

Social Media Use to Transfer Knowledge into Practice and Aid Interaction in Higher Education

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ABSTRACT

Employers have criticised graduates for having inadequate skills to apply knowledge into practice. One of the causes of this challenge is the traditional teaching and learning methods which concentrate more on theory than practice. Technology affords several teaching and learning tools like social media which students are already motivated to use. Social media aids in sharing learning experiences, research, academic events and getting the latest information. However, there is a paucity of research on its use for learner-centric teaching, learning and academic purposes in Africa. The research uses Facebook (FB) technology to facilitate a task of students' applying operating systems knowledge to record and upload a video installing a virtual machine and operating system onto a group; to promote content access, and interactive and cooperative learning. Bowers Affordance analysis eLearning design methodology framework was used to match requirements of this task with affordances of the Facebook tool (Bower, 2008). A questionnaire already validated by previous research was used to determine the attitudes and perceptions of students on the use of FB to accomplish the video upload assignment task. The results show positive effects of FB on students learning process and experience, include students' putting knowledge into practice, sharing, collaboration, interaction, flexibility and learner-centered activities, among others. In this light we recommend that FB should be integrated as a tool for learning at the university since students appreciate it, find it easy to use and familiar.

Keywords: *Knowledge Transfer, Facebook, Interaction, Collaboration, and Operating Systems*

1. INTRODUCTION

The emergency of Information and Communication Technologies (ICTs) in the 21st century has affected different aspects of life in society including agriculture, climate, health, and the economy, among others. The influence of ICTs has not spared the education sector. However, the progress in this sector is still inadequate. Technology affords new ways of learning using a variety of tools, which traditional learning approaches do not offer. Technology addresses different needs of learners and provides various skills required. It offers different opportunities for learning differently through use of various media such as chats, blogs, wikis and Facebook. Technology provides knowledge sharing opportunities where students and educators can access content and network with peers to share best practices from within and out of educational institutions. This capability is likely to develop deep learning approaches amongst students, leading to production of new knowledge and artifacts and transform educational institutions and society. Therefore, to increase learning motivation, desire and interest it is important to design meaningful learning tasks that use new educational technologies. These technologies should continuously be explored by educational institutions, educators and learners for teaching and learning in this digital era.

The 21st century learners, born after 1988 commonly referred to as digital natives (Prensky, 2001), should be taught using methods that match their learning interests, preferences, characteristics and styles. Beldarrain (2006) notes that students are tech savvy, mobile and want to learn and interact with peers and instructors at times and places of their convenience. Bosch,

(2009) notes that students are adapted to searching for and retrieving information on the Internet and thus need a more interactive learning environment. The digital immigrants, born before 1988, equally catching up with the tech era, and have become tech savvy, and can therefore benefit from educational technologies.

Despite the use of social media for sharing learning experiences, research, academic events and getting the latest information (Hurt et al. 2012), its use for learner-centric teaching has not been explored. For example, the ability for Facebook to share videos has not been explored in the education sector. Lecturers teach practical courses in a theoretical way curtailing students' acquisition of the expected practical skills. This could be as a result of personal as well as institutional challenges in using social media as learning tools. Facebook can be used to aid students in transferring knowledge into practice, which is a challenge today. Research has shown students' shortage of skills in transferring knowledge acquired in class into practice, which has led to criticism from employers (Bagarukayo et al. 2012). In Uganda the education system encourages more concentration on theory than practice, leading to a mismatch between what students expect and what educationists deliver. The education system rarely emphasizes use of technology and practical skills development. Students are familiar with Facebook online application which supports, connects and engages them outside formal in-class hours (Mbarika et al. 2010). Facebook was developed as a university project and therefore has stronger roots in academic community (Bosch, 2009). In 2007, the Facebook version of Blackboard Learning Management Systems (LMS) was launched with a new course feed application, providing users with course newsfeed (Bosch, 2009). In 2008, this application was phased out, with Facebook designers inviting developers to build other educational platforms.

Today's workplace requires individuals who create and collaborate within constraints of time and place (Beldarrain, 2006). Therefore, there is need for real-time communication among peers and co-workers, and tools to create a stronger learning community for building expertise and developing problem-solving skills. To be prepared for the complex and rapid changing work demands, students need analysis, critical thinking, decision-making, and problem-solving skills (Hussain et al. 2012). Therefore, educationists need to tap into technology that affords students the ability to learn in their learning preferences for effective learning and to be productive to employers, to address this mismatch.

Makerere University has not yet embraced e-learning to its fullest potential. The use of educational technologies at the University in teaching and learning is not mandatory. The e-learning policy exists but it is optional for the individual College or lecturer to use technology. At the University, a customized Moodle, Makerere University E-learning Environment (MUELE), is used to disseminate notes to students. However, this platform is not fully utilized to facilitate teaching and learning since collaboration and interaction tools such as forums and chats are not used. The lecturers only upload notes on the platform which students access at convenience. This implies that there is limited interaction, engagement, and collaboration with MUELE.

The subjects of the study were second year students of the Bachelor of Information Technology undertaking the Operating Systems course unit at the School of Computing and Informatics Technology, Makerere University. The Operating Systems course provides students with basic knowledge and skill in using, evaluating and managing existing operating systems. The mismatch of teaching methods and students' learning preferences needs to be addressed by developing learning activities that enhance transfer of knowledge into practice to develop skills that address real world issues and yield greater productivity and return on investment. It is hoped that by teaching students using a platform they are already motivated to use the uptake of technology in Makerere is reinforced.

This paper explores the potential of social media, in particular, Facebook in facilitating students' application of operating systems knowledge to record and upload a video installing a virtual machine and operating system onto a Facebook group; to promote content access, and interactive and cooperative learning. The rest of the paper is structured as follows: - section 2 presents the review of literature on knowledge transfer into practice, with emphasis on the current methods, practices and studies that have used Facebook, section 3 discusses Bloom's Digital Taxonomy (Churches, 2001) and Anderson's Interactions framework (Anderson, 2008) as the appropriate frameworks to define the educational goal, in section 4 we discuss the methodology used, and the eLearning task design in section 5, in section 6 we present the data collection and analysis, the results and proof of concept are presented in section 7 and 8, in section 9 we have the discussion and finally the summary in section 10.

