INVESTIGATING THE USE OF WEB 2.0 TOOLS AND STUDENTS’ COGNITIVE ENGAGEMENT IN SELECTED TANZANIAN HIGHER LEARNING INSTITUTIONS

BY

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ABSTRACT

With the availability and affordability of Information and Communication Technology (ICT) devices worldwide, teaching no longer centers on teachers. Higher Learning institutions must find ways to embrace technology applications via the Internet to ensure higher order thinking activities are involved in learning. This study has fivefold objectives. The main objective was to investigate the extent of the students’ i. actual use of Web 2.0 tools, ii. Practice techno ethics iii. Readiness to embrace technology iv. Cognitively engaged. Secondly, this study attempted to determine the effects of the three variables (actual use of Web 2.0 tools, practice techno ethics and readiness to embrace technology) on cognitive engagement. The Theories of Acceptance Model (TAM) and Web Pedagogical Affordances were used to underpin the research framework. A sequential mixed methods of quantitative and qualitative techniques were deployed. The findings of the two approaches were analyzed, compared and contrasted where qualitative data were used to support the quantitative data. The quantitative data obtained by selecting from the 409 returned responses of the undergraduate students from three universities in Tanzania. University of Dar es Salaam (UDSM), Dar es Salaam Institute of Technology (DIT), and Muslim University of Morogoro (MUM). A proportionate random sampling was employed for quantitative data while interviews were carried out among six students purposely chosen to supplement the quantitative findings of this study. Descriptive statistics using mean scores and percentage, Independent Sample T-test, One-way ANOVA, Post-hoc and Multiple Regression Analysis (MRA) were utilized to address the research questions. The findings reveal that the majority of students (93% to 94%) use Web 2.0 tools for learning involving both low and higher order thinking skills. The majority of the students (82% to 89%) are either already using or are planning to use Web 2.0 tools in learning. The findings also show that most of the students (67% to 89%) practice techno ethics in using Web 2.0 tools in learning. The findings reveal a non-significant difference in the mean scores of technology readiness for ICT related courses and non-ICT related courses. The results of One-way ANOVA reveal a statistically significant difference in students’ technology readiness in the mean scores for the three groups. The Post-hoc comparison using Tukey HSD test reveals a statistically significant differences between the Beginner and Intermediate groups, and Beginner and advanced groups indicating knowledge and skills play important role to influence technology readiness. However, there is no statistically significant difference between the Advanced and Intermediate groups as both show similar competencies. In addition, the findings show that students have positive perceptions towards adopting the 21st Century learning activities. Further findings indicate that student technology readiness and practice of techno ethics have effects on students’ cognitive engagement. On the contrary, the use of Web 2.0 tools shows non-significant effect on student cognitive engagement despite the actual use is apparent. The study has expanded TAM from the standpoint of cognitive engagement. It also shows empirical evidence that knowledge and skills become the external variable in dealing with TAM on the aspect of readiness in embracing the technology.
خلاصة البحث

