

adoption process in HEI. The study uses the following theories stated below to unravel the underlining the adoption models. The study will further focus on these theories of adoption as described in [46], [14]'s studies on ICT adoption models and approaches, namely the theory of reasoned action (TRA), theory of planned behavior (TPB), technology of acceptance model (TAM), technology readiness and acceptance model (TRAM) and self-determination theory will be discussed further in the study.

The figure below and the literature shows that there has been substantial activity in IS research. The figure summarizes the issues and concerns authors have in brief. However, these authors have not yet addressed issues with cost, benefits, flexibility and risk in their discussions as part of social software / semantic web & ICT investment. Again, no author can claim that his or her concept or approach is the most accurate, nor could offer a decisive evidence of the accurateness of their respective approach. Thus, it is appropriate to consider discussing the costs, benefits, risk and flexibility of investing in an ICT investment.

Author (s)	Key words	Journal	Central argument
[36]	Students as producers	Proceedings (ITHET)	Personalized and self-regulated learning
[37]	ICT enhancing quality education	Journal of Research in Commerce, IT & Management	The role of information and communication technology (ICT) in enhancing education
[22]	Social Technologies and informal knowledge sharing	Studies– Dissertations	ICT conditions to integrate differences in learning: Contextual learning theory and a first transformation step in early education
[47]	SWOT of using social software in education	Journal of Computer Assisted Learning	Explore the various implications of introducing social software into a course environment in order to identify the associated benefits, but also the potential drawbacks.
[26]	Web 3.0 in education & research	Journal of Information Technology, BVICAM	The benefit of Web 3.0 in education alongside the potential characteristics; the intelligence, interoperability, personalization and virtualization
[12]	An open annotation ontology for science on web 3.0	Journal of Biomedical Semantics Proceedings	An investigation to ascertain whether the annotation ontology meets critical requirements for an open, freely shareable model in OWL, and annotation metadata created against scientific documents on the Web
[3]	e-Commerce business models in the context of Web 3.0 paradigm	IJAIT	Web 3.0 promises to have a significant effect on users and businesses

[23]	E-Learning 3.0 = E-Learning 2.0 + Web 3.0?	Conference (CELDA)	The study describes the way both previous generations of e-learning (1.0 & 2.0) emerged with the prevalent technologies in their kin web versions (1.0 & 2.0 respectively)
[29]	Embracing Web 2.0 & 3.0 tools to support lifelong learning	Procedia – Social and Behavioural Sciences	Learning in a digital age
[2]	Evolution of the World Wide Web	IJWesT	Provides a background of the evolution of the web from web 1.0 to web 4.0

Figure 5. Summary of the issues and concerns related to social software / semantic web

5.5. Social software and ICT Investment in HEI

The adoption of social software as an instructional tool in a pedagogical environment is a cause that have attracted much attention [5]. The adoption of social software raises several other issues, while the case for the adoption of instructional web technologies seems convincing, it is apparent to take a closer look at what this entails [1].

Investing in the adoption of social software and ICT tools in Higher Educational Institutes has been motivated based on the business processes. It is important to note that an institution or organization is likely to invest in an ICT investment simply for few reasons, is either an institution wants to improve on quality of service delivery, invent new products or improve on the existing services/products (expansion); to replace or upgrade facilities and assets that have become obsolete (maintenance/upgrade); to reduce costs on current or future expenses (cost displacement); to change the old-style or traditional mode of operation (transformation); and most prominently, to meet the fast changes in technology. Hence the adoption of pedagogical technologies in HEI are for this purposes of maintenance/upgrade, expansion, cost effectiveness and transformation. As indicated in the proposed framework, there are four components of investment assessment, namely costs, benefits, flexibility and the risks (software crises).

These components are not fully address in the discussions by other authors [31], [19] added that when assessing value for money, it is certainly not just about getting involved with the initiative or access to resources. Institutions should reflect on the unforeseen costs of adapting and preparing staff, as well as benefits and flexibility that comes in form of time saving for instance responding to queries or improving one-on-one basic maintenance support, the simplicity of use for learners and the prospect of retention progression from tracking those who struggles.

Authors argues that educational institutes' concentration should be challenged towards advancing business efficiency, quality and competitiveness. Quite a number of issues have emerged. Academic writers have raised issues such as privacy, reputation, identity,

other cultural crises (beliefs, behavioral patterns). The issues of costs implication, benefits and risk associated with a software crisis and flexibility were not extensively considered in the literature. Institutions should finance ICT investment in the most appropriate way so that it would be value for money, return on investment (ROI), would have benefits and would transform the competitive edge of the business.

