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Research and innovation in teaching and learning are prime topics for the *Journal of Instructional Technology and Distance Learning* (ISSN 1550-6908). The Journal was initiated in January 2004 to facilitate communication and collaboration among researchers, innovators, practitioners, and administrators of education and training involving innovative technologies and/or distance learning.

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Editorial

Academic Journals

Donald G. Perrin

There are many sources for academic journals. Each have difficulties in achieving and maintaining different aspects of quality. Publications in academic journals has become the standardized test for retention, promotion and tenure in higher education, and a measure of acceptance by peers in specific academic disciplines and professional associations. Publication may be accomplished by the funding agency, be it business, industry, government, military, foundations, or philanthropic organizations. There are companies such as Encyclopedia Britannica whose mission is to provide information in a broad range of topics that has been carefully vetted by experts. The mission of publishers such as Sage and Elsevier is to publish refereed research journals for a wide range of professional associations and disciplines. Then there is the textbook industry, a highly competitive group of companies who have embedded the curricula of large city school systems, universities, and colleges into textbooks, workbooks, videos, interactive multimedia, computer based learning materials and the Internet.

Since the advent of the printing press, publication has experienced a host of innovations from movable type to linotype and desktop publishing, and from the Gutenberg hand press to gigantic automated presses for printing newspapers and encyclopedias. Since World War II, the playing field has been disrupted by newer technologies: audiovisual, as with audio books, films as with Encyclopedia Britannica Films, videos – largely to provide an inexpensive production and distribution media for films, and more recently by computers and digital media, the internet, and social media. Every innovation that is successful in the public sector eventually finds its way into schools, colleges and universities. Textbook publishers now compete not only with the quality of the textbook, but also with an array of digital services they must provide for the teacher – and for the student.

Innovations often replace or change their predecessor. For example, television went beyond radio to add sound, images and motion including films and live events; this in turn changed the nature of radio. The sacred printed media we have used for centuries is being modified and sometimes obsolete. Encyclopedia Britannica published its last printed addition in 2012 to be sold as a CD. That too is obsolete and it is now accessed from the Web, like its digital cousin the Wikipedia. The latest most up-to-date information on any topic is now accessible on the web. There is one other big difference. Britannica is a business that has to run at a profit to survive. The Wikipedia is open source which means is available at no cost and almost anyone who can add to or improve upon the existing topic can volunteer their contribution. Where Britannica selects the best experts they can find and pay them, the Wikipedia draws from a global population of experts for free.

The WWW and inexpensive computers and software make it possible for anyone to become a publisher. But for global publication a number of standards must be met. First the quality of the research – design, implementation, data collection, analysis, interpretation of the results. These are under the control of the researcher. The usual method of validation is to have the research reviewed by editors, peers who are expert, and if possible, leaders in the discipline being studied. Because of the amount of work involved getting referees, editors, librarians, copy writers and other expertise to check grammar, syntax, vocabulary, spelling, statistics, tables, illustrations and references, most professional associations have publishing companies do the production and distribution. This may be paid for in part by the association, and there may also be a cost to the author, even if the article is not published.

This has become a concern for researchers and for libraries as we will see in the December issue.

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Editor's Note: This paper shows how an integration of theory and practice can be used as a simulator that closely parallels real world experiences to achieve for effective learning and expert performance.

An integrated approach for teaching a computer networking course through the use of a virtual lab

Joon Son,Vincent Nestler, Yiran Wang
USA

Abstract

Much of what students learn in college as it relates to the skills needed for the cyber workforce are scattered throughout their academic experience. Students do not get many opportunities to use all their acquired skills together or to have contextual exercises that will be akin to what will be experienced in the workforce. As such, by the time students graduate and seek employment, the students generally lack the skills and hands-on experience required by hiring companies. Further, they lack the self-efficacy as it relates to their chosen field, impacting their decisions and approaches to solving problems. To address this issue, the authors have developed an integrated framework to teach computer networking and security and provide students with experiences that are more likely to be experienced in the workforce. The approach puts the emphasis on collaboration not isolation, on process not content and on context not specialization. The framework integrates and leverages three main concepts: the design of instruction, the use of a virtual environment, and a learner-centered approach. A preliminary evaluation of the effectiveness of the framework was conducted through pre and post treatment questionnaires. The questionnaires focused on students' self-efficacy as it relates to the various component topics integrated into the course. The raw data was collected and used for analysis. The results of the questionnaire showed a significant increase in student self-efficacy and confidence in entering the workforce.

Keywords: integrated approach, computer networking, cyber security, virtualization, learner-centered approach, instructional design

Introduction

The current situation for organizations as it relates to hiring skilled networking and security professionals is bleak. Just about every organization in existence today, public or private, big or small, has a need for highly trained professionals in order to remain competitive and relevant. Yet there is a significant dearth of qualified individuals for many of these jobs. This will likely require a greater number of schools to offer network/cybersecurity degree and certification programs. However, given the quality and quantity of qualified people needed to meet the demand of the cybersecurity workforce, the current instructional approach will not do. Cybersecurity education has some unique challenges that need to be addressed. This paper will present a description of some distinct issues networking and cybersecurity that educational institutions must contend with, a proposed solution that addresses these issues, and our findings from an implementation of the proposed solution.

Issues of the networking and cybersecurity education

Developing appropriate curriculum and learning plans for the networking and cybersecurity students of today is no small challenge. There are several challenges that must be faced and overcome if we are to prepare our students appropriately for the world to come. Those issues include the workforce shortage, continually evolving technologies, isolation of subject matter, the teacher-centered approach and the need for hands-on learning. This section will discuss each of these issues.

Shortage of skill networking/cybersecurity professionals

Currently, there are over 209,000 jobs unfilled in the US (Setalvad, 2015) and over one million jobs globally (Cisco, 2015). The number is expected to grow to 6 million globally by 2019 (Morgan, 2016). Yet in the U.S. there are only about 50,000 students graduating annually in a computer or information science degree and of those only a small portion are in cybersecurity (DataUSA, 2016). In addition, there are complaints from industry that often, the new hires are not properly prepared for the workforce (Yepez, 2016) and as such will need to be retrained. Retraining can take anywhere between 6 and 18 months.

Continually evolving needs

One of the major reasons for this shortage may be related to the nature of the profession. Unlike most other professions, networking and cybersecurity are not only growing rapidly, but are in a constant state of change. One study indicated that the great majority of employers (93%) indicate there is an overall skill gap, the difference between existing and desired skill levels, among their IT staff and over 50% of organizations attribute the skills gap to the dynamic nature of IT and cybersecurity (CompTIA, 2012). It is imperative for Information Technology (IT) or Management of Information Systems (MIS) departments to continuously evaluate and revise their curricula based upon the needs and requirements by prospective employers of new graduates (Stevens, Totaro, & Zhu, 2011). For instance, Microsoft Windows is a clear example of constant change. Late in 2009, Windows 7 was released (Microsoft.com, 2016). Then in 2012 Windows 8 was released followed by Windows 8.1 in 2013, and then in 2015 Windows 10. That means an undergraduate student starting in the fall of 2011 was at best learning Windows 7 (possibly Vista or XP). By the time that student graduated in 2015, the operating system had gone through significant changes three times. Each version of the operating system has brought with it new and unique challenges.

Isolation of subject matter

The discussion of finding the balance of teaching a subject in theory or practice has been around for generations. In the teaching of networking and security, some schools tend to focus more vocational hands-on teaching while others have a more theoretical focus.

In schools that teach more technically based courses they might teach a course on Linux, and then a course that is Windows centric, another one on Cisco, then another on security. But these classes are often taught in isolation from one another. A person will rarely if ever work in a purely Windows or Linux, or Cisco environment. Not only are networks often a mix of technologies, but the concepts of security apply across all of them. Students need to learn how to work with these technologies and concepts in an integrated fashion.

Other classrooms tend to teach more theory based instruction and focus less on actual real world application of the theory until later in the course. The essential foundational knowledge students need when they get to the workforce is there but there is still a significant gap between theory and practice.

Teacher-centered instruction

Technical classes tend to be taught using a teacher-centered paradigm rather than a student-centered paradigm. In the teacher-centered paradigm, knowledge is transmitted from teacher to student. The student may be expected to learn content passively with the use of copious PowerPoint presentations. Courses tend to specialize and focus on a single discipline, be individualistic and competitive. This type of instruction does not adequately provide the basic knowledge and skills required by many IT positions (Chen, 2003). In the IT related professions, collaboration, and working with converging technologies is more the norm. The current educational practice prepares students for a world that does not exist.

The need for hands-on experience

It is critically important to provide students with a hands-on networking laboratory. Without the networking lab (whether it is physical or virtual), students may not get the experience needed for effective student learning (Hill, Carver, Humphries, & Pooch, 2001; Sakar, 2006). This may also open up a wider gap between IT employers' expectations and student skills (Minch & Tabor, 2003). Some laboratories depend mainly on simulation tools such as OPNET (Guo, Xiang, & Wang, 2007), CISCO Packet Tracer (Smith & Bluck, 2010; Zhang, Liang, & Ma, 2012), protocol analyzers (Matthews, 2005), NS2, and NS3 (Siraj, Gupta, & Badgujar, 2012). The benefits of using the simulation environments are low-cost and easy deployment. However, nothing can replace hands-on experience on real networking devices and real commercial operating systems (Salama & Shawish, 2014).

This lack of hands-on can have a negative effect on graduating students' ability to attain work. A study showed that the most important attribute sought after by IT and cybersecurity hiring personnel was hands-on experience (ISACA, 2016). The study also showed that 64% of the respondents stated that at most only half of applicants were qualified for a security position.

Our solution: an integrated approach

Since no single solution will address all the needs and issues delineated in the previous section, we integrated the following three approaches, each of which addresses one or more of the issues raised in the previous section and is used synergistically. The three approaches are: backward design of instruction, the use of virtual environments, and learner-centered instruction. In this section, we explain the integrated approach and describe each of its components.

The design of instruction: backward design and rapid prototyping

The facilitation of learning is the purpose of instructional design (Gagne, Wager, Golas, & Keller, 2004). There are many approaches to designing instruction and each model has various advantages and disadvantages (Gustafson & Branch, 2002). A blend of the backward design model (Wiggins & McTighe, 2005) and rapid prototyping (Tripp & Bichelmeyer, 1990) may be best suited to address the current need in networking/cybersecurity education.

The backward design model is a simple three-phase model that may offer a clear way to ensure that students acquire the needed skills in a timely fashion in a constantly evolving discipline. The three stages of the Backward Design model are: identify desired results, determine evidence of learning, and develop the learning plan.

In the first stage of identifying the desired results, the standards and requirements for the course are gathered. This may be derived from COBIT (ISACA, 2016), ACM, and NICE Workforce Framework (NIST, 2016), as well as any state or institutional requirements. These desired results need to include the Knowledge, Skills, and Abilities (KSAs) that the workforce so desperately needs. Once the desired results are gathered, determine what evidence of competency looks like. Often standards are vague and require context. The evidence should be activities that integrate many aspects of real world environments students are likely to find themselves in. Last, develop the learning plan to get the students from their current educational state to achieving the desired results.

The systems approach to instructional design finds its strength in effectiveness but not efficiency. It is often a costly means of designing instruction both in terms of time and money (Tripp & Bichelmeyer, 1990). In the design of courses that will experience little change over time due to the content remaining constant (e.g., math, chemistry, etc.), taking the time to sort out all the necessary details can pay off down the road. In networking and cybersecurity, the content is constantly evolving. If too much time is taken to develop the curriculum, it is likely that

significant changes may have already occurred by the time it is ready to be implemented. For this reason, elements of the rapid prototyping design were used. By designing instruction in a rapid prototype fashion, we get the instruction to the students and get them working with and thinking about the problems they can expect to see when they get into the workforce. Each iteration of a course gets revised and adjusted for improvement. Backward design and rapid prototyping can help identify the desired skills students should acquire and meet the continuously evolving needs discussed in the previous section.

Implementing backward design and rapid prototyping instructional design

The first step was to determine the desired results. In order to make the determination some relevant prior research was reviewed (Abraham et al., 2006; Downey, McMurtrey, & Zeltmann, 2008; Stevens et al., 2011). In addition, curriculum standards and recommendations such as ACM SIGITE IT computing curricula guidelines (Lunt et al., 2008), ACM/IEEE Computer Science Curricula 2013 (ACM Computing Curricula Task Force, 2013) and several technical job sites were inspected. To make the vast number of possible desired results manageable, we identified five knowledge domains and derived a set of tasks students should complete to acquire skills specific to each knowledge domain. The identified five knowledge domains were: 1) routing skills 2) Windows server skills 3) Linux/Unix skills 4) network service skills 5) firewall and security hardening skills (see Table 1).

Table 1

Learning five knowledge domain skills by completing tasks in the right-hand side

Knowledge Domain Skill	Tasks to complete for acquiring knowledge domain skill
Routing skills	Configure the network with either static or dynamic routing. Understand sub-netting; configure IP addresses and subnet masks for all machines. Configure and troubleshoot connectivity of all machines on different segments of the network.
Windows server skills	Basic configuration of Windows Server 2008 machines. Install Active Directory Service on the 2008 machine.
Linux/Unix skills	Basic configuration of CentOS machines. Install and configure a workstation linux operating system (e.g., network setup, user/password management, etc.)
Network service skills	Install both authoritative and caching only DNS service. Implement a web server and create a web site using html. Install and configure DHCP.
Firewall & security hardening skill	Create a security policy for the network. Implement Access Control List (ACL) on firewall based on security policy developed. Configure static routing on the firewall. Use security tools to scan the entire network for vulnerabilities. Hardening network devices and servers (e.g., security updates and patches for the CentOS, Windows 7, Windows Server 2008 machines). Prepare network for a penetration test.

To determine evidence of learning and develop the learning plan of the backward design model, the course requires students to complete a course project, which is the dominant factor in the student's grade. Traditionally, course projects are limited in scope and constitute a small portion of the student's grade. In addition, these projects are mostly based on textbook cases, not real world challenging tasks students will face in their professional career. On a typical day, IT specialists work on multiple domains such as routing, Windows or Linux server administration, network security, etc. The course project is designed to mimic the real-world environment and requires students to carry out a series of realistic tasks throughout the quarter. The realistic tasks include configuring different network devices (e.g., routers, Windows servers, Linux servers, and a firewall), implementing various network protocols, and hardening system security.

The creation of the network and the learning plan is where much of the reliance on rapid prototyping came into use. The course was designed in such a way that any instructor can easily implement their own ideas based on the course curriculum. For example, use of a remotely accessed, virtualized environment combined with the learner-centered approach worked hand in hand with the rapid prototyping model. The virtual lab environment was quickly created and modified (about a week), unlike the tremendous work and effort needed for preparing a real computer lab environment. As students are active participants in the processes of learning rather than passive recipient of transferred knowledge in the learner-centered environment, the burden of lecture preparation for instructors can be reduced. Both the virtual lab and learner-centered approach helped us implement the rapid prototyping model. Our learner-centered approach is explained in subsequent sections.

Virtual environments for hands-on experience and integration of subject matter

Virtualization allows a "single physical computer (the host) to simulate the hardware of one or more other computers" called virtual machines (VM) (Nance, Hay, Dodge, Seazzu, & Burd, 2009). The literature has numerous references to the advantages and uses of virtualization in teaching Information Technology and related subjects (Nestler, 2009; Hay, 2010; Nestler & Bose, 2011; Son, Irrechukwu, & Fitzgibbons, 2012; Son, Bhuse, Othmane, & Lilien, 2015).

Of the various implementations of virtualization, the one used for our integrated approach is with a Remotely Accessible Virtualized Environment (RAVE). With VMs that are remotely accessed, the computer requirements are greatly reduced. For example, a student can use just about any computer that can reasonably display web pages and good internet connection and be able to interact 24 hours a day with the environment. Since all of the computing is done by the server hosting the VMs, the requirements for the student's computers are significantly decreased. This easy accessibility to the lab environment dramatically increase students' *hands-on experience.* In addition, virtualized environments allow for easy isolation from the school network, the fast deployment of VMs, the simplified process of creating interesting network/security labs and doing this cost effectively.

To address the issue of isolation of subject matter discussed in the previous section, various network devices such as a routers, firewall, and Linux server, Window server, and Kali Linux workstation were set up on a virtual network (see Figure 1). This virtual networking setting provides two unique advantages:

1. Students can learn how various network protocols or standards ensure that the variety of devices interact with each other. We believe that this virtual lab setting would increase integration of subject matter as students are given an environment where they can take a unified approach by configuring or testing all the different network devices.

2. This networking setting mimics a real work environment to a certain degree and provides a valuable experience to students as an enterprise network often consists of a mixture of technologies.

Learner-centered approach

A learner-centered approach is a constructivist approach that encourages problem-solving and ultimately promotes lifelong learning (Duncan & Buskirk-Cohen, 2011). A learner-centered approach shifts the focus from what the teacher chooses to teach to what the student chooses to learn through discovery and construction (Froyd & Simpson, 2008). This approach is especially useful as it organically develops the habits of mind that are necessary to be successful in these fields. They will need to be self-learners for the rest of their lives. It will serve them well to start while in school to learn how to learn on their own and solve problems as they will in the real world.