2. LITERATURE REVIEW

2.2.1 Transferring Knowledge into Practice

We define learning as acquiring new information, knowledge and sharing best practices, while development is the process of doing something with that learning so that it has an impact on students' progress (Ractham et al. 2012). The authors argue that for the learning process to be long lasting, time should be invested in transferring knowledge into practice and understanding the outcomes. To provide a rich learning space, practical skills are required for students to transfer knowledge into practice and test newly acquired skills. The ability to apply classroom skills and behavior in the workplace greatly enhances knowledge retention (Ractham et al. 2012). Therefore, the gap between knowledge generated through studies, evaluations and application of findings in practice needs to be addressed.

Bloom's Taxonomy stresses the need for holistic learning (Churches, 2001). Bloom states that one cannot apply knowledge and concepts unless they understand them and one cannot understand a concept unless they remember it. Before one analyzes a concept, they must have remembered, understood, applied, analyzed and evaluated it. Therefore, for students to create an artifact, they should remember, understand, apply, analyze and evaluate it. As noted by Bloom, knowledge application is using information, concepts and ideas in a new situation. Knowledge application includes implementing, carrying out, using, executing, doing, running, loading, playing, operating, uploading, sharing and editing. The possible learning activities include demonstration, presentation, interview, performance, editing, illustration, simulation, and playing. Applying knowledge involves digital activities of operating, playing, uploading, and editing.

2.2.2 Current Methods and Practices For Transferring Knowledge Into Practice

A current method for transferring knowledge into practice include Problem-based Learning (PBL) and multimedia instructional materials.

PBL is a learning method where the problems act as the circumstance and driving force for learning. PBL encourages acquiring knowledge to solve a given problem, and hence the problem being solved determines the skills attained (Bradley et al. 2005; 2007). This approach has a major impact on thinking and practice in education. PBL teaches students application of knowledge to solve the authentic and practical situations, increases student motivation, deepens understanding of subject area, encourages collaborative learning, and develops Higher Order Cognitive Skills (HOCS). Collaborative environments, typically computer-mediated, are used to help students explore potential solutions as they attempt to solve the problems posed in the cases. Such environments provide interactive feedback that enhances the analysis of multiple perspectives. PBL aspires at functioning towards understanding and finding a solution to a given

problem. This method is essential and suitable for science courses since it enables students to develop skills and confidence in solving new problems. There are hardly any direct solutions to problems from the materials in textbooks (Bradley et al. 2005; 2007). Students' preparation for the workforce should include the ability to develop HOCS so that they can apply knowledge in new contexts and have problem solving, critical thinking and decision-making skills needed by the employers.

Over the last decade Mbarika et al. (2010) have used multimedia case studies to solve real-life problems, which have improved students' HOCS like putting knowledge into practice in the work environment to solve real-life problems. It is therefore important for multimedia instructional materials to be designed with constructs and items corresponding to learning-driven factors. These constructs and items should challenge learning, produce learning interest, provide self-reported learning, and opportunities to learn from others.

2.2.3 Research Studies That Have Used Facebook

The effect of the advent of social media in our lives cannot be ignored. Social media is used for sharing learning experiences, research, academic events and getting the latest information (Hurt, et al. 2012). In the recent past, it has also infiltrated the education sector because it provides a learner-centered technologically and socially rich environment (Monopolis, 2014). Social networking sites lead to collaborative learning, communication, interactivity and knowledge sharing which leads to deep learning.

As noted by Murumba et al. (2015), social networking tools integration into learning provides students with better instructional materials, engagement and motivation, communication and interaction, increased family involvement and application of real-world skills. Teachers benefit by enhancing professionalism and collaboration and gain opportunities to build relationships with students (Monopolis, 2014). According to Coffin & Fournier (2015) the opportunities of social media in higher education include more students report using social media as a learning tool in class and for course-related purposes, students indicate that social media helps them remain connected with their peers and their institution, students increasingly want their instructors to use social media as a learning tool, and Instructors underutilize student mobile devices for learning. Murumba et al. (2015) therefore note the need for adoption of appropriate frameworks to facilitate repurposing social media for utilization in learning. Social software approach should be used to promote learning activities that improve the learning process, since there is a paucity of research on its use for academic purposes in Africa (Bagarukayo & Kalema, 2015). Students are already engaged and motivated in social media platforms, therefore it should be tapped for the learning process. Therefore, there is a need for a paradigm shift from teacher centered to learner centered learning which social networks promote when used in the learning process. These platforms may encourage active participation from passive and shy students, which leads to more efficiency in the learning process. Universities are likely to remain relevant and competitive by using ICTs for education not only to attract and retain students, but to facilitate knowledge acquisition and utilization.

Facebook offers a simple, intuitive interface and asynchronous features. Facebook provides an additional space, which facilitates learning, engagement, reflection, and interaction beyond the classroom (Monopolis, 2014). Monopolis (2014) further notes that Facebook facilitates collaboration and communication between students and faculty, allowing for information sharing and interaction. Students find it easy to use Facebook for social interaction in daily activities like chatting, communication and collaboration. Since students are already familiar, motivated and engaged in the Facebook environment, introducing educational content is easy and allows students to upload, chat, communicate, and interact by liking and commenting on posts and critiquing each other's assignments. Facebook promotes collaborating using electronic tools for

sharing, editing and uploading materials. It is an appropriate tool to facilitate discussions between students and lecturers through chatting, recording, making presentations, viewing videos, uploading and sharing files. Facebook can be used for planning, communication, interaction and control, which are at the applying and evaluating levels of Bloom's Digital Taxonomy.

Elsewhere, Bosch (2009) reported that University of Cape Town (UCT) learners are more engaged with Facebook and preferred it to the Vula LMS. Bosch, (2009) further reported that a UCT lecturer said it was quicker to 'talk' to learners on Facebook than finding them in class if they wanted to communicate. Facebook enabled students' activism and other extra-curricular learning, made low self-esteem and low life satisfaction learners more comfortable; and lecturers more accessible in a less formal environment for students to ask questions freely (Bosch, 2009). He reports that another benefit was that lecturers became more approachable after the online interactions. Therefore, the several benefits associated with Facebook make it a potential educational tool because of its efficient ways to teach large classes, through group discussions and chats.

