system. They can also create and publish their training contents easily and quickly. Students also enjoy learning in a modified learning environment that meets their needs.

**Moodle system to manage e-learning:** It is an open source learning management system, designed on educational basis to help trainers in providing e-learning environment. It can be used individually, as well as its possibility to serve 4000 trainees.

## Using the learning management system "Moodle" technology:

Alsamerae (2008) explained how to set a course on the platform in the following steps: create the course and how it will be managed, management of students' records, building basic approaches to the course, types of educational resources and how they could be linked to the system, design and management of a forum for the course, sending and receiving home works and tasks, building an agenda for the course and monitor students' activities, methods of communication with students and building referendums, evaluation methods and building tests. Following is a detailed explanation of the mechanism of its management:

**Create the course and how it will be managed:** creating and managing the course depends on the following aspects, as explained by Awad (2012):

**Editing and adding learning courses:** the system manager classifies the learning courses; each classification contains the assigned courses. For example, course can be classified into scientific or literary in addition to others. The course window consists of the following basic elements: the navigation bar, run (or stop) editing, blocks, and the content.

**Abbreviation:** it is a short description to a curriculum, or subject provided to the student or teacher, or even to a visitor of the main page of the course.

**Dictionary:** the dictionary contains narration, and definition of all terms and concepts within the electronic course or within the specific topic of the course, so that students can refer to for understanding. There are two types: a major dictionary created by the teacher, and the secondary one which can be entered by students themselves.

**Management of students' records:** this includes old and new registered students, and others to define their roles. Abd Almajeed (2008) presented the elements as follows:

**Adding users:** manager of the system and faculty member can add new users of the learning course.

**Setting roles of the different users:** users of the system are able to set roles of each user, to be defined inside the electronic course. The role could be a teacher, student or administrator.

**Basic approaches to the course:** At this stage, the table of contents of the e-learning course is built, plan of the course, its units and other relevant data.

**Types of learning resources, and how to connect them to the system:**

**Downloading files:** Abu khotwa (2011) pointed that there are many files that could be downloaded, and used within the curriculum or the e-course, such as: PowerPoint, Word, Excel, video files, Audio and Photos, Flash player.

***Different resources to display the e- curriculum content:***

**Creating a text page:** to create and insert text pages only, without photos or coordination, which is allowed only in the abbreviation.

**Creating a web page:** to create and insert pages including coordination of types, formats, colors, volumes for certain lines. Add or insert photos and symbols.....etc. either by a coordination like Word or HTML, where user can move text or buttons.

***Linked to a file or site:***

**Linked to a file:** The source is linked to a file within the course files like audio files, a photo, video, PDF, Power Point slides...etc. Students will be able to see and download these files through the teacher's file.

**Linked to a site:** The source is linked with an Internet connection to another site, or page, on the internet.

**Folder Display:** a list of all files on the area of course folders, including a folder named key files folder, which displays all files, and thus be available for students.

**Electronic Course:** it is called SCORM, which is a modular system that put contents in one package to facilitate transfer and sharing of e-learning programs.

**Design and manage the course forum:** it is a kind of asynchronous communication, which simply represents a talk forum, similar to many other interactive forums scattered across the Internet. Teachers and students could participate in such forums without being online at the same time. Any participant could write about a topic for others to reply, or suggest new topics. All participants of the e-course, who enter the forum, receive e-mails of new posts, unless this order was cancelled by a faculty member.

***Sending and receiving home works and tasks:***

Alashqar and Aqel (2009) explain that sending and receiving home works and tasks is a space that allows students to send any task or homework assigned by teachers. A time limit could be fixed to hand over the assignments, and teachers only have the authority to change that.

***Building an agenda for the course and monitor students' activities:***

**Add a new event:** each teacher can add new events that are connected to his/her own courses, these events are considered as work agenda of the academic course (Abd Almajid, 2008).

**Reports:** teachers can monitor students' various activities within the learning curriculum, and level of interactive through monitoring time spent at each activity.

**Methods of communicate with students and building referendums:**

**Chat:** chatting rooms and video conferences are considered the most important instantaneous communication methods, used by teachers to communicate with learners, or for mutual communication between learners.

**Questionnaire:** raising an issue through a question and providing several answers to vote on this issue. It is useful in evaluating students' attitudes towards thinking and learning.

**Selection:** a fast referendum or vote, where the teacher is allowed to ask one question along the lines of a multi-optional question, then, students read the question and choose the answer (vote). The teacher can choose when they see the result of the vote.

**Forum:** this interface allows access to Moodle program, to be used as an electronic forum for mutual interaction among learners.

**Workshop:** Abd Almajid (2008) pointed out that workshops create a debate that allows learners to evaluate each others' work. The primary purpose of this process is the possibility of displaying a students' works to be reviewed by a colleagues within an organized framework, standards prescribed by a faculty member.

**Evaluation methods and building tests:** evaluation is considered to be the best method that teachers need to measure learners' academic achievement. Moodle system contains the feature of self-tests for learners, with or without time limits. The system, also, corrects and records grades automatically according to the standards prescribed by the teacher for multiple-choice, or right and wrong tests and questions with short answers. Teachers can provide answers, explain and insert relevant content links. It also provides teachers with all features of electronic tests (Abdul Majid, 2008).

**Experience of Arab Open University**

Arab Open University uses information and communication technology to manage the education process in its various programs. The university adopted programs, and systems designed according to proper e-learning standards, as a strategy to achieve a level of sophistication in the quality of education, as well as reduce the cost, and increase the efficiency of internal and external adaptation of the systems of higher education in the Arab World. The university developed a better model of e-learning system from that of British Open University, and implemented an e-learning system, and a communication system for mutual communication of teachers and learners in a way that is compatible with the learning system in the Arab World. The AOU also completed a normal and e-testing system, a system for free and direct meetings, a system for e-lecturing linked to the satellites web. There are two types of programs at AOU, the first is derived from British Open University, and the other was prepared at AOU. Most of these curriculums are supported by different audio and video learning material, in addition to printed and interactive materials.

Using Moodle, AOU aims at raising quality of education. Its vision adopts using high information technology, by implementing such learning systems that provide control and management of the system through: Control in all matters relating to the educational process using the course agenda. There are ten installed templates in the system, which enables the user to change interface as wished. You have to insert a password and a user's name to access the system. Supervisor of the system and teacher are given broad authorities. Moodle system at AOU offers education of high quality, which is available to all in or outside users. The system also helps teachers to follow up learners and run their records.

LMS is used at AOU to arrange mutual communication between the learners themselves, and between learners and teachers. Home works are delivered through the system, providing that teachers download education material, and tasks connected to the course. LMS provides online

exams, and learners have the opportunity to participate in university forums, and it allows students to interact with all activities offered by the system. It also allows the university to manage e-contacts with learners, to inform them with all announcements and activities of all departments in AOU (center of e-learning at AOU, 2014). LMS offers courses in an integrated manner, for example, students can browse the educational material, deliver homework, have examinations and observe other learners in the course through a coordinated and unified interface. AOU follows two evaluation methods: formative and synthesis assessment. Formative assessment depends on learning methods based on practice, where students search for solutions for the problems individually or in groups. Then, students download suggested solutions on the system for the teacher to evaluate, not only for grading, but also to provide learners with feedback to help improve their performance in problem solving. The system lists the solutions automatically, so the teacher evaluate student's homework then easily provides feedback. Through this interface, a teacher can define the score and provide remarks on the same form, then the system monitor score and remarks and send them to the student simultaneously, by pressing only one button. Currently, the university is implementing a project to develop an integrated system to manage home works. The system enjoys a high capacity in dealing with the second method of evaluating student's academic performance. It provides different methods for the preparing of question banks, listed in groups according to the desired classification. And then synthesize the exams with a high degree of safety, with adequate amount of random selection of questions, which makes it possible to prepare different types of synthesis evaluation tools like self- testing and formal (periodic) ones among others. A lot of activities are added to the courses, such as different types of forums, lessons, drills, workshops which help in developing students' competence in discussions through peer evaluation that represents a multi-dimensional evaluation. Other activities to follow and support interactive participation in the course activities like the attendance record (Center for e-learning at AOU, 2014).

Electronic learning at AOU is supported by different education resources required to explain the curriculum. Some of these resources are: texts, sounds, animations, web sites, CD, which provides high level of interaction with learners. All courses are provided through a unified education management system. AOU curriculums contains specials guidebooks used for specific purposes (for learners, teachers, and administrative coordinators), and booklets containing preparatory activities and bulletins on software installing, and required resources to connect with the system (LMS) to start studying. The course guide is valuable for the basic information it contains about objectives of the course, basic skills, the expected acquired skill, outcomes, prerequisite needs, how to prepare and study the course, parts and form of evaluation, how to reach for resources, instructions concerning compulsory, preparatory activities, and training on the basic principles of using LMS as a requirement of the course.

Content units or scientific materials are presented to students in various forms to enable them of practicing activities in different contexts. AOU provides professional web sites for the printed form of the course, which enable learners to browse, search, point, and comment automatically. In addition to journals, workbook, tests, Computer- marked assignments, tutor-marked assignments, and end- of –course assignments, which could have the two previous ones. AOU started providing lectures presentation, and content explaining on Video streaming, where content is explained by a teacher on video clips according to subjects, then it inserted on Video Steaming Server, after that, those clips are recalled through Moodle according to the subject matter. E-learning forms an integrated environment for the content and all accompanied resources. The site Video Streaming Server was visited by a great number of learners, which led AOU to provide video lectures in three various formats: DSL, Dialup, and Voice only. Also, lectures were provided in high dense quality format, and distributed as DVD with the training bag.

## Previous studies:

Due to the lack of sufficient studies on this subject in general and locally, the researcher will limit the preview to previous studies on learning management systems in their various forms.

Salloum and Radwan (2011) conducted a study aimed to create a template that facilitates developing the interactive e- courses, based on the "Blackboard" LMS at King Saud University, Saudi Arabia. The study designed two suggested templates for a digital course compatible to the Blackboard system, in accordance with educational literature analysis. The first template is easy to use and requires the least computer skills to use the system possibilities. The other template is similar to the first but differs in the content folder, which contains a SCORM file that requires transforming the course into a SCORM file. Study was applied on (67) teachers of King Saud University, Saudi Arabia. A poll form questionnaire was delivered, with (46) items. Results showed that all teachers agreed upon making the templates easier to allow them to uplift and modify their courses, training and providing help for an easy, and high quality for the download of courses through the templates. Results also asserted the need for advance training for teachers to be able to change their courses into SCORM files.

Learning Management System Evaluation Committee (2011) conducted a study aimed at comparing of Blackboard learning system and Moodle learning system. The study followed a descriptive approach using a questionnaire of (53) items to examine the difference between the two systems. The questionnaire was distributed to two samples, the first consisting of 80 male and female students, and the second consisting of (56) faculty members at the University of California, USA. Results revealed that: there were no statistical significant differences in the perceptions of students to the learning management systems Blackboard and Moodle attributed to sex. Never the less, there were statistical significant differences for the variable faculty where students study for the favor of medical and scientific faculties.

Ayub, Tarmizi, Jaafar, Ali & Luan (2011) conducted a study aimed at defining the factors affecting on students' use of learning system "Moodle". The sample consisted of (215) male and female students, who were studying the course of statistics at Putra University, Malaysia. The study used a questionnaire of five areas to define the factors that affect on students' use of learning management systems. Results showed a high degree in students' use of learning management systems, including: technological competency of students, role of faculty members, and the learning system itself.

Jabrini (2010) conducted a study aimed to develop an interactive, intelligent, tutorial system on the Web to be used by students. The study used a descriptive approach where a test was prepared consisting of (30) questions. The test was applied to the study sample consisting of (150) male and female students enrolled in e- courses in the field of languages at the University of Aleppo, Syria. Results were as follows: high degree of students' use of the interactive tutorial system, and their perceptions of the interactive, intelligent tutorial system were high. The new interactive system allows the system administrator to plan the educational process through managing its users, major and minor classifications of the interactive courses that are created through him; also, it allows managing Students and their groups, and adding a new language to the interface. Results showed statistical significant differences of students' use of interactive learning system attributed to the variable sex in favor of females, and variable type of college and in favor of scientific faculties.

The study of (Holm, 2010) aimed to define the success of applying of an e-learning model at the University of Applied Sciences, Switzerland. AWEBCT system was used to support this model. The study used a questionnaire consisting of (39) items. Study sample consisted of 168 students at the University of Applied Sciences, Switzerland, distributed on scientific and humanitarian faculties. Results concluded were: WEBCT system was not used as a substitute for traditional

education, but as an additional value to the course. Students stressed that web-based learning is more effective when accompanied by traditional learning and focus on some important tools such as collective conversation, tests and course content. Results showed no statistical significant differences in the success of the application of e-learning model attributed to the variables of sex, the faculty where students study, or age.

The study of (Dougiamas, & Taylor, 2010) aimed to analyze the impact of a particular study course on the Internet using Moodle system, on the interaction between students and their attitudes towards the system. Both researchers taught a course called constructivism. Sample consisted of (68) male and female graduated students using Moodle, at Morten University, Australia. The study used a questionnaire divided into six themes. Results showed high perceptions of students to Moodle system, where students' use of the system on other learning courses was improved, and goals of the course were achieved successfully.

Study of (Paine, 2009) aimed to define the effect of a language course that was built using WEBCT system. The course was built to teach French to first-year students at O'Brien University, Alabama. The study used the experiment method, using a questionnaire as a research tool to explore the perspective of teachers and students of the built model. Sample of the study consisted of (96) male and female students and (58) teachers. Results were: Teachers reported that managing the course has become meaningful and more efficient, as well as reducing the time and effort spent on routines, and it became easier to access contents of the course. While students reported that they benefited from using WEBCT system at their French course by gaining more self-confidence, and ease access to the course. The system also, enhanced communication between colleague teachers who are teaching the same course, and provided immediate feedback through the student's knowledge of score after the completion of the test.

Ali & Hassoun (2009) conducted comparative analysis study to compare e-learning management systems (LMS) and Learning Management System (LCMS) on one hand and normal learning on the other. To achieve objectives of the study, a training program was implemented using traditional method, which included three courses in the ICDL program that was carried out by one of the specialized companies. The same three training courses were provided through e-learning, considering same features of participants and same content (Word course, Access course, and Excel course). Participants consisted of (60) students at Baghdad University, distributors evenly into two groups. The study used a practical test of (50) items, with the following results: the group which studied Word, Access, and Excel according to LMS excelled in scores.

Ashour (2009) conducted a study that aimed to examine the effectiveness of Moodle system in the acquisition of three-dimensional design skills to the students of the Faculty of Education Technology at the Islamic University in Gaza. To achieve the objectives, the study used experimental method where the researcher built an e-course for three-dimensional design, and then inserts it to the Moodle system. The e-course was applied on the students who were divided into a control and experimental groups. Study used an achievement test consisted of (30) questions divided into five themes to measure the level of knowledge in terms of educational experiences and academic achievement of students. In addition to a note card of (25) items, divided into five themes to measure performance level of the students. The purposed sample consisted of (35) students of the multimedia class at the Islamic University of Gaza, Palestine. Results showed statistical, significant differences between the experimental group and the control group due to the effect of the three-dimensional program that enhanced learning experience and academic achievement and in favor of the experimental group.

