Utilisation of Web2.0 technologies among undergraduate agricultural students of higher educational institutions in Osun State, Nigeria

Ojo, Toyin Femi[1], Durojaiye, Olufemi Damilola[2]

A B S T R A C T

This study interrogated agricultural students' usage of Web2.0 technologies in higher educational institutions in Osun State, Nigeria. A validated interview schedule was used to collect data from 360 respondents who were selected through a multi-stage sampling procedure while descriptive statistics like mean and inferential like Pearson Correlation were used to sumarise and make inference from the data respectively. The mean age of the respondents was 22.7±2.8 years and the majority (91.7%) were single. Also, the mean years of schooling were 18.07± 2.25 years while their mean monthly income was $40.06±$23.11. Also, more than half (55.80%) of the respondents had a high level of awareness about Web 2.0 technologies while about 62 percent of the respondents had a moderate level of Web 2.0 technologies usage. The findings revealed that at p<0.01, awareness level (r = 0.727) and monthly income (r = 0.124 had a significant relationship with agricultural students' level of usage of Web2.0 technologies. The study concludes that respondents had a moderate level of usage of Web 2.0 technologies.

1. Introduction

Agricultural information dissemination is an important function carried out in agricultural extension to connect agricultural stakeholders with the latest technologies needed for optimum performance that would result in the development of the community at large. Information and Communication Technologies (ICT's) have revolutionized every aspect of life thus making it easier to overcome time and distance impediments in the dissemination of agricultural information (Collence, 2012). Worthy of note among the communication technologies used for agricultural information dissemination purposes is the *Web2.0* technologies. The *Web 2.0* technology is variously defined. These defintions however converge arround issues of attributes, functionlity, and agencement. For instance, O'Reilly (2005), while acknowledging that the technology is of the second generation of the "World Wide Web" and web design, indicated that its aims are to enable creativity, faciliatate information sharing, and boost collaboration among users. Barsky (2006) in Mohammad (2011), on the other hand, explored the human experience dimension of the *Web 2.0* and suggested that the technology somewhat allows for equitable agencement as depicted by its chacteristics such as "open communication, decentralization of authority, and increased freedom for users to share and reuse content". Similarily, Richardson (2006) and Ikenwe *et al.* (2019) underscored the enhancement of agency of the users . The authors, at different times, noted not only the easy accessibility or usability of the technology by the users but also the increased latitude it gives to the users in terms of modifying or adding to its contents through reading/writing, among others. Hence, *Web 2.0* is concerned with many different things at the same time: ideas, technologies, behavioural patterns,

---

[1] Ojo, Toyin Femi
Department of Agricultural Extension And Rural Development
toyinfemiojo@yahoo.com
[2] Durojaiye, Olufemi Damilola
Department of Agricultural Extension And Rural Development
olufemidurojaye@gmail.com

ideals, goals and cultures (Anderson, 2007). It encompasses creating, manipulating and sharing information as well as enabling collaboration and interaction among information service users (Burke, 2009).

Various organizations have utilized the *Web2.0* technologies in training, seminars and conferences aimed at introducing and sustaining agricultural and rural development globally. Ashley, Corbett, Garside, Jones and Rambaldi, (2009) noted that *Web2forDev* was "a term used at the Web2forDev International Conference organized by the Technical Centre for Agricultural and Rural Cooperation (CTA) and other development partners in Rome at Food and Agricultural Organization in September 2007." *Web2forDev* is about encouraging the active use of these tools in development (Ashley *et al.*, 2009). These tools which include blogs (political Blog), Social networks (Facebook, Twitter, WhatsApp, to mention a few.), video sharing (YouTube), audio sharing (Podcast), mobile sites (2go, WhatsApp), image or picture sharing (flicker), Voice over Internet Protocols (VoIP services) among others, have the capacity of boosting participation in the communication process because of their open, conversational nature, connectedness and textual and audio-visual characteristic appeals Abubakar (2011). The ability of *Web 2.0* technologies to transform education landscape is not in doubt. Hartshorne & Ajjan (2009) and Rogers-Estable (2014) posited that the technologies have the capacity to improve teching-learning process through effective d sharing of information among various groups of scholars such as techers and students, mentors and mentees. According to Bonk, (2009), *Web2.0 technologies* have revolutionized education to the extent of emerging as platforms to encourage users to be collaboratively creating and sharing their insights into current and emerging themes within their environment.