According to guidelines as suggested in the above sections, this study will collect a qualitative and quantitative data, which is a combined approach towards data collection and is referred as mixed methods. Data will be collected in this study through audio interviews from the individual interviews and will be analyzed by simple content analysis. Data coding will be used to develop categories.

This reduction of data into themes is a simple but effective form of data analysis that will lead to the identification of these themes. On the other hand, questionnaires will be used to collect information from students across the selected universities. Both approaches qualitative and quantitative data analysis will be consolidated to analysis the results towards developing a comprehensive framework for social software adoption in HEI.

6. Conclusion

This study laid the foundation for the study by presenting the introduction in form of background context, the research problem, identifying the research objective. Furthermore, gave an overview of a framework for social software adoption in HEI in the form of a literature that detailed and unveiled the theoretical perspectives that are of relevance to the study based on previous scholars' experience of how similar research problems were solved. It again, presented the research design and methods, it offered a clear discussion of research processes, approaches and theoretical paradigms and as well as techniques, that the study intends to adopt during this study. A detailed discussion on the proposed conceptual framework. Ultimately, the research problem identified in the study will be solve and the objectives will be attained. Solutions will emerge through the comprehensive framework based on the mixed method research approach.

Substantially, this study offered a planned methodological concept to develop and test framework for social software adoption in HEI. This research will establish an effective feedback process of information that could potentially be exchanged across these selected universities. After research have been conducted, social software adoption will be based on the adapted comprehensive framework that will serve as complimentary tools to support teaching and learning, not as a replacement of the traditional method, but as a blended approach.

Given the distinguishing features of Web 3.0/ Web 2.0, educators and students could potentially gain the skills and knowledge required to better prepare them in the use of instructional ICT web technology and application in HEI. It may serve as tools for students to effectively manage and administer their own teaching and learning practices. Setting their respective ambitions and making sustainable decisions concerning education [23], [12].

These tools and applications will indefinitely impact positively on learners' performance, knowledge acquisition and advancement in ICT use. Ultimately, intelligent agents and personal assistants could be people's companions in education. Then, and only then, the Web 3.0/ Web 2.0 will have become a reality in HEI.

7. Acknowledgment

This research acknowledges the support rendered by the Institutional Bursary Scholarship, North West University who gave financial support in advancing this project. The authors would like to than Prof Sam Lubbe and Prof Nehemiah Mavetera who provided expertise that assistance towards the research.

8. References

- [1] Abousoliman, O. (2017). Integrating social networks in teaching in higher education. Biola University.
- [2] Aghaei, S., Nematbakhsh, M. A. & Farsani, H. K. (2012). Evolution of the World Wide Web: From WEB 1.0 TO WEB 4.0. *International Journal of Web & Semantic Technology*, 3(1), 1.
- [3] Al-Alwani, A. (2005). Barriers to integrating information technology in Saudi Arabia science educatio. Kansas: The University of Kansas (Doctoral dissertation).
- [4] Almeida, F., Santos J.D. & Monteiro, J.A. (2013). E-Commerce business models in the context of Web 3.0 paradigm. *International Journal of Advanced Information Technology*, 3(6):1-12
- [5] Angeli, C., Valanides, N., Mavroudi, A., Christodoulou, A. & Georgiou, K. (2015). Introducing e-TPCK: An adaptive e-learning technology for the development of teachers' technological pedagogical content knowledge. In *Technological pedagogical content knowledge* (pp. 305-317). Springer, Boston, MA.
- [6] Balanskat, A., Blamire, R., & Kefala, S. (2006). The ICT impact report. *European Schoolnet*, 1:1-71.
- [7] Bingimlas K.A. (2009). Barriers to successful integration of ICT in teaching and learning environments: A review of the literature. *Eurasia Journal of Mathematics, Science & Technology Education*, 5(3):235-245.
- [8] Bingimlas, K. (2018). Investigating the level of teachers' Knowledge in Technology, Pedagogy, and Content (TPACK) in Saudi Arabia. *South African Journal of Education*, 38(3).