This approach is especially important in the more advanced classes. As students progress, each student will likely retain different levels of information from previous classes that the current class may depend on. One student may be weak at Linux but strong in Windows administration and another one the opposite. One student may be good with internetworking devices but not good with administration of servers or securing them. Yet each student may have had the same instruction in all of these areas. By taking a student-centered approach, students can work on the areas they are in need of improving, develop where they are weak and engage in an environment that integrates the various domains of knowledge they will be expected to work in when they join the workforce.

In a student-centered paradigm, students are required to actively participate and engage in the learning process. It often involves student interactions via group activities and self-directed learning. In the literature, the following student-centered learning approaches were successfully employed to teach computer networking as well as various IT courses: active learning (Prince, 2004), constructivist approach (Chen, 2003), problem-based learning (Linge & Parsons, 2006), and collaborative project-based learning (Dong, Chen, & Hernandez, 2015).

To promote a learner-centered approach and self-learning, we created a learning environment based on a pedagogical approach of Self Organized Learning Environment (Mitra & Rana, 2001; Mitra, 2003). The Self Organized Learning Environment (SOLE) is an approach initiated by Dr. Mitra to provide self-directed education to students in an underprivileged area where good teachers are not available.

Our implementation of a student-centered model addresses the three main factors which impact self-efficacy. First, the hands-on experiential learning in a complex environment, with instructor assistance where necessary, will enable active attainment. Students who can perform tasks that are difficult for others are encouraged to demonstrate it for other groups. When necessary, the professor can also model troubleshooting and learning on the fly as new problems arise. Finally, it was explained in the course expectations that students are expected to help one another when possible and an environment of cooperation and support is nurtured by the instructor. Our method and implementation are explained in the subsequent section.

Research questions

In this research, our major goal is to investigate if our integrated approach (the design of instruction, use of virtual environments, and learner-centered instruction) improved students' self-efficacy and specific skills in all five knowledge domains. In this study, self-efficacy refers to the definition of Albert Bandura (Bandura, 1986): self-efficacy is defined as "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of

performances. It is concerned not with the skills one has but with judgments of what one can do with whatever skills one possesses".

Our research questions are listed below:

1. Does our integrated approach improve students' self-efficacy in routing skills?
2. Does our integrated approach improve students' self-efficacy in Window server skills?
3. Does our integrated approach improve students' self-efficacy in Linux/Unix skills?
4. Does our integrated approach improve students' self-efficacy in network service skill?
5. Does out integrated approach improve students' self-efficacy in firewall and security hardening skills?

Methodology and implementation

The integrated approach outlined above was deployed to teach an undergraduate course called Advanced Information Networking and Security (IST 475) in the Spring 2015 quarter. IST 475 is typically offered twice a year in the department of Information Decision Sciences in the School of Business at the California State University San Bernardino (CSUSB). The university operates on a quarter system with each quarter being 10 weeks long. In this section, we explain the process and implementation of the integrated approach.

Nine virtual networks were created for 8 groups of students and one instructor. Each virtual network was created to have the following 10 network machines and 4 different subnets. Figure 1 shows a total of 10 network devices and servers with their IP addresses & subnet masks in 4 different subnets:

- Two routers: one Vyatta router with the IP address of 172.28.1.1/24 and one VyOS router with the IP address of 10.0.20.1/24.
- Two Windows 2008 Servers with the IP addresses of 192.168.53.200/24 and 172.28.1.200/24.
- One Kali Linux with the IP address of 10.0.20.100/24.
- Two CentOS Linux workstations with the IP addresses of 192.168.53.100/24 and 172.28.1.40/24
- One pfSense firewall machine with three IP addresses of 10.0.20.2/24, 192.168.53.2/24 and 172.28.2.2/24.
- One Windows 7 machine with the IP address of 172.28.1.30/24.
- One Nagios server with the IP address of 172.28.1.50/24. Students can monitor their progress with the Nagios server.

With this realistic network topology (10 devices, various operating systems and types of devices, 4 subnets, etc.), students could learn and practice different networking and security skills listed in Table 1 and understand how the various network components interact with one another.

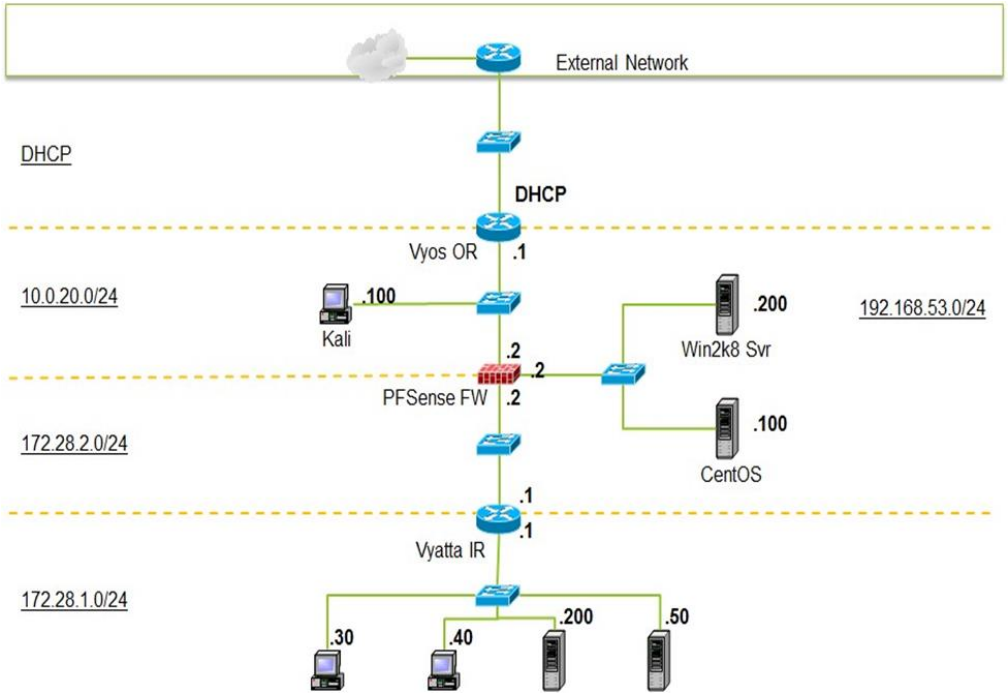


Figure 1: RAVE Virtual Network

To promote learner centered instruction, we divided the class into 8 groups of 4~5 individuals and the brief description of the project was presented on the first day. Only minimal instruction and lecture (Mitra & Rana, 2001; Mitra, 2003) were given to students (the details of this approach are beyond the scope of this paper and are the focus of a subsequent paper by the authors). This means students can learn from their group members as well as other groups. Each group made their own strategic plan, searched for relevant documents from various resources, worked their way through the solution to the course project, and verified the correctness of their solutions during troubleshooting. Starting from the first week, one virtual network was assigned to each group and 24/7 access was available for 10 weeks. Once logged on to the RAVE, students could access all 10 Virtual Machines (refer to Figure 2 and Figure 3). The final goal of the course project is to complete a set of tasks listed in Table 1.

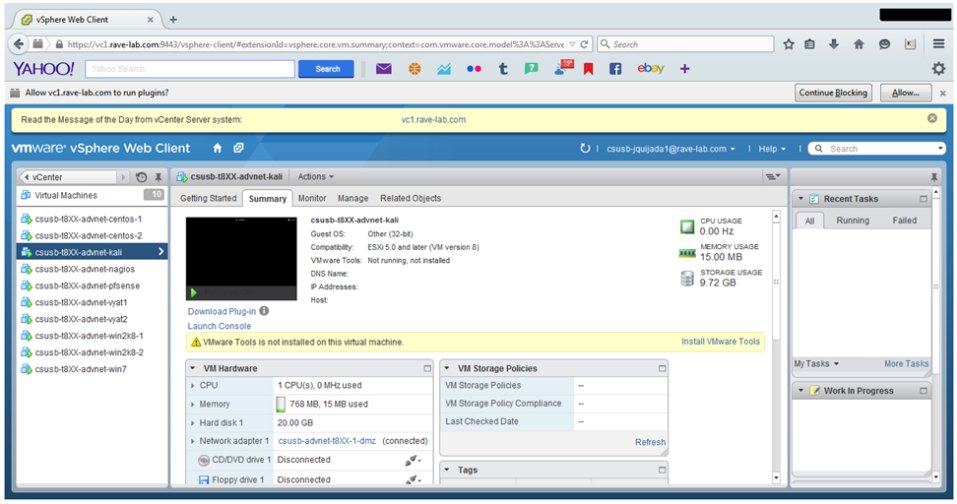


Figure 2: VMware's vSphere client (flash-based web interface): a list of 10 Virtual Machines (VMs) implemented in the RAVE network. These 10 VMs are assigned to each group

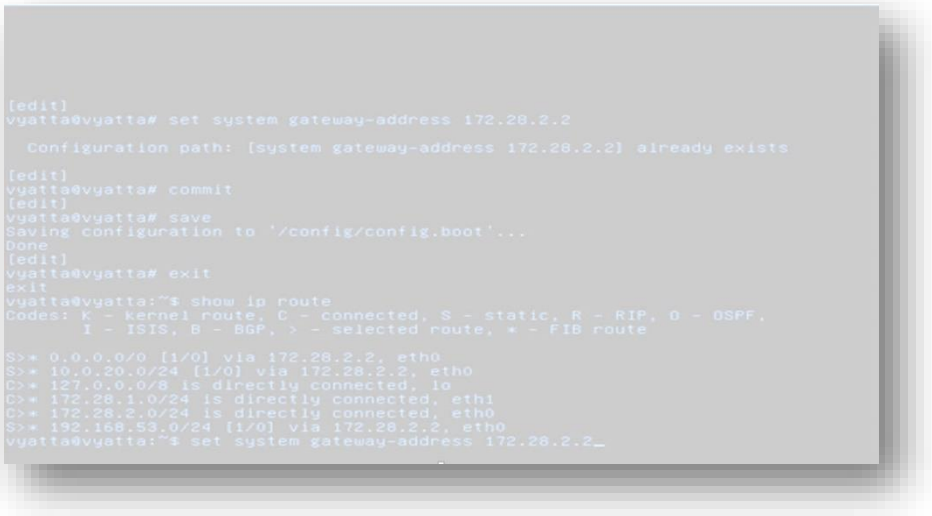


Figure 3: The diagram shows command line interface & routing table of Vyatta (internal) router. This snapshot is from the turnover folder submitted by 8th group.

To measure the changes of students' skills efficacy in the five knowledge domains, we pre- and post-surveyed our students with a set of questionnaires that asked to rate their self-efficacy level in all five domain areas. Additional questions relating to the teaching method were also included in the survey but were not used for this study. The results of the survey are presented in the next section.

Analysis and results

The results of the study are based on data collected during the spring quarter of 2015. A total of 30 students participated in the class and survey. Each of the nine groups were able to complete all of the tasks listed in Table 1. While all the tasks were completed each group required varying degrees of assistance. Also, some groups went above and beyond what was required. Giving statistically meaningful values to the work that was done by each group is beyond the scope of this study. The main focus was to determine if the result of this approach improved the students' self-efficacy. The data used in this study consists of a pre and post survey to measure skills efficacy as well as an exit survey to assess their sense of preparedness for entering the workforce.

As shown in the Table 2, a pre and post survey were used to measure the changes of students' skills efficacy in the 5 knowledge domains

Table 2

Average pre- and post- survey results on students' efficacy on knowledge domain specific skills

(1 = No Confidence; 2 = Not Very Confident, 3= Neutral, 4 = Somewhat Confident, 5 = Confident, 6 = Very Confident)

Knowledge domain	Average pre-survey	Average post-survey
Network-level Routing	2.97	4.36
Windows Server	3.00	4.86
Linux/Unix	2.47	4.11
Network services	2.60	4.46
Firewall security and hardening	2.17	4.07

Scope of inference & multiple testing adjustment

The conclusion of the statistical hypothesis tests in this section can be generalized only under the assumption that the students who participated in this study are representative of the population of interest, which is usually achieved by a random sample. The population of interest is all IT major students at California State University San Bernardino. The students were not randomly selected, but we are willing to assume that these students are representative of the population, as no known factors played a role in influencing who would register for this course.

Since there are five research questions/hypotheses, the family-wise error rate needs to be controlled. We adopt the Bonferroni adjustment in this paper: instead of testing each hypothesis at the usual 5% significant level, we do each test at 5%/5 = 1% significance level. That is, each individual p-value has to be less than 0.01 for the result to be considered statistically significant. Correspondingly, we will construct 99% confidence intervals instead of the commonly used 95% confidence intervals.

In addition, the following question was given to students to assess whether students thought the tasks assigned to them were realistic and resembled a real-world scenario: *The skills that I learned and performed in the class, I expect to perform in the kinds of jobs I will seek upon graduation.*

Strongly disagree	Disagree	Neutral	Agree	Strongly Agree	Weighted Average (max = 5)
0%	0%	7.14%	67.86%	25.0%	4.18

The above results show that the students reported highly positive experiences with the real-world project and our integrated teaching framework. Note that 92.86% of the students either agree or strongly agree that the tasks and activities used in the course project resemble those that they would perform in their professional job.

Paired-t Test

Hypotheses

H_{0i}: $\mu_i = 0, i = 1, 2, 3, 4, 5,$ or the mean of the difference between post-survey scores and pre-survey scores for the i^{th} knowledge domain is zero.

H_{Ai}: $\mu_i > 0, i = 1, 2, 3, 4, 5,$ or the mean of the difference between post-survey scores and pre-survey scores for the i^{th} knowledge domain is greater than zero

Assumptions

1. It is legitimate to translate the categorical responses to the numerical responses. We assume, for instance, the difference between very confident and confident is the same as the difference between confident and somewhat confident.
2. The variable is approximately normally distributed.

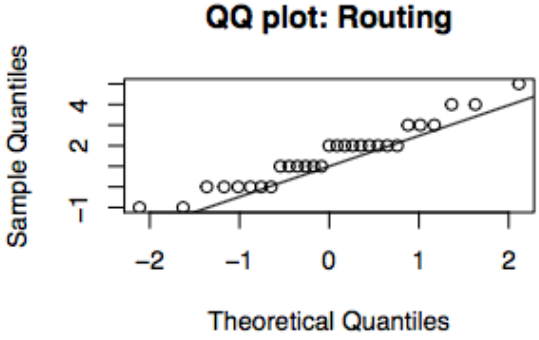
Paired-t Test Result and Interpretation

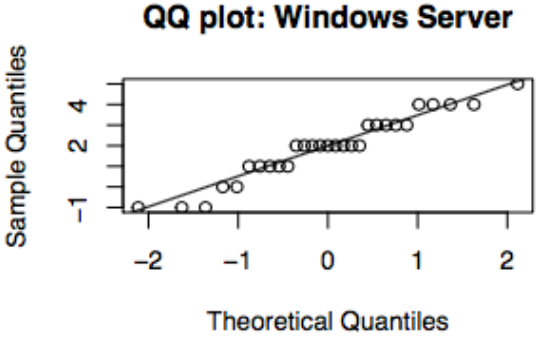
	p.values	lower.bound	upper.bound
Routing Skills	3.30e-06	0.758	2.276
Windows Server Skills	2.00e-07	1.121	2.742
Network Service Skills	0.00e+00	1.140	2.584

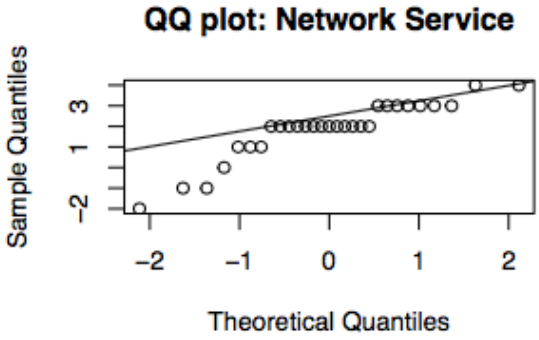
Table 3
Paired-T test: P-values and 99% Confidence Intervals for Average Score Improvements in self-efficacy.

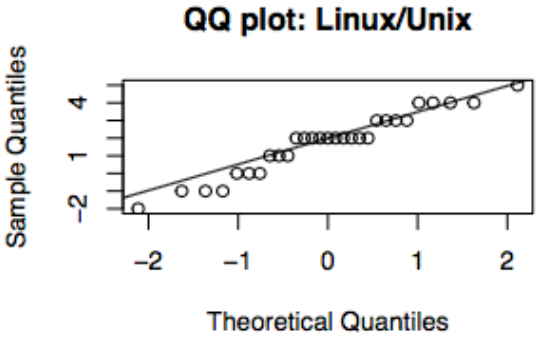
Linux/Unix Skills	4.30e-06	0.863	2.654
Firewall Skills	6.43e-05	0.508	2.182

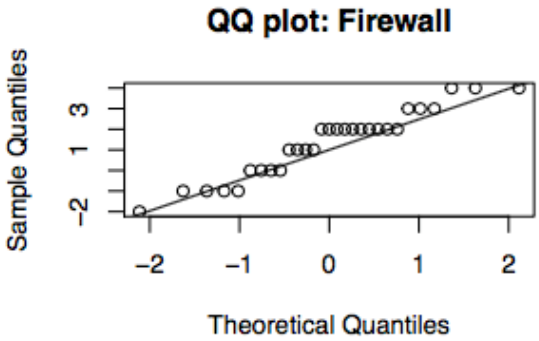
As all the p-values are much less than 0.01, there is strong evidence that the students have improved their self-efficacy in all five knowledge domains. With 99% confidence, students improve their self-efficacy by 0.758 to 2.276 on average in routing skill scores, 1.121 to 2.741 on average in Windows server skill scores, 1.14 to 2.584 on average in network service configuration skill scores, 0.863 to 2.654 on average in Linux skill scores, and 0.507 to 2.182 on average in firewall configuration skill.