Studies of the potentials of Web 2.0 technologies for agricultural development conducted in Nigeria revealed that "the web2.0 tools were used for the purposes of leisurely entertainment, to watch films, discuss serious national issues like politics, economy, and religious matters. The use of this technology for agricultural discuss was very minimal" (Ezeah, Euphemia, Asogwa and Obiorah, 2013). Mtega, Dulle, Malekani, & Chailla (2014) noted from their study that the *Web2.0* technologies were very useful for agricultural knowledge creation and information sharing in Tanzania. The *Web2.0* tools were used to send information from the extension agents to farmers on the latest technologies while feedbacks were sent from the farmers to the extension agent. YouTube and other video tools were used to teach them new techniques for planting and harvesting. Collence (2012) noted that farmers in Zimbabwe have begun to exploit the numerous opportunities that *Web 2.0* technologies provide such as using social media to share information on the cultivation of crops. Furthermore, a survey of higher learning institutions across five countries (Australia, the Netherlands, South Africa, the United Kingdom and the United States of America) revealed that *Web 2.0* technologies were deployed across all areas in higher education including academic, administrative and support areas for disseminating information (Kelly, 2008). The UK and Netherlands lead the way in enabling use, through supporting national infrastructure developments. In the United States, *Web2.0* tools (such as blogs, Facebook, LinkedIn, Twitter, YouTube) are "emerging for more two-way (or even multi-directional) collaboration and learning between extension experts, entrepreneurs and farmers that creates new space for relationship building and innovation" (Cornelisse, Hyde, Raines, Kelley, Ollendyke, & Remcheck, 2011; Fisher, 2011; Gilbert, Karahalios, & Sandvig, 2010). Agricultural videos and audio scripts from around the world are being collected in searchable web portals such as YouTube (Chowdhury *et al.,* 2013) which are being used for training purposes.

In spite of these promising prospects of the *Web 2.0* technologies in agricultural information generation and transfer among various users globally, little fact is known about the usage of this technology for agricultural information dissemination among agricultural students in Osun State, Nigerian hence this study.

1.1. Objectives of the study

The main objective of this study is to assess agricultural students' usage of *Web2.0* technologies in higher educational institutions in Osun State, Nigeria. The specific objectives of the study were to
1. describe the socio-economic characteristics of Web2.0 technology users in higher educational institutions in Osun State;
2. determine the level of awareness of Web2.0 technology users in higher educational institutions in Osun State; and
3. determine the level of usage of Web2.0 technology in higher educational institutions in Osun State.

Hypothesis of the study

There is no significant relationship between some selected variables and agricultural students' and their level of usage of *Web2.0* technologies in the study area.

2. Material and methods

Osun State is the six States of South west geopolitical zones of Nigeria, The study area was located within longitude 2.750 and 6.750 Greenwich meridian and latitude 70 and 90. Osun State has one Federal, one State, six Private Universities and two State Colleges of Education. They are one Federal University (Obafemi Awolowo University, Ile-Ife), one State University (Osun State University, Osogbo), Seven private University (Joseph Ayo Babalola University, Ikeji-Arakeji, Bowen university, Iwo; Kings University, Ode-omu; Fountain University, Osobgo, Oduduwa University, Ipetu-Modu, Adeleke University Ede; and Redeemer University, Ede), and two State College of Education (Osun State College of Education, Ilesa and Osun State College of Education, Ila). The population of the study comprised of 3556 agricultural students across the selected institutions. A two-stage sampling procedure was adopted for the study. At the first stage, four higher institutions, that is, one Federal University (Obafemi Awolowo University), one State University (Osun State University), one private University (Joseph Ayo Babalola University), and one State College of Education (Osun State College of Education, Ilesa) were purposively selected based on their offering of the agricultural courses and for equal representation. At the second stage, 10 percent of all the agricultural students in the selected institutions were randomly selected based on their numerical strength, making a total of 360 respondents which translate to 185 respondents from Obafemi Awolowo University, 152 respondents from Osun State University, 13 respondents from Joseph Ayo Babalola University (JABU), and 10 respondents from Osun State College of Education (COE) were interviewed. Data collected were analyzed using descriptive statistical tools such as frequency counts, percentage, mean and standard deviation while inferential statistics such as Chi-Square and Pearson Product Moment Correlation (PPMC) were used to test the hypotheses.

