

## TRANSFORMING SCIENCE TEACHING AMONG PRE-SERVICE TEACHERS THROUGH SOCIAL SOFTWARES: IMPLICATIONS FOR 'LOVING LEARNING

OFOEGBU, THERESA

Department of Arts Education University of Nigeria, Nsukka, Nigeria

### ABSTRACT

The study investigated the extent of use of social software among pre-service science teachers in the federal universities in the South-east geopolitical zone of Nigeria. The population consists of all final year pre-service science teachers in the federal universities in the south-east geopolitical zone of Nigeria. Accidental random sampling technique was used to sample 592 final year science education student otherwise known as pre-service science teachers. The sample consists of 279 males and 314 females. The instrument for the study named Application of Social Software Questionnaire (ASSQ) consists of a 30-item questionnaire developed from the ten major classes of social software based on Mejias, 2005, classification. The instrument was validated by three experts in educational technology, measurement and evaluation and vocational teacher education. Crombach Alpha was used to determine the reliability of the instrument which was 0.82. Two research questions and one null hypothesis guided the study. Mean and Standard Deviation were used to answer the research questions while t-test statistics was used to analyze the null hypothesis. The findings of the study showed that the pre-service science teachers make use of all the social software investigated. However, they do not use any of them to a very high extent. They use a few of them to a high extent and majority to a low extent. Based on the findings, some recommendations were made which include that different universities in Nigeria should be encouraged to adopt different aspects of e-learning where social software will be integrated into science teaching and learning, knowing that students are interested in them

**KEYWORDS:** Science Teaching, Pre-Service Teachers, Social Soft Wares

### INTRODUCTION

Science teaching and learning are at the heart of many nations educational priorities. This is because of the obvious relationship among science, technology and national development. Science teaching can be very interesting if the teacher avails himself of the numerous opportunities in his environment. It is imperative that training of science teachers should expose them to current issues that will make it possible for them to explore situations in their environment and subsequently be in a position to transmit the same to their students.

Tertiary education is imperative for the development of nations. Universities, like many other organizations in modern society, are becoming highly computerized. University finances, student recruitment and registration, library resources, information storage, clerical work, analytical tools, as well as classrooms are being influenced by and restructured to adapt to computer technologies (Albert and Campbell 2008). These activities are gradually compelling students to improve their Information and Communication Technology competencies. Again this technological sensitization is driving students' interest. According to Fallis (2007), the effects of computerization on the university have been many, but we are only at the beginning of a long process of adjustment and development. In the present dispensation

of technological and social changes, important transformations are underway in terms of how we live and work. A fundamental responsibility of tertiary institutions is to be critical of new teaching methods and to challenge students. Many new technologies may not be suited to the classroom nor hold enough long-term promise to make them feasible to implement. However, when new technologies which affect patterns of communication and collaboration become commonplace within the student population, these technologies cannot be ignored, and their relationship to pedagogies that emphasize communication and collaboration should be examined. One of such technologies as indicated in many developed nations is social software also known as Web 2.0.

### **Concept of Social Software and Application in Education**

Social software has been defined and described differently by different authors. Shirky (2003) defined it as those software that provide group interaction. Again Klamma et al., (2006); Chatti et al., (2006a) described it broadly as tools and environments that support activities in digital social networks. However Styles, (2006) defined it as a kind of software, that users can contribute their content, and therefore this content gets richer, or more accurate and more people can use it. The term Web 2.0 was coined in 2005 (O'Reilly, 2005) as a way of characterizing the emerging interactive, user-centered Web based tools that were revolutionizing the way the Internet was conceptualized and used. These tools include: blogs, Wikis, image-sharing (e.g., Flickr), video-sharing (e.g., YouTube), podcasting, and so forth. These Web 2.0, or "social software," tools share many synergies with social constructivist learning pedagogies. Therefore many educators have harnessed Web 2.0 tools for creating engaging student-centered learning environments. According to Owen, Grant, Sayers and Face (2006), Social software and the changing goals in education seem to be moving in the same direction. They discussed some of the key attributes of social software in relation to education to include:

- Delivers communication between groups. They are implicit mechanisms that allow interest groups to electronically coalesce – to be aware of what each other is doing and to review each other's actions and to allow those actions to benefit every member of a community.
- Enables communication between many people. If the authors wish, all their work is available to the rest of the digital world. Access is available to expert and novice alike and in fact social software provides systems whereby experts and novices can work together.
- Provides gathering and sharing of resources. It provides a means of gathering and making material available. Simple acts like putting holiday snapshots on a searchable photo site can give others insight into the location, for instance; for other people making available their work in progress can both inform others and prompt critical feedback.
- Delivers collaborative collecting and indexing of information. Knowledge is no longer limited by historically constructed visions of curricula. There are new ways of organizing and finding knowledge objects that are of interest to you and the groups with whom you share interests.
- Allows syndication and assists personalization of priorities. There are mechanisms to be passively active. You can choose what information streams you want to be kept informed about and that information will come to you rather than you having to go and seek it. It will help you both to keep abreast with your co-workers' online activity and those other information streams you actually prioritize.