Some scholars may not think that the recoding of the categorical responses to the numerical responses is justified. However, some potential issues are associated with the paired-t test:

The normality assumption is not perfectly met. A QQ plot assesses the normality of the data. If all the data points are close to the reference line, then the data are likely from a normal distribution. In the following plots, most look good, except network service, where many data points are far away from the reference line. Especially with our small sample size (30), we need to be cautious of this violation.

To address the above two potential problems, we also did a binomial test. Instead of testing whether the difference of (Post-Survey scores – Pre-Survey scores) is significantly greater than 0, we are testing if the proportion of students who improved their self-efficacy is greater than 0.5 (this represents the null hypothesis: half of the students improved while half did not). In addition, we are forming 99% confidence intervals for the proportion of students that improved their self-efficacy in each of the five knowledge domains.

Binomial Test

Hypotheses

H_{0i}: $\pi_i = 0.5, i = 1, 2, 3, 4, 5$, or the proportion of students who improved their self-efficacy in the i^{th} knowledge domain is 0.5

H_{Ai}: $\pi_i > 0.5, i = 1, 2, 3, 4, 5$, or the proportion of students who improved their self-efficacy in the i^{th} knowledge domain is greater than 0.5.

Binomial test result

For every student, record 1 if the post survey score is higher than the pre survey score, and 0 otherwise. Then we have the following result:

Table 4
Binomial test: P-values and 99% confidence intervals for self-efficacy in the five knowledge domains.

	p-value	lower.bound	upper.bound
Routing Skills	0.0121	0.470	0.904
Windows Server Skills	0.0003	0.584	0.961
Network Service Skills	0.0001	0.626	0.976
Linux/Unix Skills	0.0041	0.507	0.924
Firewall Skills	0.0307	0.435	0.881

Again, it is assumed the students in the study is representative of a larger population of interest. As shown in in Table 4, with 99% confidence, between 47.0% and 90.4% of the population are expected to show improvements in their self-efficacy in routing skills. Between 58.4% and 96.1% of the population are expected to show improvements in their self-efficacy in Windows server skills. Between 62.6% and 97.6% of the population are expected to show improvements in their self-efficacy in network service configuration skills. Between 50.7% and 92.4% of the population are expected to show improvements in their self-efficacy in Linux skills. Between 43.5% and 88.1% of the population are expected to show improvements in their self-efficacy in firewall configuration skills.

Table 4 shows that the improvements in self-efficacy in Windows server skills, network service skills, and Linux/Unix skills are statistically significant (p-value < 0.01), while routing skills and firewall skills are not statistically significant (p-value > 0.01). The lower bound values in routing and firewall configuration skills are 47.0% and 43.5%, respectively (which are below 50%).

Although all groups were able to complete the tasks related to the router and firewall in the course we do not have sufficient evidence to suggest that the students improved their efficacy in routing and firewall skills. Our conjecture why the self-efficacy levels of routing and firewall skills are a little bit lower than the rest is, as follows:

To properly configure and test firewalls and routers, it is essential that students should completely understand how a network can be hierarchically structured and sub-netted. A few students in class had a hard time getting a firm grasp of the sub-netting concept.

Ten (10) weeks (one quarter) is a relatively short period of time to learn all five knowledge domain skills. It could be a challenging task for students to learn subnetting and routing protocol concepts in short time and apply them when configuring the routers and firewall machine.

Summary of analysis results

Under the assumptions that it is justified to translate the categorical responses to numerical responses and that the responses are normally distributed, the paired-t-test shows improvements in self-efficacy in all five knowledge domains are significant. If we are not willing to make such assumptions, we could rely on the binomial test result which shows that improvements in students' self-efficacy in Windows server, network service and Linux/Unix skills are significant.

Discussion

While the research is preliminary the outcomes already have been quite rewarding and shows promise. In the rapid development of the course, the instructor may have legitimate concerns over the network being deployed and the lack of specific lecture notes. However, the environment that was deployed had only minor issues that were easily remedied and in fact became organic to the course. For instance, the firewall deployed in the virtual network had a misconfiguration with the IP addresses assigned to the three ports. Students were walked through the process of troubleshooting and able to fix the issue.

Perhaps most striking was the level of student engagement and deep learning that was observed. A majority of the students often stayed late after class, working through the challenges of setting up their network. Students would get together after school through the use of google hangouts and continue to work at a distance with the remote virtual lab. The sophistication of the questions students asked were also greater than in previous classes.

The increase in self-efficacy while a good first measure is not enough. Further research is required. A follow-on survey is planned for students who have since graduated. The survey will gather information from their experience in the class, the impact it had on both their confidence as well as their actual ability. Further research will also be useful in the area of the actual difference in skill level in each of the domains before and after the course. The difficulty will arise with creating a measure that can be given at the beginning and the end of the course. Essentially the course is both the treatment and the measure.

If a program of study does not provide experiences that are integrative and more represent the types of conditions that will be experienced in the workforce, then we do students a huge disfavor. Educators spend a great deal of time focusing on the specific and measurable knowledge, skills and abilities, we have forgotten the need and value of the affect. What student think and believe, especially about themselves can have a huge impact on their success or failure in their lives. A student with ability but not believing they have it may be just as detrimental as not having the skills at all. As educators, we need to make sure the students have good foundational skills and develop their confidence in being to take those skills and know they can successfully complete a designated task.

Conclusion

Further research is needed in relation to each of the parts of the integrated approach. An in-depth explanation of the steps as it relates to the rapid prototyping and backward design model is needed. Although the use of virtual environments is well established in the literature, the value of deploying a larger number of virtual machines to teams of students should be studied to observe that the complexity may actually enhance rather than hinder the educational experience. Some research into the various methods of learner centered instruction that will work well for the integrated approach is also needed.

Despite many challenges, we believe that our integrated framework is a good example of how to address the networking/security education needs of both IT industry and academia. Other academic institutions should be able to apply similar frameworks or approaches when designing computer network courses or hands-on labs. We plan to continuously monitor our student experiences to more formally investigate the effectiveness our pedagogical approach on student perception of their educational experiences.

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Editor's Note: This study integrates a number of proven strategies and technologies to raise the bar for learning a second or third language. It makes innovative use of available resources, works at any educational level, and complies with institutional and regional goals and curricula for language learning.

C3 Model:

Implementing language and culture support in schools abroad via video-conferencing and flipped classrooms

William R. Naugle, Jose Antonio Lecea Yanguas
USA

Abstract

This article reports on the C3 Model project piloted at Clarion University of Pennsylvania (CU) during the Spring 2017 semester. C3 is an abbreviation of Clarion, CLIL (Content and Language Integrated Learning), and intercultural Competence. Students, primarily in CU's Department of Education, used the model as part of their curricular experience to provide language/culture content resource and support to students and teachers in a K-12 school in Spain. The C3 Model, based on evidentiary research, presents a practical, low-cost approach for providing language/culture support to primary, secondary, and university classrooms using video-conferencing and/or flipped classroom strategies.

Keywords: distance learning, intercultural communication, cultural competence, language acquisition, CLIL, video-conferencing, web-conferencing, streaming, hyperconnectivity

Introduction

The genesis for this article is born from the First Conference on Bilingual Education hosted by Instituto Franklin, University of Alcalá de Henares, Spain, four years ago. During that conference, practitioners and researchers from Spain and the US came together to explore best practices and current trends and theories in bilingual education. Many questions were raised surrounding methods of implementation to create bilingual and multi-lingual classrooms in accordance with Spanish governmental mandates that may not have fully taken into account practical resource needs for students, teachers, and teacher trainers. The C3 Model is a response to the questions raised at that conference; and this article describes the pilot that we ran in the Spring of 2017 to demonstrate the viability of the model.

In order to create a bilingual or multilingual classroom, it is necessary to have an instructor, or instructors, who are at least bilingual in order to facilitate the learning. Alternatively, where there is an "other" language deficiency on the part of the instructor(s), having an individual in the classroom who is competent in the target language(s) assists in acquisition and support of language learning. At issue in the popular dialogue (Torres, 2016) is that many of the current population of K-12, and university, instructors in Spain have not had the language competency skills to meet the CEFR requirements to teach at a level necessary to create a bi-/multilingual learning environment. This is not a commentary on the skills, training, and abilities of the instructors; rather, this is potentially reflective of the changes in geo-political and geo-economic forces. Converting classrooms from monolingual to bi-/multilingual environments is done easily enough as a mandate; however, actually acquiring a language well enough to a level of syntactic and grammatical competence, such as to permit one to teach, is a long, slow process that requires years of training and practice in production (both written and spoken).

As stated earlier, at the First International Conference on Bilingual Education in a Globalized World, many questions and concerns were raised about how best to implement language policies

in the Spanish school system. Many of these questions and concerns centered on teaching assistant resources which may have been or may not have been available at that time to support the lead teachers and instructors in the Spanish classroom. It was noted that, in an attempt to fill this resource gap, schools were hiring students from English-speaking countries who were on study abroad. The challenge with this, of course, was that the student may not have been studying language acquisition, education, or even a content area close to that being taught in the Spanish classroom, thus creating another set of challenges for the lead teachers and instructors. Additionally, with the upcoming exit of Britain from the European Union, there are many questions and concerns about how this politico-economic may affect mobility, not only of citizenry, in general, but specifically students. Will the so-called Brexit reduce the number of students from Britain available to assist in English-language acquisition?

Using English-speaking study abroad students in Spain as teaching assistants or aides in the classroom has been a practice in the past. However, there is no evidence to suggest that the majority of these individuals have had any training or experience in education or that they had any experience in the content of the lessons being presented or content delivery. One could easily imagine how this could lead to pedagogical confusion or linguistic misinformation should one not be familiar with subject matter terminology in English natively: e.g., stirrer for pipette, or led (past part., lead) for lead (Pb). Also, there may be indirect and direct costs in hiring foreign student assistants or aides into classrooms: advertising for student assistants, employment costs, teaching preparation, appropriate visa costs, etc.

The C3 Model potentially meets those language resource needs that may not be currently supported in the Spanish classrooms (or classrooms elsewhere in the world). During the piloting of the C3 Model, the Spanish classrooms were provided with language/culture teaching assistants, who were in academic programs of teaching training, and who could support the teachers/instructors and their students in the target-language acquisition, in a meaningful way. While the model assumes English as the target language with cooperation between US colleges/universities and Spanish schools and universities, the model could be applied to any language combination(s) and multiple inter- and intra-governmental systems of education.

Literature review

Classroom language learning is an artificial process and environment in which to acquire another language. Native language is acquired naturally through both explicit and implicit learning. Teaching grammar and vocabulary acquisition is exemplary of explicit learning strategies (Bueno-Alastuey & Luque Agullo, 2015), while deep syntactical structure is acquired through implicit learning by means of contextual repetition and aural/visual cues (Rebuschat, 2015).

> "Learning of [language] category sequences is most likely based on forming gradual associations between category representations which are repeatedly activated in succession. As a result, processing an exemplar from one category leads to preactivation of the next category, which speeds up naming of objects coherent with the preactivated category, and delays naming of those incoherent with it" (p. 72).

This is consistent with current theory in teaching techniques that enhance a student's learning by building on what the student already knows, understanding the patterns of how that knowledge may be stored structurally, and, most importantly, understanding how to access and retrieve the knowledge from the student: in a word, scaffolding. (Pratama, et al., 2016; Wood, et al., 1976)

> "Students can easily infer meanings based on the ways by which information is encoded and stored in long-term memory. This profoundly affects the processing of information in the working memory. Accordingly, if, at the beginning of a lesson, educators present information patterns that activate information patterns already learned, students are more

> likely to retrieve the correct information (Ranzijn, 1991). This in turn may facilitate understanding and integration of information learned up to that point" (Kuldas, et al., 2016, p. 920).

So, from a perspective of language acquisition, we can assume, based on the research, that scaffolding on the learner's existing abilities to assimilate deep syntactical structure implicitly will be facilitated through aural/visual repetition and the explicit teaching/learning of vocabulary and incrementally advancing grammar. This research both resonates with and supports the European Framework for Content and Language Integrated Learning (CLIL), which has been adopted widely in Europe, and specifically Spain, but less so in North America.

The real question, then, is how do we move from a theoretical model to a practical model without overwhelming the students or instructors? Additionally, we must consider the artificial environment within which the learning is occurring. Providing a language-learning environment that incorporates the theoretical models while mitigating the environmental barriers becomes paramount to supporting the process of implicit learning. The literature provides us with conceptual tools and strategies to effect such a learning synthesis:

> "One suggestion is to establish a conceptual connection between visual and verbal imagery, between pictures and texts (Schnotz, 1993). The illustration of texts with corresponding pictures effectively assists the memory in the tasks of encoding, storing, and retrieval (Clark & Paivio, 1991)" (Kuldas et al., 2016, p. 920-921).

The C3 Model moves beyond those conceptual tools and strategies to present a practical, low-cost model for providing other language support (OLS) to primary, secondary, and university classrooms using video-conferencing and/or flipped classroom strategies. Replicating a combination of existing research models (Hao 2016, Thompson and Nutta 2015, Hopper 2014) and tailoring them specifically to the OLS needs of Spanish schools (Spanish Statutory Education Law 2/2006 (LOE), Chapter VII), we argue that OLS can be provided synchronously and asynchronously, incorporating general and content-specific target-language support.

Flipped classrooms

Flipped or inverted classrooms have been implemented widely for several years now. Primarily exchanging the lecture and homework components of instruction to be conducted at home and in class, respectively, the inversion permits instructors (throughout all levels of instruction, K through university) to provide a greater focus on experiential learning (Heyborne & Perrett, 2016; Rotellar & Cain, 2016; Clark, 2015).

> "In-class activities for the flipped section included, but were not limited to, jigsawing [mix-group peer-to-peer learning], team teaching, modeling, discussion, data analysis, problem sets, videos, and question/answer" (Heyborne & Perrett, 2016, p. 32).

Kvashnina & Martynko (2016) include "analysis, synthesis, evaluation, and creation" (p. 71), which they consider higher level cognitive skills, as part of the in-class activities, while the "lower levels of cognitive work" can take place at home. Rotellar & Cain (2016), writing about university-level instruction, even suggest "that the flipped classroom philosophy form the foundation of a new model of medical education" (p. 6). Clark (2015) suggests that the students' ability to take advantage of self-directed learning is augmented by being able to access "media pieces over and over until they fully understood the content being demonstrated." (p. 104)

Hao (2016, p. 299), quoting Prensky (2001), refers to those students currently in our educational systems as "digital natives;" that is to say, they are so adept at interacting with burgeoning technology and software as to be instinctively capable of integrating it into their learning process.

Rotellar & Cain (2016, p. 7) make the claim that the underlying "principles" of the flipped classroom "best prepares [sic] them to practice within a highly demanding work environment." As it has become increasingly commonplace to be required to participate in webinars and online training as part of one's duties and responsibilities in any workplace, it is imperative that we, as educators, incorporate this medium of content delivery within our classrooms.

Video-conferencing

Given the proliferation of current, commercially available video-conferencing applications (e.g., Skype, Zoom, Google Duo/Hangouts, FaceTime, WhatsApp, Weibo, BlueJeans, GoToMeeting, etc.), the digital natives in the classroom have a facile mastery of such tools. What was once a cumbersome and tech-heavy setup that was "intimidating" and possibly skewing the "learning experience" (Thompson & Nutta, 2016, p. 108) is now "technology [that is] more accessible to all learners" (p. 96) - including instructors, for instructors are integral to the learning process. Video-conferencing now permits us to bring "experts into the classroom, [take] virtual field trips, [connect to] different schools, and [help] to work with students with disabilities" (p. 96). Krakower, et al. (2016), in *CONNECTING Your Students with the World*, provide a detailed guide demonstrating the many ways in which K-8 classrooms have been connected virtually and globally. This is particularly helpful for those practitioners who are new to "hyperconnectivity" or who are seeking best practices experiences.

Hopper (2014, p. 78) writes that video-conferencing had been "integrated into every grade level from Kindergarten to 8th grade" in a project based in the state of Texas. However, this tool is not simply relegated to primary or secondary education, rather it is now integral to learning and training in higher education and professional arenas as well.

> "We have implemented a learning system that interactively transfers the visual and practical aspects of ECG from a nursing skills lab into a classroom where the theoretical part of the course is taught. The students and the instructor in the classroom observe the activities in the skill lab in real time, while communicating with the nurse in the lab via audio and video links" (Celikkan, et al., 2011, p. 286).

> "The curriculum administrator initiated communication with potential partner schools through email and Skype or a videoconference to highlight project guidelines. The teachers then videoconferenced with the partner schools to meet, discuss, brainstorm, and develop projects" (Hopper, 2014, p. 80).

The literature demonstrates, thus, that flipped classrooms and video-conferencing are pervasively employed throughout the learning process at school and at work; and, increasingly, those using the technology are exposed to it throughout their lives. Of course, the obvious gap, upon which I have not even touched, is online learning and coursework. However, the focus in online learning is that the instructor is not necessarily present in the same space or at the same time as the learner. Whereas, video-conferencing, in the present context, implies synchronous communication in addition to an instructor being present in the same room with students.