2.1. Measurement of variables

The dependent variable for the study is usage of the *Web2.0* technologies. It conceptualized as the extent to which the agricultural students were using *Web2.0* technologies. This was measured using a utilization score which was calculated following the pattern used by Ayodele (2015). The score was obtained from the summary of the students' responses to selected questions on the frequency of utilization of *Web2.0* technologies. Respondents were asked to indicate the extent of utilizing *Web2.0* technologies using a-8 point scale ranging from Never (0), Annually (1), Biannually (2), Quarterly (3), Monthly (4), Fortnightly (5), Weekly (6), and Daily (7). The maximum usage score was therefore 98 while the minimum usage score was 0. Equal interval approach was used to divide the scores and group the respondents into low (≤36.7), moderate (36.7-65.2) and high (≥65.2) usage level categories. The mean score and standard deviation were also calculated. On awareness, the respondents were asked if they are aware of each of the technologies. Their responses were rated on a four point scale as "not aware" (0), "heard about" (1), "seen" (2), and "experienced" (3). Since it requires progressive responses, the maximum obtainable score was 3 multiplied by the 14 *Web 2.0* tools listed which gave 42. The mean score and standard deviation for the

respondents were calculated and the tools were arranged in descending order of their mean to determine the level of awareness of each tool. The aggregate score was used to calculate the overall mean score of the respondents and this was used to categorize the respondents into overall level of web 2 tools awareness. Respondents with overall mean score of ≤ 1.44 were categorized as having low awareness (heard); 1.45 – 2.44 were categorized as having moderate awareness (seen); while ≥ 2.45 were categorized as having high level of awareness (experienced). This was based on the approach used by Mtega *et al*. (2014) to identify the level of awareness among respondents in the use of *Web 2.0* technologies in sharing agricultural knowledge in Tanzania.

3. Results and discussions
3.1. Socio-Economic Characteristics of Respondents
The results in Table 1 showed that the mean age of the respondents in the study area was 22.67±2.76 years. This was expected given the fact that most young people of this age category were expected to be in the higher educational institutions as undergraduate students. This agrees with the submission of Adesoji *et al,* (2018) the mean age of undergraduate agricultural students was 23 years. This implies that young people with their characteristic traits of innovativeness and creativity would be keen to acquire new knowledge and skills on the use of *Web 2.0* technologies for agricultural purposes. This finding is similar to the findings of Tapscot (2006) and Procter *et al.* (2010) who observed that the usage of *Web 2.0* technologies is often associated with urban, younger and more technological savvy users who are eager to learn and make use of these new technologies. A huge proportion of (91.7%) of the respondents were single. These results indicate that as undergraduate students, majority of the respondents were single, still very young and may not have the means to support a family yet as a result of their educational pursuit. The implication is that the high proportion of the respondents who were singles were more likely to acquire knowledge on the use of Web2.0 technologies to promote agricultural information dissemination to the end-users. This validates the findings of Moro (2013) that the majority (77.7%) of the students using *Web 2.0* technologies in the Kenya School of Computing and Informatics were single. The majority (79.4%) of the respondents were Christians. The results showed that all the respondents had one religious affiliation or the other. This implies that religious affiliations did not constitute a hindrance to the use of *Web 2.0* technologies by the agricultural students in the study area and the various religions had no prejudice against the use of *Web 2.0* technologies. Besides, the mean household size of the respondents was 7±3 persons. This shows that a large proportionof the agricultural students in the study area belonged to households whose sizes were larger than the national average household size of 5 persons (National Bureau of Statistics, 2016). This implies that more than half of the agricultural students belong to a family with large household sizes having a large number of dependent relatives. This could affect the number of resources available to each agricultural student to purchase internet data for surfing the web, hence limit the use of *Web 2.0* technologies by these agricultural students. Also, the majority (86.9%) of respondents were from the monogamous family. This shows that the majority of the agricultural students were from the monogamous family, thereby making it possible for them to enjoy good attention from their parents and possibly get more funds, and other resources needed for their use of these *Web 2.0* technologies. Besides, the mean monthly income of the respondents was $40.06±$23.11. This implies that the majority (91.7%) of the respondents earned, at most, $75.87 monthly as allowance or income from stipends, salary and/or gift. The implication of this is that the agricultural students are most likely to have some funds to be used on the acquisition and maintenance of gadgets that support the use of *Web 2.0* technologies for various uses. Also, the mean years of schooling experience were 18.07± 2.25 years. This implies that most of the agricultural students were literates and most likely able to determine the type of *Web 2.0* technologies needed to meet their communication needs. Also, they were most likely able to use the *Web 2.0* tools as prescribed by their manufacturers, especially because they are literates. The findings were in line with the submissions of Stutzman (2006) and Yoo *et al.* (2011) which indicated that users' literacy is capable of influencing the

effective use of *Web 2.0* applications because college students have been found to use these applications more recently than ever both in and out of their classrooms.