Alkhalil (2008) study aimed to design and deploy an electronic course in educational technology in the light of the quality of e-learning standards. The study sample consisted of (40) students from the Professional Diploma students of the department of Education Technology, Faculty of

Education at the University of Mansoura, Egypt. The sample was randomly divided into two groups: experimental group studies the course through 2-learnings, and the control group that learned traditionally. Measuring tools used were: an achievement test to measure the cognitive acquisition of the content, and a note card to measure the performance of students. Results reveal that there are significant differences between the experimental group students for scores, test card in favor of post application.

The aim of (Lim & Karol, 2008) study was to define the effect of three types of learning on student achievement and motivation, and these patterns are based on the Internet using learning management systems (Moodle, WebCT) on the one hand and traditional learning, and face-to-face. On the other hand, as well as the use of Web-based learning with the traditional learning. This study was applied to students of public health course at Northern State University, USA. The students were divided into three groups: a group taught in the traditional way, and a group having Web-based learning, and a group is studying a combination of both. Number of students was (120 students) and by (40) students per group. Results indicated that there were statistically significant differences between the two groups (who studied based on the Internet and the group that studied a combination of both) compared to the group that studied only the traditional way, in favor of the first group.

Weaver & Sparrt (2008) study aimed to acknowledge use of LMS by students and academics at higher education institutes. The focus was on the use of WebCT by students and professors at Monash and Swinburne universities, Australia. A questionnaire consisting of (41) items was distributed to the sample of (208) students and teachers. Results showed a frequent use of LMS, in specific WebCT. No significant statistical differences for the use of LMS were obvious attributed to the variables of gender or academic level.

Al Mezher(2006) conducted a study aimed at developing an organizational model proposal to manage learning management systems in Saudi Arabia. A descriptive method was applied, using a questionnaire of (47) items, to measure reality and obstacles of e-learning management in Saudi Arabia. The sample consisted of (120) teachers and (45) educational supervisors. Results were as follows: responses of teachers and supervisors were high. Among the obstacles defined for the use of LMS was lack of national plans for e-learning management systems.

Study of (Pilgrim, 2006) aimed to reveal the role of WebCT system in supporting faculties of Ontario University, U S A. The sample consisted of (25) teachers,(76) supervisors of the e-curriculum support systems, (37) designers of courses, and (34) administrators. A questionnaire with (60) items was used to collect data, in addition to interviews to define the role of the system in supporting faculties indifferent areas. Results of study were as follows: all estimations about the role of the WebCT system in support of faculties of Ontario University were highly rated by all groups. Results showed statistical differences in the sample of teachers estimating the role of the WebCT system attributed to the variable of sex and in favor of male teachers, and in favor of scientific faculties attributed to the variable of faculty of education.

Through reviewing the previous studies and exploring of some approaches used, and objectives and results of studies, the researcher observed the following:

The variety of methods used, while some studies used the experimental method like (Ali & Hassoun ; 2009 ; Lim & Karol, 2008 ; Dougiamas & Taylor, 2010 ; Pilgrim, 2006), other studies of (Alsalloum & Radwan, 2012 ; Jibrini, 2010) used the descriptive method. Some studies aimed to acknowledge the success of learning management systems represented by commercial or free systems to provide qualified learning environments, such as studies of (Holm, 2010; Lim & Karol, 2008 ; Pilgrim, 2006). The previous studies were concerned with different learning management systems. Some of them were concerned with Moodle like (Ashour, 2009 ; Dougiamas & Taylor, 2010) which represent the system of the current study applied at AOU. Blackboard was the system

discussed in studies of (Paine, 2009; Holm, 2010 ; Pilgrim, 2006 ; Alsalloum & Radwan, 2010). Other studies compared between the two systems (Ali & Hassoun, 2009; Lim & Karol, 2008).

The current study is similar to the previous studies in certain aspects: it is concerned with Moodle, but specifically to define learning effects of using Moodle by students of AOU. In agreement with the computer department at the AOU, the researcher downloaded instrument of the study on the LMS site at the university. The current study emphasized results of previous studies concerning the accelerating technological innovations. Add to that, this study is one of the few local studies - to the knowledge of the researcher - that dealt with Moodle learning management system.

## **Method and procedure:**

### ***Methodology:***

The study is based on the descriptive, survey method adequate for the purposes of the study. Descriptive methods are concerned with reality and identifying influencing factors in terms of nature and relations between them. Descriptive method is not limited to a mere description, but also to interpret and analyze to reach at accurate facts about the list of conditions for purposes of development and improvement.

### ***Population of study:***

Sample of the study consisted of all Arab Open University students, enrolled for the second semester 2013/2014 in different disciplines (information technology, business administration, education, English language), with the number of (3388) students.

### ***Members of the study:***

Members of the study were (1247) students with a proportion of (38%) of population of study, who responded to the survey instrument that was delivered (educational effects) electronically by being uploaded to the learning management Moodle site, according to the registered learning material. All was in arrangement with computer center. Members of study were distributed according to the variables of gender, and discipline of study, as shown in table 1.

**Table 1**

**Distribution of sample according to variables of gender and discipline**

<b>Variable</b>	<b>Type</b>	<b>Number</b>	<b>Average</b>
Gender	Male	338	27%
	Female	909	73%
	Total	1247	100%
Discipline	Information Technology	124	21.5%
	Business Administration	256	10.5%
	Education	651	50.5%
	English	216	17.5%
	Total	1247	100%

### **Instrument of the study:**

The study aimed to identify the learning effects of using the learning management system Moodle by students of AOU. To achieve this goal researcher developed a questionnaire to measure the learning effects of using Moodle. The tool consisted of two parts:

**First:** general information about members of the study, in the light of the following variables (gender, discipline).

**Second:** main themes that are subject to learning effects of students' using of Moodle LMS. Those themes are: Planning of learning process (9 items), experiences and skills of learning(13 items), learning activities (10 items), thinking and search methods (10 items), academic achievement (7 items), and cultural configuration(7 items), with a total of (51items).

### **Steps for creating instrument of study:**

Reviewing education literature and previous studies, concerning interest of the current study in the learning effects of using the learning management system "Moodle". Researcher benefited of theoretical framework and some questionnaires that accompanied those studies (Ashour, 2009; Salloum and Radwan, 2012; Abd Almajid, 2008; and Alnabahin, 2005).

Building themes and items of the instrument, in the light of research literature, and personal experience of the researcher. The questionnaire was formed consisting of six areas, and (58) items, to identify the learning effects of using the learning management system Moodle, by students of AOU.

A group of experts specialized in educational technology, curriculum, measurement and Evaluation, and Psychology, viewed the instrument, to examine the adequacy items and content for each theme.

Benefitted of views of all arbitrators to prepare an orderly sequential instrument, in terms of the adequacy, competency and proper language of all items.

Writing the instrument in its final form, after taking notes offered by experts, considering their scientific and linguistic corrections. Some items were merged, others were excluded as agreed upon by (85%) of the arbitrators. Number of items was limited to (51), to identify the learning effects of using the learning management system Moodle by students of AOU.

Level of answer to each item of the study instrument was gradated according to Likert scale Quintet, which had five levels: strongly agree (5 degrees), Agree (4 degrees), neutral (3 degrees), disagree (2 degrees), and strongly disagree (1 degree). Level of learning effects of students using the learning management system Moodle was divided into three levels: (high, medium, low) by dividing the extent of the numbers from 5-1 in three categories for the extent of each level i.e. 1.33 it be levels as follows: low level of effects (1-2.33), and the average level of effects (2.34-3.65), high level of effects (3.66-5).

### **Validity of the instrument:**

Validity of the instrument was confirmed as follows:

Virtual validity based on the arbitrators: to confirm validity of content of instrument, the researcher referred to arbitrators, where the initial form was presented to (8) arbitrators specialists in educational technology, curriculum and instruction, educational measurement and evaluation from AOU, and Jordan University, to judge the degree of appropriateness of items in terms of language, and affiliation of the area to be measured. After reviewing the remarks, some items were reformed, others were deleted, to reach to final form of the instrument, which consisted of (51) items.

**Reliability of the instrument:**

Researcher used (test-re-test) method to ensure reliability of the instrument. A questionnaire was distributed to (20) students outside the study sample, and re-applied to them after two weeks, then, reliability coefficient was extracted using Pearson correlation Coefficient between the first application and the second. Reliability coefficient of the questionnaire concerning learning effects was (0.92, which is an acceptable result for the purposes of the study. And Table 2 shows the reliability of themes of the instrument of learning effects.

**Table 2**  
**Reliability coefficient stability of the instrument measuring learning effects using (test-re-test) method**

Area	Number of items	Reliability by test-re-test method
Planning for the learning process	9	0.88
Experiences and learning skills.	8	0.92
Learning activities	10	0.90
Thinking and search methods.	10	0.89
Academic achievement	7	0.90
Cultural background	7	0.93
Tool as a whole	51	0.90

**Procedure:**

The instrument was uploaded, and distributed to students through to e-learning management system of the University. Students were asked to fill the questionnaire, and send it back electronically. Then, questionnaires were analyzed using Statistical Packages for Social Sciences (SPSS).

**Variables of the study:**

Independent variables:

Gender: (males, females)

Discipline, with four levels (information technology, business administration, education, English language).

Dependent variables:

Learning effects of using the learning management system "Moodle" by students of AOU, and measured by degrees earned at the study instrument.

**Statistical process:**

To answer questions of study, a statistical analyzes was conducted as follows: To answer the first question, averages, standard deviations and the level of effect on the item level and theme were calculated. To answer the second question relating to the disclosure of the differences between responses of the sample members on learning effects of using learning management system "Moodle" by students of AOU attributed to variables of the study. Statistic used t-test for the

variable (gender), and analysis of variance unilateral One Way ANOVA for the variable of discipline.

## Results:

The study proposed to detect the learning effects of using the learning management system Moodle by students of AOU in the process of learning, teaching and building attitudes towards the system. Results are presented according to the sequence of questions proposed:

### **Results of first question: what are the learning effects of using the learning management system Moodle, by students of AOU, as seen by the student themselves?**

To answer this question, researcher calculated averages, standard deviations, and level of effect of the use of students at AOU for the learning management system "Moodle" in the education process, and other areas as well; results are illustrated in table (3).

(Table 3) Averages, standard deviations for the level of the learning effects of using Moodle by students of AOU, in descending order of averages:

Rank	Item Number	Theme	Average	Standard deviation	Level of effect
1	2	Planning for the learning process	3.62	0.98	moderate
2	3	Learning activities	3.62	1.02	moderate
3	5	Academic achievement	3.58	0.99	moderate
4	1	Planning for the learning process	3.57	0.94	moderate
5	6	Cultural configuration	3.45	0.95	moderate
6	4	Thinking and search methods	3.44	0.79	moderate
<b>Tool as a whole (Total)</b>			<b>3.55</b>	<b>0.84</b>	<b>moderate</b>

Table (3) above indicates, that the arithmetic average of the instrument as a whole is (3.55), which is considered a medium degree of effects. The highest arithmetic average was in the theme "experience and learning skills" and "learning activities", where the average for each of them was (3.62), followed by "academic achievement" where the average was (3.58), rest theme averages had medium degrees of influences.

### **Results can be explained by several factors:**

Linking theoretical framework to interactive examples presented by Moodle system, with the ability to refer to at any time.

Re-operation practical application studies at lectures through Moodle system using illustrative, interactive programs easy to comprehend by student, with the ability to make it available on a permanent basis for constant, practical communication.

The potentials of communication, provided by Moodle LMS through a forum for practical participation between students and communicating with faculty members for the special inquiries concerning practical application.

Researcher believes that the moderate learning effects may be relevant to factors connected only to AOU, where the AOU is working constantly to amend its learning policy, by making courses

supporting aid in the learning process. AOU is working to provide technical and technological support for LMS Moodle, and offering maintenance of network and devices on permanent basis, during the use of the faculty members and students of e-courses on Moodle system. In addition to having the support of the coordinators of the academic programs and their motivation to integrate in e-learning courses, which allows faculty members to activate, and employ this system properly, which reflects positively on the learning process.

Results of this study are in consistent with the results of the following studies: (Ashour, 2009; Alashqar & Aqel, 2009; Abd Almajid, 2008; Ayub, Tarmizi, Jaafar, Ali and Laun, 2011; Dougiamas and Taylor, 2010), which showed a high affectivity of Moodle system in favor of the experimental group. And results confirmed a frequent use of Moodle by students.

Averages and standard deviations for the study sample were calculated on the items of each theme separately, as it was shown on the study instrument:

## 1. Planning for the learning process

**Table 4**

**Averages, standard deviations and level of effect of items in the theme of planning for the learning process, in descending order according to averages:**

Rank	Item No	Items	Average	Standard deviation	Level of effect
1	8	Enhances acquiring self-learning planning skills	3.66	1.28	high
2	9	Helps to define general and specific objectives of subject to be studies.	3.66	1.31	high
3	6	Provides opportunity to interact with teachers to participate in course planning.	3.62	1.29	moderate
4	4	Easy to obtain information concerning coming lessons.	3.58	1.37	moderate
5	3	Helps me to organize my schedule all year long	3.57	1.38	moderate
6	5	Helps me to practice required activities with peers.	3.57	1.28	moderate
7	7	Provides me with option for further future studies.	3.57	1.28	moderate
8	1	Moodle helps me to plan my daily lessons	3.50	1.31	moderate
9	2	I adopt Moodle to prepare my assigned activities	3.48	1.31	moderate
<b>Total</b>			<b>3.57</b>	<b>0.94</b>	<b>moderate</b>

Table (4) showed that the averages of the items of planning of the learning process has ranged from (3.48- 3.66), where the AOU students' responses concerning the effects of using Moodle varied between high and moderate effects, where two items were highly estimated , while (7) items were estimated as moderate. Items Number (8 and 9) which read "Enhances acquiring self-learning planning skills" and " Helps to define general and specific objectives of subject to be studied." respectively, in the first place and an average of total (3.66), while item (6) that read " Provides opportunity to interact with teachers to participate in course planning. " ranked third with an average of (3.62), while the last rank was of item (2), which reads, " I adopt Moodle to prepare my assigned activities." and an average of (3.48) with a moderate level of effect.

Previous results may be due to the students' sense of the importance of planning for the learning process, because they are committed to study the e-course at a specific time, which requires a high quality of planning, and thus they gain self-learning planning skill. The researcher believes that the reason may also be due to the transmission of the impact of the teacher's professional experience and practice acquisition of planning an e-course based on the Moodle system, which reflects on students enrolled in these courses, reinforcing their skills of planning for the learning process. Results of this study were in consistent with results of Jibrini study (2010), which confirmed that the new, interactive system allows system administrators to plan for the management of users plotting and planning for the management of the learning process through management students and groups.