Hurt et al. (2012) noted that Facebook could be used effectively for academic discussions because students preferred it over eLearning Commons as a classroom supplement, since it was familiar and easy to navigate. He further noted that students became more acquainted with classmates, felt valued as participants, learned more course material, and increased engagement by cultivating a classroom community and stimulating intellectual discourse. Ractham et al. (2012) used Facebook as a learning tool to build and foster an enhanced learning environment and reported that 55% of the students found Facebook helpful in learning, 78 per cent found Facebook a useful supplemental learning tool. Therefore, Facebook has great potential for informal constructivist learning environments as the primary space to communicate and collaborate through social interaction. The study showed that participating in discussions enhanced students' learning and perceptions.

Facebook facilitates interactive communication among students in the course and between the instructor and students (Barczyk & Duncan, 2013). The authors note that Facebook enhances participation, provides personal and professional growth, and is a convenient tool for enhancing discussion. In the study by Barczyk & Duncan (2013) students found the overall Facebook experience positive. Facebook facilitates the development of community of practice that climaxes in knowledge sharing, collaboration and interaction, and learner-centered activities. Therefore, integrating Facebook into university level courses provides students with the opportunity to interact with individuals within and beyond their classrooms and positively impacts student learning and retention.

In a study carried out by Rinco & Sandoval (2014), Facebook was the greatest host (81%), followed by Twitter (30%), LinkedIn (5%) and Myspace (4%), therefore making Facebook the most popular social network. In another study, learners were more familiar with Facebook and preferred it for discussions (Brady et al., 2010). Hough & Neuland (2014) reported that University of South Africa (UNISA) learners use social networking sites to connect with fellow learners and are strongly in support of Facebook. Facebook also helps in the management of large numbers of students through creation of groups.

As noted by Cloete et al. (2009), the benefits of Social Networking Sites (SNSs) like Facebook include a higher level of engagement, digital literacy skills, and integration in learners' daily practices, the potential to make identity information more relevant during class discussions, adding a 'social' peer to peer component and managing alumni through the group. Facebook creates an online academic community by linking learners and faculty, thereby breaking barriers and providing more immediate responses. The lecturers' highlighted promotion of critical thinking and improved 24/7 access to resources as benefits. The learners cited companionship,

information access, emotional and material support, the opportunity to know their lecturers better, expanding social research, more confidence, and opportunities to develop peer relationships and lecturers, and more self-disclosure as the benefits.

According to Beldarrain (2006) technology delivery method should encourage contact between students and faculty, develop cooperation and reciprocity among students, emphasize time on task, use active learning techniques, communicate high expectations, give prompt feedback, and respect ways of learning talents and diverse. Facebook affords seven principles and hence, its use for interaction to increase collaboration between learners and lecturer.

Facebook, the most popular social media platform, was used because students were motivated to use it in the learning process. Facebook provides students engagement with one another and instant access to lecturers in an informal environment and makes it easy to combine teaching and learning with social interaction. Using Facebook brings interaction with peers, content and teachers, collaboration (from peers and industry), digital leaders, practitioners and stewards, into the classroom and forms communities of practice. This facilitates continuous learning and formation of personal learning networks with fellow students, teachers and content accessed from different sources on social media for effective learning.

In spite all the positive contribution of social media to the learning environment, Coffin & Fournier (2015) highlight the challenges of using social media in higher education as students wanting to keep their academic and social lives online separate, social media as a source of distraction and social media impacting both productive and unproductive behaviors, among others. Other challenges include privacy, time wasting and miscommunication (Zaidieh, 2012).

3. APPROPRIATE FRAMEWORKS TO DEFINE THE EDUCATIONAL GOAL

3.1 Bloom's Digital Taxonomy

Bloom's Digital Taxonomy (BDT) addresses how the new technology-based classroom initiatives affect the students' levels of learning (Churches, 2001). BDT includes digital technologies and digital cognitive objectives and addresses all domains of the taxonomy unlike former versions. It includes how aspects of psychomotor like perceptions, and affective domains like attitudes and feelings changes, affect learning process. BDT introduced new digital verbs that aid collaboration, which are elements to facilitate higher order thinking and learning. There are four major aspects of the collaboration rubric which include collaboration features, emotion expression features, preparation and the users' confidence in using and operating the tool (Bloom et al. 1956). Collaboration is a 21st century skill integral to the learning process and has an increasing influence on learning. Collaborating and sharing are higher order thinking skills, which are facilitated by digital media and increase learning influence. Social networking is a key element of collaborating and networking because it forms links between people and helps to develop networks.

3.2 Anderson's Interactions Framework

Interaction between students, teachers and content has to happen for learning to be effective (Anderson, 2008). Therefore, the Facebook tool needs to afford interactions between students, teachers and content. The task of facilitating students' application of operating system knowledge emphasized teacher-content, teacher-student, student-student and student-content interactions using technology to enhance effective learning.

4. METHODS

The researcher created a Group page in Facebook for students taking the Operating Systems course. Through the group, students had discussions, commented on posts, posted videos, links, uploaded and shared videos they created. The task required students to create a video, using their mobile phones or cameras, installing an OS and uploading the video to the class FB group to enable peers' interactions, critiquing and learning from one another in the process. Students learnt by doing, by creating the video, and from their peers, lecturers, and the content uploaded by peers and the lecturer. This activity promoted the use of educational technologies for learning and teaching. The use of Facebook was important because it affords students ability to communicate, interact, and collaborate which enabled them to put knowledge into practice in a new context.