بالرغم من توافر أجهزة تكنولوجيا الاتصالات في جميع أنحاء العالم، فإن التدريس لم يعد يتمحور حول المعلمين. فقد أصبح الطلاب متعملين مستقلين، ولم يعتمدوا بشكل كلي على المعلمين كمصادر للتعلم. وعلى مؤسسات التعليم العالي أن تجد طرقاً لتطبيقات التكنولوجيا عبر الإنترنت للتأكد من استعمال أنشطة التفكير العالي في التعلم. هذه الدراسة لديها هدفان، الهدف الرئيس هو الكشف عن مدى استخدام الطلاب لـ 1. الاستخدام الفعلي لأدوات الويب 2.0، 2. مراعاة أخلاقيات استخدام التكنولوجيا، 3. الاستعداد لبني التكنولوجيا، ممارسة المعرفة. الهدف الثاني معرفة أثر ثلاثة متغيرات (الاستخدام الفعلي لأدوات الويب 2.0، وأخلاقيات استخدام التكنولوجيا، الاستعداد لبني التكنولوجيا) على المشاركة المعرفية. وقد استخدمت نظرية قبول التكنولوجيا (TAM) ومنهجية الويب التربوي لدعم الإطار المعرفي. واستخدمت الدراسة المنهجين المعرفي والمنهجي. وتم تحليل نتائج المهتمين بشكل مفصل، حيث استخدمت البيانات النوعية لدعم البيانات الكمية التي تم تصيدها من 409 طالبا جامعيًا في ثلاثة جامعات في تنزانيا، وهي جامعتين دار السلام (UDSM)، ومعهد دار السلام للتقنية (DIT)، والجامعة الإسلامية في موروغورو (MUM). وتم اختيار عينة قاسية مناسبة مع بيانات الدراسة، في حين أجريت مقابلات مع ستة طلاب لدعم النتائج الكمية لهذه الدراسة. واستخدم الإحصاء الوصفي لاستخلاص المتوسطات والنسب المئوية، واختبار المعارج المستقل، وتحليل الأنماط المتعدد لمعالجة الأسئلة البحثية. وكشفت النتائج أن غالبية الطلاب (93٪ إلى 94٪) يستخدمون أدوات الويب 2.0 لتعلم من خلال إيجاد المواد لكل من مهارات التفكير المنخفضة والعلمية. وأن غالبية الطلاب (82٪ إلى 89٪) يستخدمون بالفعل أو يخططون لاستخدام أدوات الويب 2.0 في التعلم. وأظهرت النتائج أيضًا أن معظم الطلاب (من 67٪ إلى 89٪) يمارسون أخلاقيات التكنولوجيا أثناء استخدام أدوات الويب 2.0 في التعلم. كما كشفت النتائج عدم وجود فروق ذات دلالة إحصائية في درجات الطلاب للمواد المتعلقة بـ التكنولوجيا المعلومات والاتصالات والمواد غير المتعلقة بـ التكنولوجيا المعلومات والاتصالات. وکشفت نتائج وجود فروق ذات دلالة إحصائية في درجات الطلاب لاستخدام التكنولوجيا في المواد المتعلقة بـ التكنولوجيا المعلومات والاتصالات. وکشفت مقارنات فردية ما بعد الاختبار ANOVA باستخدام اختبار Tukey HSD مقابلات مرحلة ما بعد الاختبار
والمجموعات المبتدئة والمتقدمة. ومع ذلك، لا توجد فروق ذات دلالة إحصائية بين المجموعات المتقدمة والمتوسطة حيث أظهرت كلا المجموعتين مستويات مماثلة. بالإضافة إلى ذلك، أظهرت النتائج أن الطلاب لديهم تصورات إيجابية تتجه تبني أنشطة التعلم في القرن الواحد والعشرين. وتشير النتائج إلى أن الاستعداد التكنولوجي للطلاب ومارسات أخلاقيات التكنولوجيا لها تأثير على مشاركة الطلاب المعرفية. وعلى العكس من ذلك فإن استخدام أدوات الويب 2.0 في التعلم لم تظهر أي فروق ذات دلالة إحصائية تأثر على مشاركة الطلاب المعرفية على الرغم من الاستعمال الفعال. واستعملت الدراسة نموذج (TAM) من وجهة نظر المشاركة المعرفية. كما أظهرت الأدلة التجريبية أن المعارف والمهارات هي متغيرات خارجية في التعامل مع نموذج (TAM) في الجانب المتعلق بالاستعداد في تبني التكنولوجي.
The dissertation of Issa Omar Malecela has been approved by the following:

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DECLARATION

I hereby declare that this dissertation is the result of my own investigation, except where otherwise stated. I also declare that it has not been previously or concurrently submitted as a whole for any other degrees at the IIUM or other institutions.

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Affirmed by Issa Omar Malecela
I dedicate this dissertation to my late parents Mr. Omar Malecela and Mrs. Hawa Hassane Semle, whose love, sacrifice and encouragement, enabled me to sustain throughout this journey. May Allah reward you abundantly and grant you Jannatul Firdaus (Paradise), Amiin.
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CHAPTER ONE

INTRODUCTION

“It’s not what you teach but how” (Nancy Sulla, 2015, p. xiv).

