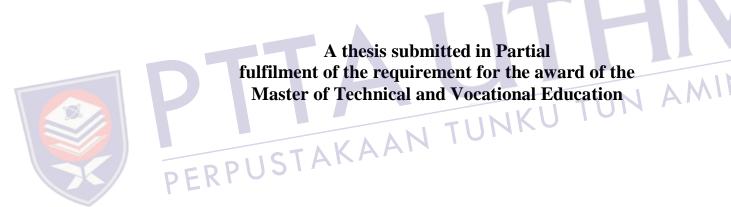**Effects of Modern Instructional Technology (MIT) on Critical Thinking Skills of Students in Agriculture Vocational Courses in Nigeria**

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DEDICATION

I dedicate this thesis to my children; Abdullahi, Abdurrahman, Ibrahim Khalil, Mohammad Habeeb and Imran for their unequal patient, encouragement and prayers, despite the hard time they went through, which gave me the strength to withstand the obstacles throughout my academic struggles. I dedicate this thesis to my lovely husband Dr. Bala Ishiyaku for his understanding, encouragement and prayers to my success. I dedicate it to my brothers and sisters that contributed immensely to the success of this study. I love you all.

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Finally, I thank Almighty Allah, the Lord of heaven, the Creator and Inheritor of the Universe and beyond, for His abundant grace and special favour He granted me to write this all-important piece. Ultimately, whatever good is derived from this piece, all praise is due to Him but any error contained therein is my own and are highly regretted.

ABSTRACT

The recent development in modern instruction technology (MIT) methods and equipment warranted for studies to examine their effects on students, teachers, and the education system in general. This study examines the effects of MIT on students' critical thinking skills in Agriculture vocational courses in Nigeria. The methods and equipment used were identified, and the effect of teachers' usage behaviour was assessed. A survey approach was adopted, using questionnaires for data collection. The descriptive, correlations and multiple regressions were carried out using SPSS. The result of this study indicates that the most commonly used equipment is electronic whiteboard, while the least are electronic tablets and laptops. Cooperative learning is the most commonly used methods while games and online instruction are the least. There is a moderate positive correlation between MIT methods and the students' critical thinking skill, but a very weak positive correlation between MIT equipment and students' critical thinking skill. There is statistically significant contribution of methods to student's critical thinking, but insignificant method usage behaviour. Therefore, it is concluded that government should incorporate the provision and effective utilisation of MIT equipment and methods in the national education policy. School managements should emphasise the use of MIT methods and review curriculum to improve teachers' skills in MIT usage. Teachers should utilise the available MIT equipment and method along with their skills for an effective delivery of lessons. Similarly, the students should be encouraged to appreciate the available methods and the equipment, and use them effectively.

ABSTRAK

Perkembangan terkini dalam kaedah dan peralatan teknologi pengajaran moden (MIT) diguna pakai dalam kajian ini untuk mengkaji kesannya terhadap pelajar, guru dan sistem pendidikan. Kajian ini bertujuan untuk mengkaji kesan MIT terhadap kemahiran pemikiran kritikal pelajar dalam kursus vokasional pertanian di Nigeria. Kajian ini telah mengenal pasti kaedah MIT dan peralatan yang digunakan dan seterusnya menilai kesan tingkah laku guru. Borang soal selidik telah digunakan dalam proses pangumpulan data. Ujian deskriptif, korelasi dan *multiple regression* telah dijalankan. Kajian ini mendapati bahawa peralatan yang sering digunakan adalah papan putih elektronik manakala penggunaan tablet elektronik dan komputer riba adalah pada tahap yang rendah. Pembelajaran koperatif adalah kaedah yang paling biasa digunakan, manakala permainan dan pengajaran dalam talian tidak digunakan secara meluas. Terdapat hubungan positif pada tahap yang sederhana antara kaedah MIT dan kaedah kemahiran pemikiran kritikal, tetapi hubungan positif pada tahap yang rendah antara peralatan MIT dan kemahiran pemikiran kritikal. Sumbangan kaedah ini adalah signifikan terhadap pemikiran kritikal pelajar, tetapi tingkah laku penggunaan kaedah adalah tidak signifikan. Oleh itu, pihak kerajaan disyorkan untuk memasukkan peruntukan dan menggunakan peralatan dan kaedah MIT dengan berkesan dalam dasar pendidikan negara. Pengurusan sekolah perlu menekankan penggunaan kaedah MIT dan kajian semula kurikulum perlu dijalankan untuk meningkatkan kemahiran guru dalam penggunaan MIT. Guru perlu menggunakan peralatan dan kaedah MIT sedia ada bersama dengan kemahiran mereka bagi meningkatkan keberkesanan penyampaian pelajaran. Dalam pada masa yang sama, pelajar perlu digalakkan untuk menghargai dan menggunakan kaedah dan peralatan MIT dengan berkesan.