- [9] Buabeng-Andoh, C. (2012). Factors influencing teachers' adoption and integration of information and communication technology into teaching: A review of the literature. *International Journal of Education and Development using Information and Communication Technology*, 8(1):136-155.
- [10] Chawinga, W. D., & Zinn, S. (2016). Use of Web 2.0 by students in the Faculty of Information Science and Communications at Mzuzu University, Malawi. *South African Journal of Information Management*, 18(1), 1-12.
- [11] Chetty, D. (2012). Challenges and prospects: ICT-enhanced teaching and learning in the College of Human Sciences (Unisa). 5th International Conference of Education, Research and Innovation, pp.3618-3627.
- [12] Chisega-Negrila, A.M. (2012). Web 3.0 in education. The eighth International Scientific Conference eLearning and software for Education Bucharest. Central and Eastern European Online Library, 1:455-460.
- [13] Creswell, J.W. (2015). *A concise introduction to mixed methods research*. Thousand Oaks, CA: Sage.
- [14] Davis, F.D., Bagozzi, R.P. & Warshaw, P.R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science*, 35(8):982-1003.
- [15] Davis, N., Preston, C. & Sahin, I. (2009). Training teachers to use new technologies impacts multiple ecologies: Evidence from a national initiative. *British Journal of Educational Technology*, 40(5):861-878.
- [16] Dotsika, F. (2012). The next generation of the web: an organisational perspective. Working Paper, University of Westminster. Series in Business and Management, University of Westminster, London.
- [17] Ertmer, P.A. & Ottenbreit-Leftwich, A.T. (2010). Teacher technology change: How knowledge, confidence, beliefs, and culture intersect. *Journal of research on Technology in Education*, 42(3):255-284.
- [18] Gray, K., Chang, S. & Kennedy, G. 2010. Use of social web technologies by international and domestic undergraduate students: implications for internationalising learning and teaching in Australian universities. *Technology, Pedagogy and Education*, 19:31-46.
- [19] Haigh, C.A. (2010). Reconstructing nursing altruism using a biological evolutionary framework. *Journal of Advanced Nursing*, 66(6):1401-1408.
- [20] Hamadani Janes, S., Patrick, K. & Dotsika, F. (2014). Implementing a social intranet in a professional services environment through Web 2.0 technologies. *The Learning Organization*, 21(1), 26-47.
- [21] Hennessy, S., Wishart, J., Whitelock, D., Deaney, R., Brawn, R., La Velle, L., McFarlane, A., Ruthven, K. & Winterbottom, M. (2007). Pedagogical approaches for technology - integrated science teaching. *Computers & Education*, 48(1):137-152.
- [22] Hooker, M., Mwiyeria, E. & Verma, A. (2011). ICT competency framework for teachers in Nigeria, teacher development for the 21st Century (TDev21) pilot a national commission for colleges of education Nigeria. World Bank and GESCI Initiative.
- [23] Hussain, F. (2012). E-learning 3.0 = E-learning 2.0 + WEB 3.0? IADIS International Conference on Cognition and Exploratory Learning in Digital Age (CELDA 2012).
- [24] International Society for Technology in Education. (2002). *National educational technology standards for teachers: preparing teachers to use technology*. Danvers, MA: ISTE.
- [25] Jaffer, S., Ng'ambi, D. & Czerniewicz, L. (2007). The role of ICTs in higher education in South Africa: one strategy for addressing teaching and learning challenges. *International Journal of Education and Development using Information and Communication Technology*, 3(4):131-142.
- [26] Jimoyiannis, A., Tsiotakis, P., Roussinos, D. & Siorenta, A. (2013). Preparing teachers to integrate Web 2.0 in school practice: Toward a framework for Pedagogy 2.0. *Australasian Journal of Educational Technology*, Vol. 29 (2).
- [27] Kanvaria, V.K. (2013). Skill development and professional development of teacher educators on and through Open Education Resources (OER). University of Delhi, India
- [28] Korte, W.B. & Hüsing, T. (2007). Benchmarking access and use of ICT in European schools 2006: Results from Head Teacher and A Classroom Teacher Surveys in 27 European countries. *eLearning Papers*, 2(1):1-6.
- [29] Kwanya, T., Stilwell, C. & Underwood, P. (2012). The application of Web 2.0 tools by libraries in Kenya: a reality check. In *SCECSAL XXth Conference* (pp. 4-8).
- [30] Lal, M. (2011). Web 3.0 in Education & Research. *BVICAM's International Journal of Information Technology*, 3(2).
- [31] Lefever, R. & Carrant, B. (2010). How can technology be used to improve the learner experience at points of transition. *Higher Education Academy*.
- [32] Louw, J. S. (2017). The development of a framework for the use of Information and Communication Technology in the classroom (Doctoral dissertation, Bloemfontein: Central University of Technology, Free State).
- [33] Madhukar, B.S. (2013). Innovations in education for knowledge society role of ICT in Education. *Scholarly Research Journal for Interdisciplinary Studies*.
- [34] Makura, A. H. (2014). Students' perceptions of the use of ICT in a higher education teaching and learning context: The case of a South African University. *Mediterranean Journal of Social Sciences*, 5(11), 43.
- [35] Marshall, S., Taylor, W., Moakofhi, M. K., Leteane, O., Phiri, T. V., Pholele, T. M. & Çakır, A. (2017). The role of ICT in supporting various learning environments. *International Journal of Education and Development using Information and Communication Technology*, 13(2), 2.