## 2. Experiences and skills of learning

**Table 5**  
**Averages and standard deviations to the items of experiences and skills of learning, in descending order according to averages**

Rank	Item No	Items	Average	Standard deviation	Level of effect
1	14	Helps me acquire learning skills through Learning By Play program	3.69	1.30	high
2	13	Helps me focus on linguistic skills of learning	3.67	1.25	high
3	10	Helps me acquire a lot of learning skills	3.63	1.29	moderate
4	11	Enhance my following of positive study methods	3.63	1.30	moderate
5	12	Helps me organize my learning experiences	3.62	1.29	moderate
6	15	Helps me develop my communication skill through interacting with other students	3.60	1.32	moderate
7	16	Helps me acquire computer skills required for successful learning	3.60	1.33	moderate
8	17	Helps me benefit of modern technology to produce learning material connected to course of study	3.55	1.35	moderate
<b>Total</b>			<b>3.62</b>	<b>0.98</b>	<b>moderate</b>

Table 5) shows that averages of items of the theme "experiences and skills of learning" ranged from (3.55- 3.69), where items 14 and 13 were highly estimated with averages of (3.69 and 3.67) respectively, while the rest items were estimated as moderate. Item (17) which reads "helps me benefit of modern technology to produce learning material to course of study", obtained the lowest estimation, with an average of (3.55).

Previous results might be due, particularly, to the development of information and learning technologies, which has largely become an urgent need for a lot of successful projects, whether in education or others. Students also recognize the need to have experience and learning skills to keep up with technological development, if they want to have a bright future. Most students also believe that the technological culture they gain will be reflected positively on their performance and thereby enrich their experience and learning skills. Researcher believes that the frequent use of Moodle by students of AOU developed their experiences and skills of learning, in light of

availability of multiple LMS via electronic networks. Current study results are in consistent with results of study of Ashour (2009), which confirmed statistical, significant differences for the effect of the three-dimensional program to acquire learning experiences.

### 3. Learning Activities

**Table 6**  
**Averages and standard deviation of items of learning activities,**  
**descending in order according to averages**

Rank	Item No	Items	Average	Standard deviation	Level of effect
1	26	Helps me in dealing with learning materials and activities	3.68	1.26	high
2	27	Helps me in preparing and coordinating activities of the university	3.64	1.30	moderate
3	18	I need less time by using Moodle to practice the required learning activities	3.63	1.29	moderate
4	19	I need less effort by using Moodle to practice the required learning activities	3.63	1.30	moderate
5	20	Moodle system provides me with a lot of learning activities	3.63	1.27	moderate
6	22	It organizes the sequence of learning activities needed	3.62	1.25	moderate
7	23	Provides opportunity for easy interaction with peers	3.61	1.33	moderate
8	25	Provides opportunities for independent observation of my learning performance	3.61	1.30	moderate
9	21	Using Moodle enhances my desire of performing learning activities	3.60	1.27	moderate
10	24	Provides opportunity to observe learning activities of others	3.60	1.26	moderate
<b>Total</b>			<b>3.62</b>	<b>1.02</b>	<b>moderate</b>

Table 6 showed that the average of the items of learning activities have ranged from (3.60- 3.68), where item No. 26, which reads " Helps me in dealing with learning materials and activities" materials and learning had the average (3.68) with a high level of effect, while the rest of the items were ranked moderate. Item (24), which reads " Provides opportunity to observe learning activities of others " was ranked least with an average of (3.60).

Results may be due to the conviction of students at AOU in the role of Moodle LMS in the learning process, being responsible for fundamental changes in the learning environment. The system works in promoting learning situations that achieve educational goals. The researcher believes that there are other reasons that encourage the use of Moodle LMS in the field of learning activities, such as raising the skills of students in thinking and provides time and effort in dealing with the learning activities uploaded to the site. The system also helps students to deal flexibly

with subjects and learning activities, and thus improve their skills of self-learning and communication skills, which pays students to accomplish their home works with enthusiasm. Results of this study were in consistent with results of Jibrini study (2010), which confirmed that the students' perceptions of the possibility of surfing the course, having exams, and learning activities were high according to the interactive system.

#### 4. Thinking and search methods

**Table 7**  
**Averages and standard deviations of items of thinking and search methods**  
**descending order according to averages**

Rank	Item No	Items	average	Standard deviation	Level of effect
1	29	I can search the information connected to my study.	3.60	1.29	moderate
2	30	Helps me search information working with peers	3.59	1.28	moderate
3	35	Helps me develop exploring skills	3.59	1.32	moderate
4	36	Moodle motivates my creative skills	3.57	1.26	moderate
5	34	Helps me exchange research, activities and homework with peers	3.56	1.32	moderate
6	31	Helps to search using e-library and database.	3.53	1.33	moderate
7	33	Enhances development of reflective thinking skills	3.50	1.26	moderate
8	37	Helps to develop my technological skills	3.41	1.29	moderate
9	28	Helps me to use scientific research methods	3.09	1.47	moderate
10	32	Moodle develops my critical thinking skills	2.97	1.44	moderate
<b>Total</b>			3.44	0.79	moderate

Table 7 shows that average of the items of the theme "thinking and search methods" ranged from (2.97- 3.60), where all items of this theme were estimated over medium, except of item (32) which reads " Moodle develops my critical thinking skills", which was ranked last with a low estimation. The researcher believes that the above results may be due to what students of AOU observe of the importance of using Moodle LMS, which promotes research methods and skills. Students at AOU believe in the learning effects of Moodle LMS, because it helps in the search for information relevant to e-course and develops their technological skills. Moodle allows mutual exchange of research, activities and home works with peers, and develop creative skills of students. They strongly believe that the era of rapid scientific and information technology developments necessitate the need to exploit Moodle LMS, to develop their abilities to keep pace with these developments. Study results agree with the study of Almezher (2006), which confirmed the ability of learning management system in the Kingdom of Saudi Arabia to develop thinking abilities of students.

## 5. Academic achievement

**Table 8**  
**Averages and standard deviations of items of academic achievement**  
**descending order according to averages**

Rank	Item No	Items	Averages	Standard deviation	Level of effect
1	38	Contributes to increase my achievement at e-courses	3.62	1.28	moderate
2	43	Contributes to my competency in asking scientific questions and receive answers	3.62	1.30	moderate
3	39	Enhances my ability of self-assessment	3.61	1.29	moderate
4	41	Helps me present distinguished scientific projects	3.60	1.28	moderate
5	42	Helps me see teachers' evaluation of home works	3.59	1.32	moderate
6	44	Helps me see teachers' evaluation of tests	3.55	1.31	moderate
7	40	Helps me to predict types of different tests, to be properly prepared	3.48	1.35	moderate
<b>Total</b>			<b>3.58</b>	<b>0.99</b>	<b>moderate</b>

Table (8) reveals that that averages of the items of the theme "academic achievement" ranged from (3.58- 3.62), where members of the study estimate the level of learning effects of the use of Moodle LMS as moderate. All items of the theme were estimated to be moderate.

Results may be due to the fact that Moodle contributes to open horizons for students to deal with the electronic subject and search for the information they need, also, using this system is exciting, interesting, fun and rich with activities, which pushes them towards positive and effective participation in the learning process with a teacher s in the performance of homework, working papers and prepare for exams. In addition to opportunities is provided by the system to participate in dialogues and forums that students are familiar to, and use them to ask questions or answer them in relevance to e-course learning. Such benefits reflect in all academic achievements, and this explains the high estimation of students for the effect of using Moodle on their academic achievement. Such results were in consistent with the results of a study by Ashour (2009), which confirmed statistical significant differences for the effect of three-dimensional program in academic achievement.

## 6. Cultural configuration

**Table 9**  
**Averages and standard deviations for the items of cultural figuration theme descending orderly according to averages**

Rank	No	Items	Average	Standard deviation	Level of effect
1	45	Helps me understand democratic concepts in dialogues	3.47	1.27	moderate
2	46	Helps me develop my life towards modernity	3.36	1.29	moderate
3	47	Helps me to express the cultural thoughts I believe in	3.45	1.31	moderate
4	48	Contributes in participation of distant cultural forums	3.50	1.32	moderate
5	49	Helps to keep up with latest events	3.56	1.35	moderate
6	50	Helps to keep up with cultural activities at the university, and elsewhere	3.57	1.34	moderate
7	51	Helps broadened my acquaintances and enrich my learning	3.30	1.31	moderate
Total			3.45	0.95	moderate

Table 9 shows that the averages for items of the theme "cultural configuration" ranged (3.30 - 3.47). All items of this theme were estimated moderate in terms of the level of learning effects.

Results have been attributed to the importance of Moodle LMS in the learning process, being one of the rapid, technological innovations. Students at AOU believe that this system is an important source of cultural configuration, which provides them with information on all aspects of the academic course loaded on the Internet, which helps to increase cultural and knowledge of the student inventory. Students confirmed that using Moodle had its effects in the theme of cultural configuration, which helped them to expand their knowledge, enrich their learning, and follow-up of modern developments, participating in cultural forums, and publishing of students' cultural ideas, and awareness of the concepts of dialogue and democracy. These results agree with the study of Almezher (2006), which confirmed the ability of learning management system in the Kingdom of Saudi Arabia in developing the students' cultural and scientific competencies.

**Results of Second Question:** *Are there any statistical significant differences in the learning effects of using the learning management system "Moodle" by students of Arab Open University, according to gender, and discipline variables?*

### **Variable of gender**

To answer about the variable of sex, the researcher calculated averages, standard deviations and t-test for the themes of the instrument themes, and for the instrument as a whole in the light of the Gender variable, as illustrated in table 12.

**Table 12**  
**Averages, standard deviations, results of t- test for themes of the instruments, and instrument as a whole for the learning effects of using Moodle attributed to the variable of gender**

Themes	Gender	Students No	Average	Standard deviation	T	Significance
<b>Planning of the learning process</b>	Male	338	32.49	8.07	0.718	0.473
	Female	909	32.11	8.54		
<b>Experiences and skills of learning</b>	Male	338	29.12	7.42	0.343	0.732
	Female	909	28.94	8.05		
<b>Learning activities</b>	Male	338	36.30	9.81	0.129	0.897
	Female	909	36.23	10.35		
<b>Thinking and search methods</b>	Male	338	34.58	7.70	0.449	0.653
	Female	909	34.35	8.09		
<b>Academic achievement</b>	Male	338	25.17	6.63	0.312	0.755
	Female	909	25.03	7.05		
<b>Cultural configuration</b>	Male	338	24.47	6.37	0.829	0.408
	Female	909	24.11	6.79		
<b>Total</b>	Male	338	182.13	41.11	0.449	0.618
	Female	909	180.77	43.41		

Results illustrated in Table 12 show no statistical significant differences at the level of significance ( $0.05 = \alpha$ ) in the estimations of students of AOU of the learning effects for their use of the Moodle LMS, attributed to the variable of gender in all themes of study. Where values of T also shows no statistical significant at the significance level ( $\alpha = 0.05$ ).

Results of table 12 may be due to the fact that all students (male and female) at AOU are subject to similar conditions of cultural and technological expertise used during the course, therefore, no difference between male or female students were found in using Moodle LMS. The researcher believes that the perspective by male and female students at the AOU for themselves, regardless of gender make them rush towards trends that call for employing technological innovations and accept them with positive feelings to promote their development. Results of this study are consistent with a study of Learning Management System Evaluation Committee, 2011, which confirmed the absence of statistical significant differences in the application of learning management systems, Blackboard and Moodle attributed to the variable sex. It also agrees with the study of (Thomas, 2006), which showed no statistical significant differences in the perceptions of first-year students majoring in economics towards the use of Moodle LMS attributed to the variable of gender.

**Variable of discipline**

To answer about this variable, we calculated averages and standard deviations for the learning effects of using Moodle LMS by students of AOU, attributed to the variable discipline, results were as illustrated in table 13.

**Table 13**  
**Averages and standard deviations for the learning effects of using Moodle LMS by students of AOU, attributed to the variable discipline**

Variable Themes	Information Technology (124)		Business Administration (256)		Education (651)		English Language (216)		Total (1247)	
	Average	Standard deviation	Average	Standard deviation	Average	Standard deviation	Average	Standard deviation	Average	Standard deviation
Planning for the learning process	33.15	27.7	31.63	8.61	32.07	8.51	32.78	8.26	32.21	8.42
Experiences and skills of learning	6030	6.66	29.10	7.75	28.40	8.191	29.71	7.58	28.99	7.88
Learning activities	37.97	9.07	435.8	10.24	35.95	10.39	36.58	10.18	36.24	110.2
Thinking and search methods	35.29	6.84	2034	8.08	34.17	8.06	134.9	8.23	134.4	7.98
Academic achievement	26.26	6.20	224.4	7.03	25.02	6.91	25.29	7.27	25.06	6.94
Cultural configuration	25.68	5.82	24.14	46.4	23.91	6.91	24.32	6.67	24.21	6.68
Total	7188.9	36.94	179.3	43.12	179.5	43.53	183.62	42.89	181.1	42.78

Averages in Table 13 indicate morphological differences in the estimations of students at AOU to the learning effects for their use of Moodle LMS in the disciplines mentioned above. To find out if these differences were statistically significant at the level of statistical significance of the differences in averages, a One-Way ANOVA analysis was performed. Results are shown in Table 14.

**Table 14**  
**Results of One Way ANOVA analysis to detect significance of differences for learning effects of using Moodle by students of AOU attributed to the variable of discipline**

Source of difference	Sum of squares	Degree of freedom	Average of squares	Value of F	Level of significance
<b>Planning for the learning process</b>					
Between groups	279.87	3	93.29	1.317	0.267
Within groups	88059.38	1243	70.84		
Total	88339.25	1246			
<b>Experiences and skills of learning</b>					
Between groups	662.61	3	220.87	3.574	0.054
Within groups	78606.32	1243	61.79		
Total	77468.93	1246			
<b>Learning activities</b>					
Between groups	494.61	3	164.87	1.584	0.192
Within groups	129391.21	1243	104.09		
Total	129885.82	1246			
<b>Thinking and search methods</b>					
Between groups	197.72	3	65.90	1.033	0.377
Within groups	79305.26	1243	63.80		
Total	79502.99	1246			
<b>Academic achievement</b>					
Between groups	298.387	3	99.46	2.069	0.103
Within groups	59758.81	1243	48.07		
Total	60057.20	1246			
<b>Cultural configuration</b>					
Between groups	331.015	3	110.33	2.476	0.060
Within groups	55391.93	1243	44.56		
Total	55722.95	1246			
<b>Total</b>					
Between groups	11430.69	3	3810.23	2.087	0.100
Within groups	2269386.46	1243	1825.73		
<b>Total</b>	2280817.16	1246			

Results in Table 14 indicates that all statistical values of (F) related to Total and sub-scores for the learning effects of using Moodle by students of AOU are not statistically significant at the significance level ( $\alpha = 0.05$ ) for variable of discipline (information technologies, business Administration, education, English), that there is no statistical significant differences of learning effects attributed to the variable of disciplines (information technology, business management, education, English).