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LIST OF ABBREVIATIONS AND ACRONYMS

ACTE	Association for Career and Technical Education
AECT	Association for Educational Communications and Technology
ATBU	Abubakar Tafawa Balewa University
AVE	Available Equipment
AVM	Available Methods
BCED	British Columbia Education Department
CGPA	Cumulative Grade Point Average
CK	Content knowledge
ECR	Equipment Critical Thinking
ESA	Entertainment Software Association
ETD	Educational Technology Division
EUSB	Equipment Usage Behaviour
FCET	Federal College of Education Technical Gombe
ICT	Information and Communication Technology
ICTI	Information and Communications Technology Integration
MCR	Methods Critical Thinking
MIT	Modern Instruction Technology
MOE	Ministry of Education
MUSB	Methods Usage Behaviour
NBS	National Bureau of Statistic
NMC	New Media Consortium
PCs	Personal Computer
PK	Pedagogical knowledge
TAM	Technology Acceptance Model
TK	Technology knowledge

TPACK   Technological Pedagogical and Content Knowledge

TPB   Technological Pedagogical Knowledge

USB   Usage Behaviour

VTE   Vocational and Technical Education

CHAPTER 1

INTRODUCTION

1.1   Introduction

Modern instruction technology (MIT) refers to the theory and practice of applying educational rules and techniques and recent information and technology, through sketches, outline, improvement, usage, assessment and administration of the teaching methods and teaching materials, to accomplish the ideal transfer of knowledge (Long et al., 2008). MIT methods are advanced teaching methods concerned with improving the efficiency and effectiveness of learning (Cranford, 2011; Shapiro & Varian, 2013). This terminology is used widely in different fields of education, specifically in emerging technologies that are used in instruction and learning processes (Earle, 2002). It is sometimes referred to both the medium of communicating knowledge and other media used, such as audiovisual equipment and computers, or a systematic process (method) such as instructional design and assessment (Seels & Richey, 1994; Hodell, 2015).

Modern instructional technology (MIT) is very important in teaching process as it helps in improving the efficiency and effectiveness of instruction and motivates student's interest in learning. MIT also allows students to learn by themselves (student centred), helps them to produce their innate ability by boosting their critical thinking ability, resulting in the creation of new learning experience and high quality learning outcomes.

Despite the roles of MIT in improving the teaching and learning process, it was observed that much emphasis is given to information and communication technology (ICT) instead of MIT in education studies (Nwezeh, 2010; Onyia & Onyia, 2011; Oviawe & Oshio, 2011; Turruam & Abur, 2013; Brown & Green, 2015). ICT referred to combination of informatics innovation and relevant innovations, especially communication technology (Hennessy, 2010; Hodell, 2015). ICT consists of the communication mediums such as wireless networks, Internet, cell phones and so on. In contrast, MIT comprises new teaching methods such as simulation, games, problem based instruction, case studies, cooperative learning, competition, brainstorming, individualized instruction, on-line instruction, programmed and automated instruction and the respective communication equipment needed such as computers, handset, iPhone, iPad and projector to impact knowledge (College of Southern Nevada, 2011). Despite the fact that MIT and ICT have the same mediums of communication, their primary aims differ significantly. Communicating an idea (ICT), and understanding and applying the idea into action (MIT) are two different aspect of learning. Therefore, it is expected that after using MIT there must be a result, which should be manifested, exhibited or demonstrated, in a form of reflex, cognitive and psychomotor which are the expected outputs.

