Factors Influencing Web 2.0 Technology Usage Among Academics:
A Case Study of Two South African Tertiary Institutions

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ABSTRACT

The usage of Web 2.0 tools in education affords many benefits, which include increased access to educational resources and the ability to collaboratively create and use content. Despite the benefits of Web 2.0 tools in higher education, the technology has not been widely used by academics in South Africa. Thus, the purpose of this research is to investigate the extent of usage and the factors that play a role in the usage of Web 2.0 tools among academics at two South African higher education institutions. A case study research strategy was adopted to fulfil the objectives of the study. This paper reports on the quantitative approach used to conduct the study. A questionnaire was administered to collect data from the target population. The results revealed that individual factors, organisational factors, perceived usefulness, and perceived quality characteristics are significant predictors to the usage of Web 2.0 tools. The study has practical implications for academic stakeholders in private higher education for the integration of Web 2.0 technology into their teaching practice.

KEYWORDS

Individual Factors, Organizational Factors, Pedagogic Factors, Perceived Quality Characteristics, Perceived Usefulness, Tertiary Education, Web 2.0 Usage

INTRODUCTION

Technology is advancing at a rapid rate and is becoming increasingly popular amongst students. This creates an ideal climate for the integration of technology into teaching and learning by academics in tertiary education. Technology can be an enabler for academic staff to develop and broaden their teaching skills and redesign curriculum for optimal integration. Web 2.0 is the term given to describe a second generation of the World Wide Web from static web pages to a more dynamic Web with applications like wikis, blogs, social networking (Facebook) and podcasting that allows greater collaboration, enhanced communication and easy access to material (Bower, 2015; Okello-Obura & Ssekitto, 2015). Web 2.0 tools used in an educational setting allows educators and students to create, collaborate, edit and share content on-line (Tyagi, 2012; Ajise & Fagbola, 2013). The usage of Web 2.0 tools in education holds a lot of benefits like enhancing teaching and learning experiences, improving students' access to educational resources and programmes, collaboration and easier communication with the lecturer and peers (McKnight, O'Malley, Ruzic, Horsley, Franey & Bassett, 2016). Despite

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the benefits afforded by Web 2.0 tools in higher education, the technology has not been widely used by academics in South Africa (Ngcobo, 2016).

A study by Yadav & Patwardhan (2016) revealed that the usage of Web 2.0 tools in higher education may be a result of individual efforts rather than institutional policies and strategies. Another study conducted by Tyagi (2012) on the usage of Web 2.0 tools among faculty members in six universities in India revealed that the usage of Web 2.0 tools was associated with important challenges such as potential risks and institutional fears. The results also indicated that faculties' attitude and their perceived behavioural control were strong predictors of intention to use Web 2.0 tools. According to Jimoyiannis, Tsiotakis, Roussinos, & Siorenta, (2013), Web 2.0 tools needs to be implemented in higher education as a learning platform and a learning attitude rather than just technology. A study conducted by Bagarukayo and Kalema (2015) revealed that academics are not using Web 2.0 technologies to their potential, thereby contributing to the low usage rates in South African higher education institutions. According to Keats and Schmidt (2007), major barriers that limit most African universities from adopting Web 2.0 technology tools are related to poor ICT infrastructure, limited access to computing technologies, and high cost and scarcity of Internet bandwidth, among others. Other factors that affect the implementation of Web 2.0 tools in South African higher education institutions are the lack of e-learning policy, the need for appropriate training and capacity development, a lack of relevant digital content, and the cost of implementation (Unwin, Kleessen, Hollow, Williams, Oloo, Alwala, Mutimucuio, Eduardo, & Muianga, 2010).

Based on the gaps in past literature, this research presents an original and empirical study on the extent to which Web 2.0 technologies are utilised to support teaching and learning at two South African private tertiary institutions. In addition, this study aims to uncover the factors influencing the usage of Web 2.0 technology in tertiary education.

BACKGROUND

Web 2.0 tools use the online platform that includes a variety of web sites and applications where *academics* and students can share ideas, information and interests. The usage of Web 2.0 tools can assist students to participate in groups by means of collaborative learning in tertiary education. Web 2.0 tools used in education can engage students in meaningful learning, as well as social interactions (Atkinson & Swaggerty, 2011). These tools also have the ability to provide effective and efficient feedback to students (Hartshone & Ajjan, 2009). Web 2.0 tools are important to implement in education because it will increase students' interests in courses taught, provide an exciting learning environment and improve learning by introducing appropriate technologies into the curriculum (Dooley & Jones, 2012). According to Junco (2012), students prefer to communicate with their fellow classmates by means of their cellular phones, e-mail, and social networks.

Many higher education institutions around the world are integrating Web 2.0 technological tools to enhance the teaching and learning process, however, most African higher education institutions are still faced with challenges that affect the effective use of Web 2.0 technologies in education (Kumar, 2009; Hramiak & Boulton, 2013). An empirical study conducted in Nigeria in 2013, examined the use of Web 2.0 in learning amongst librarians, academics and students in Nigeria, and reported that the use of these tools was lacking (Echeng, 2014).

The remainder of this section presents background information on the usage practices of Web 2.0 tools, and the factors related to the problem of Web 2.0 usage.

Web 2.0 Tools Usage

The three main uses of Web 2.0 tools in a university environment are: (1) to communicate classroom and research activities; (2) to keep up-to-date on topics of interest and (3) to make professional contacts (Yadav & Patwardhan, 2016). Regarding the first main use, which is to communicate classroom and research activities, Eyyama, Menevis and Dogruer (2011) explained that academics mostly use Web

2.0 technology tools as a means of communication, to communicate course material, announcements, and so on.

Web 2.0 tools have been adopted in many countries such as the United States of America and Europe. According to Virkus (2008), Web 2.0 technologies were used at universities in Europe to deliver content and the results of the study demonstrated that some academics had successfully adopted Web 2.0 technologies in supporting face-to-face lectures or online learning. Ferdig (2007) reported that in the United States of America, usage of Web 2.0 technologies has brought about a collaborative and active community of learners. Gupta, Singh and Marwaha (2013) pointed out that Web 2.0 technologies have changed the way that distance education is facilitated by making learning more flexible, interactive and collaborative for academics and students in Africa (Uganda). However, Mbatha (2013) has indicated that academics at the University of South Africa have not fully utilised Web 2.0 technologies for educational purposes.

The potential factors that influence the usage of Web 2.0 tools in education are discussed in the following in the following sections.