Researcher believes that results may be due to the interest of all students at AOU in Moodle LMS, regardless of discipline of study. Moodle learning management system does not distinguish between different disciplines, and deals with all students in the same way and capabilities. This interest may have stemmed from: the availability of infrastructure at AOU, and holding frequent meetings of the members of the faculty and students. Researcher believes that Moodle LMS is a learning necessity to achieve desired goals of study, solve many educational problems, improve learning outcomes, save time and effort, and instill self-reliance and self-confidence. Results of this study are consistent with the results of a study of (Dougiamas and Taylor, 2010), which confirmed the absence of statistical significant differences in the effect of a study course via the Internet using Moodle LMS program, on the interaction between the students due to the type of college. Results of this study are incompatible with results of a study of (Learning Management System Evaluation Committee, 2011), which confirmed statistical significant differences in the perceptions of students for the learning management systems Blackboard and Moodle attributed to the variable type of faculty and in favor of the medical and science faculties. And differs from the results of the study of (Thomas, 2006), which showed a statistically significant differences in the perceptions of first-year students majoring in economics towards the use of Moodle LMS attributed to the variable type of faculty and in favor of scientific faculties.

### **Recommendations and suggestions:**

Based on the results of the study, the researcher recommends the following:

Emphasis the role of the Moodle management system in the learning process and focus on the continuing process of modernization and follow-up of all that is new, and linked to model-Moodle.

Organizing training workshops for members of the faculty and students to employ learning management system Moodle in education, and define its role and importance in the teaching and learning process.

Conducting a similar study so that it is applied to all open branches of the Arab Open University.

Encourage students at Arab Open University to use the learning management system Moodle in the learning process through more attention to the system and deal with its features.

Demand all faculty members to encourage students on using Moodle system as a distinct management of learning and teaching process in all courses and benefit from the many advantages it possesses.

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#### **About the author**

**Dr. Khalid Ajlouni** is a full Professor in Educational Technology at the Arab Open University in Amman, Jordan.

Email: [k\\_ajlouni@aou.edu.jo](mailto:k_ajlouni@aou.edu.jo)

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**Editors Note:** To use the authors own words, the importance of this study is that:

*... some key issues in higher education persist in the Pacific region, particularly related to cost, accessibility, smallness and remoteness of islands, geographic fragmentation, changing needs, changing demography and technology. All these affect elearning, which remains a subject of interest for exploration because of its influence on learning and teaching and the endless possibilities it affords.*

## **Learners and instructors' digital status and satisfaction with learning environments in higher education**

**Raturi Shikha and Chandra Subhas**

Fiji

### **Abstract**

The integration of digital technologies has impacted the Pacific Island Countries and higher education sector. Online learning is gaining momentum in higher education institution and even Massive Open Online Courses are beginning to influence the stakeholders in the region. It becomes imperative to investigate learners and instructors/tertiary teachers' satisfaction with their learning environment and gauge their digital status. A total of 945 learners and 116 instructors/tertiary teachers participated in the university wide survey. This study, is part of a larger study, and helps establish a baseline in ICT skills and satisfaction with learning environment. The findings of the study reveal good digital skills and experience among young learners despite their poor access to ICT as opposed to mature learners and instructors with better access. The highest satisfaction was recorded in face-to-face learning environments for both learners and instructors, however, it was a close tie with blended learning environment in case of mature learners.

**Keywords:** eLearning, Learning Environments, Information and Communication Technologies, online learning, Computer Assisted Instruction, Higher Education

### **Introduction**

With the advent of the World Wide Web, Computer Assisted Instruction (CAI) has gained momentum, giving rise to a variety of instructional delivery modes (IDMs). This in turn has led to a paradigm shift in traditional educational delivery with varying degree of acceptance across the globe of concepts such as blended/hybrid learning, online learning, mlearning (Mlearning or mobile learning), flipped classrooms and Massive Open Online Courses (MOOCs). The tertiary education provider in the Pacific Island Countries (PICs) have also joined their global counterparts and followed suite.

Higher Education (HE), which was traditionally delivered through face-to-face (F2F) mode and print-based DE (P), has transformed with the use of CAI in these learning environments (LEs). Thus different LEs are distributed along time and space with varying use of technologies, with these technologies increasing from one end to another giving rise to an *elearning continuum*. Learners' interaction with virtual learning environment (VLE) is dependent on their access to tools and experience with technology as well as their attitude, perception and interest towards the subject. Learners prefer VLEs for various reasons and use their lifestyle to determine the extent of their engagement with elearning, essentially making elearning a way of life. The extent and purpose of a VLE is thus rapidly evolving and its relationship with the learner has implications for educational institutions, specifically in HE. This study therefore investigates learners' digital skills, access and experience that affect their satisfaction for their LE. The University of the South Pacific (USP), which is a regional university, offers an appropriate site for this investigation.

As a regional university in the South Pacific region, USP serves all Pacific Island Countries (PICs) together with its twelve member countries by offering courses through print based distance education, face-to-face, blended and online modes of delivery. The rate at which blended and online LEs (as the IDMs) are being utilised at USP is phenomenal: one fully online course in 2009 to sixty fully online courses in 2012 (Varunesh Rao, Centre for Flexible Learning, USP, pers. comm., 7 February 2013). A variety of new initiatives/projects such as mlearning, tablet project and smart classrooms have been implemented by USP and other universities in the region are also beginning to embrace ICTs in their learning and teaching activities to different extent. Similarly, the education ministries of several Pacific Island Countries (PICs) together with their international partners have implemented projects such as OLPC project (<http://one.laptop.org/>) and SchoolNet in Samoa (<http://www.samoaoobserver.ws/education/4184-schoolnet-new-approach-to-teaching-and-learning>). Amidst all this, some key issues in HE persist in the Pacific region, particularly related to cost, accessibility, smallness and remoteness of islands, geographic fragmentation, changing needs, changing demography and technology. All these affect elearning, which remains a subject of interest for exploration because of its influence on learning and teaching and the endless possibilities it affords.

Within USP, there has been a tremendous change in learners' digital ownership and experience with technology. The University of the South Pacific Laucala campus in Suva, Fiji boasts the state-of-the-art ICT facility while the rest of the region struggles with poor ICT infrastructure in the region. We see increased use of ICTs such as mobile phones, computing devices and internet and assume that it gives rise to digital natives/net-generation and this trend continues to increase (Internet World Stats). The demography and technological experience of learners enrolled at USP is also different from what it used to be. Since 2009, Fiji and Tonga in particular have improved internet connection and technology access. Tonga's acquisition of fully functional optic fibre cable on 21<sup>st</sup> August 2013 and Vanuatu's in December 2013 will improve the quality of broadband internet access and elearning. Cook Islands acquired the O3b (<http://www.o3bnetworks.com/>) solution paving the way for a different type of technology in the region. Samoa and Solomon Islands continue their negotiations while Tuvalu signed a deal (with Kacific Broadband Satellite) in June 2014. It is, therefore, worthwhile to investigate the changing demography, technological needs and perceptions of the learners and teaching faculty at the university (USP) towards their learning environment.

### **The learning environment context**

LE refers to the physical or virtual spaces and the use of these spaces during the learning process. This space can be reorganised depending on the tasks within a social, psychological and emotionally conducive setting to meet the learner's needs and expectations. The quality of learning is dependent on the learner's ability to interact with various components in their LE. The LE research is constantly exploring the environment where learning is optimised, be it print-based DE, Face-to-Face classroom, Blended or Online education. The learners' and instructors' perceptions of the LE provide crucial information for all stakeholders (Erichsen & Bollinger, 2011; Jackson & Helms, 2008; Ravert & Evans, 2007; Richardson, 2009; Walker, 2003; Walker & Fraser, 2005; Zhao, Alexander, Perreault, Waldman, & Truell, 2009). The LEs in higher education have been transformed with the rapid evolution of ICTs. The use of technology in HE is a dynamic and rapidly evolving issue that traditional teachers have often considered 'revolutionary' (Bates, 2001, Gonzales, 2004, Rajpal, Singh, Bhardwaj and Mittal, 2008). There is a move to incorporate ICTs in all disciplines and fields in HE, resulting in an academic community that is far more connected and networked.

The integration of ICT in education has transformed the HE scene in PICs despite the challenges (Baba, 1997; Chandra, 2000; Chandra, Koroivulaono & Hazelman, 2011; Evans & Hazelman,

2006; Gold, Swan & Yee Chief 2002; Hammond, 2000; Hogan & Kedrayate, 2010; Lingam Raturi and Finau, 2015; Marsh & Hogan, 2005; Raturi, Hogan & Thaman, 2011 a, b; Sharma, 2008; Thaman, 1998, 2001; Whelan, 2007, 2008) as well as the rest of the world (Allen & Seaman, 2011, 2013; Ally, 2004; Palmer & Holt, 2010; Puziferro, 2008; Sangra & Wheeler, 2013).

Since 2008 – 2009, USP started its diversifying the learning environments by offering courses via blended and online learning. These IDMs/LEs are now becoming options of convenience as well as necessity in PICs (Hogan & Kedrayate, 2010; Raturi, 2010). USP is moving away from the traditional classrooms to VLE supplemented classrooms to a greater extent; all USP courses regardless of their IDM host the course on Moodle ([www.moodle.org](http://www.moodle.org)) since 2012. This has resulted in the integration of technology in learning and teaching methods at various levels thereby resulting in four distinct IDMs along the elearning continuum. The positive perception and acceptance from learners and instructors/teachers are crucial for successful integration of ICTs at any HE institution. It is a common belief that the young learners are generally willing to embrace new technology simply due to their greater exposure and interest in technology. However, it is also important to see how exactly the learners make use of technology: is it used for SMS texting through mobile phone, social networking through Facebook or recreation by means of computer and internet games or educational purposes? Researchers have reported on various factors such as age, ICT skills access and experience and time affect faculty's willingness to embrace elearning (Donnelly, 2014; Gulati, 2008; Osiga, Johnson & Buteau, 2009; Schult, 2010; Shank, 2005; Wright, Dhanarajan & Reju, 2009). Again, the younger faculty members use technology in different ways as opposed to the older ones; for instance a young lecturer is likely to carry a fancier and more expensive phone with full internet connection than their senior counterparts. The faculty members in HE have been using technology in their learning and teaching with the intention of enhancing the learning experience of the learner though the usage but this also depends on individual skills and experience with technology as well as available time.

Since its inception in 1968 as a traditional university in 1968, USP moved into additional offering of courses through print based DE to meet the educational needs of the region. The Distance and Flexible (DFL) print mode courses have grown in numbers together with a growth in student enrolment (Sharma, 2008). The print-based DFL mode at USP has had its share of issues demanding attention (Baba, 1997; Bolabola and Wah, 1995; Chand, 2007; Chief and Hola, 1995; Hogan, 2009; Kailawadoko-Waqaliti, 2010; Lal, 1989; Marsh & Hogan, 2005; Prasad, 1988; Sharma, 2008; Thaman, 2001; Tuimaleali'ifano, 1994, 1996; Wah, 2000). The nature of print-based courses has since been transformed and all the courses are now supplemented with Moodle facility, making it possible for the teacher to upload documents on Moodle and use the platform for communication purposes to some extent.

With the technological advancements in PICs, there has been a gradual move from the traditional classroom and the print based DE to CAI making use of more sophisticated PowerPoint presentations using tools like interactive graphs, videos and simulations. Since the 1990s, USP has experimented with a few Course Management Systems (CMS)/Learning Management Systems (LMS) before opting for Moodle. During its experimentation with ClassShares (Class Shares was USP's home grown CMS, which allowed only one-way communication, from lecturer to student), USP also utilised WebCT as their LMS for a short period and soon replaced it with another LMS called Moodle; all courses offered by USP, whether print-based or fully online use Moodle. The eLearning continuum at USP no longer starts from 'no-technology'. The Print (P), face-to-face (F2F or F), blended (B) and online (O) courses are currently offered with all having 'Moodle' as the common denominator and technology is integrated to various extents at undergraduate (UG) and postgraduate (PG) levels.

The role of the Centre for Flexible Learning (CFL), which previously assisted primarily with print-based DE courses, has also evolved; it now assists all courses and are part of the elearning

continuum. The learners' educational needs and technology access and experience have also changed. The teacher has no choice but to adapt to the changing needs of the learner and HE; how well they have occurred or are coping with this change remains to be seen. Since 2012, there have been a few developments in elearning at USP (with a steady increase in number of blended and online courses since 2008) and the elearning continuum has steadily progressed in terms of integration of ICTs in learning and teaching. It is, therefore, crucial to explore the elearning continuum in light of all these developments. This paper first focuses on establishing the digital status for the sample and then investigates any correlations that exist between learners' satisfaction and the digital access and experience.

## Digital skills, access and experience

With the increase in CAI and internet access, digital skills of learners have been a subject of interest in higher education. The use of the terms *digital natives* and *digital immigrant* (Prensky, 2001), *Digital/Net Generation* (Oblinger & Oblinger, 2005; Tapscott, 1998) and *Millennials* (Howe & Strauss, 1993) for ones generally born between the years 1980s – 2000, has created enormous debates on the use of digital skills for social and educational/academic purpose (Gros, Garcia & Escofet, 2012; Passanisi & Peters, 2012; Romero, Guitert, Sangrà & Bullen, 2013). The learners and instructors in the PICs have seen tremendous development in the availability of cheaper and diverse range of computing and mobile devices and a range of internet services, though Fiji is more advanced than the rest of the PICs. The learners in the USP's Laucala Campus in Suva have opportunities to get exposed to a variety of ICTs and therefore they also learn these digital skills slowly and steadily. In general, if one compares the status of ICTs in the last 10 years in PICs, it would not be incorrect to say that this has changed dramatically. As discussed earlier, the schools and university systems in the PICs are embracing ICTs in education. What good are these digital skills for and how are these being exploited by the education system?

The digital skill of the learners and instructors together with digital access and experience influence their preference for their learning environment. Therefore, the skills set is crucial for learners. However, skills in turn depend on access to technology and time spent on its use. The notion of education becoming more accessible and flexible with the advent of World Wide Web is also debatable; accessibility and flexibility remain to be fully vetted. This can only happen if the learners and instructors have been exposed to the ICTs for sufficient duration of time to acquire the necessary digital skills. Previous small-scale study for a postgraduate cohort in education at the USP established sufficient digital skills falling in the category of digital adapters and indicating preparedness for elearning coupled with a small positive relationship between access and experience to ICTs (Raturi, Hogan and Thaman, 2011a). This study establishes a baseline of general digital skills of learners and instructors and their satisfaction towards their learning environment.