This means that the results are observed in the students' action, critical thinking ability and new learning experience. Therefore the use of MIT cannot be over emphasized as it plays a vital role in improving student's performance, developing critical thinking skill and allowing students to make decision by themselves and experience the outcome of their decision. This can even lead to innovation as it supports factual knowledge acquisition.

1.2   Background of the study

Integrating MIT into learning and classroom instruction has been a relevant issue in all fields of studies. Despite the important role of MIT on instruction and learning, high cost

of MIT equipment, lack of technical expertise by instructors and lack of awareness towards the use of MIT limit its utilization in the classroom (Lai & Kritsonis, 2006). Despite the increasing progress in introduction and application of MIT for teaching, generally (Hunt, 2005) there are issues with integration of MIT in higher education institutions in developing countries, due to inadequate financing (Lai & Kritsonis, 2006). This causes the failure of both students and teachers to work at improving the level of use toward MIT (Aburime, 2010).

It is evidenced now that the importance of MIT is vividly clear and has become a globally discussed issue as efforts are geared toward making policies for its effective incorporation and utilisation in teaching and learning activities (Nwezeh, 2010). MIT encompasses planning, development, utilisation, administration and assessment of procedures and resources for instruction (McDonald, Yanchar & Osguthorpe, 2005). It expects to advance the utilization of approved, practical systems in the design and conveyance of lecture.

MIT requires that today's teacher should be able to utilize modern technology in instruction to achieve educational objectives on a modern, faster, reliable and repeatable basis (Adegbija, 2013). This means that teachers should know and utilise MIT in order to achieve educational objectives in the 21st century digital instructional tools and methods for timely delivery of lesson and use it on a daily basis when delivering a lesson. This include the use of audio/video production, digital imaging, and standards of visual configuration; working with cloud based, community oriented applications; planning and developing instructional media for learning; designing and producing internet learning; coordinating present day innovation into every branch of knowledge; developing an individualised learning network and making their own digital footprint and making a digital portfolio that exhibits their development, capacities and comprehension (Adegbija, 2013).

MIT methods encourage students to solve problems by gathering data, organizing data, and attempting an explanation (College of Southern Nevada, 2011). For example, MIT can help create competition among students under the surveillance of the instructor, and encourage students to display their critical thinking ability. Students can discuss contents of a given task with their instructor via telephone conferencing, video

conferencing and other communication technology. Students interact with colleagues and share ideas, which provide room for creativity and critical thinking disposition. Through this, each member will be encouraged to contribute and bring out their innate ability, and display critical thinking skill to perceive successful completion of a given task.

Kung, Chang and Feng (2010) also pointed that as the MIT equipment such as computers are user friendly, as long as teachers in high institutions can comprehensively integrate the instructional methods with MIT equipment, then students can use MIT equipment as tools for self-learning, and acquire more learning opportunities. There is a consensus in literature narratives, that MIT knowledge is very important in developing students' critical thinking skills (Jonassen, Carr, & Yueh, 1998; Halpern, 1999; Hopson, Simms & Knezek, 2001). Authors like Carr & Kemmis (2003) stated that understanding the knowledge and implication of MIT methods and equipment by the instructors are vital to the students' achievements of critical thinking skills and innovation. This is important in making the graduates marketable. Summers and Vlosky (2001) indicated that both Agriculture students and lecturers accepted that courses relevant to MIT application are significant to students' forthcoming struggle for employment. As the study involved Agriculture vocational course that need acquisition of skills, the skills can best be achieved by using modern instruction technology. In the 21st century digital world, most skills require the use of modern technology to achieve a certain level. Students that acquire critical thinking skills can manipulate ideas to achieve sound decision, which is highly required in today's competitive labour market environment.