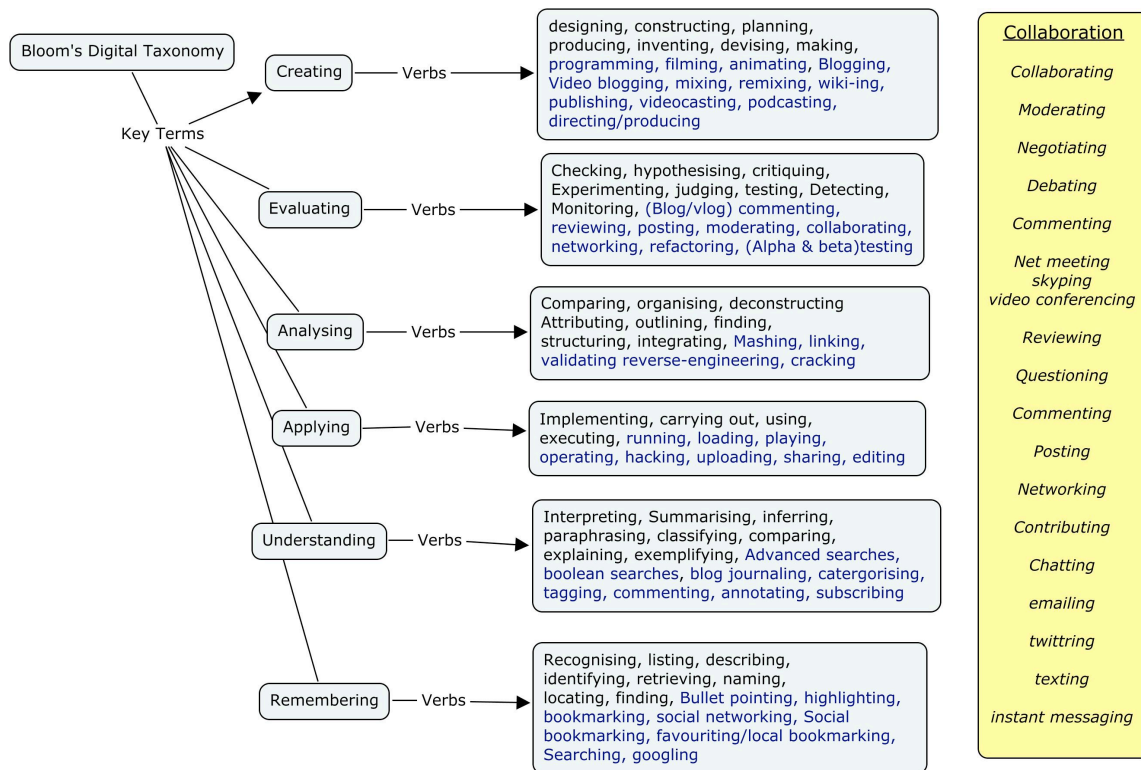


FIGURE 1: Blooms Digital Taxonomy

Students need to attain higher levels of thinking skills, needed by employers hence, the importance of this task was to enable them to acquire practical skills. Therefore, it was necessary to create learning activities that make students put knowledge into practice to develop hands-on skills. BDT was applied to train students holistically to attain knowledge, skills and attitudes, which addressed all levels of three domains. Students were taught from lowest to highest levels of the BDT by teaching them theory about installing an operating system and virtualization in an introduction lecture, which enabled them to gain skills at lower levels of remembering and understanding. At 'remembering' level, students carried out recognizing, listing, describing, retrieving, naming, locating, finding, social networking, googling activities to achieve this level. Reproduction (creating video), social networking and basic searches are some of the activities that led to remembering during the task. At 'understanding' level, students carried

out activities of interpreting task, summarizing, classifying, advanced and Boolean searches, googling, youtubing, tagging, discussion, posting and commenting on Facebook. Content authoring like creating the video aided understanding. At 'applying' level students did implementing, executing, using, carrying out, loading, playing, uploading, sharing and editing their videos. It involves digital activities of running and operating, playing, uploading, and editing which were all carried out by the students during video creation and upload on Facebook. In the video recording and upload task some of the activities that enabled applying include demonstration by the video, collaboration by students interacting and sharing ideas, playing and editing.

Facebook addresses how aspects of the psychomotor like perceptions, and affective domains like attitudes and feelings changes, affect the learning process. Analyzing includes comparing, organizing, deconstructing, attributing, outlining, finding, structuring, and integrating. The digital activities include mashing, linking, and were addressed in the learning task during video creation. Social networking tools, discussions, presentation, cellphones and texting helped get students to this level. At 'Analyzing' level, students did organizing, outlining, finding, structuring and integrating the content they found. Evaluating includes checking, critiquing, judging, reviewing, posting, moderating, reflecting, validating and was achieved during the video creation and upload task. Digital additions include commenting and reflecting, reviewing, posting, moderating, collaborating and networking, testing (alpha and beta), and validating. These skills were addressed in the task presented to students. The activities that promoted reaching this level include chat rooms, discussions, collaborating tools, camera, searching, presentation, recorders, posting, collaborating and networking.

Students attained 'evaluating' level by commenting, posting, testing, and experimenting during the task. The creating level involves designing, constructing, planning producing, inventing, devising and making the video which students acquired. The digital additions include programming, filming, animating, video casting, pod casting, mixing and remixing, directing and producing, publishing. These skills were achieved by the video creation, editing and upload on Facebook. The students put together their ideas from research on Virtual Memory (VM) and OS installation, and then created the video and posted it on Facebook. Therefore, Facebook was used as a tool for collaborating and sharing or publishing the video.

4.1 Bowers Affordance Analysis Elearning Design Methodology Framework

Bowers Affordance Analysis eLearning design methodology framework was used to match requirements of this task with affordances of the tool (Bower, 2008). Affordances refer to the perceived and actual properties of the object, primarily those fundamental properties that determine how the object could possibly be used. Bower, (2008) classifies affordances of e-learning technologies as media affordances-type of input and output forms, spatial affordances-the ability to resize elements within an interface, temporal affordances-access anytime anywhere, navigation affordances-capacity to browse to other sections of the resource and move back/forward, emphasis affordances-capacity to highlight aspects of a resource, synthesis affordances-capacity to combine multiple tools together to create mixed media learning environment, access control affordances-capacity to allow or deny who can read/edit/upload/download/broadcast/view/administer, technical affordances-capacity to be used on various platforms with minimal/ubiquitous underlying technologies, usability affordances-intuitiveness of a tool, aesthetics affordances-appeal of design, appearance of interface, and reliability affordances-robustness of a platform, systems performing as intended whenever required. Facebook has all the above affordances, which were required to facilitate achievement of the learning and teaching objectives of this study. Affordance analysis included identifying the educational goals, postulating the suitable tasks to satisfy the educational goals, determining the

affordance requirements of the tasks, and determining the affordances from Facebook tool before designing the eLearning Task, as detailed below: -

1. Identify the educational goals

The learning design intended to facilitate students' application of operating system (OS) knowledge to record and upload a video installing a virtual machine (VM) and OS onto a Facebook group; to promote content access, collaborative and cooperative learning.