1.1 BACKGROUND OF THE STUDY

In the era of globalization, the vision of education not only focuses on sustainability of human development and socio-economic factors, but also seeks to foster values, skills and knowledge which prepares students for innovation and problem solving. Educators must find ways to seek various technology resources to enhance the students’ abilities to think critically and creatively. By 2025, Tanzania has formulated its vision to achieve its objective of being a country that produces human capital with first class mentality and competitive skills that are able to contribute seriously and significantly to the success in terms of the social and economic advancement of the country (The Tanzania National Five Year Development Plan, 2012).

The Vision 2025 targets to attain a solid competitive economy through creativity, innovation and a high level of quality skills which coincides with the variety of interpersonal encounters and adjusts to the dynamic challenges of the world market and advancement of technology, at both the local and international level. (The Tanzania National Five Year Development Plan, 2012). Due to this, the Government gives emphasis on education and training reform as they are necessary for the shift of the country’s development through enhancing digital skills towards creating a knowledge economy (k-economy) (The Tanzania National Five Year Development Plan, 2012).
The role of Higher Learning Institutions (HLIs) should be parallel in bringing the vision of the country to fruition by integrating knowledge-based content with Information Technology. The notion of a quality education should also be linked with the quality of teachers. This is in alignment with the present research that investigates the use of Web 2.0 tools and Student Cognitive engagement in the selected Tanzanian higher institutions preparing them towards 21st century teaching and learning.

To accomplish this vision, the Tanzanian Government has invested in ICT infrastructure for its learning institutions. Throughout the HLIs, computer centres for student learning are provided with the accessibility of high bandwidth connections via Internet providers. Additionally, the Tanzania Education Network (TEN) was formed to offer an Internet network linking for all HLIs, research facilities and teacher training colleges. For example, in 2005, the Ministry of Education and Vocational Training (MoEVT) in collaboration with the Swedish International Development Agency (SIDA) has granted 30 thin client computers and a server, peripherals and accessories to all 34 teacher training colleges countrywide. In 2008, many universities started employing computer centres to conduct research and access e-learning resources (Swarts & Wachira, 2010). Hence, the availability of submarine fibre and the installation of the national fibre backbone are anticipated to significantly assist HLIs by producing high speed Internet that will stimulate learning and teaching activities (Swarts & Wachira, 2010). At current status, the Internet speed in Tanzania is about 155 mbps as in the case of the University of Dar es Salaam in 2018.

In this 21st century, nearly any occupation that pays more than the minimum income in Tanzania is designed for workers who understand how to resolve a variety of intellectual and technical problems. As such, HLIs need to prepare and produce learners who are capable of collaborating, thinking critically and solving problems in
their surroundings (Wagner, 2008). Hence, HLIs are vehicles towards developing holistic students for the progress and development of Tanzania as a prosperous nation. Quinlan, (2011) suggests that holistic student development is among the contemporary challenges which HLIs need to focus on. Students have to be exposed beyond traditional approaches in teaching and learning. They need to be skillful in terms of collaboration, communication and problem-solving by embedding social and emotional and spiritual learning strategies (World Economic Forum, 2016). This is contrary to the existing mode of teaching approaches employed in most HLIs in Tanzania, which is still based on a teacher-centred and lecture-oriented method. There are still minimal interactions between the instructors and students. The traditional method seems to be more attractive to many instructors due to its simplicity (Moulali & Sasidhar, 2017)

In collaborative learning, learners can remove stereo-types, learn to cooperate, improve listening skills, acquire the talent of compromising and negotiating, absorb interpersonal skills, and gain experience from a diversity of people and resources. Additionally, learners become more active in the learning process. Instructors can also employ diverse teaching approaches boosting the use of various viewpoints when assessing classroom topics, motivating instructors to become innovators in teaching, maintaining learners, generating students who are flexible to multiplicity. Finally, collaborative learning is an important element to survive and to secure a job effectively in the contemporary world community (Cabrera, Cerdefio, Maridic, Rogers, Agnese & Thakur, 2015).