Some of the skills required include identifying direction of technology in agricultural practices such as irrigation, pesticide use, cultivation, harvest and storage technology and ability to uterlise it. Time management and organizational skill is also important for agricultural practices such as supply of raw material and management of laborers. It is equally important that students should have skills in ability to adapt to a changing environment. This is because what is learn from school may be different from the practical, such as difference in soil topography which can influence success in agriculture. An innovation skill is also important, which is to be able to use modern technology in local environment.

It is therefore expected that Agriculture student that acquire critical thinking skills can be engaged in self-active learning, hence can have more learning and employment opportunities. It can give such students the ability to make sound criticism and judgment, and the ability to work independently. However, to what extent are students and teachers in Agriculture education utilise the advantages of such MIT methods is the bone of contention (Birkenholz & Stewart, 1989). The study by Klimoviene et al. (2006) pointed that the need for critical thinking skills is not only the concern of employers; as their staff did not exhibit the necessary skills to work independently and efficiently. Similarly, parents and the general public show concern that students are not skilful, in terms of independent reasoning and the ability to utilise the enormous opportunities of the present developments. The study and modelling critical thinking is essential to give students an insight on how their teachers perceive critical thinking (Brookfield, 2012).

Higher education institutions provide opportunities for students in their learning and skill acquisition process to improve their abilities in the competitive environment (King, 2000). The higher education institutions design skills acquisition for students consists of an effective understanding of technical and vocational skills, and the ways to use those skills in their respective areas of study. In this manner, MIT has additionally turned into an essential part of the higher learning institutions' vocational education content delivery technique (Kung, Chang & Feng, 2010). Technical and vocational education are career courses which are available in secondary schools, colleges, polytechnics and universities all over the world to provide skills training that solve the need of high-development industries (ACTE, 2010). Technical and vocational education makes a very great impact to students, as it emphasizes practicality rather than just the acquisition of knowledge. It also makes a student more interested in the specialized field of study and, serves as encouragement to develop the sentential skills and critical thinking (Horne, 2010).

Among the major problems of higher education institutions is the issue of poor condition of equipment and facilities. Equipment acquisition in higher education institution is partly carried out by the school management at central level and by respective departments concern. In Nigeria for instance beside the central procurement

of equipment by high education institution the departments have direct teaching and learning committee (DTLC). This committee have an allocation every year for direct purchase of consumable equipment. Despite all this, the problem of vocational and technical education still includes inadequate equipment (Umunadi, 2011). The ability of an Agriculture education department or institution to adapt MIT will be influenced by factors such as a) availability of high quality facilities, equipment, technical support, and training in MIT used in teaching Agriculture vocational courses, b) knowledge, skills, attitude and abilities of its staff to apply MIT methods in teaching Agriculture vocational courses, and c) strategic framework for improving teaching of Agriculture vocational courses using MIT (Adedbija, 2013). Therefore, continuous research to identify and improve MIT in Agriculture education is important to accommodate students' dynamic learning needs and styles through a variety of MIT methods.

Regardless of the advantages and importance of MIT equipment and methods on students' critical thinking skills explained, the above discussion indicated its limited application in Agriculture departments in Nigeria. This created the need for investigation into the MIT equipment and methods used and their effects on students' critical thinking skills in Agriculture departments in Nigerian high education institutions; Abubakar Tafawa Balewa University, Bauchi (ATBU Bauchi) and Federal College of Education Technical Gombe (FCET Gombe).