2. Postulate the suitable tasks to satisfy the educational goals

a) Understand the key concepts

Students researching on 'how to install Virtual box software and UNIX operating System' specifically Ubuntu 14.04 and download an ISO image of Ubuntu 14.04 OS'. The students were required to explain on the video - what file systems they chose for Ubuntu 14.04 to use, justify their choice and explain the use of swap space.

b) Apply knowledge acquired to install the Virtual Machine and Operating System, and Record and Upload the Video

Students needed to use knowledge from research to practically install a VM and OS onto VM while video recording themselves and then upload the video to the Facebook group.

3. Determine the affordance requirements of the tasks

a) Understand the key concepts

For students to research about the installation of the VM and OS, read-ability, write-ability, search-ability, view-ability, listen-ability, access-ability, browse-ability, data-manipulation-ability, link-ability, download-ability were necessary for reviewing, searching, downloading, adjusting and relating information.

b) Apply knowledge acquired to install Virtual Machine and Operating System, and Record and Upload the video

For students to install the VM and OS they needed to set up the software and create the video installing the OS on VM. Therefore, Record-ability, watch-ability, move-ability, combine-ability, listen-ability, view-ability, video-produce-ability, focus-ability, resize-ability, playback-ability share-ability, and permission-ability were necessary for recording, playing back, editing, putting together the video and posting it on the Facebook group.

4. Determine affordances from Facebook tool

The technology considered for this task was Facebook because it has the affordances of 'uploadability,' 'downloadability,' 'commentability,' 'sharability,' and 'likability' among others, to enable this task to be accomplished.

a) Understand the key concepts

The tool needed to afford read-ability, write-ability, search-ability, view-ability, listen-ability, access-ability, data-manipulation-ability, link-ability and browse-ability by allowing students to research and 'download-ability' of OS and Virtual box software, which were necessary for reviewing, searching, downloading, adjusting and relating information.

b) Apply knowledge acquired to install Virtual Machine and Operating System and Record and Upload the video

A tool was needed to enable students to record themselves installing the OS and VM and upload video to the Facebook group. The technology needed to afford record-ability, video-produce-ability, combine-ability, watch-ability, move-ability, resize-ability, focus-ability, listen-ability, view-ability, playback-ability, share-ability, and permission-ability necessary for recording, playing back, editing, putting together the video and posting it on the group.

5. ELEARNING TASK DESIGN

The task required students to create a video recording of themselves installing a VM and OS and then posting it for peers and lecturers to comment and interact. The process of integrating available and required affordances, that is, selecting the appropriate tool to match the tasks was as follows:

5.1 Understand the Key Concepts

Facebook is a tool, which enables students to do research and understand key concepts. It affords read-ability, write-ability, search-ability, view-ability, listen-ability, access-ability, data-manipulation-ability, link-ability, browse-ability and 'download-ability' for reviewing, searching, downloading, adjusting and relating information.

5.2 Apply Knowledge Acquired to Install Virtual Machine and Operating System, And Record and Upload Video

Students installed the OS and VM on their machines and used their phone or computer cameras to record the video. Facebook affords record-ability, video-produce-ability, combine-ability watch-ability, move-ability, resize-ability, focus-ability, for recording editing, putting together the video. Facebook affords listen-ability, view-ability, playback-ability, share-ability, and permission-ability, which were necessary for playing back the video and posting it on the group. Since the pragmatic aspects of learning tasks are not incorporated in this methodology, the researcher chose Facebook which students are already motivated to use to account for motivation and student ability.

Facebook affords social networking, seeking peer support, community building, student activism, general communication, sharing information and maintaining group and personal communication on public spaces. Using Facebook, students benefitted from the affordances include:

- (1) Constructed a semi-public profile within a bounded system,
- (2) Shared a connection, and collaborated more with students, lecturers and communities of practice,
- (3) Interaction and engagement with students, teachers and content
- (4) Chatting, liking, posting, uploading and downloading video, text and audios file

Other Facebook affordances the students benefitted from are illustrated in (table 1)

According to Bower, (2009) 8, 9, 10 and 11 (table 1), relate to quality of learning experience and effectiveness with which tool or interface delivers. As noted from the table 1 Facebook has the affordances in all nine categories and therefore it was relevant for the research.

TABLE 1: Assessing Different Categories of Facebook Affordances (Bower, 2008)

#	Affordances Matrix	Description
1	Media affordances	The types of input and output forms were students post questions, status, sharing videos, photos, music and inspirational quotes. Text (read-ability, write-ability), view-ability, audio (listen-ability, speak-ability), video (watch-ability, produce-ability)
2	Spatial Affordances	The ability to resize elements within an interface (resize-ability, move-ability). Students customized the group page to reflect their shared identity by a student posting a cover photo
3	Temporal Affordances	Students logged in from anywhere to access the group account (access-ability), ability to be recorded (record-ability), and playback (playback-ability), synchronous vs asynchronous (synchronicity)
4	Navigation Affordances	Students navigated the page and checked photos, videos and files from class PowerPoint presentations, notes and assignments (browse-ability), ability to link to other sections (link-ability), ability to search (search-ability) and sort and sequence (data-manipulation-ability)
5	Emphasis affordances	Allowed for combining articulating media uploaded through posting of status attached to media like videos, slides and captioning photos (highlight-ability and focus-ability)
6	Synthesis affordances	Allowed for multimedia content such as videos, music, pictures, text, emojis, etc., (combine-ability) and functions of tools and content of resources integrated (integrate-ability)
7	Access control affordances	Access to group page required approval from the Administrator and creator of group. Parameters for access were set. The admin approved all requests to the group ensuring that only students were added (permission-ability). There was support for one to one, one to many and many to many contributions and collaborations (share-ability)
8	Technical affordances	Facebook is efficient, fast and adapts to bandwidth of connection, and is used alongside other social media platforms. Some students uploaded the video on YouTube and then shared the link on the Facebook group for videos that were too large to be uploaded directly. Facebook needs minimal / ubiquitous underlying technologies.
9	Usability	Facebook is efficient to use and allowed user greater flexibility in personalizing user experiences. It is intuitive and can execute various functions.
10	Aesthetics	Facebook design is appealing and appearance of the interface is familiar, relates to user satisfaction and holds user attention. Therefore, students are engaged in the environment. The group page was customized to reflect group values, identity and theme. Some functionalities were handset dependent, and catered for individualized experience.
11	Reliability	Introduced more than 10 years ago, Facebook is a robust and reliable platform and has stood the test of time. The system performed as intended.