- Has new tools for knowledge aggregation and creation of new knowledge. The massive uptake of MP3 music players is indicative of a move to collecting material from many sources and aggregating it for our personal use. There are also tools that allow content to be modified and incorporated in new formulations: the concept of a mash-up.
- Delivers too many platforms as is appropriate to the creator, recipient and context. Creators and users of social software tools and content know their lives are not constrained to desktops, they use many media: mobile phones; PDAs; MP3 players and games consoles. They increasingly expect that the digital part of their lives will integrate with them in the context that they are in.

From these attributes it is obvious that the essence of social software is communication, collaboration and participation. These differentiate them from earlier forms of Web usage otherwise described as Web 1.0. Web 2.0 represents a new era of paradigm shift. In this era, there is a transition from traditional software to internet services (Bray, 2007). Transition from the traditional view of e-learning to the dimension of technology aiming at collaborative nature of learning refers to as e-Learning 2.0. E-Learning 2.0 contains: discussion forums, blended learning, virtual classrooms, podcasts, mobile learning, games, blogs, wikis etc. (Wassall, 2006, pp.2-3; Hruby and Wooden, 2006, p.52; Drasil and Pitner, 2006, p.1). All these involve participatory activities that make users active and ready to collaborate and share information. These attributes are necessary for learning science because with the participatory activities students interest is likely to be stimulated making them to love learning.

By using social software, students have three main communication modes: One-to-one communication which includes e-mail and instant messaging, One-to-many communication which includes web pages, blogs and Many-to-many communication (Marhan, 2006, p. 210).

### **Educational Applications of Social Software in Higher Education**

Use of social software is gradually gaining grounds in higher education and can take different models. Crosseck (2009) presented this model:

#### **Blogging**

- Use blogs for real-world writing experiences
- Pull class blogs together into one area for easy tracking
- Quickly give feedback to students, and students to each other
- Students use peer networks to develop their own knowledge
- Update new information such as homework and assignments
- Using comments in blogs can encourage students to help each other with their writing, and get responses to a question without getting the same answer twenty times etc.

#### **Micro Blogging**

- Classroom community, exploring collaborative writing, reader response, collaboration across schools, countries, project management, assessing opinion, platform for metacognition, conference or as part of a presentation or

workshop, for reference or research, facilitating virtual classroom discussion, creating a learning experience, a Personal Learning Network

- Use for dissemination of teachers' publications and materials, locating original sources of ideas, quotes, allows for very focused and concrete feedback to students to refine their thinking and improve their skills, fostering professional connections, informal research, for storytelling, follow a professional, get feedback on ideas, event updates, live coverage of events, build trust, build a community etc.

### **Wikis**

- Use for students' projects; use for collaborating on ideas and organizing documents and resources from individuals and groups of students
- Use as a presentation tool (as e-portfolios); as a group research project for a specific idea; manage school and classroom documents; use as a collaborative handout for students; writing: student created books and journaling
- Create and maintain a classroom as a place to aggregate web resources; supporting committees, working parties and university projects etc.

### **Photo / Slides Sharing**

- Share, comment, and add notes to photos or images to be used in the classroom
- Inspire writing and creativity; create a presentation using the photos
- USE tags to find photos of areas and events around the world for use in the classroom.
- Post student presentations to an authentic audience and get feedback from around the world; share professional development materials and have it available anywhere, anytime, to anyone; post presentations of special events

### **Video Sharing**

- Video professional development on own terms; create and own subject specific videos with students; use video sharing sites to find videos on current issues etc.

### **Syndication of Content through RSS**

- Professional development, time saving; updated information in teaching area
- Information coming from constraining sources; sharing work with other educators
- RSS feeds can potentially replace traditional email lists, reducing email overload
- RSS feeds can be used to keep course specific web pages current and relevant etc.