Perceived Usefulness of Web 2.0 Tools

Hartshorne & Ajjan, (2009) argued that Web 2.0 technologies inspire active and social learning by providing effective and efficient feedback to students, as well as opportunities for social interactions and collaboration among students and academics. This is supported by Eison (2010) and Okello-Obura and Ssekitto (2015), who reported that Web 2.0 tools enable students to become active participants in the learning process by creating and sharing content rather than passively receiving information from academics. Web 2.0 tools enable students to take control and manage their own learning. An, Aworuwa, Ballard and Williams (2009) argued that the use of Web 2.0 technologies in teaching facilitates interaction, communication and collaboration and knowledge creation. The literature shows that Web 2.0 tools encourage communication, student participation and collaboration, content creation and active learning.

Perceived Quality of Web 2.0 Tools

Delone and Mclean (2004) measured systems quality by means of responsiveness, usability, availability, reliability, and adaptability. The ISO 9126 standard listed functionality, usability, reliability and efficiency as quality characteristics of a software product (Bevan, 1999). A study conducted by Ajan and Hartshorne (2008) highlighted that ease of use, usefulness and compatibility of Web 2.0 technologies contributed significantly to the usage of Web 2.0 tools to accomplish students' academic activities.

Pedagogical Factors

Web 2.0 technologies aim to support learning from different contexts such as formal education, workplace learning, and informal learning. In order to enhance education with the usage of Web 2.0 tools, Jimoyiannis, Tsiotakis, Roussinos and Siorenta (2013) defined the educational Web 2.0 by developing six interrelated aspect dimensions namely, participatory web, open web, collaboration, sociability, open classroom and web as a learning platform.

A study conducted by An, Aworuwa, Ballard and Williams (2009), identified pedagogical characteristics of using Web 2.0 technologies in teaching, which included among others ease of use and flexibility, and writing and technology skills. LeNoue, Hall, & Eighmy (2011) elaborated on characteristics of Web 2.0 tools use such as self-directed learning and accessing learning content at any time and place.

Exter, Rowe, Boyd and Lloyd (2012) covered pedagogical beliefs regarding the use of Web 2.0 tools in tertiary education, namely engaging students in their learning, providing a social platform where students can interact with their peers, developing a deep understanding of content and facilitating collaborative learning by working in groups.

Organisational Factors

According to Al-Mukhaini, Al-Qayoudhi, and Al-Badi (2014), tertiary education institutions need to make sure they provide an infrastructure in which social media tools are accessible to all students and academics; create an atmosphere of support for Web 2.0 tools; foster and integrate new teaching and learning models; and be open to new assessment and grading strategies. Jimoyiannis et al. (2013) argues that a key issue of 21st century education is preparing academics to effectively use ICT in the classroom. Academics must be trained to successfully integrate ICT, in this case Web 2.0 tools into instruction and learning.

In a study conducted by An and Reigeluth (2011), lack of technology was reported to be a leading barrier to creating technology enhanced classrooms. In addition, Whitehead, Jensen, and Boschee (2003) identified lack of resources and funding as major barriers to the usage of Web 2.0 tools in higher education. Lack of internet connection, lack of ICT policies and limited supply of computers are major constraints in the usage of Web 2.0 technologies (Munguatosha, Muyinda and Lubega, 2011). In a study conducted in Tanzania, it was identified that poor infrastructure such as low Internet bandwidth and high cost of internet connectivity were major barriers to the usage of Web 2.0 tools (Anya et al, 2010). A similar study in Africa showed barriers to Web 2.0 usage include large class sizes, limited bandwidth and financial limitations (Kinuthia & Dagada, 2006). Unwin et al. (2010) also identified barriers to Web 2.0 usage to include lack of infrastructure and the cost of implementation. Olasina (2011); Okonedo, Azubuike, & Adeyoyin (2013) and Olatokun & Ntemana, (2015) identified the following challenges to Web 2.0 use namely, inadequate access to the Internet, poor ICT infrastructure and limited technological skills.

Individual Factors

Familiarity with Web 2.0 Tools

Olanike (2016) argued that computer experience helps to establish an academic's knowledge and familiarity of Web 2.0 tools and this in turn influences usage. In a study conducted in Makerere University in Uganda, Okello-Obura and Ssekitto (2015) reported that educators were knowledgeable and aware of Web 2.0 tools, which contributed to the usage of these tools in education.

Teaching Style

Teaching styles are considered as general principles, educational, and management strategies for classroom instruction. The teaching style for blended learning combines the traditional teaching approach (face-to-face) with online teaching methods. Huang, Yoo and Choi's (2008) study found that a correlations exists between teaching style preference and academics' attitudes towards using Web 2.0 tools in education.

Personal Barriers

This relates to the personal elements that restricts academics from using Web 2.0 tools. Echeng (2014), identified problems of personality characteristics, motivation and lack of computer expertise relating to the lack of use of Web 2.0 in learning amongst librarians, academics and students in Nigeria. According to Wachira and Keengwe, (2011), technical support, teacher expertise, time for planning and pedagogical applications are barriers when integrating technology into the classroom. A study conducted by An and Reigeluth (2011) reported that lack of technology, lack of time, and assessments were the leading barriers to creating technology enhanced classrooms. Additionally, a study conducted by Al-Kharousi, Jabur, Bouazza and Al-Harrasi (2016) indicated that the usage of Web 2.0 tools is affected by internal factors such as low motivation of staff regarding usage of Web 2.0 applications and lack of knowledge and awareness of Web 2.0 tools. Based on the research findings of the study conducted by Jimoyiannis et al. (2013), academics stated that the main barriers to usage of Web 2.0 tools in education were difficulties in designing learning activities based on

Web 2.0 tools; lack of time to design learning activities based on Web 2.0 tools and lack of resources available in the classrooms.

Lack of time and lack of necessary knowledge and skills were the most commonly identified personal barriers associated with the usage of Web 2.0 tools.

Conceptual Model

The conceptual model depicted in Figure 1 examined the research problem of limited Web 2.0 tool usage in higher education from a multi-dimensional perspective encompassing the constructs of perceived usefulness, perceived quality and attitude, as well as pedagogical, organisational and individual factors discussed in the literature. This model was used to predict which constructs/factors were significant predictors of Web 2.0 tool usage in the ensuing empirical study.