## Methodology

A survey questionnaire investigated quantitative data and provided descriptive statistics for digital skills, access and experience. and satisfaction for learning environments.

### Sample

A sample was drawn from the University of the South Pacific which was chosen as the site for exploring elearning in higher education. USP was chosen because:

- it offers courses in the entire spectrum of the elearning continuum (P, F2F, B and O) at both UG and PG levels and
- it is the only in-region higher education institution to host learners from different parts of the region, thereby giving access to learners from at least 12 different countries.

A total of 945 learners (873 Undergraduate (UG) & 72 Postgraduate (PG)) and 116 instructors/teaching staff from different disciplines (from four different department units, referred to as faculty in USP namely, College of Foundation studies (CFS/Foundation), Faculty of Arts Law and Education (FALE), Faculty of Business and Economics (FBE) and Faculty of Science, Technology and Environment (FSTE)) and ethnic backgrounds studying courses in different learning environments (with a good understanding of print (P), face-to-face (F2F), blended (B) and online (O) learning environments at USP) participated in this study. The sampling was random stratified.

**Instrument**

Based on the previous study (Raturi, Hogan and Thaman, 2011), the instrument (appendix 1) was refined and tested on a pilot sample. This instrument comprised questions on ‘Demographic and digital access and experience’ which focused on the use of ICTs for different activities, access to ICT and ICT use for general and academic purposes. The reliability (Cronbach alpha coefficient) value was found to be between 0.83 and 0.88 and validity value (Construct Validity using Principal factor analysis with varimax rotation and Kaiser normalization) was also found between 0.50 and 0.80 for various items.

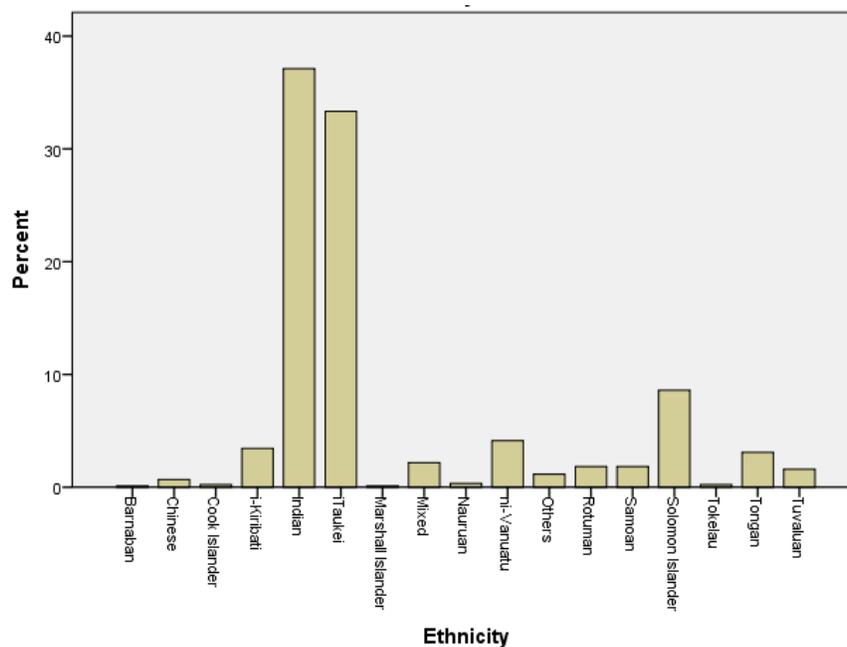
**Data Collection and data analysis**

The ethical considerations were treated with utmost care and the USP research protocol was followed. The data collection was undertaken by the first author between the period September-December 2013 in USP Suva (Fiji) and Apia (Samoa) campuses in person as well as online. SPSS 21 was utilized for descriptive statistics on demographic distribution and significant relationships

**Result and discussion**

The demographic characteristics are presented in the format that best explains it such as bar charts and tables.

**Undergraduate (UG) Learners**



**Figure 1.1: UG learners by ethnicity**

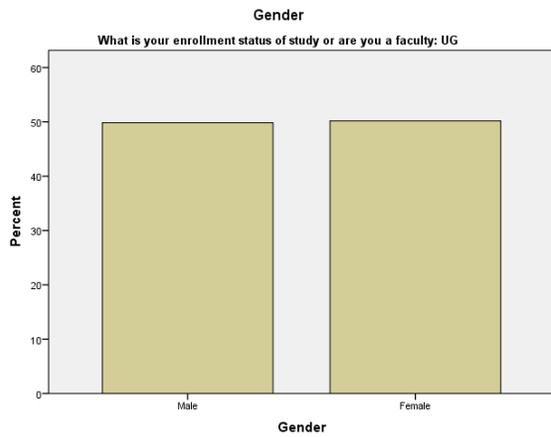


Figure 1.2: UG learners by gender

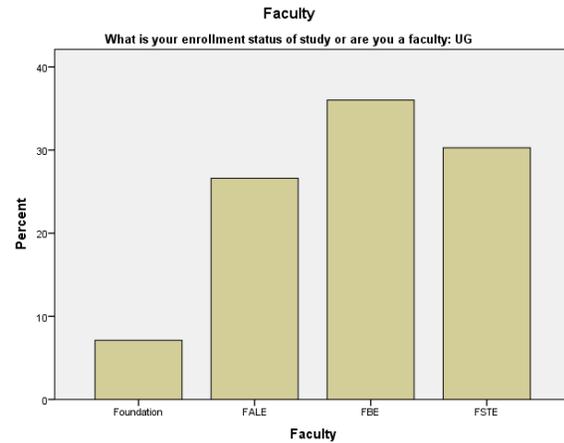


Figure 1.3: UG learners by faculty

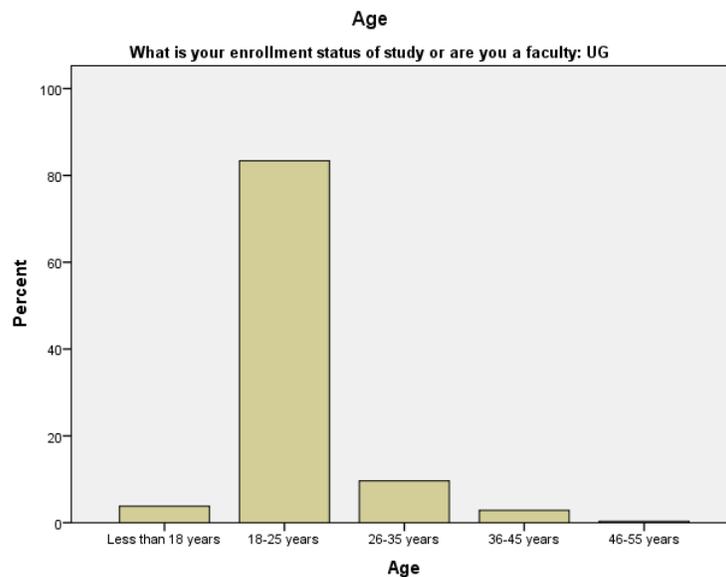
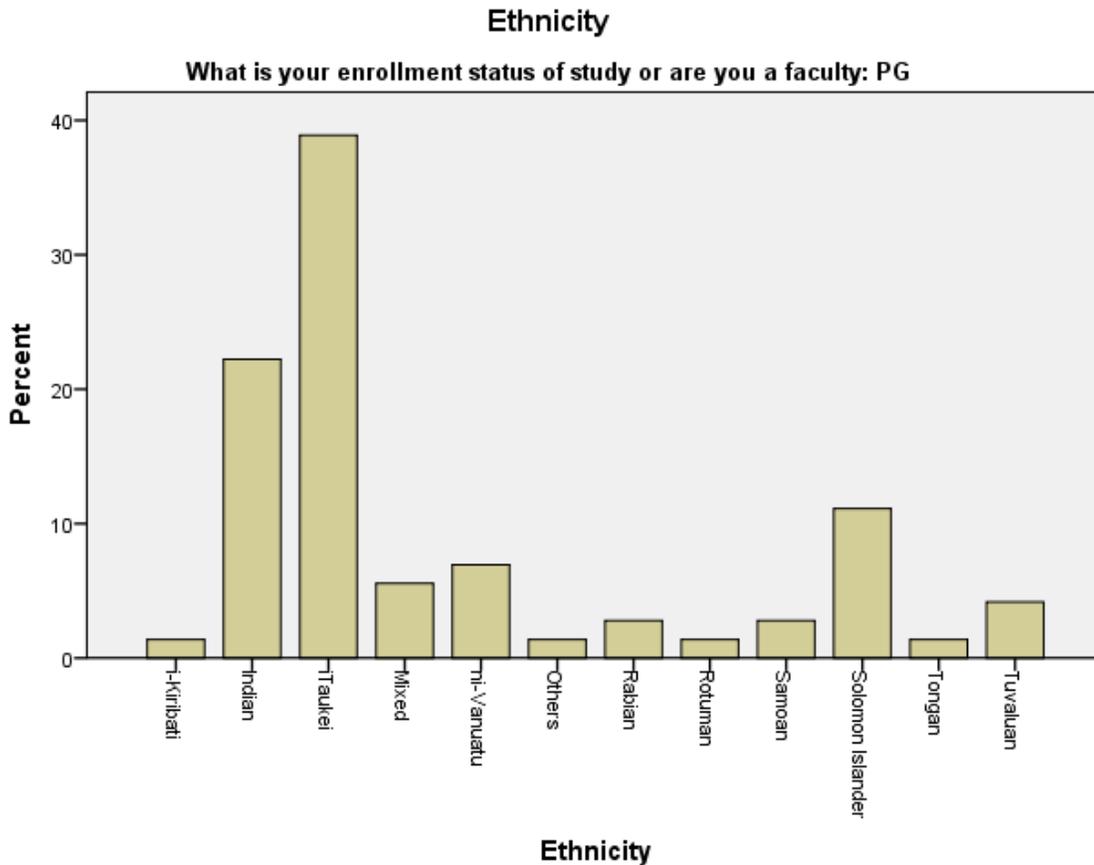


Figure 1.4: UG learners by age

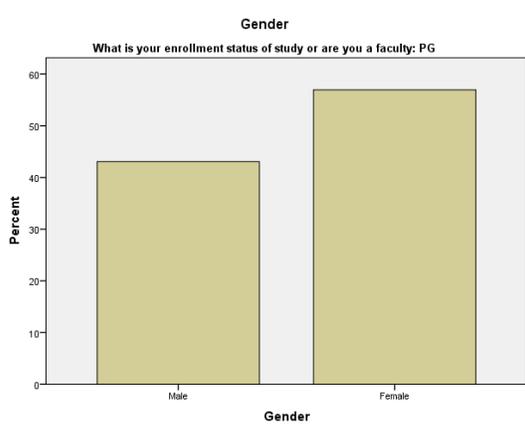
The demographic details illustrate that students from all but one USP region are included (there was ‘no representation’ from Niue), and this distribution was similar to the details provided in Dashboard and Intelligent Business System (D.I.B.S.) for USP on its portal. FBE being the largest faculty in USP was also highest percentage in the sample. The near equal ‘female’ learner percentage in the UG learner indicated gender balance in USP. The student numbers from Niue (together with Tokelau, Cook Islands and Marshall Islands) as indicated earlier was extremely small as compared with the rest of member countries. Therefore, it is a limitation to this study. Except for no Niuean participant, this sample reflected USP’s ethnic composition in the UG studies with highest percentage of Indians (Fijian of Indian origin) followed by iTaukei. The highest percentage of UG learners fall into the age group ‘18-25 years’ (83%) as would be expected anywhere in the world; it was encouraging to note a tiny fraction from ‘46-55 year’ (0.3%) in this sample. A very small fraction of UG learners were part-time learners and the majority pursue their degree straight after the high school certificate, though there were some who were doing a second UG degree. This helped put the main demographic (UG learner being the focus of this study) into perspective. The so called digital natives (18-25 years) clearly dominate

the group followed closely by '26-35year' (9.6%) who are also considered digital native. One could expect the digital natives to have excellent digital skills but what kind of skills are these and for what purpose are these skills being used?