Hence, the integration of Web 2.0 tools in learning techniques seem to be appropriate to enhance 21st century skills among HLIs students. Learner collaboration not only emphasizes on mastering academic resources per se, but also focuses on how
well learners work together and communicate with others. Web 2.0 tools such as Podcasts, Wikis, and Blogs enhance learners to develop critical thinking, cognitive engagement, and knowledge building in higher education in the contemporary educational context. Web 2.0 tools are also useful for formative evaluation of learning, peer assessment, collaborative learning, content creation, as well as for self-learner and group-learning (Khalid, 2010).

1.2 WEB 2.0 TOOLS
Patil and Surwade (2018) define Web 2.0 tools as technological gadgets that are used to enable people to communicate through technological applications. Web 2.0 tools refer to the Internet applications that enhance online learning by engaging minds collaboratively and creatively which leads to interdependence of ideas, individuals and information networks which ultimately results into knowledge creation (McLaughlin & Lee, 2008). Web 2.0 tools are defined as those digital tools that enable accessing and producing knowledge in ways that move beyond passive consumption to active construction (Beach, Hull & O’Brien, 2011). There are different types of Web 2.0 tools such as (i) social network sites namely Facebook and Twitter. These are online tools that enhance collaboration, information sharing, communication and interaction of learners and lecturers in teaching and learning activities. (ii) Media sharing which include Moovely, YouTube, Google plus (+), Vimeo, Prezi (iii) Blogging like Blogspot.com, Wordpress, Website editor, Mozello.com, Wix.com, Weebly.com, Moovly (iv) Online libraries like ProQuest, Google scholar (v) Content management such as learning management system (LMS) which includes Moodle and Blackboard.
Web 2.0 tools involve four major applications, namely expressive, reflective, exploratory and playful tools. According to Walsh (2011), expressive applications involve media which can create and share videos, audio and animation, e.g. YouTube, Flickr and slide share. The reflective application includes blogging, wikis and social networking. Exploratory application consists of, social bookmarking Really Simple Syndication (RSS), folksonomies that can support research and inquiry in a range of ways including social bookmarking, annotation and reference management services e.g. Delicious, Diigo, CiteULike, and news feeds e.g. RSS, Atom. The last application involves playful learning tools which relates to games and virtual worlds. Thus, Web 2.0 tools enable personalized learning, participation learning, and production (outcomes) of knowledge (McLoughlin and Lee, 2010). As such, Web 2.0 tools are seen to have emerging roles to transform teaching and learning related to the 21st century demands. As such, Web 2.0 tools are able to bridge the gap between effective pedagogy and content management that shapes the way HLIs operate towards teaching and learning (Darwish & Lakhtaria, 2011). Table 1.1 reveals the types and applications of Web 2.0 tools.
Table 1.1 Web 2.0 Tools and their functions in learning

<table>
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<tr>
<th>Types of Tools</th>
<th>Examples</th>
<th>Applications</th>
</tr>
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<tr>
<td>Social networks</td>
<td>Facebook, WhatsApp, MySpace, Twitter</td>
<td>Enhance learners to interact with peers and lecturers. Enhance knowledge sharing, creative production, development of ideas and making reflection</td>
</tr>
<tr>
<td>Multimedia</td>
<td>Moovely, Youtube, Google plus (+), Vimeo, Prezi, Flickr, Google drive, Wikipedia, Wikis</td>
<td>Facilitate sharing videos, photos</td>
</tr>
<tr>
<td>Blogs</td>
<td>Blogspot.com, Wordpres, Website editor, Mozello.com, Wix.com, Weebly.com, Moovly</td>
<td>Enable online-users to make regular postings to the Web, e.g., a personal diary or an analysis of current events</td>
</tr>
<tr>
<td>Online Database</td>
<td>ProQuest, Scopus, Taylor &amp; Francis, Science Direct, Google scholar</td>
<td>Help to retrieve online resources for research and teaching and learning purposes.</td>
</tr>
<tr>
<td>Content management Systems</td>
<td>Learning management system (LMS) which includes Moodle, Blackboard.</td>
<td>Facilitate to create, share, augment, tag, and upload content.</td>
</tr>
<tr>
<td>Wikis</td>
<td>Wikipedia</td>
<td>Assist users to post and edit one another’s content/work. Enable users to make collaborative writing and can be used as a repository for the storage and retrieval of professional knowledge</td>
</tr>
<tr>
<td>Social Bookmarking</td>
<td>Delicious.com, tagging, folksonomies</td>
<td>Enhance users to add, annotate, edit, and share bookmarks of web documents</td>
</tr>
</tbody>
</table>

(Adapted from Grosseck & Bran, 2016).