Figure 1. Conceptual model
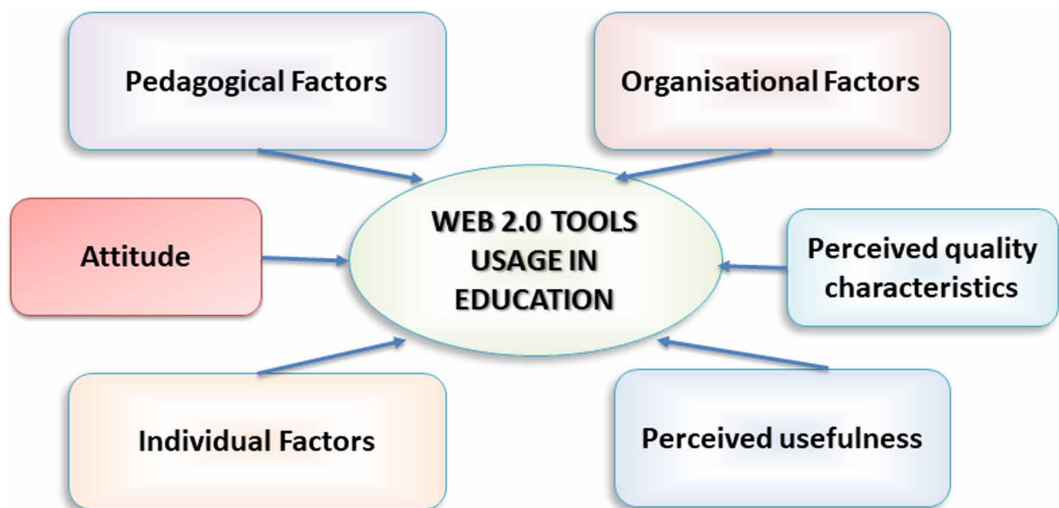
The factors/constructs from the Conceptual Model (Figure 1) were derived as follows:

Pedagogical Factors (PF)

This factor is related to academics' *pedagogical beliefs* and *characteristics* of Web 2.0 tools. Pedagogical beliefs refer to the understanding, premise or propositions about teaching that are thought to be true (Okello-Obura & Ssekitto, 2015). In this study, it is hypothesised that pedagogic factors will positively influence the usage of Web 2.0 tools in higher education.

Organisational Factors (OF)

Organisational factors consider enabling (institutional support) and inhibiting factors (institutional barriers) in relation to the usage of Web 2.0 tools in higher education. In this study, it is hypothesised that institutional support will positively influence the Web 2.0 tools usage, whilst institutional barriers will negatively influence Web 2.0 tools usage.

Individual Factors (IF)

Individual factors relate to the personal characteristics of academics. The individual factor constructs considered in this study were familiarity with Web 2.0 tools, teaching style and personal barriers. In this study, it is hypothesised that individual factors will influence the usage of Web 2.0 tools in education.

Attitude

Attitude is a construct derived from the Theory of Reasoned Action (Fishbein and Ajzen, 1975), which states that the decision to adopt and use new technology is based on the individual's intention, which is influenced by the attitude towards the technology. In this study it is hypothesised that attitude will positively influence the usage of Web 2.0 tools in higher education.

Perceived Usefulness

Perceived usefulness is a construct drawn from the Technology Acceptance Model (TAM), which refers to the extent to which a person believes that using a particular system or technology would improve job performance (Davis, Bagozzi & Warshaw,1989). In this study, it is hypothesised that perceived usefulness will positively influence the usage of Web 2.0 tools in higher education.

Perceived Quality Characteristics

Perceived quality characteristics namely efficiency, usability and reliability were drawn from the systems quality attributes of the Information Systems (IS) Success Model (Delone & Mclean, 2004) and the ISO9126 standard (Bevan, 1999). Perceived ease of use was derived from TAM and refers to the degree of ease associated with the use of the technology, which also falls under the usability quality characteristic as defined by Delone & Mclean (2004) . In this study, it is hypothesised that perceived quality characteristics, namely usability, reliability and efficiency will positively influence the usage of Web 2.0 tools in higher education.

Web 2.0 Tools Usage

The innovation diffusion model (IDM) was applied to the field of educational innovations (Rogers, 2003), where it was noted that individuals show dissimilar levels of willingness to adopt innovations, and that the segment of the population adopting an innovation is more or less normally distributed over time. In this study, it is hypothesised that the usage of Web 2.0 tools, which represents an innovative way of teaching in higher education is influenced by several factors and constructs.

The selected factors and constructs from extant models served as theoretical underpinnings of this research.

FACTORS INFLUENCING WEB 2.0 USAGE IN HIGHER EDUCATION

This section describes the research methodology adopted for the study and presents the quantitative findings and analysis of the aggregated data obtained from surveys administered at two private tertiary education institutions in South Africa.

Research Methodology

The collection of secondary and primary data was planned and conducted in phases where the findings of one phase was used as input to the following phase. Phase one involved the reading and understanding of secondary data from conducting a literature review of Web 2.0 tool usage in higher education by using a variety of published sources. The literature study undertaken in Phase 1 led to the creation of an initial conceptual model, upon which the empirical study was conducted. Phase 2 involved primary data collection and analysis. A Web-based questionnaire based on the literature and conceptual framework was developed and administered with the use of Google Forms to collect data

for this study. The research instrument was broken up into different sections in order to get a better understanding of academics' usage of Web 2.0 tools in education. The sections comprised of *Section A: General usage of Web 2.0 tools, Section B: Usage of Web 2.0 tools for teaching and Section C: Academics perceptions on the usefulness and shortfalls of using Web 2.0 for educational purposes based on pedagogical* factors, *individual* factors, *perceived quality characteristics, organisational* factors *and usage* factors.

The empirical research was conducted using a case study research design to conduct the study where two (2) private higher education institutions served as the two (2) cases for the study. The sampling frame for data collection comprised academics teaching at the two private higher education institutions located in the province of Gauteng in South Africa. The criteria used to select sample respondents were as follows: academics holding varying positions including professors, associate professors, senior lecturers and lecturers of different faculties and departments that were currently using Web 2.0 tools for teaching and or faculty use. A stratified random sampling was used to select academics for data collection and analysis on the extent of usage of specified Web 2.0 tools in teaching and the factors that influence Web 2.0 tool usage in higher education. The data was collected from a total population of 210 academics from both institutions that met the sampling criteria. A total of 127 valid completed questionnaires, 57 from Monash South Africa (MSA) and 70 from Pearson Institute of Higher Education (PIHE), were collected and analysed.