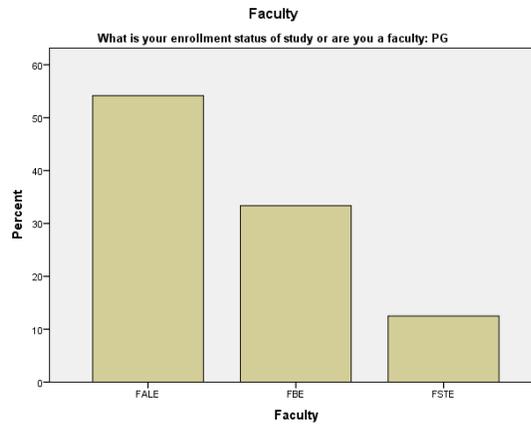
**Postgraduate (PG) Learners**



**Figure 2.1: Postgraduate learners by ethnicity**



**Figure 2.2: PG learners by gender**



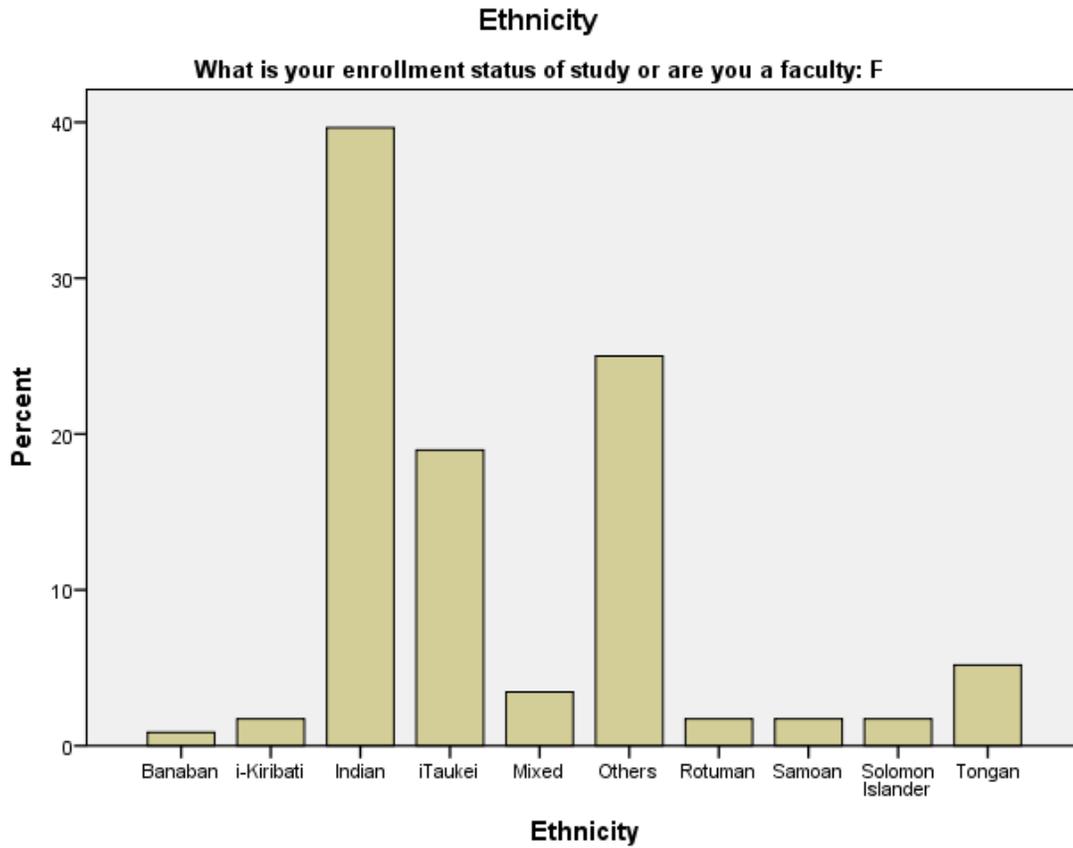
**Figure 2.3: PG learners by faculty**



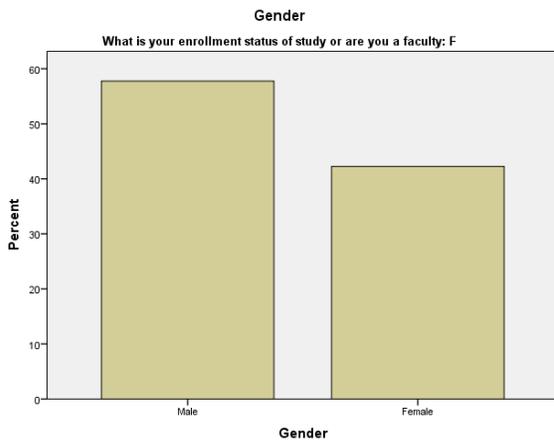
**Figure 2.4: PG learners by age**

The highest percentage in the sample was from FALE and this could prove to be a limitation in terms of generalization for PG learners. The percentage of female PG learner is much higher as compared to male. The ethnicity is representative of USP’s PG enrolment; iTaukei PG learners being the highest in percentage could be related to the fact that maximum PG learners from FALE are iTaukei (FALE has highest iTukaei enrollment in PG programme); similarly female PG learner could also be related to higher number of PG from FALE. The PG learners were highest from the age group ‘25 – 35 yrs’ (43%) and the rest were mature age learners from age group ‘>55’ (7%) and ‘36 – 45 yrs’ (27%). It was, therefore, not surprising that 69% were studying part-time. While about 76% are doing Master’s level studies, it was interesting to note that 7% were doing a second Master’s programme. Similarly, the majority is digital native and one could speculate on their digital skills and these digital natives using it perhaps for different purposes.

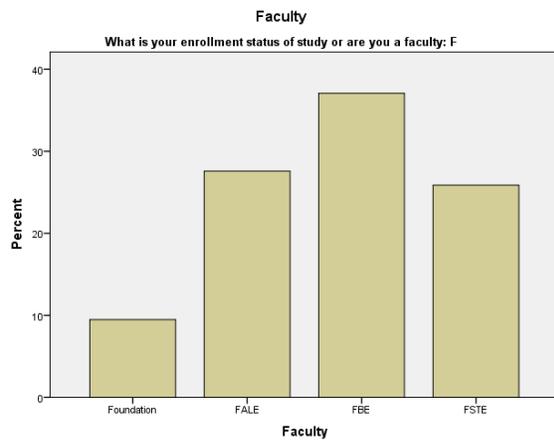
**Instructors**



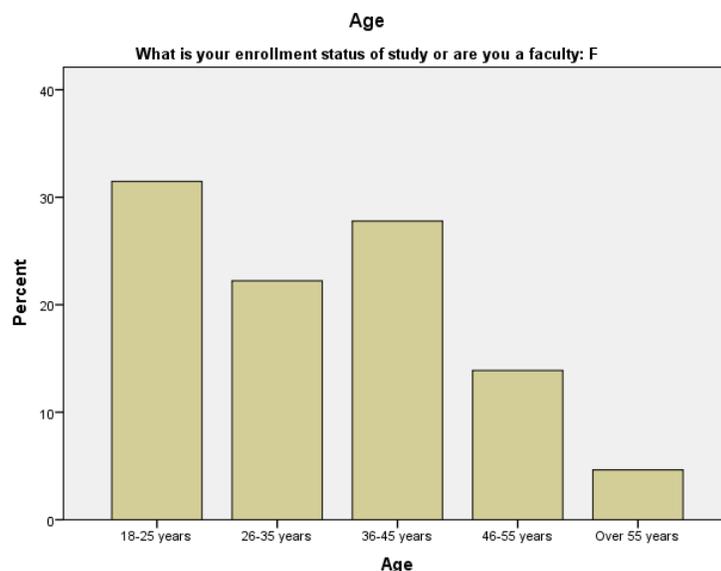
**Figure 3.1: Instructors by ethnicity**



**Figure 3.2: Instructors by gender**



**Figure 3.3: Instructors by faculty**



**Figure 3.4: Instructors by age**

The sample of instructors represents each of the three faculties and CFS with the highest percentage from FBE and male instructors making up to 58% of the total sample. The highest percentages of ethnicity in the instructors were Indian followed by 'others' followed by 'iTaukei'. 'Others' constitute all other ethnicity that do not fall in the ones stated. All age groups were represented in this sample with the highest percentage from '18 – 25 yrs' followed by '36 – 45 yrs'. Since the stratified sampling aimed at obtaining instructors from all academic positions, all academic positions within USP were represented in this sample, with the majority being lecturers and TAs (23.3% of each). The highest qualification amongst the staff surveyed was master's (49.1%) followed by PhD (35.3%). Interestingly enough, a large sample of instructors (comprises Tutors and Lecturers) in this sample also belongs to the digital native camp, this should have implication in their elearning adaptation within pedagogical practices.

### ICT access and experience

A look at the digital status (ICT access and skills & experience) of all participants gives some insights into the satisfaction of the learners.

**Table 1**  
**Distribution details for Digital Status of ALL participants**

	N	ICT Access Period Mean $\pm$ Std. Dev.	ICT Access Period Median; IQR	ICT Skills & Experience Mean $\pm$ Std. Dev.	ICT Skills & Experience Median; IQR
UG Learners	873	2.7 $\pm$ .85	3.0; 2.0 – 3.5	3.6 $\pm$ .76	3.6; 3.1 – 4.2
PG Learners	72	3.3 $\pm$ .81	3.5; 3.0 – 4.0	3.7 $\pm$ .84	3.9; 3.1 – 4.3
Instructors	116	3.8 $\pm$ .35	4.0; 4.0 – 4.0	3.6 $\pm$ .72	3.7; 3.0 – 4.1

An average value of 3.6 – 3.7 (between 'good' and 'very good') in ICT skills and experience with a standard deviation ranging from 0.71 – 0.84 indicated that learners and instructors have a reasonable level of set of skills and experience in ICT (Table 4). One look at the mean and

standard deviation in Table 1 indicates ICT access and experience was good, a closer look at kind of access helps get a complete picture (what kind of ICT access and to what extent).

**Table 2**  
**ICT Access extent for ALL participants**

ICT Access Extent	UG learner Frequency (Percent)	PG learner Frequency (Percent)	Instructor Frequency (Percent)
Access to computer and internet at Univ. only	113 (12.9%)	9 (12.5%)	--
Access to computer at home and Univ but internet access at Univ. only	106 (12.1%)	7 (9.7%)	11 (9.5%)
Access to computer and internet at home as well as Univ.	654 (74.9%)	56 (77.8%)	105 (90.5%)
Total	873 (100.0%)	72 (100.0%)	116 (100.0%)

**Table 3**  
**Mobile ICT Access extent for ALL participants**

Mobile ICT Access Extent	UG learner Frequency (Percent)	PG learner Frequency (Percent)	Instructor Frequency (Percent)
No mobile	37 (4.2%)	3 (4.2%)	4 (3.4%)
I have a mobile	361 (41.4%)	31 (43.1%)	67 (57.8%)
I have a mobile and I use it to access internet	475 (54.4%)	38 (52.8%)	45 (38.8%)
Total (Valid)	873 (100.0%)	72 (100.0%)	116 (100.0%)
Total (Missing)	0	nil	nil
Total	873 (100.0%)	72 (100.0%)	116 (100.0%)

12.9% of UG learners and 12.5% PG learners had access to computer and internet only at the university (Table 2) and 4.2% of UG learners and 4.2% PG learners did not have a mobile (Table 3). The learner having no access to computer and internet at home leads to speculation on 'the kind of elearning' these learners are prepared for. On the other hand approx. 74.9% of UG learners and 77.8% of PG learners had full access to computer and internet at university as well as home (Table 2) and 54.1% UG learner and 52.8% PG learner access internet on their mobile too (Table 3). Should we consider it a digital divide?

On one hand, there were more than half of learners all connected with good sets of ICT skills and experience and on the other, there were learners with very limited access to ICT even though the skills and experience were at a reasonable level ('good' to 'very good') (Table 4). The skills related to 'Email', 'social net-working site' and 'search engines' for all learners stood at an impressive 4 to 4.6 which is 'very good' and above. Email as a popular learning technology has been a subject of scrutiny owing to cultural and gender issues. It seems that the privacy provided to the learner in the email environment and exposure to email affords confidence and empowers learner to discuss issues which would otherwise be non-existent in a face-to-face setting owing to

culture of silence (Nabobo-Baba, 2005). Email has definitely picked up since an evaluation study conducted in 2002 by Frank and Toland.

**Table 4**  
**ICT Skills and Experience ALL participants**

ICT Skills and Experience	L/I	N	Mean $\pm$ Std. Dev.	Median; IQR
Word processing	UG	872	3.8 $\pm$ 1.1	4.0; 3.0 – 5.0
	PG	72	4.2 $\pm$ 1.1	4.5; 4.0 – 5.0
	I	116	4.3 $\pm$ .74	4.0; 4.0 – 5.0
Spreadsheets	UG	872	3.1 $\pm$ 1.1	3.0; 2.0 – 4.0
	PG	72	3.1 $\pm$ 1.3	3.0; 2.0 – 4.0
	I	116	3.6 $\pm$ 1.1	4.0; 3.0 – 4.0.
Paint, Publisher etc	UG	873	3.2 $\pm$ 1.2	3.0; 2.0 – 4.0
	PG	71	3.0 $\pm$ 1.3	3.0; 2.0 – 4.0
	I	116	2.8 $\pm$ 1.2	3.0; 2.0 – 4.0
Email	UG	872	4.1 $\pm$ 1.0	4.0; 3.0 – 5.0
	PG	71	4.6 $\pm$ .66	5.0; 4.0 – 5.0
	I	116	4.5 $\pm$ .75	5.0; 4.0 – 5.0
Eportfolio	UG	873	3.2 $\pm$ 1.2	3.0; 2.0 – 4.0
	PG	71	2.6 $\pm$ 1.4	2.0; 1.0 – 4.0
	I	115	2.2 $\pm$ 1.3	2.0; 1.0 – 3.0
Moodle/ WebCT/ Blackboard other LMS/ CMS	UG	872	3.8 $\pm$ 1.0	4.0; 3.0 – 5.0
	PG	71	4.0 $\pm$ 1.0	4.0; 3.0 – 5.0
	I	116	3.8 $\pm$ .97	4.0; 3.0 – 4.8
Online library searches	UG	873	3.5 $\pm$ 1.1	4.0; 3.0 – 4.0
	PG	71	4.0 $\pm$ 1.0	4.0; 3.0 – 5.0
	I	116	4.1 $\pm$ .81	4.0; 3.0 – 5.0
Search engines e.g. Google, Yahoo etc	UG	873	4.1 $\pm$ 1.0	4.0; 3.0 – 5.0
	PG	71	4.4 $\pm$ .83	5.0; 4.0 – 5.0
	I	116	4.5 $\pm$ .68	5.0; 4.0 – 5.0
Online Services e.g. registration, pay fees/ bills, shopping etc.	UG	872	3.3 $\pm$ 1.3	3.0; 2.0 – 4.0
	PG	71	3.4 $\pm$ 1.4	3.0; 2.0 – 5.0
	I	116	3.7 $\pm$ 1.3	4.0; 3.0 – 5.0
Facebook, Twitter etc.	UG	873	4.2 $\pm$ 1.1	4.0; 4.0 – 5.0
	PG	71	4.1 $\pm$ 1.1	5.0; 3.0 – 5.0
	I	116	3.2 $\pm$ 1.5	3.0; 2.0 – 5.0
Yahoo messenger, MSN, Gtalk, Skype etc.	UG	872	3.7 $\pm$ 1.3	4.0; 3.0 – 5.0
	PG	71	3.9 $\pm$ 1.1	4.0; 3.0 – 5.0
	I	116	3.5 $\pm$ 1.4	4.0; 2.0 – 5.0
Blogs, wiki	UG	873	3.2 $\pm$ 1.3	3.0; 2.0 – 4.0
	PG	71	3.3 $\pm$ 1.3	4.0; 3.0 – 4.0
	I	116	2.8 $\pm$ 1.3	3.0; 2.0 – 4.0
ICT Skills n Experience	UG	873	3.6 $\pm$ .76	3.7; 3.1 – 4.2
	PG	72	3.7 $\pm$ .84	3.9; 3.1 – 4.3
	I	116	3.6 $\pm$ .71	3.7; 3.0 – 4.1

The PG learners had other skills also between 4 to 4.2 such as ‘word processing’, ‘LMS/CMS’ and online library searches. All these skills are important for online learning. The instructors too had

a sound set of ICT skills and experience, especially their ‘word processing’, ‘email’, ‘online library searches’ and ‘search engines’ skills which ranged from 4.1 to 4.5 (all above ‘very good’). This presented an encouraging scene in terms of skills and experience of learners and instructors. However, the lowest mean for ‘blogs/wiki’, ‘spreadsheet’ and ‘eportfolio’ indicates the need for an improvement in these skills, which are equally useful (if not more) for academic purposes for all learners. Some of the digital skills indicate quite low values for some learners which suggests that the result is not homogenous. The learners with certain digital skills having around a value as low as 1 and 2 definitely needs attention.

## Gender and ICT

Amongst 873 UG learners, there were 438 female and 435 male learners. A comparison of their ICT access, skills and experience is illustrated in Table 5.

**Table 5**  
**A comparison of ICT Access, Skills and Experience between the genders amongst UG learners**

UG Learners	N	ICT Access Period	ICT Skills & Experience
		Mean $\pm$ Std. Dev. Median; IQR	Mean $\pm$ Std. Dev. Median; IQR
Male	435	2.7 $\pm$ .86 2.5; 2.0 – 3.5	3.6 $\pm$ .74 3.6; 3.1 – 4.1
Female	438	2.8 $\pm$ .83 3.0; 2.0 – 3.5	3.6 $\pm$ .78 3.7; 3.2 – 4.2

The means for various ICT related investigation revealed that female learners had nearly the same access, skills and experience as male learners; statistical tests revealed that there was no significant difference between the two. The standard deviation for ICT skills and experience which in turn can affect their online practices also indicated tight closeness between the learners’ skills and experience within each category. It is worth a mention that about 87% of UG learners were below 25 years of age, could this be a new generation effect: the gender neutral ICT scenario? Even though the sample from PG learner was small (N=72) but considering their age group, it was considered worth investigating. The results of this investigation are illustrated in Table 6.