### **Social Bookmarking**

- Create a set of resources that can be accessed on any computer connected to the internet; conduct research and share that research with peers
- Track author and book updates; groups of students doing a classroom project sharing their bookmarks; rate and

review bookmarks to help students decide on usefulness of resources; setup a group tag in order to share educational resources

- Share one del.icio.us account between a numbers of different subject specific educators in order to share resources with each other etc.

### **Social Networking**

- Event support and continuation, team and community support, aggregation of social media applications, personal learning environments etc. (Cobbs, 2008)

### **Other Tools**

- Instant messaging increase the sense of community and accessibility which is required for collaborative learning; voip can promote international collaborations and understanding; calendars make calendar events, homework, anything you want available on mobile devices connected to the Internet
- Survey and polls, online diagrams and web-based word processor, on-line spreadsheet, social search, mind mapping; virtual worlds - virtual conferences and seminars, team meetings and collaboration spaces, simulations etc.

From the fore going social software have positive and negative dimensions just like most ventures in life. The concern is that youths are getting more and more engrossed with these technologies. Researchers are continuously advancing the need to gear learning towards the interest of the learners. This of course is embedded in the principles of constructivism. Kharade and Thakkar (2012) insisted that according to constructivism, knowledge is considered to be socially as well as individually constructed; learning is the acquisition of meaningful competences in realistic context; learning is advanced through interactive and authentic experiences that match with the interest of the students. Applying these new technologies effectively for teaching and learning science requires effective instructional design.

### **Purpose of the Study**

The general purpose of this study was to find out the extent of application of social software among undergraduate science education students otherwise known as pre-service science teachers in Nigerian Universities. Specifically the study investigated:

- The extent at which Nigerian pre-service science teachers make use of social software.
- The extent to which male and female pre-service science teachers make use of social software.

### **Research Questions**

- To what extent do Nigerian pre-service science teachers use social software?
- To what extent do Nigerian male and female pre-service science teachers use social software?

### **Hypothesis**

- There is no significant difference in the extent of use of social software among male and female Nigerian pre-service science teachers.

## METHODOLOGY

The study is a survey of the extent to which Nigerian pre-service science teachers use social software. The population consists of all final year science education students in the federal universities in the south-east geopolitical zone of Nigeria. Accidental random sampling technique was used to sample 592 final year students. The sample consists of 279 males and 314 females. The instrument for the study named Application of Social Software Questionnaire (ASSQ) consists of a 30-item questionnaire developed from the ten major classes of social software based on Mejias, 2005, classification. These classes are: Multi-player online gaming environments / virtual world, Discourse facilitation system, Content management system, Product development systems, Selling/purchasing management, Peer-to-peer file sharing systems, Learning management systems, Relationship management systems, Syndication systems, Distributed classification systems (“folksonomies”). Each of the items is provided with a four point rating scale of Very high extent(VHE)(4pionts), High extent (HE)(3pionts), Low extent (LE)(2pionts) and Not Applied (NA)(1piont). Three experts from Educational technology, science education and measurement and evaluation validated the instrument. The reliability of ASSQ was established using Crombach Alpha and it came up to 0.79. The instruments were distributed to the respondents by the researchers and retrieved immediately on completion. Means and standard deviation were used to answer the research questions and were calculated item by item. The interpretations of the means were based on the limit of the real numbers: 3.50-4.00 (Very High extent), 2.50-3.49(High extent), 1.50-2.49 (Low extent), 0.50-1.49 (Not Applied). T -test was used to analyze the null hypothesis at 0.05 level of significance.

## RESULTS

**Research Question One:** To what extent do Nigerian pre-service science teachers make use of social soft wares?

**Table 1: Mean and Standard Deviation of the Extent of Use Social Software by Pre-Service Science Teachers**

S/N	Social Software	N	Mean	Sd	Decision	Rank
1	Yahoo messenger	592	2.46	1.083	LE	4
2	Skype	592	1.79	.967	LE	18
3	2go Chat	592	2.94	1.150	HE	2
4	E-mail	592	3.13	.870	HE	1
5	Bulletin boards	592	2.07	1.126	LE	8
6	Discussion boards	592	1.95	.962	LE	12
7	Moderated commenting systems	592	1.70	.859	LE	23
8	Blogs	592	1.99	1.027	LE	11
9	Microblogs	592	1.71	.923	LE	21
10	Wiki	592	1.93	1.017	LE	13
11	Product development system e.g. source forge	592	1.58	.934	LE	29
12	Libresource	592	1.81	1.006	LE	17
13	Peer to peer file Sharing	592	2.12	1.157	LE	6
14	Selling/purchasing management systems e.g. e bay	592	1.71	.991	LE	21
15	MySpace	592	2.10	1.134	LE	7
16	Face book	592	2.76	1.227	HE	3