Descriptive statistics such as frequencies, charts, inferential and multivariate statistical procedures such as analysis of variance (ANOVA), t-tests, factor analysis, correlational analysis and reliability coefficients were used to analyse the quantitative data. Regression analysis was used to estimate the relationships between independent constructs/ factors and usage of Web 2.0 tools in higher education. The survey findings were further analysed and compared to the literature to determine if they supported or refuted existing empirical studies of a similar nature.

Findings and Analysis

This section describes descriptive statistics, factor analysis and regression analysis.

Descriptive Statistics of Participants

This section presents findings for some of the demographic data collected namely academic rank, teaching style, and familiarity with Web 2.0 tools.

Academic Rank

The academic rank of the respondents, depicted in Figure 2, comprised 78% lecturers, 13% senior lecturers, 1% associate professor, 5% professors and 3% who fell in the option "other" (Campus Director, Head of Programme and sessional lecturer). There was a larger percentage of lecturers compared to the other academic ranks. The lowest percentage was the academic rank of associate professor.

Teaching Style

Based on the findings depicted in Table 1, 67% (85) of respondents used a blended approach and 33% (42) used the traditional teaching style. A blended approach combines traditional classroom teaching methods with online educational resource material, online interaction, and online educational activities. A traditional teaching style, on the other hand, comprises face-to-face lecturing delivered in a lecture theatre.

Based on the results, the average usage for blended teaching is significantly higher than for the traditional teaching style. The findings revealed that 67% of the respondents at Pearson Institute of Higher Education and Monash South Africa prefer a blended approach to teaching. Means, Toyama, Murphy, Bakia & Jones (2010) argued that blended learning was more beneficial than purely online instruction.

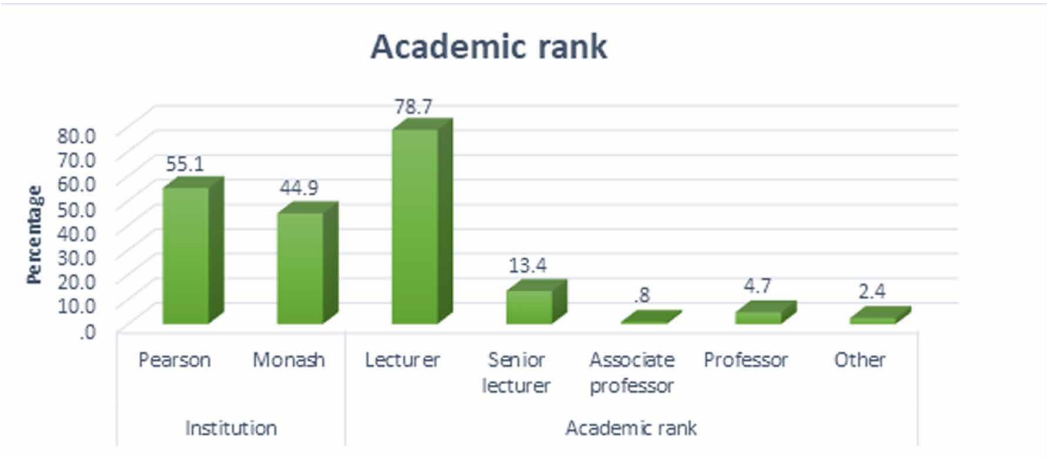**Figure 2. Overall academic ranking of the respondents**

Table 1. Preferred teaching style

	Frequency	Percent	Valid Percent	Cumulative Percent
Blended	85	66.9	66.9	66.9
Traditional	42	33.1	33.1	100.0
Total	127	100.0	100.0	

Familiarity with Web 2.0 Tools

A total of 72% of the respondents shown in Table 2, reported that they were familiar with Web 2.0 tools. Thus, a significant proportion of the sample are *familiar in general about Web 2.0 tools in education* (72%, p<.0005).

Table 2. Familiarity with Web 2.0 tools for education

	Frequency	Percent	Valid Percent	Cumulative Percent
No	36	28.3	28.3	28.3
Yes	91	71.7	71.7	100.0
Total	127	100.0	100.0	

These findings were similar to a study conducted by Santosh (2017), where the findings revealed that majority of the information professionals were familiar with Facebook (86.25%), Wikipedia (85%), YouTube (80%), and Blogs (79%). In a study conducted by Okello-Obura and Ssekitto (2015) in Africa, it was reported that the majority of educators were familiar and comfortable with the use Web 2.0 tools, which augured well for their usage in education.

Factor Analysis

Factor analysis helps to "reduce a number of variables to a meaningful, interpretable set of factors" (Sekaran, 2010:408). A factors analysis was performed in order to determine the factors / grouping of independent variables that could be used in the regression analysis with usage of Web 2.0 tools as the dependent variable. Factor analysis was followed by a conducting reliability test using Cronbach alpha, and the results revealed Cronbach values greater than .7 for all factors. The Cronbach's alpha reliability test is defined as " a reliability coefficient that indicates how well the items in a set are positively related to one another" (Sekaran & Bougie, 2010:324).

A factor analysis yielded the following groupings:

● Individual factors comprising sub factors rank, teaching style and personal barriers
● Organisational factors comprising sub factors organisational support and organisational barriers
● Pedagogical factors comprising sub factors pedagogical characteristics and pedagogical beliefs
● Perceived quality of Web 2.0 tools comprising sub factors ease of use and general quality characteristics
● Perceived Usefulness of Web 2.0 tools

Descriptive Statistics of Factors / Constructs

Individual Factors

A number of factors were identified in this category namely the demographic variables of academic rank, teaching style, and familiarity with Web 2.0 tools, presented under the descriptive statistics of participants.

as well as personal barriers discussed below.

The results for academic perceptions on personal barriers as depicted in Figure 3, *shows* significant agreement *on* the following barriers to the use of Web 2.0 tools in education:

● *the lack of knowledge on how to use the tool effectively* (M=3.98, SD = .729), t (126) = 15.097, p<.0005;
● *the lack of instructional value or appropriateness* (M=3.69, SD = .850), t (126) = 9.187, p<.0005;
● *using Web 2.0 tools requires more planning* (M=3.86, SD = .814), t (126) = 11.885, p<.0005 *and* effort than traditional face to face teaching
● *lack of motivation* (M=3.64, SD = .957), t (126) = 7.512, p<.0005.