Table 1. Distribution of agricultural students by socio-economics characteristics

Variables	Frequency (f)	Percentage (%)	(n = 360)
Age (years)			
≤20	81	22.5	
21-30	273	75.8	Mean = 22.67
≥31	6	1.7	SD = 2.76
Sex			
Male	162	45.0	
Female	198	55.0	
Religion			
Christianity	286	79.4	
Islam	71	19.7	
Traditional religion	3	0.8	
Marital Status			
Single	330	91.7	
Married	30	8.3	
Household size			
≤ 5	121	33.6	
6 – 10	208	57.8	Mean = 6.74
≥ 11	31	8.6	SD = 3.30
Family type			
Monogamy	313	86.9	
Polygamy	47	13.1	
Income ($)			
≤25.29	156	43.9	
25.29- 50.58	144	40.0	Mean = 15,839.03
50.59- 75.87	37	10.3	SD = 40.06
≥75.88	21	5.8	
Years of schooling			
≤ 12	3	0.8	
13 – 16	94	26.1	
17 – 20	222	61.7	
≥ 21	41	11.4	

Source: Field survey, 2018
SD = Standard deviation. *Multiple choice

3.2. Level of awareness of respondents on the *Web 2.0* technologies

Results in Table 2 showed the mean score of the respondents which was used to categorize their levels of awareness into three, i.e., high, moderate and low. The result indicated that the respondents had high awareness of Facebook (Mean = 2.97), WhatsApp (Mean = 2.95), YouTube (Mean = 2.77), BBM (Mean = 2.72), Instagram (Mean = 2.59) and Google Plus (Mean = 2.57), while respondents had moderate awareness of Twitter (Mean = 2.38), Blogs (Mean = 2.19), Skype (Mean = 2.10), Wikis (Mean = 1.52) and Google Sheets (Mean = 1.45). The result also indicated that the respondents had low awareness of Dropbox (Mean

= 1.17), ResearchGate (Mean = 0.82), and Soundation (Mean = 0.39). The overall results indicated that the respondents were more aware of Facebook, WhatsApp, YouTube, BBM, Instagram and Google Plus. The implication of these findings is that agricultural students were likely to have more knowledge of Facebook, WhatsApp, YouTube, BBM, Instagram and Google Plus in relation to agricultural information dissemination than other *Web 2.0* technologies whose awareness level were low, such as Dropbox, ResearchGate, and Soundation.

Further analysis revealed the general levels of awareness of the respondents about the *Web 2.0* technologies as shown in Figure 1. This finding reveals that more than half (55.80%) of the respondents had high awareness about *Web 2.0* technologies, 41.40 percent of the respondents had moderate awareness while the rest (2.80%) had low level of awareness about the *Web 2.0* technologies. This result indicate that more than half of the respondents had heard, seen and experienced the *Web 2.0* technologies. The aggregate mean was 28.59±6.30. The implication of this high level of awareness about *Web 2.0* technologies like Facebook, WhatsApp and YouTube is that agricultural information or messages can be easily prepared and packaged by the students and delivered to the farmers using these technologies upon graduation. These findings are in consonance with the submission of Mohammad (2011) that students of higher educational institutions in Kuwait were highly aware of *Web 2.0* technologies such as YouTube, Facebook, Wikis and Twitter.

Table 2. Mean score and standard deviation for level of awareness of *Web 2.0* technologies

Web 2.0 Technologies	Mean	SD	Remark
Facebook	2.97	0.27	High
WhatsApp	2.95	0.30	High
YouTube	2.77	0.60	High
BBM	2.72	0.59	High
Instagram	2.59	0.71	High
Google Plus	2.57	0.83	High
Twitter	2.38	0.82	Moderate
Blogs	2.19	1.02	Moderate
Skype	2.10	1.00	Moderate
Wikis	1.52	1.27	Moderate
Google Sheets	1.45	1.18	Moderate
Dropbox	1.17	1.09	Low
ResearchGate	0.82	1.06	Low
Soundation	0.39	0.82	Low