17	Friendster	592	1.96	1.228	LE	12
18	Really Simple Syndication (RSS aggregation)	592	1.69	.993	LE	24
19	List-servs	592	1.61	.974	LE	28
20	Social bookmarking	592	1.82	1.007	LE	16
21	Social cataloguing (books)	592	1.87	1.041	LE	15
22	Flickr	592	1.77	.988	LE	19
23	Youtube	592	2.05	1.125	LE	10
24	Twitter	592	2.07	1.104	LE	8
25	Slide share	592	1.63	.965	LE	26
26	Voice over IP (VoIP)	592	1.58	.879	LE	29
27	Podcasting	592	1.64	.976	LE	25
28	Eskime	592	1.76	1.032	LE	20
29	Nigerian best forum	592	1.90	1.060	LE	14
30	On-line games	592	2.24	1.129	LE	5

**Table 1** show that pre-service science teachers in the federal universities in the South- east geopolitical zone of Nigeria make use of all the social software listed. However they do not use any of them to a very high extent. But they use a few to a high extent and majority to a low extent. The ranking indicated that the most popular is e-mail followed by 2go and face book while the least popular is product development system, voice over IP and Listserv.

**Research Question 2:** What is the difference in the extent of use of social software by Nigerian male and female pre-service science teachers?

**Table 2: Mean and Standard Deviation of the Extent of Use of Social Software among Male and Female Pre-Service Science Teachers**

Sex	Mean	N	Std Deviation
Male	60.74	279	15.333
Female	58.02	314	17.150
<b>Total</b>	<b>59.30</b>	<b>593</b>	<b>16.363</b>

Table 2 shows that male pre-service science teachers with a mean of 60.74 make more use of social software than female pre-service science teachers with a mean of 58.30. The lower standard deviation of male (15.33) indicated that they are closer to the mean than the females with higher standard deviation (17.15)

**Hypothesis 1:** There is no significant difference in the use of social software among male and female Nigerian undergraduates.

**Table 3: Independent Sample T- Test Analysis of Sex Influence on the Use of Social Software**

Sex	N	Mean	Std.Dev.	T	Df	Sig(2tailed)
Male	279	60.74	15.33	2.054	590	.040
Female	313	57.98	17.17			

The hypothesis was tested using an independent t-Test analysis of sex influence on the extent of use of social software among Nigerian pre-service science teachers as shown in table 3. The analysis resulted in a t (592) = 2.054, p<.05 and sig (2-tailed) = .040 with males having higher mean score than females. Based on this, the null hypothesis is rejected; hence there is significant difference in the extent of use of social software among male and female Nigerian pre-service science teachers. Therefore males significantly use social software more than females..

## DISCUSSIONS

The findings of the study showed that pre-service science teachers make use of all the social software investigated. However, they do not use any of them to a very high extent. They use e-mail, 2go, and face book to a high extent and majority to a low extent. This finding is in line with that of Marhan (2006) that students make use of social software either for one to one communication which includes e-mail and instant messaging, One-to-many communication which includes web pages, blogs and many-to-many. From the ranking they make greatest use of email, followed by 2go chat and face book. It shows that the pre-service science teachers are more into discourse facilitation system and relationship management systems. The study equally indicated that male pre-service science teachers make use of social software more than their female counterparts. These findings are in line with the view of Anderson (2004) that the greatest affordance of the web for educational use is the profound and multifaceted increase in communication and interaction capability.

### Implications

The implications of the findings are that Nigerian pre-service science teachers are gradually joining their counterparts in the developed nations in exploring the social software. As these learners engage in social interaction, dialogue and information sharing, they build participatory and collaborative tendencies. There is therefore the urgent need to start planning the design of our e-learning programmes in that direction. This reiterates the core principles of social software which advocates that the web is about linking minds, communities and ideas, while promoting personalization, collaboration and creativity, leading to joint knowledge creation.

## RECOMMENDATIONS

Based on the findings of the study, the following are recommended

- Different universities in Nigeria should be encouraged to adopt different aspects of e-learning in science teaching and learning where social software will be integrated knowing that students are interested in them.
- Nigerian female pre-service science teachers should be encouraged by their lecturers to get involved in the application of social software.