The findings on the barrier '*the lack of knowledge on how to use the tool effectively'* are in line with Anunobi and Ogbonna (2012), Echeng, Usoro and Majewski (2013), who explained that the adoption of Web 2.0 technologies is low for teaching and learning in tertiary education due to the lack of familiarity with the tool. The finding on the barrier '*Using Web 2.0 requires more effort than traditional face to face teaching'* supports the premise that the usage of Web 2.0 tools in tertiary education may be a result of individual efforts rather than institutional policies and strategies (Yadav & Patwardhan, 2016). The finding on lack of motivation concurs with the study conducted by Sulaiman, Mohamed and Afendi (2011), who identified lack of motivation among lecturers as one of the barriers in teaching and learning using online tools.

Attitude

A significant 58% of the respondents agreed and 6% of respondents strongly agreed that they are confident and comfortable in using Web 2.0 tools as a delivery method when teaching. A small 2% of the respondents strongly disagreed, however 19% of respondents disagreed that they were confident

Figure 3. Personal barriers

or comfortable in using Web 2.0 tools as a delivery method. The remaining 15% were neutral to this statement.

These results differ from that of The ETNA survey (2012), which indicated that only 3% of academics were confident with emerging technologies such as Twitter and 14% were confident with Wikis (McLaughlin, Robertson & Nelson, 2012).
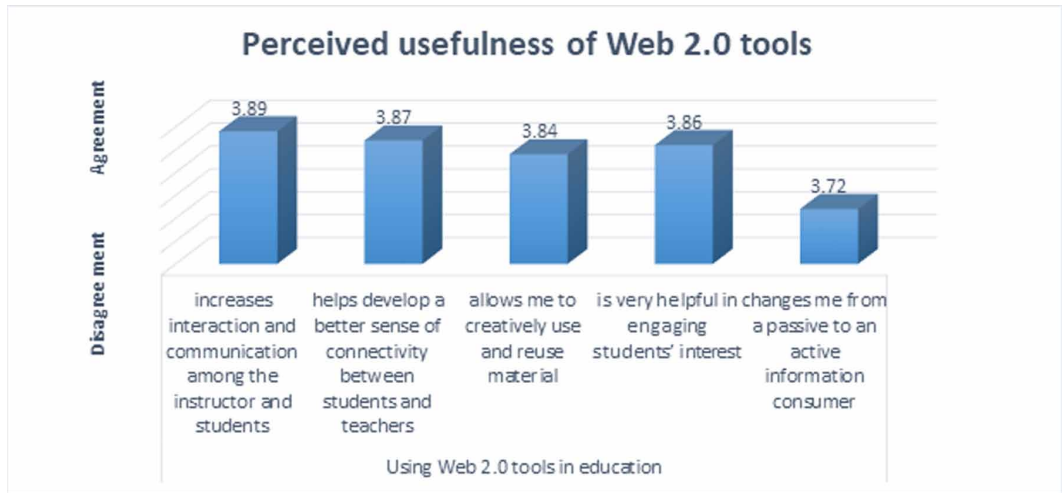
Perceived Usefulness

The results of academic perceptions of perceived usefulness pertaining to the usage of Web 2.0 tools depicted in Figure 4 revealed that there was significant agreement on the following statements:

- *increases interaction and communication among the instructor and students* (M=3.89, SD = .799), t (126) = 12.548, p<.0005;
- *helps develop a better sense of connectivity between students and teachers* (M=3.87, SD = .770), t (126) = 12.675, p<.0005;
- *gives students the opportunity to create content themselves instead of just listening to lectures* (M=3.84, SD = .858), t (126) = 11.061, p<.0005;
- *allows me to creatively use and reuse material in novel ways because there is not one centralised power controlling the web* (M=3.86, SD = .897), t (126) = 10.779, p<.0005;
- *changes me from a passive to an active information consumer, allowing academics' online voice to be part of the conversation* (M=3.72, SD = .950), t (126) = 8.497, p<.0005.

These findings concur with the findings of a study conducted by Echeng, Usoro and Majewski (2013), who reported that perceived usefulness was one of the main contributory factors that emerged in the acceptance of Web 2.0 as a social networking tool in teaching and learning. According to a study conducted by An and Williams (2010), the major benefits (perceived usefulness) of using Web 2.0 technologies in teaching include interaction, communication, and collaboration, knowledge creation, and ease of use and flexibility. Richardson (2009) argued that Web 2.0 tools provides academics with the opportunity to create more interactive and powerful learning environments in which learners

Figure 4. Perceived usefulness of Web 2.0 tools in education

become knowledge creators, producers, editors, and evaluators. In a study conducted by Usoro and Echeng (2015), the findings revealed that perceived usefulness positively influence use of Web 2.0 tools for learning.

Perceived Quality Characteristics

The results of academic perceptions of perceived quality pertaining to the usage of Web 2.0 tools depicted in Figure 5 showed significant agreement with the following statements regarding system quality:

- *The system is easy to use* (M=3.65, SD = .707), t (126) = 10.286, p<.0005;
- *The system is easy to understand* (M=3.65, SD = .598), t (126) = 12.168, p<.0005;
- *The system is easily adapted as a learning tool to create interaction, enable knowledge sharing, etc.* (M=3.24, SD = .930), t (126) = 2.863, p=.005.

There was a significant disagreement with the statement that *the system is reliable*: (M=2.65, SD = .867), t (126) = -4502, p<.0005.

These findings are in line with a study by Ajjan and Hartshorne (2008) who highlighted that ease of use, usefulness and compatibility of Web 2.0 technologies with students' academic activities contributed significantly to the usage of Web 2.0 tools. According to Cheung and Vogel (2013), perceived ease of use was found to be a significant determinant towards usage of Web 2.0 tools. Chen (2010) and Cheng (2012) reported that quality characteristics was a significant predictor of perceived usefulness of e-learning.

Pedagogical Factors

The results for pedagogical factors are organised and presented as *pedagogical characteristics of Web 2.0 tools* and *pedagogical beliefs*.