C3 Model

Based, then, on what the literature presents about implicit learning, flipped classrooms, and video-conferencing, what we are proposing, and piloting, is replicating a combination of the aforementioned research projects and recalibrating them with a focus on engaging university students in one country to support the language, culture, and content acquisition (in essence, the CLIL methodology) in another country. The proposed model engages education majors specializing in elementary and secondary education, as well as STEM majors and education majors in the STEM fields, though any major is possible insofar as it matches the target

classroom's content. These university students act as teaching assistants or teaching aides to the instructor in Spain (in the pilot), for that portion of the class or lesson that incorporates language and culture acquisition. They are provided with experiences in cross/multi-cultural/lingual communication, service learning, distance learning, and student teaching.

In order for this experience to be meaningful to the participant US student, the activity is best incorporated into the student's curriculum, or recognized as fulfilling a portion of requisite coursework or student teaching if possible and in accordance with statutory law and regulations. InTASC provides the best practices model to which many states in the US adhere as a standard for diversity and inclusion, such as cultural and linguistic competencies. Pennsylvania, for instance, requires students majoring in K-12 education to attain a minimum of three (3) credits of Teaching English to Speakers of Other Languages (TESOL), as well as to demonstrate exposure to other cultures. The C3 Model not only fulfills this educational requirement, but it provides university students with practical experience and interaction with other cultures, languages, education systems, approaches to learning, and teaching methodologies.

Collaborating with colleges and universities throughout the US and other English-speaking countries, it is possible, therefore, to imagine an incredibly large pool of individuals for whom participating in the C3 Model would serve to complement coordinating and culminating educational experiences. Of course, it would also be easy to imagine the C3 Model creating a large pool of teaching assistants and aides to support instructional needs not only in Spain, but globally. Such a model could also provide university students in other countries the opportunity to support language acquisition throughout the US and other Anglophone countries.

The benefits

Clark (2015) suggests that "students were more engaged, more involved in the flipped model of instruction when compared to the traditional delivery approach" (p. 112). And, Hopper (2014) emphasizes the long-held claim that "[i]nteractive videoconferencing . . . can be used to connect one school to another, regardless of location" (p. 78). The potential benefits for education, STEM, and humanities majors in the US is multitudinous. Increasingly, university students in the US are generally required to demonstrate cultural competency within their respective programs of study. Universities in the US have recognized the importance of internationalizing curricula and campuses. The reality is that study abroad can be a significant financial burden in addition to an already burdensome educational debt. Often, the student's curriculum itself can prohibit study abroad, as the number of required courses would preclude the possibility of exchanging foreign credits for domestic credits. Thus, the C3 Model answers these challenges by bridging the gaps of time, place, culture, and language. Therefore, the four areas on which we are presently focusing are language support, cost effectiveness, linguistic and cultural competence, and technological needs.

Language support

Thompson & Nutta (2016, p. 106) conclude that "[v]ideos may be used in FLES [Foreign Language in Elementary Schools] programs as a way to help mitigate some of the interaction problems found in using videoconferencing if the regular classroom teacher has some knowledge of the language being studied." The C3 Model provides both the support of videos and a teleconferenced teaching aide in the target language. Consequently, the instructor has language support that helps to conduct the lesson plans monolingually with incidental language support, bilingually with the participation of the teaching aide, or multilingually using more than one video-conferenced teaching aide, if necessary.

Used in this way, the hyperconnected classroom falls clearly in line with CLIL as a methodology and a teaching tool. Should there be an interest for plurilingual support within classrooms (for

both cognate and non-cognate languages), it is conceivable that the C3 Model could provide the optimal platform through which instructors and students would have access to synchronous and asynchronous support. This could be accomplished simply by employing conferencing features of the teleconferencing software being employed.

Cost effectiveness

Lamenting the ever-increasing austerity measures being imposed by governments, especially within the education sector, Thompson & Nutta (2015, p. 96) rightly conclude that "interactive videoconferencing [. . . and] distance learning [allow] students to be instructed by specialists who would not be available any other way." Video-conferencing and flipped classrooms also permit students and instructors alike, to have synchronous and asynchronous access to native speakers who are, at the very least, content-cognizant, if not content-expert. This foundational concept of CLIL rises from Marsh & Rasanen's (1994) work of teaching content through a foreign language. It also speaks to the implicit acquisition of language, as mentioned earlier, by repetition and association, while content is being conveyed.

As the interest in the US grows to create and support culturally competent classrooms, so grows the need for educators who are exposed to, have experience in, and are able to manage bilingual and plurilingual students, or students on their way to becoming bilingual/plurilingual. Sending tertiary-level students majoring in education (or training) abroad for culture/language access and/or immersion is, admittedly, an enriching experience; however, taking time out of one's studies to study abroad for a semester can be costly and can be an insuperable barrier to cultural/linguistic competence and success if, for some reason, studying abroad is not possible. The C3 Model, however, provides teachers-in-training with a way to incorporate the multi-cultural and bilingual/plurilingual experience into their curricula.

Linguistic and cultural competence

Developing linguistic and cultural competencies (or, in CLIL terminology, *competences*) is at the core of the CLIL methodology. Thompson & Nutta (2015) studied video-conferencing in elementary-level, Spanish-language classrooms in the US. Within the context of heightened US political climes vis-á-vis immigration and immigrants, they found that the students who participated in their program "developed a connection with the Hispanic culture that they had not previously felt, experiencing more positive cultural attitudes toward Hispanics" (p. 107). This is an extraordinarily encouraging finding that supports global efforts in supporting cultural diversity and understanding. In addition, and in light of the global movement of refugee communities, Thompson & Nutta found that the students developed "greater awareness of diverse communities, and [exposed] students to some of the challenges faced by immigrants to a country where they do not speak the language" (p. 95).

In the United States, new K-12 teachers, and especially university instructors, are increasingly faced with classrooms of individuals for whom English is an unknown language, to which they have never been exposed, and for whom US culture is only an ephemeral snap of ideologies, icons, and soundbites the various media permit. Preparing faculty for cohorts of students, who are forming the changing demographics, is paramount to the success not only of the faculty, but of the students, as well. While interacting with exchange students at university is an important part of developing one's cultural/linguistic competence, teaching and managing a class of students who are non-English mono/plurilingual is a completely different skillset. Though student teachers may have the benefit of doing undergraduate and graduate work in urban centers, where they may be exposed to an array of cultures and languages, it is equally likely that they are at university in an ex-urban or rural area, where the changing demographics are just beginning to reach. Incorporating a multicultural/multilingual teaching experience into university curricula, therefore, is critical to preparing teachers, instructors, and faculty for success. The C3 Model can

provide multiple intercultural experiences, developing not only competences, but instructional classroom strategies.

Technological needs

US universities and colleges and many K-12 systems are equipped with high-speed internet connections, permitting large data flows and providing high-quality audio and video. US university students only need access to a quiet room with a computer that has a high-speed internet connection and built-in audio and video; such technology is generally paid for through student fees, which support this infrastructure. Outside of the US, the available technology may be more difficult to access, though the infrastructure needed is modest. For optimal video-conferencing, it is best to have a minimum internet speed of 25mbps (megabits per second). The classroom outside of the US needs to be equipped with a computer, microphone, camera, and, if possible, a computer-linked projector.

It would seem, based on our anecdotal interaction with institutions around the world that, at the time of this writing, there is a sufficient number of schools that would have the necessary high-speed internet connection requisite to support the C3 Model. Further, it appears that there already exist high-tech schools, such as Instituto Tiempos Modernos de Zaragoza, that cater to a digital native student body and that have the hyperconnectivity needed to support current learning tools: streaming, web-conferencing, LMSs, etc.

Outcomes of previous studies

Without recapping nearly two centuries of historical development and innovation in the fields of pedagogical and andragogical distance/remote learning, it is sufficient to say that current research has a broad and deep body of literature from which to draw on best practices, delivery, instructional strategies, and learner success. The recent research performed in the areas of video-conferencing and flipped classrooms seems to indicate that these tools are extremely effective in providing students access to content knowledge more immediately and implicitly (Celikkan, et al., 2011; Heyborne & Perrett, 2016; Hao, 2016 (quoting Bergmann & Sams, 2012)).

Engaging digital natives, therefore, within an environment of hyperconnetivity is pedagogically beneficial and content and language acquisition, we would suggest, become more fluid, mitigating cultural and linguistic barriers. Using the C3 Model within the overarching structures of CEFR and CLIL, it becomes clear how hyperconnectedness, through video-conferencing, flipped classrooms, content-focused social media, and directed internet content delivery, provides the vehicle by which learners are increasingly exposed to and engaged in explicit learning of content and implicit learning of language. Nevertheless, it is important to continue adding to the body of research that currently exists to better understand how the hyperconnected classroom can promote explicit and implicit learning.

The pilot

The C3 Model was piloted during the Spring 2017 semester to begin exploring how current research could be amplified and advanced. Eleven university students volunteered to participate; ten of these students were taking a course on teaching English language learners. The school in Spain provided a schedule of meeting times appropriate to the needs of the high school students and their instructor. The university students were asked to select three meeting times throughout the semester when they would be able to stream into a classroom in Spain - given the time difference, the university students were required to be ready for the video-conferencing by 6:00 a.m. Eastern Time (US). Thus, the university students met with the high school students 33 times during the months of March and April. We assigned the meeting times using the online scheduling tool Doodle. Once the schedule was set, we distributed it to the participants. It needs

to be noted that we had to compensate for the change from Daylight Saving Time to Standard Time, as the US implements this one week before Spain implements the change; therefore, we had one week when the meeting times were an hour later in the day for the university students.

The video-conferencing was accessed through the learning management system (LMS), D2L, and the conferencing program (CollaborateUltra) imbedded into that LMS. The university students logged into D2L and acted as the virtual meeting administrator, and the coordinating teacher in Spain logged into D2L as well, to provide access to his students. The Spanish teacher used two different cameras to give the university students the ability to see individual students, as well as the entire class.

This initial pilot was conducted primarily to test the internet connection, hardware, software, ease of use, etc. That is to say, we were trying to determine what technological challenges we were facing in order to implement the model. Fortunately, those challenges seemed to be few. There were, however, connectivity issues when university students attempted to log in from their home internet service provider over wifi. Given the low internet speeds used, the video would freeze at times, or there would be a lag in the audio versus the video. These challenges notwithstanding, the digital natives, as described above, seemed to adapt to the technology well.

The university students were provided with experiences in cross/multi-cultural/lingual communication, service learning, distance learning, and student teaching. The classrooms in Spain were provided with language/culture assistants who were able to support the teacher and his students in the target-language acquisition. While the C3 Model assumes English as the target language, it could be applied to any language combination(s) and multiple inter- and intra-governmental systems of education.

Future research

The C3 Model permits educators to engage primary, secondary, and universities around the world in an innovative and collaborative way that promotes learning, cross-cultural exposure, and access to synchronous and asynchronous student teaching and learning. More importantly, it provides a way for educators to build long-term relationships, not only with institutions, but with people who comprise those institutions, set educational policy, and seek innovation in learning.

Looking forward, it would be good to build on the research that has already been done and, in some instances, replicate studies or slightly modify past research to adapt it to our current focus. For instance, Kvashnina & Martynko (2016) asked “how relevant [flipped classroom] is to more communicative courses, namely, to foreign language teaching” (p. 71). Parkes & Comeau (2015) “designed [a study] to examine how technological and cultural aspects prompted changes in the teaching strategies, and how this affected student achievement.” (p. 26). It would be interesting, then, using the C3 Model to further explore the same or similar hypotheses posed by these and other researchers. The model creates a structure wherein we are able to observe, study, and collect data longitudinally to add to the current body of research and further our understanding of multicultural/plurilingual teaching and learning

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Editor's Note: As more advanced tools and techniques become available educators assess them for their value in teaching and learning. Successful innovations are rapidly adopted if they are accessible and affordable. This study shows that cloud storage adds new features and improves speed and reliability.

Towards the collaborative work in cloud storage services to prepare a research project

Abdellah Ibrahim Mohammed Elfeky

Egypt

Abstract

The present study aimed to investigate the effectiveness of collaborative work available in cloud storage services in preparing the research project. Google Drive services that allow users to establish, alternate, store, and synchronize office files on Google servers that guarantee files security and do not enable anyone except the owner or authorized people to access them were used to achieve this aim. Product assessment card to measure the dependent variable was also developed. The experimental approach was adopted to explore the relationship between the independent variable namely collaborative work in cloud storage services and the dependent variable that was research project preparation. The study was carried out on (120) students enrolled in the Higher Diploma Program who were distributed randomly to two experimental groups and two control ones. Each group involved (30) students. Results showed that there were significant differences in favor of students who were using Google Drive in preparing the research project. Significant differences were also noticed among students who were using Google Drive individually and collaboratively in favor of those students who were collaborating in preparing the research project.

Keywords: Cloud computing, Cloud Storage Services, Google Drive, research project, and collaborative work.

Introduction

The collaborative work is seen as a force for the individual and community. It, in the field of education, expresses the interaction among students of individual differences who work within collaborative aims and skills to achieve a specific aim. In addition, cloud storage predicts a tremendous change in the way information is stored and applications are run. That is, instead of storing information and running programs on PCs, everything will be hosted in a cloud that can be accessed anywhere and processed by addition or deletion collaboratively. (Kamara & Lauter, 2010) claim that advances in networking technology and the increase in the need for computing resources have prompted many organizations to outsource their storage and computing needs. (K. Kumar & Lu, 2010, p. 51) mentions that the cloud heralds a new era of computing where application services are provided through the Internet. (Yang & Jia, 2013, p. 1790) add that cloud storage is an important service of cloud computing. It allows data owners to host their data in the cloud and data access control is an effective way to ensure data security in the cloud. (Lin & Tzeng, 2012, p. 995) also mention that cloud provides long-term storage services over the Internet. Furthermore, It, mention (Bowers, Juels, & Oprea, 2009) denotes a family of increasingly popular on-line services for archiving, backup, and even primary storage of files .

In cloud computing, data owners host their data on cloud servers and users who are data consumers can access the data from cloud servers, which allows data owners to move data from their local computing systems to the cloud, (Yang & Jia, 2013, p. 1717). Cloud computing lets data owners and users to access all applications and documents anywhere in the world. It frees them from the confines of the desktop and makes it easier for group members in different locations to collaborate, (Wu, Ping, Ge, Wang, & Fu, 2010). Using Cloud Storage, users can

remotely store their data and enjoy the on demand high quality applications and services from a shared pool of configurable computing resources, without the burden of local data storage and maintenance (C. Wang, Chow, Wang, Ren, & Lou, 2013). Cloud storage has been envisioned as the next-generation information technology (IT) architecture for enterprises, due to its long list of unprecedented advantages in the IT history: on-demand self-service, ubiquitous network access, location independent resource pooling, rapid resource elasticity, usage-based pricing and transference of risk, (Kamara & Lauter, 2010; C. Wang et al., 2013; C. Wang, Ren, Lou, & Li, 2010).

(Kamara & Lauter, 2010) define three types of services that Cloud storage includes:

1. Infrastructure as a service (IaaS), where a customer makes use of a service provider's computing, storage or networking infrastructure.
2. Platform as a service (PaaS), where a customer leverages the provider's resources to run custom applications.
3. Software as a service (SaaS), where customers use software that is run on the provider's infrastructure.

Virtual resources in the cloud are typically cheaper than dedicated physical resources connected to a personal computer or network. Data stored in the cloud is secure from accidental erasure or hardware crashes, because it is duplicated across multiple physical machines. Besides, the cloud continues to function as normal even if one or more machines go offline since multiple copies of the data are kept continually, (Wu et al., 2010). Small and medium-sized enterprises with limited budgets can achieve cost savings and productivity enhancements by using cloud-based services to manage projects and make collaborations, (G. Wang, Liu, & Wu, 2010). Cloud storage providers, on the opposite, can distinguish themselves by offering services above-and-beyond basic storage that involve integration with other cloud computing products, (Abu-Libdeh, Princehouse, & Weatherspoon, 2010).

Collaboration, on the other hand, is defined as the collective work of two or more individuals where the work is undertaken with a sense of shared purpose and direction that is attentive and responsive to the environment, (Sparks, Herman, Wolfe, & Zurick, 2015). The concept of collaborative working is derived from the idea of virtual workspaces, and is related to the concept of e-work (Prinz et al., 2006). Collaboration extends the traditional concept of the professional to include any type of knowledge worker who intensively uses Information and Communications Technology environments and tools in their working practices, (Carreras & Skarmeta, 2006). Collaborative working system is, therefore, an organizational unit that emerges any time when collaboration takes place, whether it is formal or informal, intentional or unintentional, (Sparks et al., 2015). In most organizations, collaboration occurs naturally. Ill-defined work practices may create barriers to natural collaboration, whereas well-designed collaborative working systems not only overcome these natural barriers to communication, but also establish a cooperative work culture that becomes an integral part of the organization's structure, (Neilson, Martin, & Powers, 2008).

Taking into account the importance of collaborative work, the potentials of cloud storage, and the weakness of the Higher Diploma students at Najran University to work individually or collaboratively to prepare their research projects, drove the researcher of the present study to use and benefit from the potentials of Google Drive. Google Drive is one of Cloud Storage applications that enable the sharing of files and folders. Google Drive user can invite others to view and download all files without the need to send attachments via e-mail. In other words, Google Drive makes available the collaborative work environment that can be related to the

collaborative work system to empower students to work collaboratively online to complete the research project.