## REFERENCES

1. Bray, J. J. Cragg, P.A., Macknight, A. D. C., Mills, R. G. (1999). Lecture notes on human physiology. London: Blackwell Science.
2. Chatti, M. A., Klamma, R., Jarke, M., Kamtsiou, V., Pappa, D., Kravcik, M., & Naeve, A. (2006a). Technology Enhanced Professional Learning – Process, Challenges and Requirements. *Paper presented at the WEBIST 2006*, April 19-22, 2006, San Setúbal, Portugal
3. Drasil, P & Pitner, T. (2006). e-Learning 2.0: Methodology Technology and Solutions. Retrieved: January 13, 2007 from: [http://www.fi.muni.cz/~tomp/l2/e-learning2.0/ictel2\\_platform.pdf](http://www.fi.muni.cz/~tomp/l2/e-learning2.0/ictel2_platform.pdf).
4. Gabriela Grosseck (2009). To use or not to use web 2.0 in higher education? / *Procedia Social and Behavioral Sciences 1 (2009) 478–48*.

5. Gee, J.P. (2004). *Situated language and learning: A critique of traditional schooling*. New York: Palgrave-McMillan.
6. Hruby, J & Wooden, J. (2006). Learning 2.0. Applying the Next Generation of elearning Tools and Techniques. Retrieved: January 13, 2007 from: [http://www.fredricksoncommunications.com/showcase/Learning2point0\\_by\\_Fredrickson\\_Communications.pdf](http://www.fredricksoncommunications.com/showcase/Learning2point0_by_Fredrickson_Communications.pdf)
7. Klamma, R., Spaniol, M., Cao, Y., & Jarke, M. (2006). Pattern-Based Cross Media Social Network Analysis for Technology Enhanced Learning in Europe. *Lecture Notes in Computer Science*, 4227, 242-256
8. Marhan, A. M. (2006). Connectivism: Concepts and Principles for Emerging Learning Networks. The 1st International Conference on Virtual Learning, ICVL 2006. Retrieved: January 13, 2007 from: [http://fmi.unibuc.ro/cniv/2006/disc/icvl/documente/pdf/met/19\\_marhan.pdf](http://fmi.unibuc.ro/cniv/2006/disc/icvl/documente/pdf/met/19_marhan.pdf)
9. Martin Owen, Lyndsay Grant, Steve Sayers and Keri Face (2006). Futurelab Styles, C. (2006). How Web 2.0 will change history. Retrieved: March 17, 2007 from: <http://maeg.textdriven.com/wpontent/uploads/2006/09/Web2+history.pdf>
10. McLoughlin, C. & Lee, M. J. W. (2007). Social software and participatory learning: Pedagogical choices with technology affordances in the Web 2.0 era. In *ICT: Providing choices for learners and learning. Proceedings ascilite Singapore 2007*. <http://www.ascilite.org.au/conferences/singapore07/procs/mcloughlin.pdf> Copyright
11. Mejias, U. (2005). A nomad's guide to learning and social software. *The Knowledge tree: An e-journal of learning innovation*. [http://knowledgetree.flexiblelearning.net.au/edition07/download/la\\_mejias.pdf](http://knowledgetree.flexiblelearning.net.au/edition07/download/la_mejias.pdf) [viewed 10 Dec 2006]
12. O'Reilly, T. (2005) *What is Web 2.0: Design patterns and business models for the next generation of Software*. <http://www.oreillynet.com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html> [viewed 15 Dec 2006].
13. Redmond, P. (2011). From face-to-face teaching to online teaching: Pedagogical transitions. In G. Williams, P. Statham, N. Brown & B. Cleland (Eds.), *Changing Demands, Changing Directions. Proceedings ascilite Hobart 2011*. (pp.1050-A1060).
14. Shirky, C (2005). Ontology is Overrated: Categories, Links and Tags. Available as Clay Shirky's Writing About the Internet [www.shirky.co](http://www.shirky.co)
15. Styles, C. (2006). How Web 2.0 will change history. Retrieved: March 17, 2007 from: <http://maeg.textdriven.com/wpontent/uploads/2006/09/Web2+history.pdf>
16. Wassal, T. (2006). Blogs and Wikis in Education. Retrieved: January 18, 2007 from: [http://www.wun.ac.uk/elearning/semin\\_ars/seminars/seminar\\_five/wassall.pdf](http://www.wun.ac.uk/elearning/semin_ars/seminars/seminar_five/wassall.pdf) eaching itself is an art that requires interest, skill, resourcefulness and devotion