Pedagogical Characteristics of Web 2.0 Tools

The results of academic perceptions of the pedagogical characteristics of Web 2.0 tools, depicted in Figure 6 showed significant agreement with the following statements:

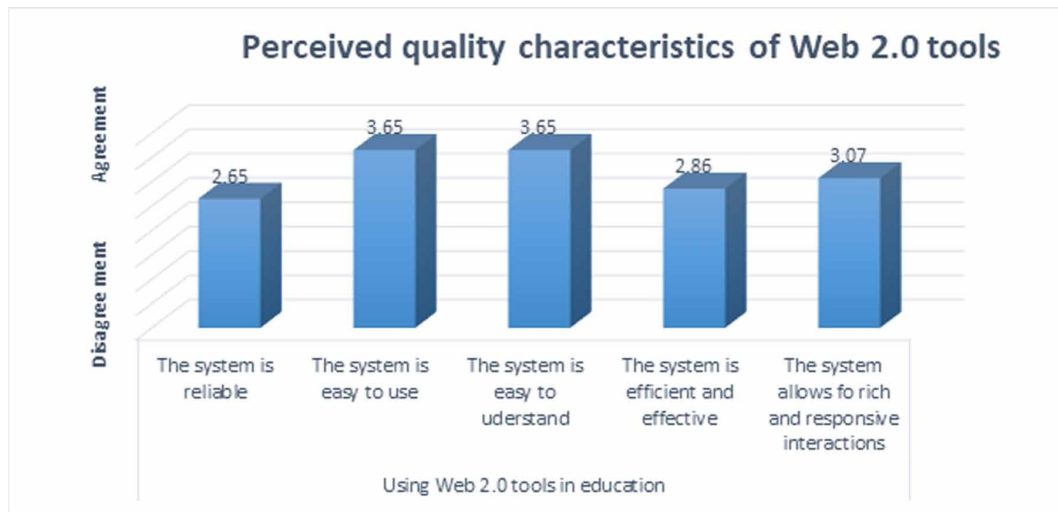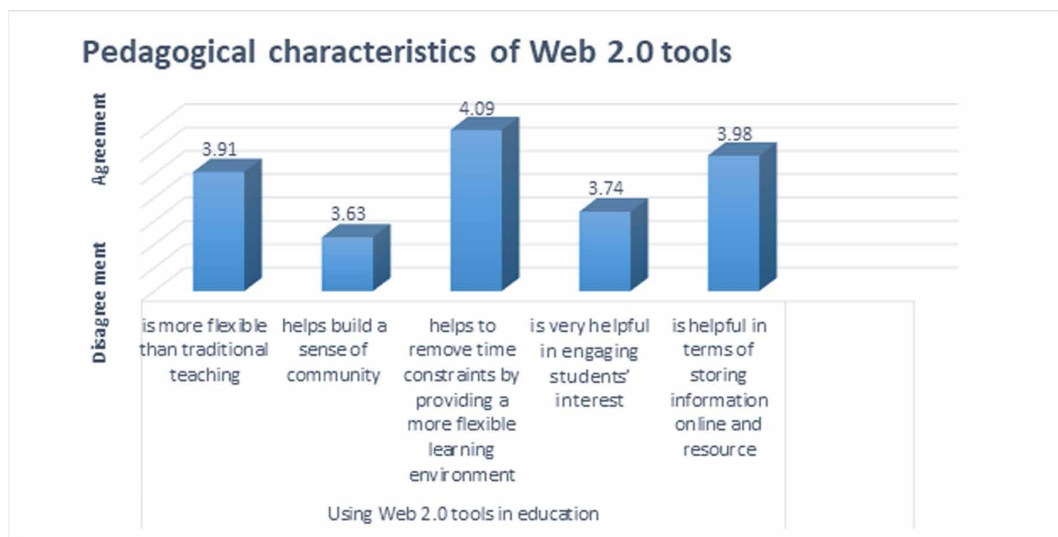**Figure 5. Sub factors relating to perceived quality characteristics**

Figure 6. Pedagogical characteristics of Web 2.0 tools

- *is more flexible than traditional teaching in terms of delivery of the content in that the teaching process can be conducted anywhere at any time* (M=3.91, SD = .735), t (126) = 14.007, p<.0005;
- *helps build a sense of community* (M=3.63, SD = .824), t (126) = 8.612, p<.0005;
- *helps to remove time constraints by providing a more flexible learning environment that is not inhibited to classroom walls* (M=4.09, SD = .791), t (126) = 15.590, p<.0005;
- *is very helpful in engaging students' interest* (M=3.74, SD = 1.107), t (126) = 7.534, p<.0005;
- *is helpful in terms of storing information online and resource sharing* (M=3.98, SD = .636), t (126) = 17.307, p<.0005.

The results were similar to a study conducted by An, Aworuwa, Ballard and Williams (2009), who identified the characteristics of using Web 2.0 technologies in teaching include interaction, communication and collaboration, knowledge creation, ease of use and flexibility, and writing and technology skills.

Pedagogical Beliefs

The results of academic perceptions of the pedagogical beliefs pertaining to Web 2.0 tools, depicted in Figure 7 showed significant agreement with the following statements:

● *allows individual students to support one another by working in groups, participating in forums, blogs, etc.* (M=3.94, SD = .833), t (126) = 12.672, p<.0005;
● *enhance learning and creativity by encouraging creative expression through blogs, etc.* (M=3.76, SD = .636), t (126) = 13.541, p<.0005;
● *social networking (e.g. Facebook) for informal learning enabling students to build their knowledge, share materials and grasp issues in class* (M=3.47, SD = .765), t (126) = 6.964, p<.0005 *and*
● *collaborative learning by working in groups on a structured activity* (M=3.91, SD = .855), t (126) = 12.043, p<.0005.

Figure 7. Pedagogical beliefs
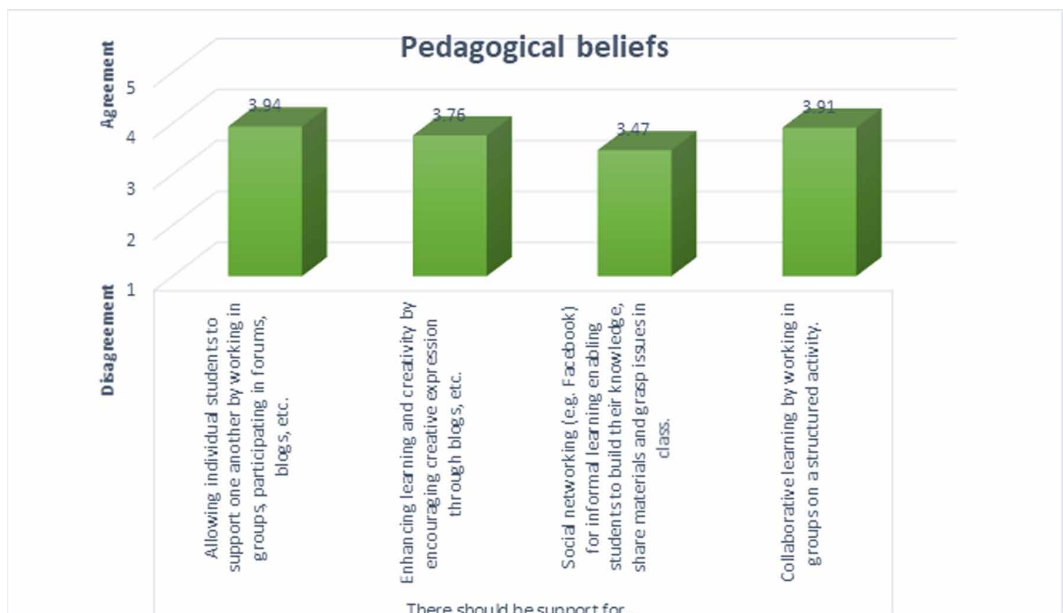
According to Exter, Rowe, Boyd and Lloyd (2012), Web 2.0 tools used in the tertiary education helped to engage students in their learning, provide a social platform where students can interact with their peers, develop a deep understanding of content and collaboratively learn by working in groups.