Questions of the study

The present study aimed to address the following questions:

1. Are there any statistically significant differences between students' grades in the first experimental group that work collaboratively in the preparation of the research project through Google Drive application and the students' grades in the first control group that work collaboratively in the preparation of the research project through the traditional way?
2. Are there any statistically significant differences between students' grades in the second experimental group that individually accomplish the research project through Google Drive and the students' grades in the second control group that individually accomplish the research project through the traditional way?
3. Are there any statistically significant differences between students' grades in the first experimental group that work collaboratively to accomplish the research project through Google Drive application and the students' grades in the second experimental group that work individually to accomplish the research project through the Google Drive application?
4. Are there any statistically significant differences among the four research groups regarding the mean scores of their grades on the research project?

Methodology

The present study aims to address the effectiveness of collaborative work available in Cloud Storage services in preparing the research project. Google Drive that allows users to establish, modify, store and synchronize office files on Google servers was used. The reason for that is the fact that such servers guarantee the security of files and do not allow anyone other than the user himself or the people he authorizes to access them. The sample of the present study consisted of (120) students who were enrolled in the higher Diploma program at the College of Education at Najran University. All participants were distributed to four main groups, two experimental and two control groups, according to the study experimental design.

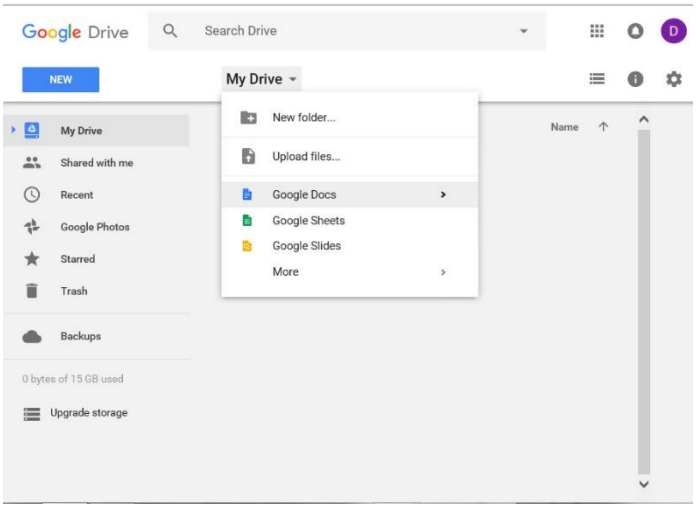

Figure 1: How Google Docs are opened on Google Drive

Each group involved (30) participants. Participants in the experimental groups were trained for two weeks to open an account on Google Drive and how to cope with Google Docs Application to prepare for the research project. Each week they had two training sessions for two hours each. Figure (1) shows the way Google Docs are opened on Google Drive.

Training aimed to familiarize students with "Explore" alternative to surf the web for everything related to their research projects they were preparing. They were also trained on how to "Select citation format" and "cite as footnote". At the end of training weeks, only students in the first experimental group on how to share the project file with their colleagues, determine the powers to collaborate and assign tasks. Figure (2) presents how to share research project files with colleagues and assign tasks.

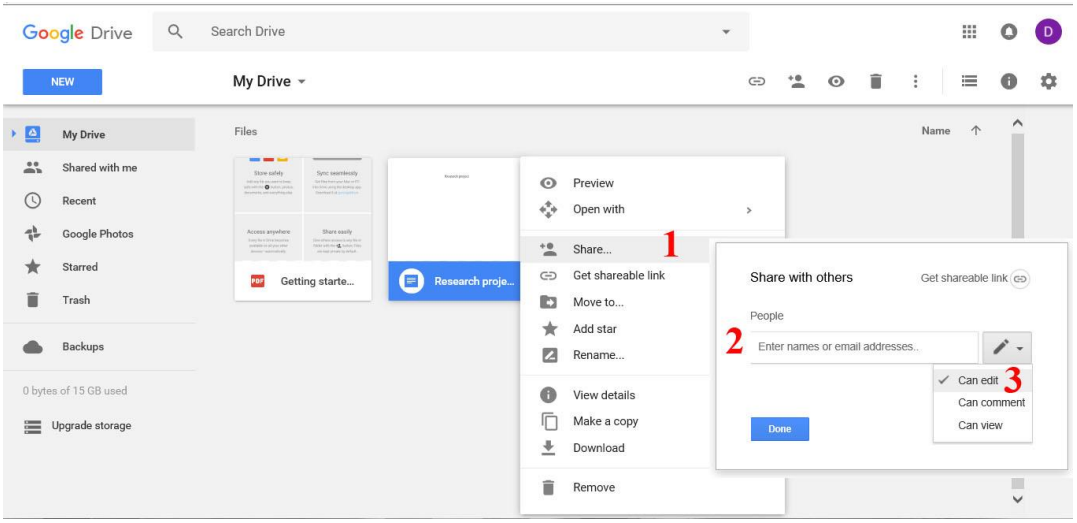

Figure 2: How to share research project files and assign tasks

After training of students in both experimental groups on how to deal with Google Docs application, students of the first group were divided into (6) minor groups. Each minor group included (5) students. Each minor group was assigned to prepare a research project collaboratively using Google Drive application. Each student was assessed according to his contributions to the preparation of the collaborative research. To obtain the full degree, his contribution was not be less than (20%) in the research project. On the other hand, all students in the second experimental group were to prepare the research project individually using Google Drive application, too.

Participants were trained for two (8) hours during two weeks on how to gather enough information related to the project whether inside the university library or via Internet. They were also trained on how to cite references and prepare the references bibliographic list at the end of the research in accordance to APA formatting. After training of both control groups, students in the first control group were divided into (6) minor groups. Each group consisted of (5) students. Each minor group was assigned to collaboratively prepare a research project whether by visiting university library or via surfing the web. Each student was assessed individually according to his contribution to the preparation of the collaborative research project. To obtain the full degree, his contribution was not be less than (20%) in the research project. Students in the second control group were asked to individually prepare the research project through university library visit of Internet.

The quasi experimental approach was used as shown in Table 1.

Table 1
Research Design

	Treatment	Post-test
Experimental Group 1	X_1	O
Experimental Group 2	X_1	O
Control Group 1	X_2	O
Control Group 2	X_2	O

Note. O = post application of project assessment card
X1= the use of Google Docs application in Google Drive
X2= the traditional way

A product assessment card was developed to check the study hypotheses through assessing the dependent variable. It consisted of (10) items and Likert scale was used to evaluate each item. Five responses were attached to each item namely "very high degree, high degree, moderate degree, low degree, and very low degree". Degrees were 5, 4, 3, 2, and 1 respectively. The total degree for the whole card items was (50) degrees for the research project. After that, the assessment card was presented to a set of arbitrators who were of expertise in the fields of educational technology and methods of instruction for validation. Using Cronbach Alpha, reliability coefficient was calculated and was (0.88) which indicated that the card is fit for assessment and results could be trustful.

Results

Results related to the first question

To answer the first question that stated "Are there any statistically significant differences between students' grades in the first experimental group that work collaboratively in the preparation of the research project through Google Drive application and the students' grades in the first control group that work collaboratively in the preparation of the research project through the traditional way?" T. test for independent samples was used. Findings are presented in Table 2.

Table 2
T.test for the significance of differences between mean scores of students' degrees in the first experimental and first control groups

Group	N	M	SD	Mean Difference	T. Ratio	Sig.
Experimental Group 1	30	46.8	2.02399	5.47	6.781	0.041
Control Group 1	30	41.33	3.92458			

Table 2 reveals the T. ratio for the difference between participants' grades in the first experimental and first control groups (6.781) was significant. The mean score of students grades in the first experimental group was (46.8) while it was (41.33) for those students' grades in the first control group. That is, there was a significant difference (α=0.05) between the mean scores of participants' grades in the first experimental group that collaboratively prepared the research project by using Google Drive and their peers' grades in the first control group that collaboratively prepared the research product but by using the traditional way in favor of the first

experimental group. This, of course, indicates the importance of using Google Drive to enhance the development of participants' collaborative abilities to prepare the research project. Figure 3 shows mean scores of participants' grades in the first experimental and first control groups.

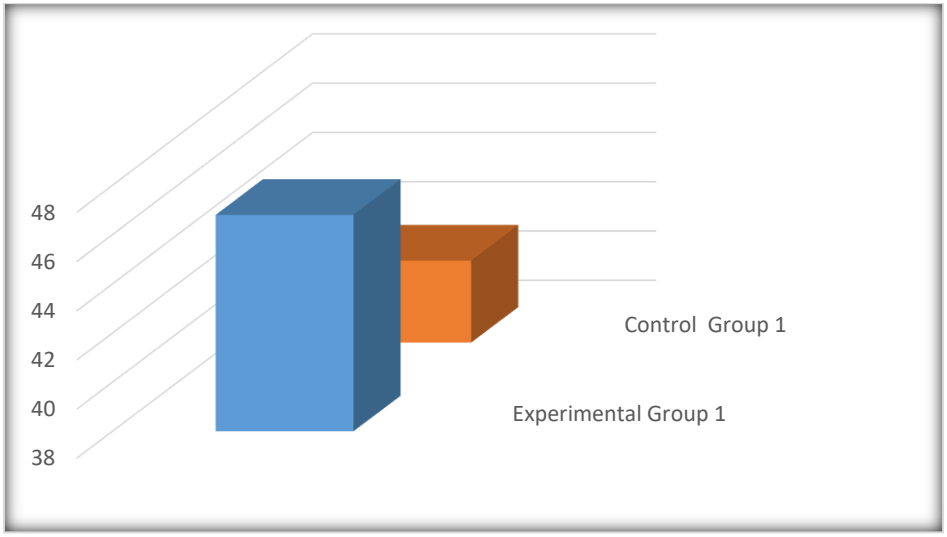

Figure 3: Mean scores of participants' grades in the first experimental and first control groups

Results related to the second question

To answer the first question that stated "Are there any statistically significant differences between students' grades in the second experimental group that individually accomplish the research project through Google Drive and the students' grades in the second control group that individually accomplish the research project through the traditional way?" T. test for independent samples was used. Findings are presented in Table 3.

Table 3

T. test for the significance of differences between mean scores of students' degrees in the second experimental and second control groups

Group	N	M	SD	Mean Difference	T. Ratio	Sig.
Experimental Group 2	30	36.5	3.31922	4.77	3.624	0.017
Control Group 2	30	31.73	6.39468			

Table 3 reveals the T. ratio for the difference between participants' grades in the first experimental and first control groups (3.624) was significant. The mean score of students grades in the second experimental group was (36.5) while it was (31.73) for those students' grades in the second control group. That is, there was a significant difference (α=0.05) between the mean scores of participants' grades in the second experimental group that individually prepared the research project by using Google Drive and their peers' grades in the second control group that individually prepared the research product but by using the traditional way in favor of the second experimental group. This, of course, proves the importance of using Google Drive that could enhance the development of participants' collaborative abilities to prepare the research project. Figure 4 shows mean scores of participants' grades in the second experimental and second control groups.

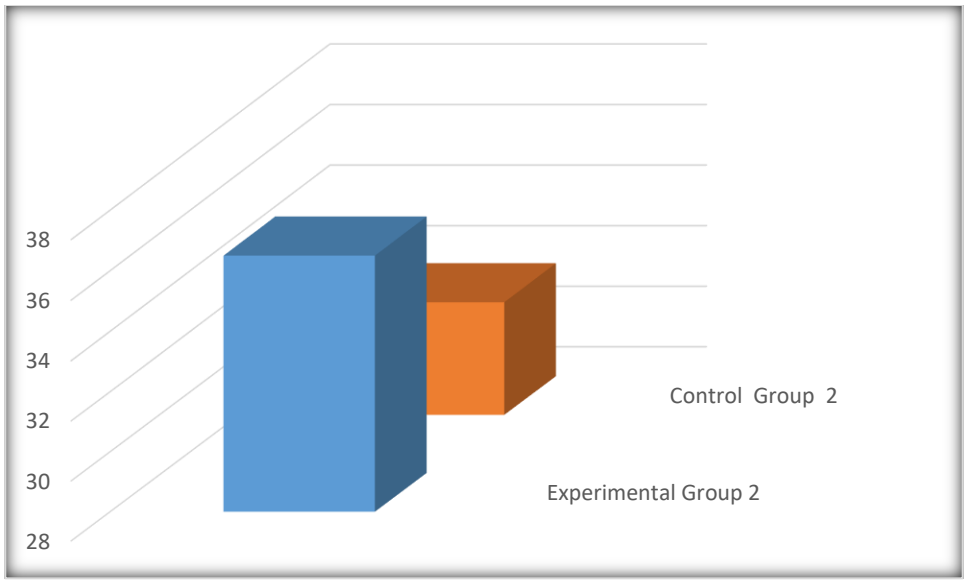

Figure 4: Mean scores of participants' grades in the second experimental and second control groups

Results related to the third question

To answer the third question that stated "Are there any statistically significant differences between students' grades in the first experimental group that work collaboratively to accomplish the research project through Google Drive application and the students' grades in the second experimental group that work individually to accomplish the research project through the Google Drive application?" T. test for independent samples was used. Findings are presented in Table 4.

Table 4

T. test for the significance of differences between mean scores of students' degrees in the first and second experimental groups

Group	N	M	SD	Mean Difference	T. Ratio	Sig.
Experimental Group 1	30	46.8	2.02399	10.30	14.511	0.004
Experimental Group 2	30	36.5	3.31922			

Table 3 reveals the T. ratio for the difference between participants' grades in the first and second experimental groups (14.511) was significant. The mean score of students grades in the first experimental group was (46.8) while it was (36.5) for those students' grades in the second experimental group. That is, there was a significant difference (α=0.05) between the mean scores of participants' grades in the first experimental group that collaboratively prepared the research project by using Google Drive and their peers' grades in the second experimental group that individually prepared the research by using Google Drive, too in favor of the first experimental group. This, of course, not only asserts the importance of using Google Drive but reveals the impact of collaborative work among participants that could develop their collaborative abilities to prepare the research project. Figure 5 shows mean scores of participants' grades in the first and second experimental groups.

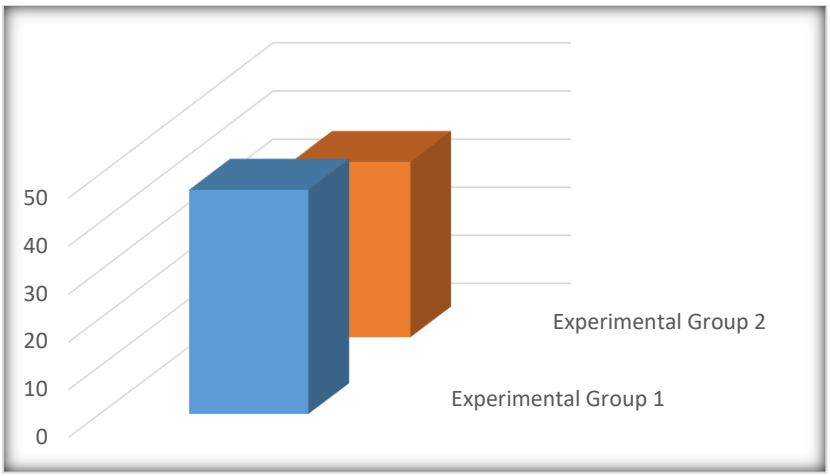

Figure 5: Mean scores of participants' grades in the first and second experimental groups

Results related to the fourth question

To answer the fourth question that stated "Are there any statistically significant differences among the four research groups regarding the mean scores of their grades on the research project?" Analysis of variance (ANOVA) was used. Findings are presented in Table 5.

Table 5

ANOVA for the significance of differences between mean scores of students' degrees in the four research groups

	Sum of Squares	DF	Mean of Square	F. ratio	Sig.
Between Groups	3759.158	3	1253.053	70.191	0.000
Within Groups	2070.833	116	17.852		
Total	**5829.992**	**119**			

Results of the statistical treatment as shown in Table 5 revealed that F. ratio (70.191) is significant at (α=0.05). In other words, there is a statistically significant difference among the four research groups' mean scores of their grades on the research project. Mean scores, standard deviations and percentages of students' grades in the four groups are shown in Table 6.

Table 6

Mean scores, standard deviations and percentages of students' grades in the four groups

Group	Mean	Std. Deviation	%	Rank
Experimental Group 1	46.8	2.02399	93.6%	1
Experimental Group 2	36.5	3.31922	73%	3
Control Group 1	41.33	3.92458	82.66%	2
Control Group 2	31.73	6.39468	63.46%	4

Table 7
LSD for the multi comparisons among the four research groups

Research group	Experimental Group 1	Experimental Group 2	Control Group 1	Control Group 2
Experimental Group 1		10.30	5.47	15.07
Experimental Group 2			4.83	4.77
Control Group 1				9.60
Control Group 2				

Least Significant Difference (LSD) for Multi Comparisons among groups was applied because there was a significant difference among the mean scores of the four research groups regarding their grades on the research project. Table 7 shows these comparisons.

Figure 6 shows the results of these comparisons by using the LSD test. Table 7 and Figure 6 show that the best groups in terms of students' grades, in accordance to the product assessment card for the research project was the first experimental Group. The first control group was in the second rank followed by the second experimental group in the third place. The second control group was at the bottom of the list regarding the mean score of participants it involved who prepared the research project individually through using the traditional way.