6. DATA COLLECTION AND ANALYSIS

A questionnaire already validated by previous research (Mbarika et al. 2010) was used to determine the attitudes and perceptions of students on the use of Facebook to accomplish the video upload assignment task. The results are presented in section 7. The qualitative data collected was analyzed by reading individual responses and is summarized in section 7. The quantitative data collected was analyzed using MS Excel to total up number of responses on each question and is presented (table 2).

TABLE 2: Total of individual responses per question

Question / Response	S (3.8 %)	D (8.3%)	N (16.7%)	A (44.4%)	SA (26.8%)
1. Facebook for classroom discussions is very convenient	3	4	3	19	18
2. Facebook allows me to interact with classmates	0	3	4	20	18
3. Facebook should be used as a learning tool	1	5	6	28	10
4. Facebook changed my overall view of the course	1	8	17	14	6
5. Facebook was well integrated into the assignment	3	3	6	26	6
6. Facebook was more effective than MUELE	1	2	7	15	20
7. I preferred using Facebook over MUELE	3	2	8	15	19
8. Overall experience using Facebook was very positive	2	5	3	22	15
9. I felt more connected to fellow students using Facebook	2	2	7	20	16
10.FB enhanced my understanding of OS	3	8	11	17	8
11.FB enabled me to interact with the lecturer more	2	3	5	20	13
12. FB enhanced my experience of participation	1	3	9	22	13
13. FB allows me to find and share educational material	2	4	8	20	10
14. FB provided collaborative learning opportunities	1	4	9	19	14
15. FB encourages learner-centered activities	2	2	12	22	7
16. FB allows me flexibility in learning	1	3	8	27	4
Total	28	61	123	326	197

7. RESULTS

The students researched and uploaded a video recording installing a virtual machine and then installed the UNIX (Ubuntu 14.04) OS a virtual machine and onto the class Facebook group 'BIT II CSC2200 Operating Systems Class'. Since students were already familiar with Facebook, they did not hesitate using it and enjoyed the experience. The results from the survey show that HOCS were achieved in assignment task. Students did the assignment practically, which enabled them gain skills at higher levels of analysis, applying, evaluating and creating. This approach helped students to practically install the OS onto the VM thereby applying knowledge into practice. Ensuring that students produced a video as a final product enabled them to gain 'creating' skills which are at the highest level of taxonomy, therefore practical skills were attained to address industry needs of putting knowledge into practice. Therefore, before students created the video, they had to remember, understand, apply, analyze and evaluate it. All in all, there was collaborating, commenting, posting, networking, chatting, texting, reviewing, questioning, replying which is the collaboration spectrum of BDT at all levels of the cognitive domain. For effective learning, students required skills of interaction and engagement which were provided by the platform, which was appropriate because it affords collaboration and communication needed for uploading and presenting video recording, and sharing ideas, and commenting on peers' videos to enhance the learning process.

BDT helped understand the problem showing that students were being trained at only lower levels of the taxonomy whereby they could only remember and understand the theory taught, to pass exams, but could not put knowledge into practice.

Facebook has semantic web facilities, which introduce agents that increase interaction and is not dependent on institution's infrastructure and empowers both the educator and student. Unlike MUELE LMS, which is unreliable because the server is down sometimes, Facebook is always available. In addition, students had face-to-face interactions with teacher and peers as emphasized by (Anderson, 2008)'s interaction framework for effective learning. Students also interacted and 'followed' their mentors and society leaders who influenced learning. Through using Facebook, learning is seen as innovative and transformative. Students were involved in choosing the cover photo for the group to personalize the 'BIT II CSC 2200 Operating Systems class' page and feel at 'class'. The peers, lecturer and systems administrator followed students' discussions to monitor progress.

a) Facebook Usage Findings

The results indicate that students were actively engaged and enjoyed the use of Facebook as a communication and interaction platform. Most students said they were very excited and interactive as compared to in class sessions. The students successfully created a video and posted it on the FB group to supplement and complement collaborative activities introduced in the classroom. Students learnt at all levels of the cognitive domain of BDT (Churches, 2001) because the task enabled them to carry out different activities using Facebook.

b) Post-assignment questionnaire responses

i) Quantitative findings

A validated students' questionnaire to determine the 'perceptions and attitudes about use of Facebook for the task', was adapted from previous research, and filled by 48 students after uploading video. It was based on a Likert scale ranging from Strongly Disagree (SD), Disagree (D), Neutral, Agree and Strongly Agree. The results of the number of individual responses per question are in (table 2).

A total of 513 students positively rated Facebook as a convenient platform for classroom discussions, which allowed them to interact with classmates. Students noted that Facebook should be used as a learning tool, since it had changed their view of the course, was well integrated into assignment, more effective and preferred than MUELE. The students had an overall positive experience, felt more connected, enhanced understanding of OS, lecturer-student interaction, experience of participation, finding and sharing of resources, collaborative opportunities, learner-centered activities and flexibility in learning. However, 123 students were neutral, while 89 did not agree to the statements because they had technological challenges of network connectivity and shortage of computers. Therefore, the overall effect of Facebook on students learning process and experience was positive because it enabled putting knowledge into practice, sharing, collaboration, interaction, flexibility and learner –centered activities, among others.