Organisational Factors

The results for organisational factors are organised and presented as *organisational support* and *organisational barriers*.

Organisational Support

The results of academic perceptions of the organisational factors in respect of Organisational support relating to Web 2.0 usage, depicted in Figure 8 showed significant agreement with the following statements:

● *Development support in terms of staff training and workshops* (M=3.28, SD = 1.021), t (126) = 3.042, p=.003 *and*
● *Monitoring of the appropriate use of online social networks* (M=3.17, SD = .977), t (126) = 1.999, p=.048.
● There was a significant disagreement *that there is adequate technical assistance for students and staff when using Web 2.0 tools* (M=2.67, SD = 1000), t (126) = -3.725, p<.0005.

Based on these results, there is one significant agreement with regard to support provided by tertiary education institutions when using Web 2.0 tools in education: *Development support in terms of staff training and workshops* (M=3.27, SD = 1.076), t (69) = 2.111, p=.038.
There are three significant disagreements:

● *there is adequate technical assistance for students and staff when using Web 2.0 tools* (M=2.47, SD = 1.018), t (69) = -4.346, p<.0005;
● *There are adequate resources e.g. Wi-Fi hot spots for students, etc.* (M=2.59, SD = 1.186),
● t (69) = -2.924, p=.005 *and*

There is an institutional policy that encourages lecturers to use new Web tools like Blogs, Wikis, video and audio Podcasting in the faculty to share their teaching experience and knowledge (M=2.73, SD = 1.020), t (69) = -2.226, p=.029.

Figure 8. Level of organisational support

These findings are similar to a study conducted by Munguatosha, Muyinda and Lubega (2011) who identified the factors that hinder the usage of new learning media were as follows: technical support and infrastructure; lack of competent technical staff; irrelevant ICT policies; lack of professional

training for staff and administrative support. According to Prensky (2007), academics have little or no experience with Web 2.0 tools and require further training and support. Technical support for academics who are unfamiliar with Web 2.0 tools is needed, as well as assisting academics to develop new ways of teaching by using these tools rather than simply teaching them how to use the tools. Based on research by Munguatosha, Muyinda and Lubega (2011) and Prensky (2007), there is lack of security and privacy in social networked learning, however, tertiary education institutions must filter and apply security measures against all content sent and received online.

Organisational Barriers

Based on these results depicted in Figure 9, it is evident that there was significant agreement that the following are barriers to the use of Web 20 tools in education:

- *low bandwidth teaching* (M=3.99, SD = 1.178), t (126) = 9.487, p<.0005*;*
- *Lack of security and privacy in social networked learning teaching* (M=3.60, SD = .994), t (126) = 6.784, p<.0005*;*
- *lack of University support to provide an ICT enabling environment for teaching with Web 2.0 tools teaching* (M=3.59, SD = 1.157), t (126) = 5.751, p<.0005*;*
- *inadequate student ICT facilities to use Web 2.0 tools teaching* (M=3.61, SD = 1.043), t (126) = 6.578, p<.0005*;*
- *shortage of adequately trained teaching staff teaching* (M=3.75, SD = .835), t (126) = 10.091, p<.0005 and*
- *inadequate training in the usage of ICT applications teaching* (M=3.91, SD = .787), t (126) = 13.079, p<.0005.*

According to Prensky (2007), security and privacy in social networked learning is a barrier, as issues of ownership and control will arise since content is freely shared and re-used worldwide.

Figure 9. Barriers to the use of Web 2.0

According to Daher & Lazarevic (2014), one challenge of Web 2.0 technologies by academics is the lack of training. A study by An and Reigeluth (2011) reported that lack of technology, lack of time and lack of training are leading barriers to creating technology enhanced classrooms.

Web 2.0 Tools Usage

Based on the questionnaire findings, a total of 47% of respondents make use of wiki sites like Wikipedia, Wiki, Javapedia, and so on. Blogging websites like Blogger.com and Blogspot.com are used by only 28% of the respondents. Thus, the use of blogging websites is not a common activity as compared to the use of wiki sites and social software applications. The use of podcasts is only utilised by 15% of the respondents. Thus, respondents prefer to use social software applications, wiki sites and blogging websites rather than use podcasts in their teachings.

Regression Analysis

Regression analysis was conducted to answer the research question: "What are the factors influencing Web 2.0 usage in higher education? "The results were as follows:

Relationship between Individual Factors and Web 2.0 Usage

The results of regression analysis confirm that:

- Blended teaching style is a significant predictor of higher Web 2.0 usage. Teaching style accounted for 20.8% of the variance in USAGE ($R^2 = .208$)), $F (1, 125) = 32.733$, $p<.0005$. It was a significant predictor of usage with usage for 'blended' lecturers (M=12.1882) being significantly higher than for 'traditional' lecturers (M=7.9286).
- Personal barriers accounted for 13.4% of the variability in usage ($R^2 = .134$,), $F (4, 122) = 4.728$, $p=.001$) with lack of knowledge ($\beta = -1.876$, $p=.002$) and lack of motivation ($\beta = -1.254$, $p=.003$) were both significant predictors of lower Web 2.0 usage.

Relationship Between Perceived Usefulness and Web 2.0 Usage

The results of regression analysis confirm that perceived usefulness accounted for 41.5% of the variability in usage ($R^2 = .415$), $F (2, 124) = 44.053$, $p<.0005$). Thus, Perceived usefulness ($\beta = 3.963$, $p<.0005$) was a significant predictor of Web 2.0 usage.

Relationship Between Perceived Quality and Web 2.0 Usage

The regression analysis shows that the Ease of Use quality characteristic accounted for 5.2% of the variability in usage ($R^2 = .052$), $F (2, 124) = 3.401$ $p=.036$). Hence Ease of Use ($\beta = 1.484$, $p=.016$) was a significant predictor of Web 2.0 usage.