Source: Field survey, 2018
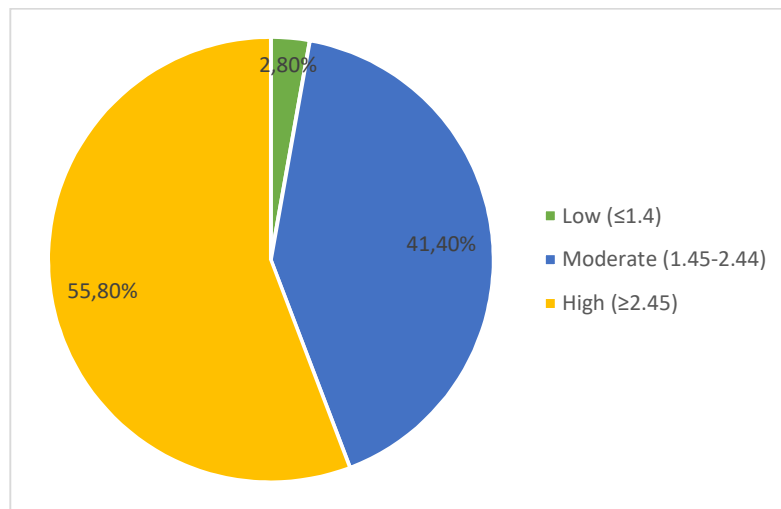
Aggregate mean = 28.59 ± 6.30
Figure 1. General levels of awareness of the respondents about *Web 2.0* technologies
Source: Field survey, 2018

3.3. Level of usage of web2.0 technology

Results in Table 3 showed the mean scores for the frequency of use of the *Web 2.0* technologies by the respondents. It was observed that Whatsapp was used daily (Mean = 7.89) while Facebook was used weekly (Mean = 7.36). The respondents used BBM (Mean = 6.32), Google plus (Mean = 6.29) and Instagram (Mean = 5.90) fortnightly, while Wikis (Mean = 5.38), YouTube (Mean = 5.22), Blogs (Mean = 5.10) and Twitter (Mean = 4.87) were used monthly. It was also observed that Dropbox (Mean = 4.41), Research gate (Mean = 3.84) and Skype (Mean = 3.55) were used quarterly, while Soundation (Mean = 2.80) and Google Sheets (Mean = 2.52) were used biannually.

These results imply that Whatsapp and Facebook were the most frequently used *Web 2.0* technologies on daily basis by these agricultural students. This might be due to the social and easy-to-use nature of the tools, coupled with the low cost involved in accessing them, considering the low level of income of the agricultural students. This is in line with the finding of Nesta and Mi (2011) and Baro *et al.* (2013) which observed that Whatsapp and Facebook were among the *Web 2.0* technologies most frequently used by students in Nigerian Universities. This imply that if agricultural information are channeled through these tools, it will be easier for them to disseminate such information to the end-users especially among young agriculturist.

Furthermore, the results in Figure 2 showed the distribution of the respondents based on their total *Web 2.0* technologies usage score. Results show that 62.2 percent of the respondents had a *Web 2.0* technologies usage score of between 36.7 and 65.2 (moderate level), 31.4 percent had a usage score of ≤ 36.7 (low level), while 6.4 percent of the respondents had a usage score of ≥ 65.3 (high level). The mean score was 77.12 ±28.16. This implies that many of the respondents (62.2%) used *Web 2.0* technologies on a moderate level. A probable reason for the moderate use of these *Web 2.0* technologies by the respondents could be the level of resources available to acquire and maintain the tools. This finding corroborates the conclusion of Yakubu *et al.* (2013) from the study of ICT usage among Extension Agents in Kano State that the respondents used *Web 2.0* technologies on a moderate level. This finding is in tandem with the conclusion of Ward *et al.* (2009), which noted that students of higher educational institutions in the United Kingdom were moderate in their use of *Web 2.0* technologies.

Table 3. Frequency of usage of *Web 2.0* technologies

Web 2.0 technologies	Mean	Std. Deviation
WhatsApp	7.89	0.747
Facebook	7.36	1.656
BBM	6.32	2.665
Google plus	6.29	2.069
Instagram	5.90	2.702
Wikis	5.38	2.140
YouTube	5.22	2.500
Blogs	5.10	2.473
Twitter	4.87	2.850
Dropbox	4.41	2.399
Research Gate	3.84	2.517
Skype	3.55	2.624
Soundation	2.80	2.533
Google sheets	2.52	2.508