**Table 6**  
**A comparison of ICT Access, Skills and Experience between the genders amongst PG learners**

PG Learners	N	ICT Access Period	ICT Skills & Experience
		Mean $\pm$ Std. Dev. Median; IQR	Mean $\pm$ Std. Dev. Median; IQR
Male	31	3.2 $\pm$ .94 3.5; 2.5 – 4.0	3.4 $\pm$ .97 3.8; 3.0 – 4.0
Female	41	3.4 $\pm$ .69 3.5; 3.0 – 4.0	3.9 $\pm$ .69 4.0; 3.3 – 4.5

Similarly, male (N=31) and female (N=41) PG learner ICT access, skills and experience did not show any significant difference. However, there is a group of UG learners whose ICT access stands at 2 (poor) and 2.5 (between poor and good) which needs to be given due consideration. Similarly, male PG learners with access around 2.5 also require attention. The standard deviation was also within a small range indicating very few outliers in both UG and PG male and female learners. The learners on the whole showed no gender difference in the area of access, skills and experience with ICT.

### Satisfaction with the current learning environment

The learners' response is separated for UG and PG learners and compared with that of instructors' response as indicated in Table 7.

**Table 7**  
**Satisfaction with the four LE for ALL participants**

	Least			Fair			Good			Very Good			Excellent			Total		
	UG	PG	I	UG	PG	I	UG	PG	I	UG	PG	I	UG	PG	I	UG	PG	I
<b>P</b>	7	Nil	3	22	nil	3	48	nil	16	42	Nil	4	15	Nil	1	134	Nil	27
<b>F2F</b>	0	Nil	3	18	0	2	86	7	22	102	12	29	56	10	10	262	29	66
<b>B</b>	8	Nil	0	50	2	2	153	7	5	115	14	8	34	4	0	360	27	15
<b>O</b>	14	Nil	0	19	4	3	42	4	1	28	4	0	7	4	0	110	16	4
<b>Total</b>	29	Nil	6	109	6	10	329	18	44	287	30	41	112	18	11	866	72	112

Key: UG = Undergraduate learner; PG = Postgraduate learner; I = Instructor

A total of 7 invalid responses for UG learners and 4 invalid responses for instructors were recorded leaving a total of 866 valid responses for UG learners and 112 valid responses for instructors for analysis. The satisfaction rating of good, very good and excellent was highest for UG learners in the F2F (93%) followed by blended (84%), print (78%) and online (70%) LE. All 72 responses by PG learners were valid. The popularity of F2F LE would have enormous implication for the HE sector in PICs. It would be worthwhile finding out the reasons for these figures. The mean and standard deviation for both UG and PG learners and instructors is illustrated in Table 8.

**Table 8**  
**Mean and Std Deviation for Satisfaction with LE for ALL participants**

Which instructional delivery mode are you focusing on?	Mean			Std. Deviation			N		
	UG	PG	I	UG	PG	I	UG	PG	I
Print	3.27	Nil	<b>2.89</b>	1.00	Nil	<b>0.93</b>	134	Nil	27
Face-to-face	3.75	4.10	<b>3.62</b>	0.87	0.77	<b>0.94</b>	262	29	66
Blended	3.33	3.74	<b>3.40</b>	0.91	0.81	<b>0.74</b>	360	27	15
Online	2.95	3.50	<b>2.25</b>	1.10	1.20	<b>0.50</b>	110	16	4
Total	3.40	3.83	<b>3.37</b>	1.00	0.90	<b>0.97</b>	866	72	112

Key: UG = Undergraduate learner; PG = Postgraduate learner; I = Instructor

It is evident from Table 8 that the learners' satisfaction was highest in F2F LE and satisfaction was least in the online LE. The instructors' responses were also the same. It should be noted that UG learners seems satisfied with Print LE more than instructors and this is quite useful information which must be investigated further. What aspect of print satisfies UG learners but does not satisfy instructors? The mean and standard deviation for male and female (Table 9) were investigated to see if there was any gender difference towards satisfaction.

**Table 9**  
**Mean and Std. Deviation for Satisfaction with LE for Gender difference**

		UG learners		PG learners	
		F	M	F	M
N	Valid	436	430	41	31
	Missing	2	5	0	0
	Mean	3.43	3.37	3.80	3.87
	Std. Deviation	0.99	0.96	0.98	.806

Key: F = Female; M = Male

There was no significant difference between the male and female satisfaction. Further investigation to probe this issue to affirm if there are other aspects affecting the two genders in different LEs would be also worth looking at.

### ***Some relationships of interest***

The relationships were considered separately for UG and PG learners as well as instructors for the four LE (P/F2F/B/O). The instructors for online LE being only 4 are not considered for this investigation.

### ***UG Learners***

There were a few weak positive relationships between ICT access period and ICT access extent in all the four LEs for UG learners as indicated in Table 10. It establishes that access to ICT skills would enhance ICT skills and experience of UG learners.

**Table 10**  
**Correlations of age, ICT and satisfaction with LE in case of UG learners**

	Spearman rho	ICT Skills and Experience			
		Print	F2F	Blended	Online
ICT Access period	Corel. Coeff	.368**	.312**	.373**	.323**
	Sig. (2-tailed)	.000	.000	.000	.001
	N	136	265	362	110

\*\* Correlation is significant at the 0.01 level (2-tailed).

There was no significant relationship between age and satisfaction with LE in any of the four LEs amongst the UG learners.

### PG Learners

There was a moderate positive to strong relationship between variables as shown in Table 11. The fact the ICT skills and experience increase with access indicates PG learners' readiness and adaptability to digital skills which in turn may have implication on their preference for their LE. The strong relationship between age and satisfaction with online LE suggests flexibility in online LE would be the reason (Raturi, 2010).

**Table 11**  
**Correlations of age, ICT and satisfaction with LE in case of PG learners**

F2F	Spearman rho	Age	Blended	Spearman rho	ICT Skills and Experience	Online	Spearman rho	Satisfaction with the Online LE
ICT Access period	Corel. Coeff	.492**	ICT Access period	Corel. Coeff	.630**	Age	Corel. Coeff	.788**
	Sig. (2-tailed)	.007		Sig. (2-tailed)	.000		Sig. (2-tailed)	.000
	N	29		N	27		N	16

\*\* Correlation is significant at the 0.01 level (2-tailed).

### Instructors

There was a moderate positive and a negative relationship as indicated in Table 12.

**Table 12**  
**Correlation of age, ICT and satisfaction with LE in case of Instructors**

	Spearman rho	ICT Access period Print	ICT Skills and Experience F2F
Age	Corel. Coeff	.406*	-.459**
	Sig. (2-tailed)	.044	.000
	N	25	63

\*Correlation is significant at the 0.05 level (2-tailed); \*\* Correlation is significant at the 0.01 level (2-tailed).

The negative relationship between ICT skills and experience with age for instructors engaged in F2F LE indicates trend prevalent in across the globe in Higher Education Institutions (HEI); younger the faculty member greater are their ICT skills and experience. This negative relationship can also influence instructor's satisfaction and preference for an LE.

### Conclusion and implication

The ICT experience for both learners and instructors was between 'good' and 'very good' was encouraging considering the very limited ICT exposure in high schools which often resulted in UG learners needing time to adjust to the technological demand of tertiary institutions. ICT access and experience is gender neutral. Approx. 75% of all learners and 90.5% instructors reported they had access to computer and internet at home and work/USP while 53% of all learners admitted having mobile phones with internet access. This can influence their LE preference which is worth exploring. While learners' skills were between 4 and 4.6 for emails, social networking sites and search engines, the mean for 'blogs/wiki', 'spreadsheet' and 'eportfolio' was lowest (3.1 – 3.2

except for PG learners' 'eportfolio' skill at 2.6); and this which are equally useful (if not more indicates the need for an improvement in these critical skills so) for academic purposes for all learners. The greater use of email since 2002 study (Frank & Toland) indicates the changing times and needs of the learners. The PI learners' use of technology for leisure more than for educational purposes is similar to learners in other parts of the world (Bennett, Maton & Kerwin, 2008; Bennett & Maton, 2010; Gros et al 2012; Passanisi & Peters, 2012; Romero et al, 2013; Selwyn, 2009; Tanner, 2011). Therefore, this can influence their satisfaction with LE and can have implication for preferences for LE.

There is an overall weak positive relationship between ICT skills and experience with ICT access, indicating that learners must be practising 'perseverance' or 'intrinsic motivation' to show good skills and experience, considering that access was not the same for all. In the case of PG learners in blended LE, there was a moderately strong positive relationship between ICT access and ICT skills and experience.

There was a moderate negative relationship between age and ICT skills and experience amongst the instructors in F2F LE. A common phenomenon generally seen around the world is that the younger the instructor, better are their ICT skills and experience and therefore the negative relationship is understandable.

The mean values for learner satisfaction was least in 'Online LE' and highest in 'F2F LE' and same was the case for the instructors too. The PG learners' satisfaction was higher than UG learners in all four LE. The learners and instructors reported that they were most satisfied with the F2F LE and least satisfied with the fully online LE. However, the fact that learners and instructors' satisfaction with blended LE also ranged from 'good to very good' is indicative of ease of adapting changing Les.

It is clear that young learners in PICs who may fall in the category of digital natives, are not exactly digital natives but digital adapters, as they master the digital skills through perseverance. However, their satisfaction with face-to-face LE is indication of emphasis they place on human interaction. On the other hand the mature learners seem to be satisfied with face-to-face LE followed closely by technology enabled environment (blended LE); it must be noted that they possess good digital skills, access and experience which probably affords blended LE for them in FALE PG courses (Raturi, 2010).

The learners and instructors are all adapting digital habits and transforming to digital adapters. Therefore, the ICT infrastructure and access cost to Pacific islanders needs urgent attention. The governments in PICs need to work closely with Higher Education Institutions (HEI) and provide a better ICT infrastructure and supporting policies in order to assist HEI with their strategic plan to move towards online learning.

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## About the authors

**Dr. Shikha Raturi** is an academic in the area of elearning and also co-manages Teachers Educational Resource and Elearning Centre (TEREC) at the University of the South Pacific, Fiji. She worked as a researcher and teacher integrating technology in Chemistry interacting with learners from diverse backgrounds from Africa to Pacific Island Countries (PICs) for nearly 20 years. She made a transition to elearning/education field 8 years back, studying and researching the learning environments in Higher Education. Her work through TERC involves working on elearning issues and projects with ministries of education across PICs. She is a certified online instructor with specialization in online pedagogy and administration. Email ids: [raturi\\_s@usp.ac.fj](mailto:raturi_s@usp.ac.fj) or [shikhanr@gmail.com](mailto:shikhanr@gmail.com)

Website: [www.usp.ac.fj](http://www.usp.ac.fj)

**Dr. Subhas Chandra** is an Associate Professor in the area of 'Assessment and Evaluation' at the University of the South Pacific. He was previously Foundation Professor and Head of the School of Education at the Fiji National University. He has worked in Australia as Director of Psychology at the Canberra Hospital as well as an academic faculty member in the Departments of Education and Psychology in several universities in the Australian Capital Territory and the state of New South Wales. He has published in international, regional and local journals. Email: [chandra\\_su@usp.ac.fj](mailto:chandra_su@usp.ac.fj)

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**Editor's Note:** Video is playing an increasing role in distance education for enriching and personalizing communication. It is an excellent reporting medium because it captures images, sounds and motion in a natural way with dimension and meaning. More ambitious users can plan, script, edit and even add images and simple animations to focus ideas, clarify meaning, explain difficult concepts and achieve higher levels of learning.

## **Video-based assessment in computer science distance education**

**Nicolas Gromik Paul Kwan**  
Australia

### **Abstract**

This paper reports on an exploratory case study that explored the potential for using video-based assessment in an Australian distance education institution, using a video-based assessment task and post-intervention survey. Thirty-seven students taking a computer science course completed video-based assessments relating to course relevant content and participated in the survey, which collected data on their perceptions and experiences of the assessment task. Overall, the participants' responses were positive and indicated that video-based assessment is likely to be suitable for use in computer science distance education at this institution. Findings are likely to be of interest to similar institutions considering the adoption of video-based assessment methods.

**Keywords:** video-based assessment, computer science, distance education, higher education, post-intervention survey.

### **Introduction**

This paper reports on an exploratory case study that explored the potential for using video-based assessment in a computer science course at an Australian distance education institution. Specifically, the purpose of the study was to investigate the possibility of introducing video-based assessment as a method to evaluate the students' computer programming skills and understanding, based on survey evidence of their experiences of completing the video-based assessment and their perceptions of its potential benefits.

It builds on a body of previous research that has highlighted the potential advantages of video-based assessment for learners and educators alike, and contributes to this body of literature by investigating the potential use of video-based assessment among distance education students, a group that has been under-researched in this field. In particular, the study aims to provide insights into the suitability of video-based assessment for computer science distance learners and the students' perceived benefits of carrying out the video-based assessment task compared with the text format programming exercise that it replaced.

### **Review of the literature**

Improvements in video technology and the increasing availability of inexpensive recording devices have facilitated the emergence and effective use of video-based learning in a range of educational contexts. Numerous researchers have provided evidence of the positive impacts of instructional videos on learning (e.g. Gruba, 2006; Smyth, 2011; Song, 2014; Zhang, Zhou, Briggs & Nunamaker Jr., 2006). However, the majority of the tasks involved in video-based learning to date can be described as passive, including for example the use of video podcasts (webcasts) (Giannakos, & Vlamos, 2013), visualization tools (Lee, 2013), or vodcasts (Lowman, 2014).

Bloch (2007) put forward the idea that learners might also be involved in producing video; an argument that built on Bandura's (1977) research into video-modelling which had suggested that

students can learn from observing themselves or peers enacting positive behaviour. More recent advances in video technology have made it possible for institutions to engage students in producing their own video artefacts for purposes of analysis, reflection and assessment (Shepherd & Hannafin, 2008). This potentially offers benefits for institutions and learners alike.

In recent years, video-based assessment has indeed been proven to be a useful tool for both educators and students (Strand et al., 2013; Tan & Towndrow, 2009; Turner, & West, 2013; Zick, Granieri & Makoul, 2007) in a diverse range of academic areas including teacher training (Gebhard, 2005; Bannink, 2009) and nursing (Strand, Fox-Young, & Bogossian, 2013). For example, Strand et al. (2013) demonstrated the effective use of camcorders to capture evidence of medical students' ability to carry out physical examinations during clinical placements. The literature also provides evidence that video-based assessment can develop students' research skills, problem solving and familiarity with technology, among other benefits (Anu, Jorma, & Sinikka, 2014).