Relationship Between Pedagogical Factors and Web 2.0 Usage

Based on the regression analysis results, neither of the two sub-factors namely, Pedagogical characteristics nor Pedagogical beliefs were significant predictors of Web 2.0 Usage.

Relationship Between Organisational Factors and Web 2.0 Usage

The regression analysis shows that the Organisational Support accounted for 7.9% of the variability in usage ($R^2 = 0.79$), $F (1, 125) = 10.780$ $p=.001$). Hence Ease of Use ($\beta = 1.756$, $p=.016$) was a significant predictor of Web 2.0 usage.

Based on the regression analysis results, Organisational barriers were not significant predictors of usage.

Relationship Between Attitude and Web 2.0 Usage

Attitude was measured in terms of being confident and comfortable using Web 2.0 tools. The independent variable attitude accounted for 38.1% of the variance in USAGE ($R^2 = .381$)), F (8,118) = 9.077, p=.001. A confident and comfortable attitude ($\beta = 2.096$, p=.000) was a significant predictor of Web 2.0 usage.

DISCUSSIONS AND RECOMMENDATIONS

One of the limitations of the study was that it focused on factors influencing usage of Web 2.0 tools in tertiary education from the perspective of educators. Another limitation was that the research was conducted at two private tertiary education institutions in the province of Gauteng in South Africa. The quantitative findings revealed that the respondents make more use of social networks and wiki sites than blogging websites and podcasts for teaching purposes. The results revealed that *individual factors, organisational factors, perceived usefulness and perceived quality characteristics* were significant predictors of the *usage* of Web 2.0 tools. This study contributes to the general area of technology integration in education by providing insight into the factors influencing the usage of Web 2.0 tools in tertiary education to supplement the traditional teaching approach. Furthermore, this study provides practical guidance to academics and academics managers who might find introducing Web 2.0 tools in tertiary education a challenge and provides insights to stakeholders in tertiary education institutions on integrating Web 2.0 tools in the traditional teaching and learning environment. Based on the results relating to institutional policy, an ICT enabling environment needs to be created by the tertiary education institutions to promote uptake and usage of Web 2.0 tools amongst academics, as well as provide the necessary training for the application of Web 2.0 tools in teaching. All of these need to be part of the current teaching and learning policy. Policies are crucial in guiding the usage and adoption of technology in teaching and learning such as the usage of Web 2.0 tools in tertiary education institutions. Recommendations to ensure the successful implementation of Web 2.0 tools in South Africa are as follows:

- Develop institutional policies and guidelines on ICT and Web 2.0 usage;
- Improve Internet connectivity/bandwidth;
- Pprovide technical support for academics and students for the use of Web 2.0 tools;
- Formally adopt Web 2.0 tools into the curriculum;
- Provide incentives to academics to motivate the usage of Web 2.0 tools;
- Provide professional development in learning theories and provide academics with training on the usage of Web 2.0 tools in teaching.

FUTURE RESEARCH DIRECTIONS

Future research can focus on factors that influence students' usage of Web 2.0 tools in education, which could then be compared with the academics' perceptions of Web 2.0 use. A future study can be conducted with educators in other universities (both private and public institutions) in different provinces of the country to examine whether differences in factors predicting Web 2.0 technologies intention and usage exist. It would also be beneficial to further study factors in place to support the integration of technology into courses, as well as the effectiveness of these support factors.

The study was based on specific types of tools (social networks, wikis, blogs, YouTube, podcasts) that were identified as being used by academics at both the tertiary education institutions, thus a study on tools like content syndication and AJAX, which were not explored, can be further investigated. In addition, the comparative studies of the varied tools with reference to their pedagogical relevance could be studied. Future studies could control for the type of Web 2.0 application and examine

differences in their impact on the learning environment and student achievement. Future research can be conducted to identify the most effective methods of using Web 2.0 technologies to improve teaching and learning and to support more active learning environments.

CONCLUSION

This paper focused on the results of the quantitative data collected from the questionnaire administered at two private tertiary institutions in South Africa. The results of the quantitative analysis indicated that the usage of Web 2.0 technologies is still in its infancy stages at these institutions, as the level of adoption and usage is low among academics. This finding concurs with studies by Mbatha (2013) and Bagarukayo and Kalema (2015) who reported that academics were not using Web 2.0 technologies to their potential, thereby contributing to the low usage rates in South African higher education institutions. Perceived usefulness was found to be a significant predictor of Web 2.0 usage, which was supported in previous studies by Echeng, Usoro and Majewski (2013), and An and Williams (2010). The quality characteristics of usability was found to be significant predictor of Web 2.0 usage, which was supported by Cheung and Vogel (2013). Other quality characteristics, namely reliability and efficiency as proposed by Bevan (1999) were not supported in this study. A confident and comfortable attitude towards Web 2.0 tools was a significant predictor of usage. This is consistent with the Theory of Reasoned Action (Fishbein and Ajzen, 1975). Pedagogical characteristics and Pedagogical beliefs were not found to be significant predictors of Web 2.0 usage, which did not concur with the arguments posed by Exter, Rowe, Boyd and Lloyd (2012) and An, Aworuwa, Ballard and Williams (2009) that pedagogical beliefs and characteristics will promote the use of Web 2.0 tools in education. Organisational support was found to be a significant predictor of Web 2.0 usage, which supported the argument by Al-Mukhaini, Al-Qayoudhi, and Al-Badi (2014). Organisational barriers were not significant predictors of usage, which differed from that reported by Munguatosha, Muyinda and Lubega (2011). Individual factors such as personal barriers were found to be significant predictors of Web 2.0 usage, which were supported by Echeng (2014) and Al-Kharousi, Jabur, Bouazza and Al-Harrasi (2016).

There was much enthusiasm amongst academics for developing the potential of Web 2.0 tools at the respective tertiary education institutions. The findings also revealed that there is a gap in the technological knowledge and skills of the academics and that organisational support in terms of training and workshops are extremely important. This finding supports Unwin, Kleessen, Hollow, Williams, Oloo, Alwala, Mutimucuio, Eduardo, & Muianga (2010) who proposed that factors that affect the implementation of Web 2.0 tools in South African higher education institutions include the lack of e-learning policy and the need for appropriate training and capacity development, among others. The findings of this study confirmed that Web 2.0 tools are beneficial in tertiary education but organisational and individual barriers exist, which need addressing.

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