Source: Field survey, 2018
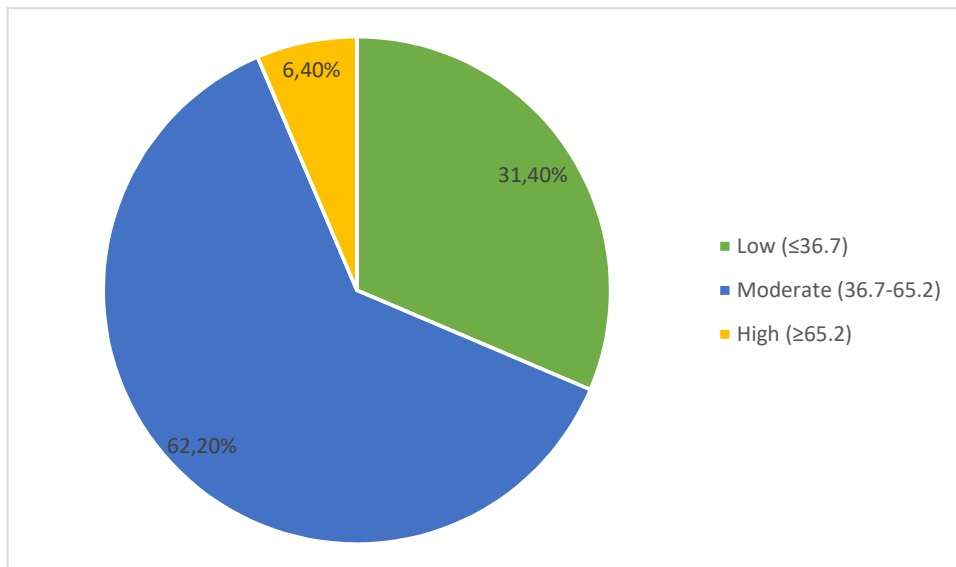
Grand mean = 77.12±28.163

Figure 2. Overall usage level of *Web 2.0* technologies by the respondents **Source:** Field survey, 2018

3.4. Relationship between selected variables and agricultural students' level of usage of *Web2.0* technologies

The results in Table 4 showed that only religious affiliation (χ^2 = 21.891, C = 0.239) had significant association with agricultural students' level of usage of *Web2.0* technologies at 0.01 level of significance. This implies that only religious affiliation could influence agricultural students' level of usage of *Web2.0* technologies in the study area. Furthermore, results in Table 5 showed that awareness level (r = 0.727) and monthly income (r = 0.124) had positive and significant relationship with student's usage of *Web2.0* technologies. The result also showed that the higher levels of awareness of the respondents to *Web 2.0* technologies, the higher their level of usage of the tools. This is also not surprising because a good level of awareness would encourage them to use the tools. Most people would use what they have been aware of. This is in line with the findings of Adesoji *et al.* (2020) that high level of awareness of innovation/technologies influence usage of that technologies. Also, the higher the monthly income of the respondents, the higher their level of usage of *Web 2.0* technologies. This is not surprising because most of the tools require financial resources to acquire and maintain them, which could be difficult to do if the income of the users were low.

Table 4. Results of Chi-Square analysis between socio-economic characteristics of respondents and respondents' level of usage of *Web2.0* technologies

Variables	χ^2 Value	Contingency coefficient (C)	Sig.
Sex	1.096	0.055	0.578
Religion	21.891*	0.239	0.000
Marital status	2.890	0.089	0.236
Family type	0.427	0.034	0.808

* - Significant at P ≤ 0.01 level **Source:** Field survey, 2018

Table 5. Results of Correlation analysis between some selected variables of agricultural students and their level of usage of *Web 2.0* technologies

Variables	r – value	Sig. Level
Age of respondent	0.038	0.470
Household size	0.040	0.453
Number of years of formal schooling	0.017	0.752
Monthly income	0.124*	0.020
Awareness score	0.727**	0.000

** - Significant at P ≤ 0.01 level * - Significant at P ≤ 0.05 level
Source: Field survey, 2018

Conclusion

Based on the findings of the study, it was concluded that the majority of the respondents were male and single, in their early twenties and from low income earning background. The majority of the respondents had a high level of awareness of Web 2.0 technologies such as Facebook, WhatsApp, YouTube, BBM, Instagram, and Google Plus. While awareness was low in Dropbox, Researchgate and Soundation. Also, the majority of the respondents rated Whatapps as daily used Web 2.0 technology while Soundation and Google Sheets were used less frequently. Besides, they had a moderate level of utilization of these technologies. Monthly income and awareness level had a significant influence on student's utilization of Web 2.0 tools. The income relationship with utilization implies that inequality exists in the utilisation of the technology which would widen the gap between the haves and have nots. It is therefore recommended that government and other stakeholders should put in place an adequate interventionist programme that

would subsidize the data cost of accessing the technology among students of the higher educational institutions in Nigeria.