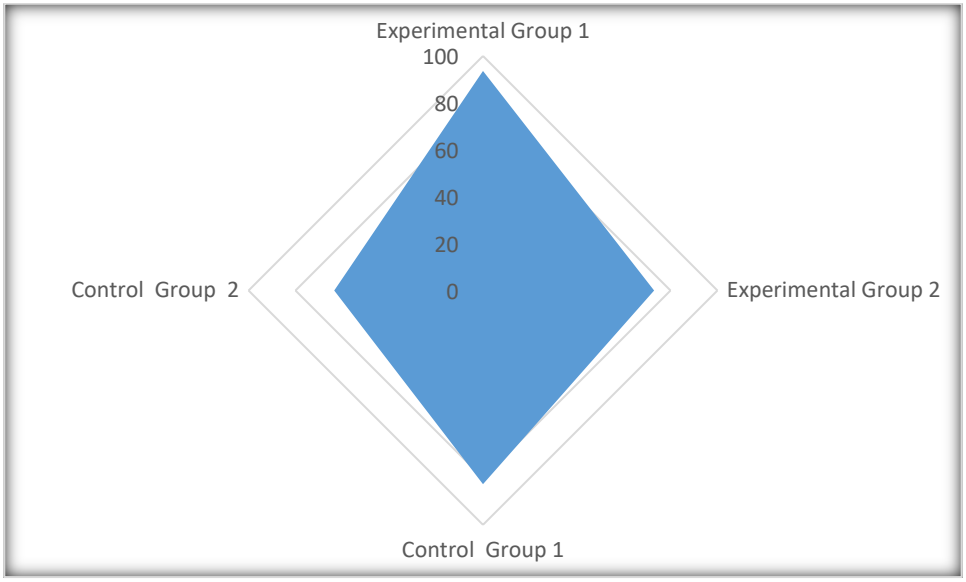

Figure 6: Proportions of the mean scores of the four research groups

Discussion of the results

The significant differences that were found between the four groups that participated in the present study can be referred to many reasons. The most important among those reasons is the fact that Cloud storage services could support participants to work collaboratively and easily access their files and share them through the Drive using any smartphone or PC. Second, the ability to quickly invite others through Google Drive to view, download, and work together on all required files without having to send attachments via e-mail had much effect on participants' performance and work completion. In the third place, the use of "Explore" option in Google Drive to search the web for everything related to the research project subject that students were preparing facilitated the task of all participating students to gather, organize and use all needed information. Training students on how to select the citation format and how to cite as footnote had an impact on the distinguished achievement of all experimental groups.

These results corroborates what (Wu et al., 2010) concluded regarding the advantages of Cloud Storage services like for instance, the ease of management where the maintenance of the software, hardware and general infrastructure to support storage is drastically simplified by an application in the cloud. Findings also corroborates (Lin & Tzeng, 2012) beliefs that Cloud Storage system not only supports secure and robust data storage and retrieval, but also lets a user forward his data in the storage servers to another user without retrieving the data back and that is what participants in the present study mostly needed.

With regard to smartphone benefit in cloud storage, findings emphasize what (Chung, Park, Lee, & Kang, 2012) mentioned about the fact that it is easy to access cloud storage services through smartphones that provide mass storage. Results also prove that Cloud Computing is an excellent alternative for educational institutions and universities to take advantage of available cloud-based applications offered by service providers and enable their own students to perform business and academic tasks, (Erkoç & Kert, 2011). Furthermore, results of present study corroborate the fact mentioned by (B. P. Kumar, Kommareddy, & Rani, 2013) about the utilization of cloud computing to improve education standards and activities. It can be used to curb problems like small classrooms, lack or resources, short-handed staff, lack of adequate teachers and instead, boost performance. In short, Cloud Storage or Computing on universities should be encouraged because, as proved by the results of the present study, has many benefits such as accessing the file storages, e-mails, databases, educational resources, research applications and tools anywhere for faculty, administrators, staff, students and other users in university, (Erkoç & Kert, 2011).

Conclusion

The study aimed to investigate the effectiveness of collaborative work provided by Cloud Storage services in research project preparation by students enrolled in the Higher Diploma program at the Faculty of Education at Najran University. Findings revealed statistically significant differences in favor of students who used Google Drive Application to prepare their research project in comparison with colleagues who used the traditional way. Besides, statistically significant differences were found between students who collaboratively used the Google Drive Application and their peers who individually

did so in favor of those students who collaboratively prepared their research project. These results, of course assert the importance for universities, as higher education institutions, to encourage the use of these Cloud Storage services to support the teaching-learning process. They also should work on integrating them within the various teaching courses. Furthermore, training programs that aim to develop the skills of faculty members to use efficiently such services as teaching tools in their lecture halls should be prepared and encouraged.

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Editor's Note: Here is a solution to getting counseling and maintaining privacy. For what situations would you choose traditional face-to-face counseling and when would you choose online?

Perceptions towards online counseling among University of Jordan students

Adel Tannous
Jordan

Abstract

The aim of this study was to investigate perceptions towards online counseling among University of Jordan students. A sample of 210 students answered the online questionnaire that contain two aspects of knowledge about and attitude toward online counseling. The results of the study indicated that participants had adequate information about the field of online counseling. The results also showed that online counseling promoted a positive attitude, had a tremendous effect on the participant's life, and participants believe that online counseling is essential part of their way to deal with daily life problems. The results indicated that social media is most effective way that help people to get online counseling.

Keywords: e-therapy, internet based counseling, cyber-counseling, online counseling, health counseling.

Introduction

The revolution of technology and the use of internet and its related web resources has taken counseling service beyond the face-to-face to electronic-based counseling services (Aaron et al., 2005). Psychiatrists and counselors are turning to a new way to help their patients. Instead of coming to the office, they can simply register to an online counseling website. This new way of counseling is also known as e-counseling (Brown, 2011; Chester and Glass, 2006), cyber-counseling or tele therapy. Some clients consider e-counseling as a substitute for in-office counseling (David et al., 2005) while others don't think it replaces the traditional methods, so they still have office visits even if they tried e-counseling (Delida, 2005). e-Counseling can be done using traditional communication tools over the internet, such as: E-mails, Internet-voice calls, chat rooms, IM, and video conferences (Alleman, 2002).

The first online counselling was demonstrated between computers at Stanford, University of California (Kolog, 2014, Fang, 1972), and Los Angeles in International Conference on Computer Communication (Rummell, and Joyce, 2010). Some of the many reasons that make people register or start to use online counseling is that e-counseling is cheaper than traditional counseling, not all e-counseling specialists require insurance (Gelso, 2000), clients can maintain their privacy by taking therapy at home instead of visiting the psychiatrist's office allowing them to take their time to organize their thoughts (Glueckauf, 2002), the sessions can go as long as the client wishes and it can also be delayed or canceled easily and clients can also reselect their counselor (van de Luitgaarden, 2016).

Clients who prefer to stay unknown use this kind of therapy, along with young teenagers who can't get to the psychiatrist's office because they can't drive. There are plenty more who find e-counseling beneficial, such as people who cannot leave their house because of a disability, people who choose not to leave their house counselor so they can avoid "triggers" caused by the outside world and abused people who can't risk their abuser knowing about their therapy sessions. As clients find time to arrange their thought, therapists benefit from that time to carefully structure their questions (Holmes, 2004 Luitgaarden, 2016). Chatting online also makes it easier for the therapist to supply his client with many websites which may help him/her case. e-Counseling also

makes it easier for the therapist to talk to his clients anywhere in the world, without even having to be at the same country.

Online counseling can work with a wide variety of needs and concerns:

- Improve social skills: meeting people, communication, collaborative activities, making decisions, time management (Jeffrey, 2005).
- Set guidelines to handle ethical and practical aspects of positive and negative issues (Kanz, 2001, Holmes, 2004)
- Provide consultation services to identify and understand one's own needs and abilities as in face-to-face counseling (Kraus and Zack, 2004; Larsen, 1998).
- Develop awareness of one's self, capabilities and surroundings and be self-directed.
- Achieve compatibility (Mallen, 2002) and adapt to the consultation recipient in order to facilitate their ability to perform various functions (Clark, 2002).
- Offer counseling help for those who need consultation to discover their abilities (Kraus, et. al 2004), determine their goals and draw their plans in line with their willingness (Kanz, 2001).
- Initiate positive changes in patterns of behavior towards people, community, cultural and professional issues; discover one's self, take and make one's own decisions (Fang, 2013).

There is no doubt that online counseling has multiple benefits and advantages that:

- accelerates the spread of consultation institutions available (Larsen, 1998).
- meets the needs of those who cannot come for consultation inside consultant building, or live too far away (Mallenand Vogel, 2002),
- supports continuous and lifelong learning (Clark, and Stone, 2002),
- expands the opportunity for those who need online counseling beyond the immediate area,
- Speeds up adoption of information technology used in the development online counseling (Fang, 2013), and
- Enriches roles and creativity in use of computer information systems (Lin et al., 2013)

There are many essential elements of online counseling such as the contact form which consists of four basic elements: consulting provider and those who receive counseling (Lewis, and Coursol, 2007), information and communication channel that is shared between face-to-face counseling and online counseling (Rochlen, et al., 2004), online counseling consists of the following elements: Consulting provider "counselor" (Shaw and Shaw, 2006). It is a people who design the contents of online counseling on the internet and explains the knowledge and content with any one in need counseling by contacting methods (Rochlen et al., 2004), Online counseling content: the information and knowledge that are the content of the scientific material that interacts with who receive counseling and counselor, Consultation interface (Rummell, Cand Joyce, 2010): The means that will allow the interaction between those who need counseling and counselor via the Internet on one hand and between who receive counseling and the content material on the other hand by using various contacting methods (Rockwell et al., 1999). Counseling receiver: a person who requests counseling in the vicinity of the connection by communication interface (Sampson et al., 1997)

The requirements for transformation from face-to-face to online counseling recognize differences between online counseling and face-to-face counseling (Stofle, 2001); in comparing online

counseling to face-to-face counseling, online has many benefits. Online counseling gives an opportunity for various segments of society from housewives and workers in factories to receive counseling integrated with their work schedule (Suler, 2000). Ease of updated counseling material submitted electronically (Skinner, and Latchford, 2006). Online counseling provides freedom to communicate with the consultor provider at any time and ask questions. Communication is done through various media such as e-mail and chat rooms (Sampson, 2000). Counseling online may be received any place and is not committed to a particular location (Suler, et al, 2001). In face-to-face counseling, the patient receives counseling in the traditional way at the same time and same place (Tate and Wing 2003), it is required to come to the consulting building (Tai, 2005). It defines the communication with the consulter with a time limit and takes some of the recipients of counseling the opportunity to ask questions because the time for all is not available (Yager, 2001, Yager, 2003).

In 2016, researchers such as Egeonu and Omeje illustrated that the universities in Nigeria and especially the southern Eastern ones, have facilities which are specialized in e-counseling, and this was in a study for federal universities' undergraduate students. The therapists and students also use this method (e-counseling) to help with distribution of career information. Some conclusions were made based on the results of the study.

In Bogo 2013, an examination tool to validate the competency of both professionals and trainees in cyber-counseling, this method was called (COSCE) which is Cyber-Counseling Objective Structured Clinical Exam, the aspects which were tested in regards of the COSCE are, interior coherence, interline accuracy and interrater reliability. They used traditional group assessment methods and using the analysis assigned to the exploratory agent to assess the coherence of the construction.

In 2005, Mallen, along with others, applied the practical points of e-counseling, with its Technology, ethical issues, observation, training and matters related to suitability and competency. They studied online therapy's benefits and boundaries and offered guidelines for all kinds of clients and specialists. They also made clear that it was necessary to discuss the skills and parts related to online therapy, and that may be done by using examples of synchronous-chats' sessions.

Therapy sessions through a computer screen was predicted a long time ago, According to Meana and Binik, it was first seen in literature back in the 60s. The program "Eliza" was the first computer program to deal with such an issue, and it was only a trial program.

More standards were set by Barnett in 2005, as he actually studied the process of e-counseling, such as distributing information in a more effective way, improving the training process, having more access to programs which are associated with innovation, and the growing support efforts.

A case study of empirical kind was concluded by Luitgaarden and der Tier in 2016, the targets of the study were social workers and service users, the purpose was to establish a relationship between the two parties via chat rooms, the study was based on analyzing two conversations from the chats they conducted and an interview from each one of the participants in the research, making it a sum of five interviews and ten conversations.

Tai Chang made an article in 2005 that also illustrated what was recommended in regards to e-counseling's practice and study, the study extended to the journal issued in November of 2005 called "The Counseling Psychologist", this journal focuses on giving the priority to researching and practicing psycho-education, parties mutually helping each other and helping themselves. The study suggests that the number of American people searching the web to educate, help and support themselves on a psychological level, is a lot bigger than the number of those looking for e-counseling by another individual. This article aimed at supporting the huge number of people in

America and abroad to create their own agenda related to practicing and researching information about mental health and how to help themselves and others mentally.

Another study was conducted by Delida Sanchez in 2005 to see how appropriate e-counseling may be for the people who live in underserved areas. She provided methods on how to help and serve those people to get online psycho-education, she also illustrates those methods where the internet is nowadays helpful for this kind of education.

In 2005, Vogel and Mallen further discussed the matter of importance of clarifying how helpful the services that people find online for mental health and behaviors, in providing them with psycho-education and methods to help themselves and help others, also in offering direct therapy and counseling, they also studied a lot of insights provided by reactants, such as their beliefs on how appropriate these online services are for people underserved, or on the priority that should be given to online counseling and whether it should come first or second in the area of counseling.

A study conducted by Granello 2000 and Krieger 2004, illustrated that demonstrating the hesitancy in applying e-learning methods on educating and practicing counseling, and may be achieved through practicing foresights and the dubitable research that backed up the efficiency of online education.

According to Bambling and his colleagues (2008) e-counseling is a separate self-dependent service and works as a helping factor to the other services. Synchronous and asynchronous chats can be conducted in a virtual world, and through that, counseling process takes place.

This study conducted under the general theme of Jordanian University students' perceptions toward online counseling. The overall purpose is to scrutinize their knowledge about and attitudes toward online counseling, the focus is on the frequency of using internet and online counseling, material and devices used to reach online counseling and the effect of using online counseling on their life.

Methodology

This study analyze the effect of using online counseling over the internet. The original sample on which the study tools were applied consisted of 210 participants. The results of the study showed that 62% used online counseling, 41% reported that online counseling is available on the internet and they can reach it easily.

In this study, the basic elements of the methodology that are discussed. are illustrated the data gathering techniques, the research sample, Data Collection and Analysis Method, and the statistical techniques used to interpret the data.

Participants

The sample for this research consisted of students from Counseling and Special Education at Jordan University who were using the Internet. The students were divided into the following groups: Bachelor and Masters and both genders, male and female. Each element in the population had equal chance of being selected as a subject. The size of the representative sample, taken using quota sampling, was 210 students.

The demographic characteristics of the respondents are listed in Table 1. Note that 89.5% of respondents were females and 10.5% were males. 72.43% of participants were less than 20 years, of age, 4.8 % were between 20 and 25 years, and 5.65 % were between 25 and 30 years, 4.3% were above the age of 30 years. Around 94.8% of the sample were studying for a Bachelor degree and 4.8% for a Masters degree. 76.7 % of respondents were in Counseling and Special Education

Table 1
Distribution the sample of the study

Demographic Variables		percentage
Gender	Male	89. 5 %
	Female	10.5 %
Age	Less than 20	72.43 %
	20-25	4.8 %
	26-30	5.65 %
	over 30	4.3 %
Qualification	Bachelor	94.8%
	Graduate study	4.8%
Scientific specialization	Counseling and Special Education	76.7 %

Data collection and analysis method

The data collected using online questionnaire. According to Chisnall (1997) the non-response is a critical limitation of a research, and in order to reduce a non-response rate, the researcher was available at the time of disseminating the questionnaire. 210 questionnaires were distributed on a sample of graduate and undergraduate students

The questionnaire was reviewed by the researchers at the faculty of educational Sciences at Jordan University. The questionnaire contained Part I that was used to collect the demographic data; Part II questions measured knowledge and attitudes related to online counseling. After collecting data from the respondents, SPSS v.11.5 was used for data analysis. Statistical, reliability and regression analysis were applied. Reliability of the questionnaire was tested using Cronbach alpha. A value with more than 0.7 means a good consistency. The value of Cronbach's alpha for all paragraphs were higher than 0.7 which indicate an acceptable values of research testing, Reliability in the 70% range was acceptable and those over 80% were good (Sekaran, 2003).

Results

The results indicated that 91% of the sample of the study used internet in daily base.

Table 2
Frequency of using internet and online counseling

How many times do you use the internet	Daily	Weekly	Monthly	Yearly
	91%	4.7%	3.3%	0.9%
Have you ever used online counseling	Yes	No		
	82%	18%		
How many times do you use online counseling	1 -3 times	4-10	> 10 times	
	29.9	21.9	48.2	

A highpercentage of 82% of the sample used online counseling, 18% use face-to-face counseling. 48.2% used online counseling more than ten times , 29.9% used online counseling between 1 to 3 times, and only 21.9% used online counseling between 4 to 10 times as shown in Table 2.