1.3   Statement of problem

Despite the continuous improvement in development and application of MIT equipment for teaching and learning (Hunt, 2005), inability of teachers and students to operate at improving levels toward MIT methods was observed in Nigeria (Aburime & Uhomoibhi, 2010). There is a problem of integration of MIT methods and provision of appropriate MIT equipment and facilities in higher education institutions in developing countries due to inadequate financing (Lai & Kritsonis, 2006). Hence, Agriculture teacher in higher institution thinks that it is hard to understand their actual potentials as

far as knowledge engineering, advancing and widening cooperation in the utilization of MIT (Aburime & Uhomoibhi, 2010).

Eventhough authors agreed on the need to apply the MIT method and equipment knowledge in instruction delivery, little attention is given to the implementation and outcomes of such interventions. Selwyn (2007) observed that in spite of large struggle to put MIT as a major target of higher education, most students and faculties do not make reasonable use of it for formal academic work. In the same view, it has been observed that teachers in vocational and technical schools use MIT most frequently for managerial purposes and least in teaching and learning processes (Kuskaya-Mumcu & Koçak-Usluel, 2013).

In addition, there is also inadequate knowledge on to what extend does the insufficient usage affect students' critical thinking skills. Hence, little is known on relationship between the provision of MIT equipment, the application of MIT methods, and the influence of teachers' usage behaviour of MIT methods on students' critical thinking. Implication of this is graduation of students without sound critical thinking skills which may assist them in the present competitive labour market. A study by Snyder and Snyder (2008) observed that nowadays, the labour market is very competitive and requires people with the ability to work independently and efficiently. A study by Aburime and Uhomoibhi (2010) who investigated in Nigeria on level of MIT knowledge revealed that there are many effort involved in improving students proficiency in technology to develop students critical thinking. The above research also indicated that majority of the students are in the habit of memorising the content rather than optimising their critical thinking skill in their learning process. They experience issues in choosing between critical options despite the fact that they do attempt to relate the lectures to real life situations. Many students attend classes without opportunity of comprehending the lessons and have problems remembering facts and treating information comprehensively. The students' memorisation of lecture notes does not help students in development of critical thinking; it even discourages it (Facione, 2015). Such issues adversely affect the progress and later advancement of students' critical thinking. This is against the objective of critical thinking which encourages in-depth learning for improved comprehension of the lesson (Marzano & Brown, 2009). In Nigeria, little

attention is given to the use of MIT in terms of provision, adequate utilisation and how the use of MIT can improve Agriculture education students' critical thinking (Adegbija, 2013). It is important to revisit instruction methods applied in Nigerian course delivery. The objective of the study was to identify the modern instruction technology (MIT) equipment, methods, and identify the teachers' usage behaviour in relation to students' critical thinking skills. Therefore, the purpose of this study is to investigate the effects of modern instruction technology on students' critical thinking in Agriculture vocational course in Nigeria.

1.4   Aim and objectives of study

The aim of this study is to assess the effect of MIT in the teaching of Agriculture vocational courses in Nigerian higher institution, with a view to identify the influence of MIT methods and equipment on students' critical thinking and recommend possible areas of improvement.

   To achieve the above mentioned aim, the following objectives are formulated:

  i.   To identify types of MIT equipment used for teaching Agriculture vocational courses in Nigerian high education institutions.

  ii.   To identify the MIT methods used in teaching Agriculture vocational courses in the study areas.

  iii.   To explore the effect of MIT methods and equipment on students' critical thinking skill in Agriculture courses in the study areas.

  iv.   To assess the effect of teachers' usage behaviour of MIT methods on the relationship between MIT methods and students' critical thinking skill in Agriculture courses in the study areas.

1.5   Research questions

i.   What is the MIT equipment used for teaching Agriculture vocational courses in Nigerian high education institutions?

ii.   What are the MIT methods used in teaching Agriculture vocational courses in Nigerian high education institutions?

iii.   What is the relationship between MIT method and equipment on student critical thinking in the study area?

iv.   How well does the combination of MIT method and usage behaviour of MIT methods predict student critical thinking skill in the study area?