- [36] McCauley, K. (2016). Computer Animation in Instructional Design. In Society for Information Technology & Teacher Education International Conference (pp. 2185-2190). Association for the Advancement of Computing in Education (AACE).
- [37] McEneaney, J. E. (2011). Web 3.0, litbots, and TPWSGWTAU. *Journal of Adolescent & Adult Literacy*, 54(5), 376-378.
- [38] McLoughlin, C. & Lee, M. J. (2010). Personalised and self-regulated learning in the Web 2.0 era: International exemplars of innovative pedagogy using social software. *Australasian Journal of Educational Technology*, 26(1), 28-43.
- [39] Moges, B. (2013). The role of information and communication technology (ICT) in enhancing the quality education of Ethiopian universities: a review of literature. *Journal of Education Research and Behavioral Sciences*, 3(8):246-258.
- [40] Motala, I. & Padayachee, I. (2018). Readiness to Adopt the Internet of Things at the University of KwaZulu-Natal. In ICEL 2018 13th International Conference on e-Learning (p. 256). Academic Conferences and publishing limited.
- [41] Noor Ul Amin, S. (2013). An effective use of ICT for education and learning by drawing on worldwide knowledge, research, and experience: ICT as a Change Agent for Education (A Literature review). *Scholarly Journal of Education*, 2(4):38-45.
- [42] Nwosu, O. & Ogbomo, E.F. (2012). ICT in Education: A catalyst for effective use of information. The official publication of the Pacific Northwest library Association PNLA Quarterly. [http:// www.ict in education: as a catalyst for effective use of information](http://www.ict in education: as a catalyst for effective use of information) Date of access: 28 Jun. 2011.
- [43] O'Reilly, T. (2005). What is Web 2.0: Design patterns and business models for the next generation of software, communications & strategies, 1(65):17
- [44] Ohei, K. and Lubbe, S., 2013. November. Social Differences between Information Systems Students and Non-Information Systems Students at North West University (Mafikeng Campus). In *Information Technology and Applications (ITA), 2013 International Conference on* (pp. 180-184). IEEE.
- [45] Ohei, K., Lubbe, S., Meyer, J. and Klopper, R., 2015. Views about Information Systems among North West University Mafikeng Campus Management, Administration and Law Students. *South African Research in Management, Informatics and Governance in a 21st Century Hyper Connected World*, p.233.
- [46] Omona, W., Van der Weide, T. & Lubega, J. (2010). Using ICT to enhance knowledge management in higher education: A conceptual framework and research agenda. *International Journal of Education and Development using Information and Communication Technology*, 6(4):83.
- [47] Özden, M. (2007). Problems with science and technology education in Turkey. *Eurasia Journal of Mathematics, Science & Technology Education*, 3(2):157-161.
- [48] Ozer, B. (2013). Teacher profile, teacher education and teacher professionalization in Turkey. *Proceedings of the 37th Annual Conference of ATEE in Eskisehir*, 25th -29th August 2012.
- [49] Pileggi, S.F., Fernandez-Llatas, C. & Traver, V. (2012). When the social meets the semantic: Social semantic web or web 2.5. *Future Internet*, 4:852-864.
- [50] Roehrig, G.H., Kruse, R.A. & Kern, A. (2007). Teacher and school characteristics and their influence on curriculum implementation. *Journal of Research in Science Teaching*, 44:883-907.
- [51] Schoepp, K. (2005). Barriers to technology integration in a technology-rich environment. *Learning and Teaching in Higher Education: Gulf Perspectives*, 2(1):1-24
- [52] Wastiau, P., Blamire, R., Kearney, C., Quittre, V., Van de Gaer, E. & Monseur, C. (2013). The use of ICT in education: a survey of schools in Europe. *European Journal of Education*, 48(1):11-27.
- [53] Wood, L.W. (2015). Faculty perceptions about virtual world technology: Affordances and barriers to adoption. *Dissertation, Georgia State University*.