The results showed that the most common devices used to reach online counseling are mobile phone, computer and laptop devices and the most used method of communication is online counseling on websites and social media with a possible rate of 52.6% as shown in Table 3 and Table 4:

Table 3
Devices used for online counseling

Computer and laptop	Mobile	Landline telephone	Others
33.9%	54.6%	10.3%	1.2%

Table 4
Method of communication used for online counseling

Method of communication used to reach online counseling	E-mail	Voice over internet protocol	Video conferencing	Websites and Social media
	27.3%	14.8%	5.3%	52.6%

Most of the participant of this study have positive attitudes toward online counseling and they feel comfortable to use it when they face trouble or need help the result indicated that 72.3% of the participants see that online counseling is better than face-to-face counseling and 83.6% feel more comfortable when they use it as shown in Table 5.

Table 5
Attitudes toward online counseling

No.	Item	Yes	No
1	Online counseling is better than face-to-face counseling	72.3%	27.7%
2	I feel more comfortable with online counseling than face-to-face counseling	83.6%	16.4%
3	In the future, would you use online counseling when needed	75.5%	24.5%
4	Do you think it is important to have a short training program to explain how counseling can be helpful to you before using online counseling	85%	15%
5	Do you believe online counseling can be as effective as face-to-face counseling	65%	35%
6	Do you think it is important for online counselor to meet you in-person before providing online counseling services	28.8%	71.2%
7	Do you know anyone (other than yourself) who has used online counseling or therapy	61.7%	38.3%
8	Do you recommend other people to use online counseling	82.9%	17.1%
9	Online counseling will help me to discover more about myself	67.2 %	32.8 %
10	If you have personal problem do you prefer to go to online counselor more than face-to-face counselor	84.4%	15.6%
11	If you have emotional problem do you prefer to go to online counselor more than face-to-face counselor	82.1%	17.9%

Results in Table 5 showed that a high percentage, 75.5% of the sample, will use online counseling when needed. The results of this study also indicate that statistically 85% think it is important to have a short training program to explain how online counseling can be helpful before they use online counseling. Results showed that large percentage of 65% believe that online counseling can be as effective as face-to-face counseling; 28.8% think it is important for an online counseling provider to meet with them in-person before providing online counseling services. 61.7%of the sample knew a person who had used online counseling. The majority of the participants preferred to use an online counselor to solve both their personal and emotional problems.

The results shows that online counseling is available and easily to be accessed from everywhere anytime they want by 85% of participants. The majority preferred to rely on online counseling to solve their daily life problems and felt that the information from online counseling is useful and is very helpful for them as shown in Table 6.

Table 6
Knowledge about online counseling

No.	Item	YES	NO
1	online counseling is available and easy to access	85%	15%
2	Do you prefer to rely on online counseling to solve your daily life problems	68.6%	31.4%
3	You feel that the information that you get from online counseling is useful	59.5%	40.5%
4	online counseling reduce time wasted in face-to-face counseling	75.5%	24.5%
5	Online counseling have privacy.	72.7%	27.3%
6	All online counseling resources are trusted (websites, Social media, chat, blogs)	44.7%	55.3%
7	when using online counseling there is no need for attendees to counseling sessions through the process in contrast to traditional way in face-to-face counseling	76.4%	23.6%
8	online counseling provide different types of counseling techniques which is not possible in face-to-face counseling	84.3%	15.7%
9	the online counseling provide an easier method to get counseling	73.2%	26.8%
10	the online counseling provide many counselling services that patient need	84.9%	15.1%
11	online counseling contributes in solving the problems facing people who need counseling and shy to use the traditional face-to-face counseling	80.8%	19.2%
12	Do you think online counseling is an effective way to deal with psychiatric disorders such as depression , emotional distress …etc.	14.3%	85.7%
13	Do you think online counseling is an effective way to deal with behavioral problem such as problem solving, increasing awareness, self-control ….etc.	63.4%	36.6%

It can be observed from table 6 that 75.5% of participants find that using online counseling reduce time wasted. It also provided privacy; so the participants had the ability to express themselves without any boundary through the online and internet tools which they considered private. Despite the high rate of privacy, results showed that 55.3% see that not all online

counseling resources are trusted because hacking or information leak could happen. Most participants indicated that when using online counseling there is no need to travel to counseling sessions and that online provides different types of counseling techniques that are not possible in face-to-face counseling.

The results showed high ratings from participants who believed that online counseling provides an easier way to get counseling services to meet patient needs, furthermore the results showed that online counseling contributes to solving problems facing 80.8% of those who need counseling.

Most participant's results showed that online counseling is an effective way to deal with behavioral problems such as problem solving, increasing awareness, and self-control. Only a small number, 14.3%, thought it was effective for psychiatric disorders.

Table 7
The effect of online counseling

How you describe the effect of online counseling in your life?	No effect	Rare positive effect	Moderate positive effect	Strong positive effect	Very strong positive effect
	7.6%	11.8%	30.4%	42.1%	8.1%

The results of the study indicated that 42.3% of participants using online counseling had a strong positive effect on their life, while 7.6% said that online counseling has no effect as shown in Table 7.

Discussion and conclusion

The purpose of this study was to explore Jordanian University students' knowledge and attitudes toward online counseling. The results of the study indicated that participants had adequate information about the field of online counseling. If they were to choose between face-to-face and online counseling their preference would be online counseling because of their worries about face-to-face counseling. As a Jordanian, in our culture face-to-face counseling is related to the concept of psychiatric disorders which are not accepted regardless of their severity or type. Singh (2012) suggests that there are many reasons that deter people from utilizing face-to-face counseling such as shame, stigma, and accessibility. As a result, some people in Jordan never reach face-to-face counseling services for cultural reasons.

The findings also showed that a high level of participants preferred online counseling. According to Viganó (2013), online counseling can have a similar impact and is capable of replicating the facilitative conditions as face-to-face counseling. In Jordan, online counseling is becoming more popular and viable because of advances in Information and Communications Technologies (ICT). Internet access is easily available in Jordan through mobile and wireless networks. It is easy to get online services and resources to reach online counseling very fast and get response any time of the day. According to Zamani and her colleagues (2010), online counseling is available and widely used as more people are going online. It is important to note that more people will continue to look to the internet as a resource for dealing with their problems.

The results showed that social media is most effective way that help people to get online counseling due to the variety of information that exists in social media. This explains why participants in this study rely on internet to get online assistance with their personal problems, particularly if they find it difficult to communicate their feelings to counselors face-to-face. Another reason was if the participant could not attend some of the sessions due to some reasons

like getting sick, going abroad, or severe weather conditions, so they prefer online counseling in order not to miss the sessions.

The most interesting finding in this study that most of the participants showed positive attitude and tremendous effect in their life by using online counseling. This result is similar to the results of the study that conducted by Zamani et.al. (2010) and Bato &Marcial, (2016).

On the other hand, most of the participants assumed that not all problems can be resolve by online counseling. They thought that online counseling is best for problem solving, time management, increasing awareness, self-control and addiction. Almost all of the participants believed that online counseling is not effective for severe problems like mood or psychiatric disorder. They did express concerns about the loss of nonverbal, ethics, trust, confidentiality, security, reliability, technical malfunctions, pacing and empathy, so the lack of perceived privacy and security during online counseling sessions and the fear of being caught while conducting online sessions were the main concerns reported by participants.

According to Teh and his colleagues (2014) The attitude towards online counseling (vis-à-vis face-to-face counseling) was generally positive and the respondents in his study indicated openness to conducting online counseling, but they still consider face-to-face counseling more effective than online counseling.

In conclusion, the study showed good knowledge about online counseling and the participants believe that online counseling is essential part of their way to deal with daily life problems. So they think that taking training program in online counseling will be helpful and assist to deal with effective and behavioral difficulties and it would enhance the opportunities to get professional help. Therefore, the study recommends further research to explore the differences between men's and women's perceptions of online counseling, in addition researchers may want to address the evidence of discomfort toward face-to-face counseling services than online counseling services. Additional areas of research should be considered is to understand how attitudes toward online counseling related to some variables like age, gender, socioeconomic status, marital status.

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Editor's Note: Successful collaboration requires a balanced approach. Conditions for success are explored in this paper.

Factors facilitating effective university - industry collaboration in the South Pacific region

Asheefa Aiyub, Gurmeet Singh, Shavneet Sharma
Fiji

Abstract

This study investigates and addresses the factors required to facilitate effective university-industry collaboration in the South Pacific Region. The study employs a qualitative method whereby participants from academia, industries and researchers category are considered. The paper puts forward a number of factors such as the need for formal documentations, resources, coaching, motives of industries, recognitions, tailored programs and the willingness to engage and influence changes which were subsequently different from what was experienced in many developed countries. The paper emphasizes that in order to have successful and long term collaborative relations, there is a need for universities and industries to engage in formal documentations which validates the responsibilities of the parties involved. As such, the industry needs should be aligned with the university programs to effectively undertake and execute university industry collaborations. This study is useful for developing collaborations on a great scale and can prove to be a way forward for many island nations. This paper also provides recommendations for future research. The finds of this paper is useful for tertiary institutes, industries, scholars and academics.

Keywords: University-Industry collaborations, effective collaborations, factors, qualitative research method.

Introduction

In today's economy, vast operations have to be executed to produce supplementary complex and innovative products (Roshani, Nadia, & Frayret, 2015). Historically, these operations were done and administered independently; however, individual organizations are now engrossed in linking their activities with universities (Etzkowitz & Leydesdorff, 1995; Roshani et al., 2015). Such acts are usually categorised as University Industry Collaborations (UICs).

UICs have peculiar attributes that distinguish them from universities and industries that do not facilitate collaborations (Dan, 2013; Guimon, 2013; Slusarek, Sobota, & Mendec, 2010). Studies have shown that UICs have gained new perspectives in the field of Research and Development (R&D) in industrialized countries since the 1970's (Baysal, 2007; Carayannis, Alexander, & Ioannidis, 2000; Etzkowitz & Leydesdorff, 1995). The fundamental impetus behind UIC is to build upon R&D capabilities and innovative potentials of the companies, and subsequently amplify a country's competitive power (Australian Technology Network, 2014; Baysal, 2007; Scott, Steyn, Geuna, Brusoni, & Steinmueller, 2002).

According to United Nations Scientific Educational and Cultural Organization (2017), it was held that the global average masks wide disparities from one region to another in terms of UICs. Universities in Canada collaborate comprehensively with Small Medium Enterprises (SMEs), industries, communities, governments and colleges to spawn marketplace innovations and provide explanation of societal challenges. Almost every year the universities in Canada carry out $1 billion in research for businesses and employs 65,000 people; generating a Gross Domestic Product (GDP) of $4.3 billion (Universities Canada, 2015). This paper identifies factors facilitating effective levels of collaboration within the South Pacific Region and proposes a methodology using an institutional case study.

The differences between universities and industries, such as aims, culture, bureaucratic structure, and human resources profile (Arvanitis, Kubli, & Woerter, 2008), create a variety of problem that affect the implementation of their joint projects (Butcher & Jeffrey, 2005; Philbin, 2008). There are different factors that can facilitate and impact the levels of collaborations. Bektas and Tayauova (2014) held that one of the reasons UICs have not been sufficiently improved was due to the university structures. While they believe that university research remains at a theoretical level, the needs of the relevant industries and commercial sectors fail to be taken into account. The report prepared by The Science Business Innovation Board AISBL (2012) focused on shedding light on the insights and lessons on 14 groundbreaking partnerships in Europe and the United States. This study demonstrated that the universities actions varied widely due to their aims and impacted the university partners in many ways. Subsequently, the core elements were identified that enabled such partnerships to work and comprised of having shared visions and strategies, leadership, long term strategic partnerships with built-in flexibility, right type of people and resources, dialogue, lessening the importance on Intellectual Property (IP) and results, promoting a multidisciplinary approach in learning and research and aspiring towards a problem solving research for the society. These factors were proven to be successful for universities in the developed countries, however, consideration and investigation of factors for universities within the developing nations, especially Fiji, has not yet been made.

The purpose of this paper is to examine the possible factors that contribute to facilitating effective collaborations in a South Pacific university, namely, The University of the South Pacific (USP) as a way forward in engaging with collaborative matters on a great scale. In addition, this research presents qualitative findings using interviews and questionnaires as a basis to gather data. The data collected has provided sufficient evidence in determining factors that can be seen as efficient and effective facilitators for collaborations in USP. Understanding these factors can enable not only USP, but the stakeholders and partners involved to better exploit and manage future collaborative relationships.

The following sections will present the review of past literature on factors facilitating collaborations, followed by the research approach used in this study and discussions on the research findings. The paper then highlights conclusions, recommendations and directions for future research.

Literature review

The affiliation between universities, industries and national research centres varies and depends on the historical and cultural surroundings of the individual country (Guimon, 2013; Nezu, 2005). The origins of UICs can be traced back to the English Revolution times, which were directed on numerous developments. It was through these developments that the technological part of the industry became more science instigative (Baysal, 2007). Studies undertaken in overseas contexts, namely, US, Germany, The Republic of Korea, Singapore, Taiwan, Japan, Thailand, Canada, Mexico, Ireland, UK, and Malaysia have described their successful models, policies, criteria in benchmarking collaborations, managing UIC projects, challenges and outcomes of successful UICs (Bruneela, D'Este, & Salter, 2010; Feng, Ding, & Sun, 2011; Kabins, 2011; Markkula & Lappalainen, 2009; Nangia & Pramanik, 2011; Natural Science and Engineering Research Council of Canada, 2009; Nezu, 2005; Perkmann, Neely, & Walsh, 2011; Philbin, 2008; Ramos-Vielba & Fernandez-Esquinas, 2012; Ryan, Wafer, & Fitzgerald, 2008; Sa & Litwin, 2011; Schilling & Klamma, 2010; Tijssen, Leeuwen, & Wijk, 2009; Torres & Dutrenit, 2011; Trappey & Shih, 2015; Yee, Abas, & Chong, 2009; Yee, Chong, & Kendal, 2015; Zakaria, Yee, & Chong, 2012).

While different countries incorporate factors to soothe and ease their collaborative relations, it is imperative to have shared visions and strategies. Since partnering with industries necessitate an

elongated, continuous devotion and focus, universities may face pressures on many fronts (University of California, 2003) if the strategies and visions are not stalwartly oriented to industries (Karjalainen, Koria & Salimaki, 2011). In cases where the collaborations are not held at zenith priority, it results in a string of incremental schemes and short-term partnerships with diminutive or no evidence of any significant positive impact (University of California, 2003). Even though this can prove to be a starting point of having a win-win partnership (Karjalainen et al., 2011), it is mandated that there should be two way communication between parties. Due to differences in goals of the two parties, empirical evidence reveals that the parties need to clearly communicate the roles and goals to avoid misunderstanding, distrust and the risk of failed collaborations (Hseih, 1997; Li, 2005).

When the goals and objectives of the collaboration are stipulated, it creates the need to incorporate resources. Scholars have put forward that mostly financial, physical, human and social capital classify as resources (Busenitz & Barney, 1997 ; Powers & McDougall, 2005). Usually industries and academic institutions acquire specialized equipment, facilities and education or knowledge that can be established to be a fundamental source for a prospective partner (University Industry Demonstration Partnership, 2016).

University presidents need to ensure that university-industry (UI) partnerships have a strategic priority and communicate the message to the members that are involved (The Science Business Innovation Board, 2012). Universities operate in specific domains, meeting the needs of a range of businesses; no one university can operate in all domains. Similarly, the needs of business align with different domains and it is not unusual for a business to collaborate with several universities in meeting those needs (Wilson, 2012). In order to achieve a world leadership in UICs, all domains must attain excellence. A source of authoritative knowledge should be established whereby the university and industry leaders sit as equals. Without mutual recognition and expertise, the competitiveness of universities can lead to weakness (Wilson, 2012).

Casey (2008) held that while constructing UI partnership agreement or contract, it must be crucial that parties develop flexibility. For collaborative interactions to be truly productive and long term, they must be flexible to meet future demands and changes of an internal and external nature. These collaborative relations promote a need to initiate a multidisciplinary institute on campus to break down the traditional academic silos and build new culture and curriculum. The growth of alliances between universities and industries exposes the graduates to research and reflects the evolution of R&D away from basic towards applied research - research that is much more valuable and nearer to the industries immediate needs and wants, providing a powerful mechanism for transferring knowledge and technology (Mowery, 2008; Science Business Innovation Board AISBL, 2012). As a result, industries are turning to universities to know what is going on at the frontiers of research, which further leads to building ingenuity and talent to facilitate future research and innovation. Such an act can take into account market needs and deliver solutions to pressing social challenges (The Science Business Innovation Board, 2012). The success of a collaborative project often leads to attaining IP on it. Usually when benefits from such IP exploitations emerge, each party wishes to get a percentage of ownership of the IP created or invented. This puts forward the idea of a co-ownership or jointly owned. It was held that co-ownership or jointly owned IP rights in practice are rarely desirable because both parties would not consent or agree on the issues stipulated out in the agreement unless it's catered and favoured within the Jurisdiction (Moore Law, 2013). Pilz (2012) stated that usually issues regarding IP ownership is costly and time-consuming; and can often lead to protracted disputes. IP issues can kill a startup before it can really begin (Feld & Mendelson, 2011).