In addition, the questionnaire had open-ended questions to capture students' views regarding their experience, challenges and recommendations using Facebook for the current assignment.

ii) Qualitative findings

Students' experience using Facebook

The students noted that it was a good experience because it made them active and learn more effectively. The platform was convenient because they worked on and uploaded assignments at their convenience of time and place, interacted with fellow students and learnt new stuff. The students said information distribution was easy, getting notes was faster, there was no need for smart phones, and it was better than WhatsApp or MUELE. Facebook is familiar, easy to use and access, was a convenient way to access learning material and different opinions from classmates, and getting updates immediately. Students mentioned that it was a new and nice experience using Facebook in class activities, it was better for mobility purposes, availability and accessibility. Facebook was the most convenient platform for communication possibly because of familiarity. A student mentioned that after several failed attempts to upload the video, they finally figured out how to do it successfully which confirms they gained skills during the learning process. Students said Facebook is not limited and enabled bonding with classmates, online discussions with peers, timely and fearless interactions, and the constant communications from the lecturer kept them updated. Students mentioned that the experience changed their overall view of learning and they learnt more about Facebook usage. They further said the experience was educative because Facebook enabled them to upload assignment, which was illustrative, and anyone who did not have prior knowledge about installing a VM and OS, clearly understood from the uploaded videos. Only one student noted that using Facebook was not a good experience because of having to wait for approval to join the group. However, majority of the students characterized the affordances of Facebook as per (Anderson, 2008) in addition to the tool bringing fun in learning.

Conceptual understanding

Majority of the students positively rated using Facebook as improving their conceptual understanding because It was practical, gave different provisions in which to share / upload assignments and they therefore understood concepts well. The approach made students more involved, it was good, exciting, interesting, interactive, research-intensive and more participatory. Facebook is a good platform and greatly improved teacher-student interaction. Students further highlighted viewing peer activities and connecting with friends which helped them learn better, they learnt how to do assignment themselves and recording themselves made the assignment more practical. Doing practical work individually led to more understanding and the students said they can never forget how it is done. It built students confidence and viewing different videos from

peers gave them multiple perspectives for identification of mistakes and improvement. Several trials made students identify the easiest way to solve the problem at hand. The students had access to educational materials from anywhere, the administrator - member relationship was stronger than lecturer-student relationship due to open interaction. The students learnt how to reduce videos for them to be uploaded after several failed attempts and it was easy to ask peers or the lecturer online in case of failure. Knowledge sharing was possible because Information was available during the learning process. The ability to listen to what students could do and their understanding of the concept. Students learnt how to upload videos on Facebook, sharing what was not clear in class, peers approached others, which enabled them learn more. Students were forced do assignments which helped them learn and generated more ideas than from class sessions. Although one student says he did not learn the concepts better because explaining in person would have been a better option, the rest found the use of Facebook as further promoting their practical, research, communication and interpersonal skills, and consequently improving their conceptual understanding. This emphasizes the fact that students have various learning preferences, which need to be addressed in the learning process. YouTube tutorials with explanations should have been watched as was required in the task and the lecturer explained in class in a general introduction to operating systems and virtualization.

Students' challenges using Facebook

The students noted the following challenges of time and cost of uploading video and poor network connections, difficulty in uploading large videos and some phones could not support it, Slow and unreliable Internet connection for uploading made access challenging, Privacy of information shared on Facebook, Recording videos using phones or cameras required someone to record them as they were installing the OS and VM, Not all students were on Facebook, Some students do not want to mix social life with academic purposes, Students using pseudo names and were few on the platform at times, Lack of individual computers so students had to borrow from peers, Low bandwidth, network failure and traffic. As cited in the above excerpts, most of the challenges were related to resource constraints, implying that limited resources are a hindrance in using social media for learning.

Students' recommendations on using Facebook for learning

The students recommended that Facebook should be used for future assignments and learning opportunities because it enables interaction with classmates. The platform is good and brings ideas together from several students, which helps in understanding concepts more easily. The students recommend further continued use of the Facebook page although it is not fair to students without accounts. Facebook should be customized but retain its features for academic work strictly, and other lecturers should make use of the learning tool because it is simple to use and can be used by anyone. The students say it is a good learning center and should be adopted by students and lecturers and learning content should be uploaded on Facebook group. The students recommend that course works are done offline and use Facebook for idea exchange, and grading. A student recommends handing in course works, integrating MUELE as an alternative and a site should be created for students to upload assignments, and share links to allow easy research, interaction is better on Facebook but getting notes should be done via MUELE. Students also requested for more time for online assignments and improvement on the network. Generally, students recommend the use of Facebook and its integration with other tools to enhance research, teaching, learning and assessment.

8. PROOF OF CONCEPT

8.1 Screenshots of Facebook Tool in Action to Provide Evidence of This Prototype Test

The screen shots below show that students put knowledge acquired into practice by uploading a video of the installation of VM and OS on VM and also show interaction between students, peers and the lecturer as well as using Facebook to solve the learning problems students had.

i) Screenshot showing a student who finally uploaded his video after a long struggle (learning by doing)

Uploading of video in fig 2 and 3 shows that educational goal was achieved since students managed to learn how to install the VM and OS and then recorded the process and uploaded or posted the video on Facebook.