References

Adesoji, S. A. Famakinwa, M. and Eghosa, A. E. (2018). Assessment of Agricultural Extension Students' Interest in Providing Private Extension Services in Nigeria Journal of Agricultural Science, University of Sabaramuguwa, 14(1):57-66 (Sri Lanka). Available online at http://dx.doi.org/10.4038/jas.v14i1.8457.

Adesoji S. A., Fabiyi E. O. and Famakinwa, M. **(**2020). Adoption of Technologies Introduced by Community Based Agricultural Development Project among Farmers in Kwara State, Nigeria *Agricultura Tropica et subtropica 53(3)*127-135. Available online at http://dx.doi.org/10.2478/ats-2020-0013

Abubakar, A. A. (2011). "Political participation in social media during the 2011 presidential electioneering in Oladokun Omojola et al (eds.) Media, Terrorism and Political Communication in a Multi-Cultural Environment: ACCE Conference Proceedings." Ota (Nigeria): ACCE Loc. Pp. 445-446. DOI: https://dx.doi.org/10.20321/%25nilesjbe.410.

Anderson, P. (2007). What is Web 2.0? Ideas, technologies and implications for education. *JISC Technology and Standards Watch*, Technical Report, February, 2007. Retrieved March 5, 2016, from http://www.jisc.ac.uk/media/documents/techwatch/tsw0701b.pdf.

Ashley, H., Corbett, J., Garside, B., Jones, D. and Rambaldi, G. (2009). "Change at hand: Web 2.0 for development", PLA issue 59, IIED/CTA, London, UK. ISBN: 978-1-84369-716-9; ISSN: 1357-938X

Ayodele, A. O. (2015). Evaluation of Farmers' Perception of Organic Fertilizer Usage in Ondo State, Nigeria. An unpublished thesis. Pp 46-118.

Baro, E. E., Idiodi, E. O. and Godfrey, V. Z. (2013). Awareness and use of Web 2.0 tools by librarians in university libraries in Nigeria. OCLC Systems & Services. 29(3),170188.[Online] Available from: http://www.emeraldinsight.com/journals.htm?articleid=17090777. ISSN: 1065-075X [accessed: 22 March 2017].

Barsky, E. (2006). Introducing Web 2.0: Weblogs and podcasting for health librarians. *Journal of Canadian Health Librarian Association, 27*, 33-34. Retrieved March 3, 2016, from http://www.webdialogues.net/cs/cdc-new_media-library/download/dlib/1082/Blogs_Podcasts.pdf?x-r=pcfile_d. DOI 10.14288/1.0077887

Bonk, C. J. (2009). "The world is open: How web technology is revolutionizing education". San Francisco: Jossey-Bass. Pp 320-321. doi:10.1016/j.iheduc.2009.04.001; ISBN#9780470461303.

Burke, M. (2009). The semantic Web and the digital library. *Aslib Proceedings: New Information Perspectives, 61*(3), 316-322. http://dx.doi.org/10.1108/00012530910959844

Chowdhury, A., and Hambly Odame, H. (2013). Social Media for Enhancing Innovation in Agri food and Rural Development: Current Dynamics in Ontario, Canada. In W. Ashton & A. S. Carson [Eds.], ISSN: 1712-8277. The Journal of Rural and Community Development, 8(2), 97-119. ISSN: 1712-8277

Collence, T. C. (2012). *Knotting and networking agricultural information services through Web 2.0 to create an informed farming community: A case of Zimbabwe*. Social networking for agricultural research, education, and extension service: An international perspective — Agricultural Libraries Special Interest Group session 205. Retrieved from https://conference.ifla.org/ifla78

Cornelisse, S., Hyde, J., Raines, C., Kelley, K. Ollendyke, D. & Remcheck, J. (2011). Entrepreneurial Education Practiced via Social Media. Journal of Extension [Online], 49(6) Article 6TOT1. ISSN 1077-5315. Available at: http://www.joe.org/joe/2011december/tt1.php#top.

Ezeah, G. H., Chika, E. A., & Edogor, I. O. (2013). Social MediaUse among Students of Universities in South-East Nigeria, IOSR Journal of Humanities and Social Science (IOSRJHSS) Volume 16, Issue 3 (Sep. - Oct. 2013), PP 23-32 e-ISSN: 2279 0837, p-ISSN: 2279-0845. www.Iosrjournals.Org.

Fisher, M. (2011). Incorporating Social Media in Extension. CSA News, Crop Science Society of America, Madison. W. I.