Angelo and Cross (1993, as cited in Hurd, & Garrahy, 2009) emphasised that the use of video-based assessment “allows faculty to assess how students understand their problem solving process and how to explain those processes to themselves” (p. 226), while Hathaway and Norton (2012) argue that by providing students with a structured approach to task completion, video production can enable them to become more critical thinkers. Video production can empower students to become more reflective not only of the content they cover, but also of their presentation or production style (Jordan, 2012). This is illustrated by Yerrick et al. (2003), who explain that filming and editing require the video producer to consciously select the most effective audio-visual output that demonstrates their understanding of and ability to explain certain concepts or issues.

Until recently, digital video camera recorders had generally been the main tool used for producing videos for assessment purposes, and have proven to be effective learning and assessment tools (Gromik, 2009; Strand et al., 2013). With the emergence and growing accessibility of mobile technologies, however, there has been increasing research interest in the possibility of using smartphone digital video cameras for the purpose of student self-assessment in situ, as well as for other learning purposes (Gromik, 2015). Advances in smartphone technology have provided subscribers with the potential for learning at any time or place, at their own pace, using audio and visual resources readily available online, or via their place of education or employment.

The emergence of more affordable video technologies and online resources is especially significant for distance education students, who can utilise these to help overcome any limitations or challenges associated with distance learning. To date, however, relatively little research has been conducted into the use of video-based assessment for off-campus, distance education students. Also, concerns have been expressed about video-based assessment not being suitable for all types of learners, highlighting the need for further research into individual experiences of using this approach (Yoo et al., 2009).

## Research setting and methods

Distance learners on a computer science course (COMP131) at the University of New England (UNE), New South Wales, Australia, were invited to participate in the study. The majority of students attending UNE are off-campus external students (17,446 compared with 4,423 internal students in 2014) (UNE, 2015) and most are part-time students. COMP131 is offered by the Computer Science department as an introduction to a programming and professional practice unit, which can be taken in either on or off-campus mode, with all learning materials available online. Students are exposed to “techniques for designing algorithms and implementing them as computer programmes using a high-level, structured programming language” (COMP131, 2015). The module requires students to complete several forms of assessments, including six individual

assignments (one essay and five programming exercises) and a final examination. For the purpose of the study, students were allocated a new task involving the creation of audio-visual demonstrations of their programming knowledge, which replaced one of the existing text format programming exercises.

The intervention required the participants to prepare a video demonstration of no more than two minutes in length on a computational concept covered in their course. For instance, one of the assessment tasks asked the students to “take a real-life object and describe some of the attributes and methods it might have if it were an object in Java.” Participants could use any software or hardware readily available to them when completing the tasks, including smartphones. To reduce any technical challenges that may impact on students’ willingness to participate and to complete and send their videos, instructions for installing relevant software and transcoding video files in order to submit these via the online learning management systems were provided. No specific training in video production or other technical assistance was provided to the participants.

While all students taking COMP131 were encouraged to complete the video-based assessment, they were also provided with the option of writing a textual description for the task instead, as had previously been possible in this subject. By allowing students to select between the video and text based explanation of a computational concept we tried to reduce the possibility that any students would be placed at risk of not successfully completing the module.

After carrying out the video assessment task, students were asked to complete a post-intervention survey. The survey included closed questions that collected data on participants’ demographic characteristics and access to technology, and a number of Likert-scale type questions, which investigated their experiences, and perceptions of the video-based assessment task.

### **Participants**

In total, 37 participants fully completed the video-assessment task and at least 50% of the post-intervention survey. Four students declined the opportunity to participate in the research, and two students completed less than 50% of the survey and their responses were not included in the results. The achieved sample of 37 included 28 male 9 female students, and covered a wide age range as shown in Table 1, with the highest number of participants (N=10) aged between 26 and 30. The majority of the participants were off-campus students (N=32), with one being on campus but studying via the online mode.

**Table 1**  
**Age Range of Participants**

	Frequency	Percent	Valid Percent	Cumulative Percent
18 to 20 years old	4	10.8	10.8	10.8
21 to 25 years old	6	16.2	16.2	27.0
26 to 30 years old	10	27.0	27.0	54.1
31 to 35 years old	6	16.2	16.2	70.3
36 to 40 years old	7	18.9	18.9	89.2
41 to 45 years old	2	5.4	5.4	94.6
46 to 50 years old	1	2.7	2.7	97.3
Over 50	1	2.7	2.7	100.0
Total	37	100.0	100.0	

The survey also collected information on participants' access to technology at home, and the results are shown in Table 2. As this shows, the majority of the participating students had access to a laptop computer (N=31), a desktop computer (N=29), a web camera (N=32), access to the Internet at home (N= 36) and access to the Internet via their mobile phone (N= 35). However, fewer students had access to a digital video recorder (N=22). Despite the lower number having access to a digital video recorder, the data suggests that very few students were likely to have been at a disadvantage when completing the video assessment task due to limited access to technology.

**Table 2**  
**Access to Technology**

Do you have a ...	<u>Laptop</u>	<u>Desktop</u>	<u>Web camera</u>	<u>Digital video recorder</u>	<u>Access to the Internet at home</u>	<u>Mobile Internet access</u>
	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)
Yes	31 (83.8)	29 (78.4)	32 (86.5)	22 (59.5)	36 (97.3)	35 (94.6)
No	6 (16.2)	8 (21.6)	5 (13.5)	15 (40.5)	1 (2.7)	2 (5.4)

## Results

One survey question was designed to investigate the participants' perceived levels of confidence in using technology, after completing the video-based assessment. This collected data using a 7-point Likert scale (1= highly confident to 7 = not confident at all). The remaining survey questions asked participants to rate their level of agreement or disagreement with specific statements relating to the assessment, using a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). The results are reported below using mean scores and standard deviations for each survey item.

### **Level of confidence after completing the video assessment task**

Table 3 reports the survey findings relating to levels of confidence after completing the video-based assessment, based on a 7-point Likert scale (1= highly confident and 7 = not confident at all). Students reported that after completing the video assessment task, they perceived some gain of confidence with computer programming (M=3.42), using a web camera (M=3.51) and listening to video files (M=3.73). This indicates that, for the most part, students were moderately confident with their computer programming, web camera use and listening to audio-visual skills.

**Table 3**  
**Level of Confidence after Completing the Video Assessment Task**

	Mean	SD
After completing the video-based assessment, what is your level of confidence with using a web cam	3.51	2.12
After completing the video-based assessment, what is your level of confidence in listening to audio-visual	3.73	2.15

Table 4 presents the findings relating to the participants' perceived improvement in particular types of IT skills. After completing the video assessment, the students indicated that they had experienced improvements in these skill levels. For example, they reported improvements in

general video production skills ( $M=4.54$ ), in their ability to manipulate digital images or video ( $M=4.38$ ), and in their Internet search skills ( $M=4.22$ ).

**Table 4**  
***Skill Improvement Rating***

<b>After completing the video-based assessment, I believe that my skills to...</b>	<b>Mean</b>	<b>SD</b>
Play digital audio files have improved	3.92	0.894
Create/edit audio and video have improved	4.54	0.836
Manage/manipulate digital photos or videos have improved	4.38	0.861
Use the Internet to search for unit related information have improved	4.22	1.004

Table 5 reports on the students' perception of the video production process and its effects on their abilities or skill. In contrast to their responses regarding more general skill improvements, as shown in Table 4, this data indicates that students did not perceive noticeable improvements or gain much confidence in their ability to use the specific technology involved in video assessment production.

**Table 5**  
***Self-perceived Improvement with Video Assessment Production***

	<b>Mean</b>	<b>SD</b>
I have taught myself how to produce an effective video assessment	3.78	0.821
I feel more confident about my ability to produce a video assessment	3.76	0.895
I was able to solve any challenges I have with video assessment	3.78	0.976
Producing video-based assessment improved my creativity	3.19	1.151
Producing a video-based assessment improved my ability to express my opinion logically	3.35	1.23
Using a web camera was easy for me	3.7	0.878
Using a digital video camera was easy for me	3.76	0.83

As Table 6 reveals, students' reported experiences of the video-based assessment task indicated that, on the whole, this was perceived to be useful, easy to complete and associated with certain benefits. For example, students did not believe that the task was stressful ( $M=2.68$ ). Further, most participants indicated that they did not need any assistance with producing their video assessment ( $M=1.81$ ), and that they did not think the cost of sending the videos to their teacher was prohibitive ( $M=1.54$ ). Students were also in agreement that producing a video for learning ( $M=3.72$ ) and for assessment purposes ( $M=3.68$ ) was for the most part easy.

**Table 6**  
***Perception of the video-based assessment task***

	<b>Mean</b>	<b>SD</b>
Video-based assessment was useful for this unit	3.32	1.203
Video-based assessment was useful for any courses	3.35	0.978
Producing a video for learning was easy for me	3.72	0.849
Producing a video for learning was too time consuming	3.05	1.433
Producing a video for assessment purposes was easy for me	3.68	0.915
Producing a video for assessment purposes was too stressful	2.68	1.056
I believe now that producing my own videos for learning purposes did help me learn better	3.27	1.239
Using video-based assessment did make learning about computer sciences more interesting	3.05	1.373
I believe now, that students studying computer sciences should produce video assessments	2.95	1.246
I needed assistance with producing my own video-based assessment	1.81	0.776
The cost of sending my video assessments to my lecturer was expensive	1.54	0.73

On average students reported that video-based assessment may have had positive impacts on their learning, though relatively few agreed strongly that this was the case, as indicated by the means shown in Table 7. For example, students reported that video-based assessment made learning about computer programming easier to understand to at least some extent ( $M=3.38$ ), and similarly may have somewhat improved their content learning about computer programming ( $M=3.86$ ).

**Table 7**  
***Video assessment production and learning gain***

	<b>Mean</b>	<b>SD</b>
Producing video assessment has made learning about computer programming interesting	3.59	1.978
Producing video assessment has made computer programming easy for me to understand	3.38	1.905
After producing video assessment I enjoy learning about computer programming languages	3.53	1.748
I believe that using video assessment has improved my learning strategies	3.78	1.974
I believe that using video-based assessment to complete computer programming assessment has improved my content learning	3.86	1.828

## Discussion

Overall, the participants' responses about the use of video-based assessment and its perceived benefits were positive, and indicated that integrating video production into the assessment process for COMP131 would be likely to enhance students' learning and deliver educational benefits.

Previous studies have identified the issue of student self-perception and losing face in front of an audience as a potential barrier to the adoption of video-based assessment. Jordan (2012), for example, reported that some participants were reluctant to be video-recorded as this may have been perceived as "narcissistic" (p. 22). By contrast, being distance education students, the participants in our study were able to produce video in their own homes, which may have helped overcome these types of concern. The participants in the current study also perceived the video-based assessment task as conducive to learning, which have been related to their level of comfort in producing the videos in a familiar home environment. It is also possible that the task was not seen as threatening since the students were required to demonstrate their computer programming skills in video form, rather than focusing on themselves as individuals.

Qualitative evidence from Yang (2014) suggests that students enjoy the creative freedom and the opportunity to explore and use the various features offered by video technology. The literature also suggests that video-based assessment can have positive impacts on research skills and problem solving (Anu et al., 2014). The quantitative data presented in this paper concur with these findings. The computer science students in the present study perceived that, through producing a video for assessment purposes, they experienced improvements in creativity and in their ability to express information logically, as well as increases in their ability to manipulate digital photos and videos, to solve challenges in the production of video assessments, and an overall enhanced effectiveness in video assessment performance.

Other researchers have documented the ability of students to recognize the educational benefits of technology-enhanced learning, such as the use of social networking sites (Brady, Holcomb and Smith, 2010). Similarly, participants in this research indicated that it was easy for them to produce videos, and that participating in this activity increased their level of interest in the assessment more interesting. Notably, students indicated that they did not find it stressful or difficult to complete the self-generated video assessment pieces. This indicates that students require limited training and preparation to learn to produce videos that are suitable for assessment purposes.

While participants indicated that they have access to suitable technology and are capable of completing the task independently, few indicated that they would be willing to recommend the use of self-produced video assessment to future students. In contrast, Borup, West and Graham (2012) found that evidence that some of their participants would recommend asynchronous video communication to their peers. Our findings indicate that, though the participants in this study appeared to enjoy producing a video for assessment purposes and recognise the benefits of this approach, they do not feel strongly that this should necessarily be adopted in future courses at this institution.

### Limitations

The issue of small sample size is one that consistently raises concerns among the academic community. However, given the selected context, and the novelty of the concept being addressed in this research, the use of a small sample was deemed to be suitable for this specific case study. The aim was not to generalise the findings to a wider population, but rather to inform educators about the potential of this form of student assessment.

Another limitation relates to the difficulties of accessing more in-depth information about students' reflections on their video production processes, challenges and solutions. Zick et al. (2007) assert that video self-assessment "is highly informative for faculty" (p. 164), and it would

indeed have been even more informative to interview all participating students in-depth to provide a fuller understanding of their views and experiences. This was not feasible given the geographically dispersed nature of this sample of distance education students, though the possibility of doing so provides a potential avenue for further research.

## Conclusion

As an exploratory case study, the objective of the research was to ascertain whether or not video-based assessment would be a feasible teaching and learning approach in a distance education environment. The goal was not to report on student performance in video production performance, but on students' perceptions of the video production process and its conduciveness to learning.

To date, video production in the academic context has primarily been a task completed by educators (Guo, Kim & Rubin, 2014) to provide learning materials for students. In contrast, the findings of this exploratory case study provide support for the conclusions of Zick, Granieri and Makou's (2007) that student-produced video assessment is a valid approach providing a varied range of authentic learning opportunities that may lead to the enhancement of their 21<sup>st</sup> century skills and knowledge.

As more research is conducted on student-produced video assessment, it will become possible to gain a greater understanding of the teaching and learning merits and implications of this approach. Affordable technology increasingly provides individuals with greater access to higher education. It is now up to educators to capture the potential educational benefits of these such emerging and converging technologies, particularly in the areas of distance education and student assessment.

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## About the authors

**Dr. Nicolas Gromik** is an international researcher with higher education lecturing experience in Australia, Japan, Qatar, Singapore and the United Arab Emirates. His research interest are in video production to enhance language and content learning.

[Gromik.n.a@gmail.com](mailto:Gromik.n.a@gmail.com) (preferred) [ngromik@une.edu.au](mailto:ngromik@une.edu.au)

**Dr. Paul Kwan's** current research interests include Artificial Intelligence, Computer Vision and Image Processing, Complex Systems and Computational Modelling, and Bioinformatics. Currently, he is a lecturer for various computer courses and manages a number of Ph.D. projects.

[Paul.kwan@une.edu.au](mailto:Paul.kwan@une.edu.au)

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