1.2.1 Pedagogical Affordances

Pedagogical affordances refer to an educational learning approach in which technologies (Web 2.0 tools) are utilized to facilitate learning (McLoughlin & Lee, 2007). Accordingly, Web 2.0 affordances are activities that one can possibly do in a particular setting with a given tool to accomplish a certain task. For instance, utilizing blogs to write, text, edit and publish online. In other words, Web 2.0 affordances
provide the assistance that can be offered by using applications to make learning happen more smoothly.

Web 2.0 tools enhance two-way interaction (between lecturers and students) and stimulate learner’s participation through diversity of images, text, audio and video. For example, Wikipedia allows users to generate their ideas and enables users to refer to its online service for definitions and details of objects and events. Using Wiki for instance, students can create a glossary to define a concept from their own words (Tynan & Barnes, 2011). Prezi and Google slides can be used to create maps of texts, images, videos, slide gallery and interactive e-book and present the lesson in non-linear mode to interact with others. Google Doc allows users to collaborate in writing as it enables them to edit the text asynchronously and synchronously. Moreover, Google drive offers online file management to store digital files and retrieve them when needed. There is also Google Form, which can be used as a survey creation tool, to build quizzes, assignments, providing the means to enable feedback between students and lecturers, and collaborating on a given group task.

Since Web 2.0 tools play vital roles in education, such as enhancing interaction, communication and collaboration and knowledge creation, this platform can foster larger engagement of students in modelling the knowledge by developing and sharing knowledge (Franklin & Harmelen, 2007; An & Williams, 2010; McLoughlin &Lee, 2010; Conole & Alevizou, 2010; Khalid, 2010; Kivunja, 2014).

Web 2.0 tools affordances are aligned with the technological pedagogical content knowledge (TPACK) model of Koehler and Mishra (2009). The model offers potential guidance for students to utilize technology in learning. Thus, when these tools are properly integrated into instructional methods based on this model, they are assumed (expected) to foster cognitive engagement among students in higher learning
institutions. Hence, Web 2.0 tools are applicable and flexible for modifying the traditional learning approach which is teacher-centered to a learner-centered pedagogy, as advocated by Constructivist Theory. As learning can be enhanced through interactive, and collaborative skills, learners will be in good position of getting employment in the job market (Damoense, 2003; Williams, 2015).

1.2.2 Readiness to Actual use of Web 2.0 Tools in Learning

Readiness is the extent in which a learner is willing to partake in learning activities (Yakhina, Yakovlev, Kozhevnikova, Nuretdinova and Solovyeva, 2016). Specifically, Parasuraman (2000) refers technology readiness as person’s inclination to integrate and use technologies in life and at work. It can be optimism and innovativeness that drive the readiness. On the contrary, he has mentioned that discomfort and insecurity will inhibit the technology integration. Based on this definition, readiness is the dominant aspect in the process of integrating Web 2.0 tools into learning. According to Rasouli, Rahbania and Attaran (2016), readiness in the effective adoption of technology involves instructors, learning facilities, learners’ skills and conducive environment. According to Davis (1989) the acceptance or rejection of an individual towards something is influenced by the individual’s attitude. If the individual perceives usefulness and ease of use of the technology, then the adoption and its integration will be executed. On the other hand, if the individual doesn’t expect any kind of benefit, he is more likely to reject the adoption of the technology. Therefore, it is assumed that students who have the capacity for ‘readiness’ will be more engaged cognitively compared to those with little or without readiness. On this aspect, readiness is represented by perceived usefulness and ease of use in TAM.