Gilbert, E., Karahalios, K., & Sandvig, C. (2010). The Network in the Garden: Designing Social Media for Rural Life. American Behavioural Scientist, 53(9), 1367-1388. https://doi,org/10.1177/0002764210361690

Hartshorne, R., & Ajjan, H. (2009). Examining student decisions to adopt Web 2.0 technologies: Theory and empirical tests. *Journal of Computing in Higher Education, 21*(3), 183-198. DOI: 10.1007/s12528-009-9023-6

Ikenwe, I. J., Idhalama, O. U. & Ode, C. E. (2019). Perception and Use of Web 2.0 Applications by Medical Students of Ambrose Alli University Ekpoma. International Journal of Knowledge Content Development & Technology 9(2) 45-64. http://dx.doi.org/10.5865/IJKCT.2019.9.2.045

Kelly, B. (2008). "A review of current and developing international practice in the use of social Networking (Web2.0) in higher education", available at: http://opus.ba th.ac.uk/17702/, (accessed 3 September 2016).

Mohammad, A. (2011). Modeling Student Perception of Web 2.0 Technologies Adoption in Kuwait, an unpublished Ph.D. dissertation; Denton, Texas. (https://digital.library.unt.edu..ark:/67531/ml/4/: accessed January 29,2021), University of North Texas Libraries, UNT Digital Library, https://digital.library.unt.edu.

Moro, P. A. (2013). Exploring Factors Affecting Students' Usage and Adoption of Web 2.0 Technologies at School of Computing and Informatics, University of Nairobi: Theory and Empirical Tests. An unpublished   M.Sc.   Thesis.   Available   at: https://erepository.uonbi.ac.ke/bitstream/handle/11295/58749/Moro_Exploring%20factors%20affecting%20students'%20usage%2and%20adoption%20of%20web%202.0%20technologies.pdf?sequence=3&isAllow. Accessed 04-09-2017. Pp 38-42

Mtega, W. P., Dulle, F. W., Malekani, A. W., and Chailla, A. M. (2014). Awareness and use of Web 2.0 technologies in sharing of agricultural knowledge in Tanzania. *Knowledge Management & E-Learning, 6*(2), 188–202. ISSN 2073-7904.

National Bureau of Statistics (2016). Nigeria- General Household Survey-Panel Wave 3 (Post Planting) 2015-2016, Third round. Available at http://www.nigerianstat.gov.ng/nada/index.php/catalog/51/study-description. Accessed 2nd August, 2017

Nesta, F. and Mi, J. (2011). Library 2.0 or library III: returning to leadership. *Library   Management.* 32(1/2), 85-97. ISSN: 0143-5124

O'Reilly, T. (2005). What is Web 2.0? http://www.oreilly.com/pub/a/oreilly/tim/news/ 2005/09/30/what-is-web-20.html Accessed 20.04.16

Procter, R., Williams, R., Stewart, J., Poschen, M., Snee, H., Voss, A. and Asgari-Targhi, M. (2010). Adoption and use of Web 2.0 in scholarly communications. *Philosophical Transactions of the Royal Society A, 368*(1926), 4039–4056. https://doi.org/10.1098/rsta.2010.0155

Richardson, W. (2006)*. Blogs, wikis, podcasts, and other powerful Web tools for classrooms*. Thousand Oaks, CA: Corwin Press. ISBN: 1412927668 9781412927666 14129276769781412927673

Rogers-Estable, M. (2014). Web 2.0 Use in Higher Education. European Journal of Open, Distance and e-Learning 17(2). DOI: 10.2478/eurodl-2014-0024

Stutzman, F. (2006). *Adopting the Facebook: A comparative analysis.* University of North Carolina. Retrieved September 19, 2016, from http://fredstutzman.com/pubs/stutzman_wp5.pdf

Ward, R., Moule, P., and Lockyer, L. (2009). "Adoption of Web 2.0 Technologies in Education for Health Professionals in the UK: Where are we and why?" Electronic Journal of eLearning Volume 7 Issue 2 (pp165 - 172), www.ejel.org. ISSN 1479-4403.

Yakubu, D. H., Abubakar, B. Z., Atala, T. K. and Muhammed, A. (2013). Use of information and communication technologies among extension agents in Kano State, Nigeria. *Journal of Agricultural Extension,* 17 (1), 172 – 177. ISSN 1119-944X 162; http://dx.doi.org/10.4314/jae.v17i1.16.

Yoo, S. J. and Huang, W. H. D. (2011). Comparison of web 2.0 technology acceptance level based on cultural differences. *Educational Technology & Society*.14(4), 241–252. ISSN 1436-4522.