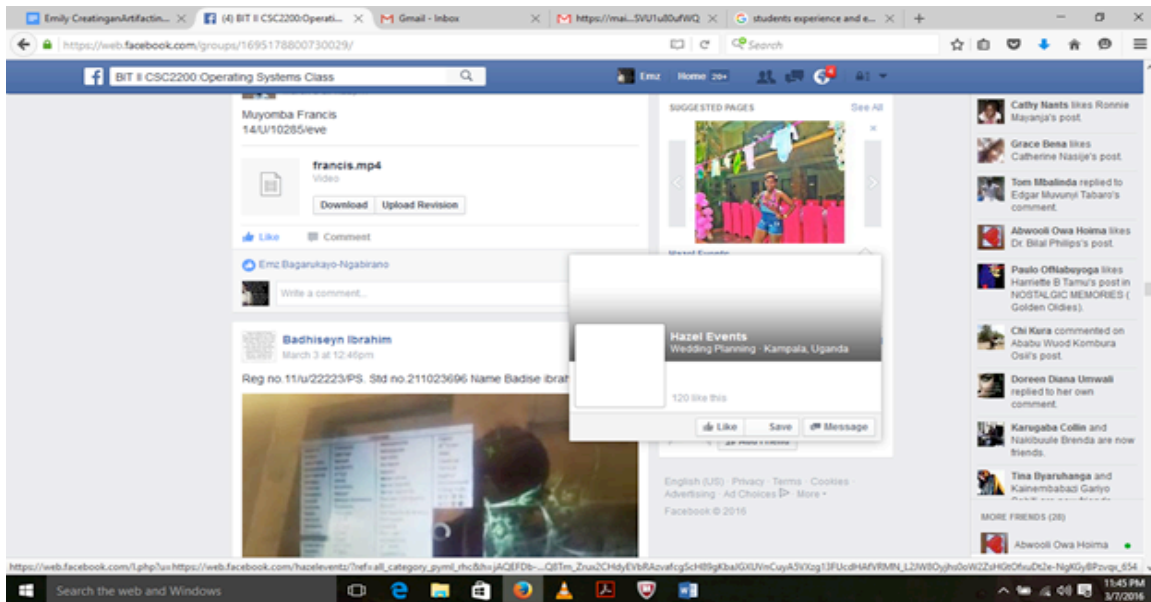


FIGURE 2: Students uploaded videos via YouTube link



FIGURE 3: Students posted video directly to Facebook



FIGURE 4: Lecturers comments on students' posts and presentations

Fig 4 and 5 show that Facebook affords interaction between students' and lecturer and student to students, which is relevant for effective learning to occur, as stated by (Anderson, 2008).



FIGURE 5: Screenshot showing student-to-student interaction using Facebook



FIGURE 6: Some of the comments from students during use of Facebook before, during and after assignment upload

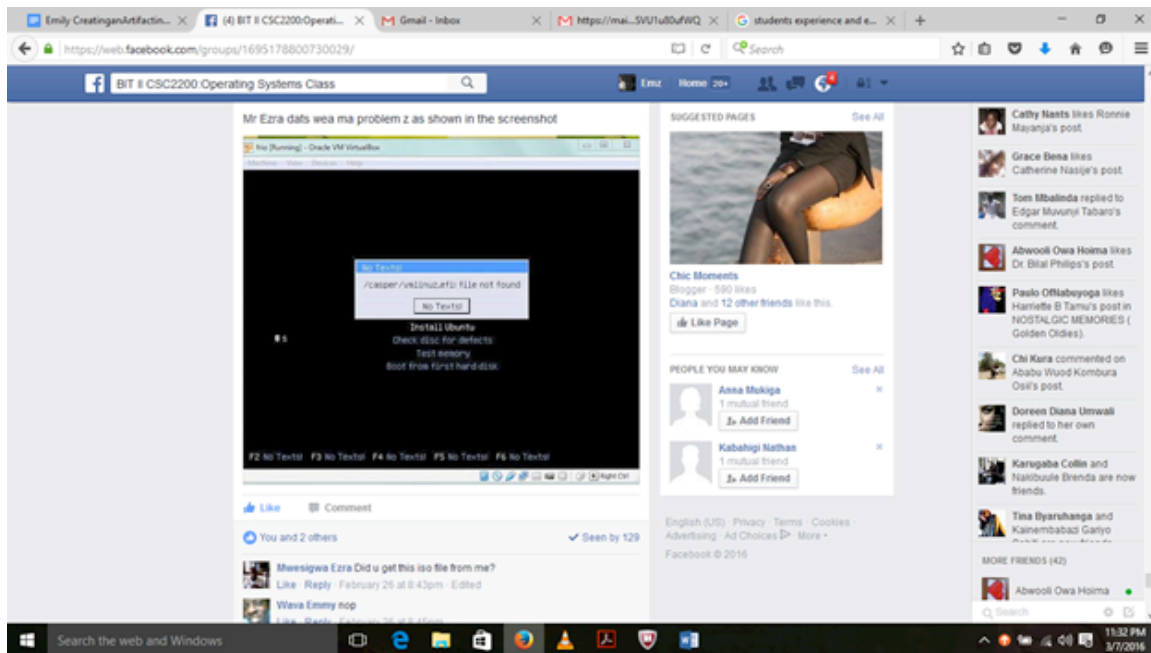


FIGURE 7: Screenshot showing a student inquiring about a problem during the assignment and how Facebook was used to solve student problems.

9. DISCUSSIONS

From the results of the study, it is clear that the overall experience was more positive than negative. Most students indicated increase in motivation, collaboration, and interaction and believed they learned better through this approach. Therefore, use of Facebook in teaching and learning has potential to facilitate application of knowledge to solve real world problems. The results are in agreement with previous research by (Murumba et al. 2015; Bosch, 2009, Coffin and Fournier, 2015) who highlighted positive effects of FB in class.

The student who observed that Facebook was not a good experience because of waiting for approval to join the group is unfortunate because the administrator was online most of the time and approved requests as soon as they came in. The student who said they did not learn concepts better because explaining in person would have been a better option emphasizes that students have various preferred methods of learning, which need to be addressed in the learning process. The Web provides several tutorials on YouTube where this student could have found explanations as was required of them in the task. The lecturer also explained in class in a general introduction to operating systems and virtualization.

10. SUMMARY

The paper highlights the findings of a survey that enabled students to transfer knowledge acquired in class into practice and thereafter upload the video onto Facebook where they interacted with peers, content and the lecturer. The problem was that students lack adequate practical skills because they are unable to transfer knowledge acquired in class into practice. Therefore, it was useful that the lecturer gave an introductory lecture about operating systems and how they are installed, after which, students carried out further research on how to install OS

and VM, and recorded the video installing the OS and uploaded it on the Facebook group. The students were given a deadline in which they were to upload their videos and later present them in class.

The results of the experience were positive with students indicating increase in motivation, collaboration, and interaction and believed they learned better through this approach. From the students' perceptions, majority thought they learnt better with this approach and cannot forget the process of installing the OS and VM; therefore, it helps to curb problem. Therefore, use of Facebook in teaching and learning has potential to facilitate application of knowledge to solve real world problems. Facebook should be integrated as a tool for learning at the university since students appreciate it, find it easy to use and familiar. In future the few students without Facebook accounts should be accommodated and the challenges of network connectivity and shortage of computers addressed.

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