Research methodology

The qualitative methodology has been applied in this study. The richness and holism of qualitative data have strong potential for revealing complexity by providing a comprehensive description that are vivid and nested in a real context, and has a ring or a truth that impacts the readers strongly. The inherent flexibility of qualitative studies gives confidence that the researchers have truly understood the underlying concepts (Miles & Huberman, 2002). Qualitative research is used for the rationale of amplification and understanding the social associations and affairs through the undeviating experiences and elucidation of individuals (Cohen, Manion, & Marrison, 2000; Sarantakos, 1998). Thus, the experiences and perspectives of the participants are gathered in this study. This study builds on a complex and holistic picture, analyzed words and reports with detailed views of informants in its natural setting (Yin, 2003).

USP was established in 1968 and is divided into three faculties, namely, The Faculty of Business and Economics (FBE), The Faculty of Science, Technology and Environment (FSTE) and The Faculty of Arts, Law and Education (FALE). USP is recognized as one of the two regional universities in the world (Naz, Singh, Narayan, Prasad, & Devi, 2015) and is owned by 12 member countries in the South Pacific which has resulted in students enrolling from diverse learning and cultural backgrounds.

The researcher adopted a purposive sampling to address such an area of study. The rationale for choosing this sampling technique was due to the fact that UICs is a topic that hasn't been given much focus or emphasis in USP. Selecting specific participants will enable the researcher to address the matter in more detail. A total of 100 participants were chosen which comprised of 35 individuals from academia, 35 individuals from the industries and 30 research students. The individuals from academia encompassed university staff such as the program leaders, research committee members and individuals who had a direct relation or were aware of UICs currently existing within USP. It also included individuals who held top positions in USP, for instance, the Chancellors, Deans, Associate Deans and Head of School's (HOS) and Deputy Head of School (DHOS). There were two sets of lists obtained for industries whereby the first list consisted of all industries present in Fiji while the second consisted of the industries that have active involvement with USP in learning and research matters. The researchers consisted of students who were enrolled through their Masters-by-Thesis and Doctor of Philosophy (PhD) programs. The rationale for choosing this number of samples and these respective participants were because those that were not involved in the decision making levels in universities and industries or in undertaking research projects would not have provided a comprehensive analysis of what factors can effectively facilitate UICs in USP. With their experiences within the university life and surroundings, these individuals were able to relate better to this proposed study. 60 participants were interviewed to gain an in-depth analysis of the factors that can contribute and facilitate collaborations in USP and 40 participants were given questionnaires.

The data generated from the questionnaires and interviews were transcribed in their entirety. After it was transcribed, the data was entered into Microsoft Excel for ease of tabulation. Specific themes started to emerge after tabulation and thus a thematic approach was applied. In a separate Excel file, the data that was gathered were then given binary codes, that is, 0's and 1's. This enabled the researcher to formulate an easier method to determine the level of responses gathered from participants. It then used Structural Package for Social Sciences (SPSS) to convert the binary data to form frequencies and cross tabulations between the three groups. This helped to generate favourability of a particular theme and how participants valued and argued for it and subsequently addressed the research questions more precisely. Thematic analysis was then carried out to identify the factors that led to effective facilitation of UICs in USP.

Results

Unlike the factors incorporated and facilitated within European countries and the US, the data gathered from the participants in the South Pacific region were very different. It is crucial to consider that different factors come into play with different country settings. The Table 1.0 below shows the possible factors that can be taken up by the individuals to facilitate efficient and effective means of collaboration. Table 1.1 represents a cross tabulation and a further breakdown of Table 1.0 of how the participants perceive such factors.

There were 7 factors that surfaced during the study. They were: Formal Agreements, Resources, Coaching and Mentoring support, Capacity and Background/Motives of the Industry, Appreciation and Recognition, Tailoring Programs, and lastly, the passion and willingness to influence changes and collaborate.

Table 1.0
Factors facilitating effective collaborations in USP

		Responses	
		N	Percent
Factors	MOU's, MOA's, Formal Agreements	79	21.5%
	Resources	75	20.4%
	Coaching, Mentoring Support and Evaluation	60	16.3%
	Capacity, Background, Motives of Industry	43	11.7%
	Appreciation and Recognition	19	5.2%
	Tailoring Programs	78	21.3%
	Passion, Willingness, Time and Ability to Influence Changes	13	3.5%
Total		**367**	**100.0%**

Table 1.1
Cross Tabulations: Factors Facilitating Effective Collaborations in USP

		Responses							
	M	MOU's, MOA's Formal Agreements	Resources	Coaching Mentoring & Evaluation	Capacity & Background	Appreciation & Recognition	Tailoring Programs	Passion, Time & Influencing Changes	Total
In	Count	32	21	23	22	6	30	4	**35**
	Percentage	40.5%	28.0%	38.3%	51.2%	31.6%	38.5%	30.8%	
Acade	Count	21	26	18	12	9	24	4	**35**
	Percentage	26.6%	34.7%	30.0%	27.9%	47.4%	30.8%	30.8%	
Researc	Count	26	28	19	9	4	24	5	**30**
	Percentage	32.9%	37.3%	31.7%	20.9%	21.1%	30.8%	38.5%	
Count		**79**	**75**	**60**	**43**	**19**	**78**	**13**	**100**

For any collaboration to be successful, it is important for parties involved to get it signed on paper. It mandates each party's obligations, and serves as a reminder that it legally binds the parties together. While such documentation is stipulated, it is essential to consider the resources, coaching and mentoring ability available to effectively move forward in the collaborative relationship. However, this may depends on whether the parties are socially or profit driven. It is

presumed that in any relationship, one needs to show appreciation and value for each other and for the work done. Such an act builds for each party the passion and willingness to collaborate. When these are the thoughts that linger, usually on individuals minds, tailor-made programs shouldn't be left behind. Tailor-made programs enable universities to align their courses to what is needed by industries.

Discussion and analysis

Formal agreements, MOU's and MOA's

In order to understand the dynamics of collaboration, the survey research showed that there's a need to understand what's required by the parties. While the agreements should be signed before any such collaboration is initiated, the stipulated goals and objectives of the agreement must be attainable. Attainable goals must be the starting point of any relationship. It would be impractical to sign off an agreement that's not within the capacity of the parties to fulfil. This enables the parties to negotiate how they can work together and bridge the gap between universities and industries. Sometimes with the fluctuating economies and markets, parties tend to be reluctant in committing to collaboration for an extended period; the formal agreements, MOU's and MOA's create a legally binding relationship between parties causing them to adhere to the rules and clauses stipulated within the agreements. Such an act prohibits parties to alter the terms of the agreements or withdraw from the agreement without facing any consequences.

Usually, agreements specify clearly and precisely the scope, details, outcomes of anticipated projects, costs, responsibilities of each party, priorities, and confidentiality of information. It is interesting to note that in the economic world, organizations possess sensitive and critical information that allows them to earn their competitive edge. A great deal of protection and adherence must be provided to avoid premature dissemination of results. However, if the results are to be published, industries purported that they should be consulted before doing so.

Resources

The survey research showed that it is imperative to consider how one would go about fulfilling the terms of the agreement based on resources. Resources are a crucial factor and must be aligned with goals and objectives. It would be unfeasible and unrealistic to have goals and objectives, if one does not have any resources to fulfil them. It was perceived that resources are categorised into funding, adequate teachings and equipment, support infrastructure, startup support, and human resources.

A question arose during the survey research as to who provides the funding for collaborative tasks or research. While most thought that both parties need to contribute to have successful collaboration, several industry and academic participants emphasised the need to have equal contribution. For instance, if the industry is putting in $1 million for the development of a particular product, it requires the university to contribute $1 million for the development of that same product, that is, if the product ownership has to be shared equally amongst the parties. However, it may not rest at each party's capacity to cater for equal contribution; participants also purported that due to the scarcity of resources, sharing of resources would be helpful in both up-skilling and knowledge building.

Most organizations prefer that other organization be required to cooperate with them. This is because in a true collaboration, the relationship between the organizations must be of a give and take, conscious, negotiated relationship. Though it is easier being the demanding, one sided and organizationally self-centred, organizations would often feel threatened when it comes to sharing of organizational information, resources and other assets. Thus, in these cases, a successful collaborative relationship may not then be established. The universities could increase their financial capacity for faculties to improve their own resources for learning. Any resource is

affordable provided that there are sufficient funds to purchase that learning resource. This adds to the university's profile of being a driver, enabling it to have sufficient resources to collaborate; opening the likelihoods to collaborate with many more industries.

In order to carry out the tasks of the parties, parties need to have the right type of people to do the task accurately. The universities must have the right type of students, embedded with the practical trainings to effectively carry out a specified task. The industry participants acknowledged that it's the teachings provided at universities that facilitate the development of the right type of students. When asked what was meant by "right type of students", the industry participants responded that students must be well versed with how the industry operates and they should be able to apply the theoretical knowledge into the practical life; adopting the need of applied research. The adequate teachings and facilities must enable the students to actually do the work that has been assigned to them and incorporate a culture of sustainability rather than exploitation for narrow economic developments. This aspect was argued by the researchers and academia that usually the private sectors do not oversee operations that relate to sustainability because of their profit oriented nature.

A resourceful environment would ensure that people are ready for the industry. The startup support is necessary in any sector, without it, initiating any task or operation would be difficult. The support infrastructures on the other hand were held to be essential, as daily needs cannot be met. If the daily needs are not met, it would be difficult to fulfill the objectives and goals of the required project or task.

Coaching, mentoring support & evaluation

The survey research depicted that both parties need to coach and mentor the student or researchers that are involved. The onus should not be only on one party, it would cause one party to feel burdened with responsibilities and collaboration would just fail. In terms of placements and internship programs, the industries can assist them by guiding them with relevant training and programs. But at the edge, the university plays a bigger role. The university program that caters for the coaching, mentoring and evaluation supports are usually behind in this area. It needs to involve the industries to push start such actions for collaboration. For some programs, universities and industries meet once a year, but a few industry participants held that it's imperative that the universities and industries build something that's of top notch. Usually in meetings, respective individuals have tea and dinner and then disperse for one year; the industry participants held that this is not effective collaboration. What they perceive to be effective is when they build things together, where both the university and the industry gains from such an action. However, when no such programs are put in place, it lies with the university to approach industries for them to coach and mentor students in internship programs. When students and researchers get training, industries are more willing to employ them after they graduate. For instance, when you study business at USP, it's not likely you can go and create your own business immediately when you finish university. It's essential and underlying factor of success that the individual goes and gets at least a little experience as to how the industry operates, understanding the needs of the sector, what's required in it and how one should perform to survive in the competitive era. As for undertaking research and projects as stipulated according to the terms of the agreement, industry mentors are needed to provide insight to add a touch of what real-life expectations and requirements look like to shape and enhance the outcomes of the project.

A good coaching and mentoring program prepares people on what's expected in the industry. Evaluation helps gain perspective on what is learned and whether the learning structure is beneficial. With regards to evaluation, feedback must be provided by both parties, that is, the universities and industries; constructive criticisms are needed, irrespective of the field to which the individual belongs. The respective parties need to meet frequently to be updated what is required from each partner. The industry participants held in their interviews that not everything

has to be formal and legal. Informal discussions can be made over a cup of coffee as to what are the industry needs and requirements and what areas need to be addressed by the university. The onus relies on the university to lead this approach.

Capacity, background and motives of industry

To address capacity, the industry needs to reach a certain level of maturity, infrastructure and aptitude, to actually be able to reciprocate these things. The survey research showed that most industries don't have that level of maturity to build on their understanding and they may not be big enough to absorb 10 students at a particular time (in terms of internships). When USP signs of the agreements with other industries, it needs to consider whether the industry has the capacity to cater for that many students. If it's a small organization, which is involved in something small, for instance, AC refrigeration and food science, these organizations would not be able to take in 10 students and mentor them accordingly, they might take in 1 or 2 students. When communication is established with industries, universities must alert the organization that there are a particular number of students that need practical or internship trainings, and must liaise with the industries as to how many they can take on board.

The universities and researchers/students must be well versed as to how the industry operates. It helps the student to adapt quickly to the surrounding and start with what they are required to do, rather than learning the basics of the organization. It was put forward that when universities and researchers/students attempt to learn about the industry, they must do a gap analysis, as to what does the industry require, what should the individual do, how would your role or internship in the industry make a difference, how would the student learn, how should the research be formulated. These questions were raised by industries because they believed that students and the university usually face difficulties in understanding what they do. It was also addressed by the industries that while assessing how one knows the industry and seeing where they fit in; the next question they should tackle is that if such collaboration is successful, there needs to be something in it for the industry. The business environment usually allocates its time, commitment and resources in areas where it benefits them. The private sectors are always profit oriented. One sided affair and benefits usually don't work. It must be a win-win situation for both of the parties. Though the public organizations are not profit oriented, they still aspire to have capable students and researchers that can work to serve the public interests. Due to different interests in private and public sectors and each trying to address their own interests, it was argued that before the collaboration initiates, it's essential for universities to assess the pros and cons of collaboration; assessing what good it will bring to both the parties.

Appreciation and recognition

When such collaborative relationships are being established, in terms when students go on internship programs, the survey research showed that industries must show some form of appreciation to the students for their contribution, because at the end of the day, the students are performing tasks for the industries. If the organization is large enough, they must at least take care of the trivial expenses, by paying them weekly or on a fortnightly basis. The cost of living is high in this modern era, providing students with support would help them to work harder and perform better. It was also perceived that the university staff should be given rewards for their efforts into such collaborative measures.

While only a few academic participants addressed the need to advertise such initiatives at the governmental and university level, a majority of academia and industry participants illustrated that the universities must invite the respective industries on their career expo day, guest lectures and seminars, whereby the industry individuals can approach students, directly, and attract them to join their organizations, not only for the purpose of their degree, but to prepare them for the industries. For schools that engage with industries, they believe that careers expo is a good

occasion where industries can interact with students directly. This helps to increase the employment rate for students by allowing them to associate with potential employers.

It is crucial to have our own collaborations first. There are collaborations existing within the university. However, they are not strong enough. Faculties and schools are well aware of their operations; a few individuals need to be present from each faculty, and when an idea gets to be generated, those persons can actually liaise with other faculty members and seek areas where assistance is needed. There should be unity amongst the schools. Usually in any relationship, disagreements happen, which tend to affect the relationship the parties have. This creates isolation. It's imperative to have a platform where all sections get together and liaise to come up with a solution or an idea.

Tailoring programs

The industry depends on academic institutions like USP for quality people, while the university depends on the industries in particular aspects of their programs. Industries need to inform the universities of what they want to see in the course syllabus and what needs to be aligned with the industry needs. By having this kind of collaboration, the industries can assist USP in tailoring the content of the syllabus and provide the right type of exposure to students to prepare them well for industry roles and for the future. Collaboration is needed to gain industry experience, as the theory learned by students must be related to the industry. Such an act is lacking from the university. The students and researchers must possess the ability to apply what they have learned and convert it to something tangible. It's evident that there's a gap between what the graduates are prepared for and what they know and want. While they may develop beautiful functions, they may not be able to communicate it. Such programs must embed a right type of attitude within the student or researcher.

Usually the industry advisory board for some of the schools in USP ensures that their course work remains relevant to the industry and oversees activities. For instance, whether safety wears such as, overalls and safety shoes are supplied to students (OHS matters). It's essential that whichever organization USP has chosen for its students or researchers, the organization provides the same level of treatment as it does to its own employees, and that there shouldn't be any forms of discrimination or biasness. The student should be put in places where they are best suited, that is, according to their qualifications, and the job specifications must be well aligned rather than making the student complete filing works or prepare tea and coffee for the staffs. For instance, the approach that engineering program has with industries enables it to be more interactive, whereby 10 weeks of industrial training allow the students to work in the industry and get hands-off experience and see the reality and subsequently build from that.

Willingness, time and the ability to influence changes

A willingness and passion to engage is needed. If not, you would just have uninterested parties that are unable to make ends meet. The parties must make it known to one another that they want to collaborate on such aspects and why. While people from industry do not get time to see what's of value to them (in terms of internship programs), the academia is bogged down with workloads, which makes it difficult to cope and cater for collaboration. The level of leadership within the university and industry also determines the success rate of the projects.

Limitations and directions for future research

With the experiences gathered from reviewing the literature and conducting this study, there's still scope for future research. Firstly, a comparative analysis can be conducted with the other PICs. This would give a more geographically dispersed understanding of how effectively UICs can be designed and facilitated in USP. Different nations have different environmental and global

understanding, the individuals from such countries would perceive differently to how we can implement and sustain UICs.

A Delphi method can be adopted to explore this area in more depth, whereby the opinions of the experts in matters of UICs are consulted upon. This would ensure that several interviews or meetings are conducted with experts on a longitudinal basis, thus validating and adding more insight to the research topic. Since the study had represented only a total of 100 participants, it's preferred that a large sample be selected to cover more participants from academia, industries and researchers to address UICs.

Conclusion

This study employed a qualitative approach to evaluate the data to assess the factors that can facilitate effective collaborations in USP. This paper considered a detailed review of literature on the current factors that are evident in the developed countries. The university and industry must realize that successful collaborations are grounded on the involvement and interactions of both the parties rather than just one. Since UICs are not exploited and administered on a great scale in USP, these factors can prove to be a starting point in building up its existing collaborative relations, to have a win-win situation for all the parties involved. New research paradigms can bridge the gap between the universities and industries and can led to significant improvements in collaborations within the South Pacific Region.

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