1.6   Scope of study

There are different types of instruction methods and equipment in teaching Agriculture vocational courses in schools. The method of instruction can be traditional method such as face-to-face method of teaching (teacher and student) and modern method, which involved the utilisation of technology equipment in learning (student centred). Therefore, this study was limited to the second group, which includes Case Studies, Problem Based instruction, Cooperative Learning, Competition, Simulation, Brainstorming, Games, Individualized Instruction, On-Line Instruction, Programmed and Automated Instruction. The MIT equipment used for instructional purpose is the audio visuals machines such as computers, M-devices, projectors, iPad, Notepad, Bluetooth, etc. This study examines the effects of the MIT equipment and methods on the students' critical thinking skill in Agriculture education courses in the study area. Meanwhile, two Nigerian high education institutions; Abubakar Tafawa Balewa University, Bauchi (ATBU Bauchi) and Federal College of Education Technical Gombe (FCET Gombe) were used to be the areas of studies because they are technical and

REFERENCES

Abedalaziz, N., Jamaluddin, S., & Leng, C. H. (2013). Measuring Attitudes toward Computer and Internet Usage among Postgraduate Students in Malaysia. *Turkish Online Journal of Educational Technology-TOJET*, *12*(2), 200-216.

Aburime, M. O., & Uhomoibhi, J. O. (2010). Impact of technology and culture on home economics and nutrition science education in developing countries. *Multicultural Education & Technology Journal*, *4*(1), 4–16. doi:10.1108/17504971011034692

Adegbija, M. V. (2013). Technologies for instruction as innovative strategies in higher education: A Nigerian perspective. *European Journal of Scientific Research*, *63*(4), 557-562.

Ajzen, I. & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. Englewood Cliff, NJ: Prentice Hall.

Aldunate, R., & Nussbaum, M. (2013). Teacher adoption of technology. *Computers in Human Behavior*, *29*(3), 519–524. doi:10.1016/j.chb.2012.10.017

Alwehaibi, H. U. (2012). Novel program to promote critical thinking among higher education students: Empirical study from Saudi Arabia. *Asian Social Science*, 8(11), 193.

Anderson, T. D., and Garrison, D. R. (1998). *Learning in a networked world: New roles and responsibilities*, Madison, WI, Atwood Publishers.

Arnold, N., & Paulus, T. (2010). Using a social networking site for experiential learning: Appropriating, lurking, modeling and community building. *The Internet and Higher Education*, *13*(4), 188-196.

Aromolaran, E.A. (1985, July, 22). Teaching principle of accounts. *Daily Times*. P. 18.

Arteaga Sánchez, R., Cortijo, V., & Javed, U. (2014). Students' perceptions of Facebook for academic purposes. *Computers & Education*, *70*, 138–149. doi:10.1016/j.compedu.2013.08.012.

Association for Career and Technical Education (ACTE). (2010). What is career and technical education? Retrieved from http://www.acteonline.org/ uploadedFiles/About_CTE/files.

Baek, Y., Jung, J., & Kim, B. (2008). What makes teachers use technology in the classroom? Exploring the factors affecting facilitation of technology with a Korean sample. *Computers & Education*, *50*(1), 224-234.

Balanskat, A., Blamire, R., and Kefala, S. (2006). The ICT impact report: a review of studies of ICT impact on schools in Europe. European School net: http://ec.europa.eu/education/pdf/doc254_en.pdf

Balschweid, M. A., & Thompson, G. W. (2002). Integrating science in agricultural education: Attitudes of Indiana agricultural science and business teachers. *Journal of Agricultural Education*, 43(2), 1-10.

Bandalos, D. & Benson, J. (1990). Testing the factor structure invariance of a computer attitude scale over two grouping conditions. *Educational and Psychological Measurement*, 50(1), 49-60.

Bartlett, J. E., Kotrlik, J. W., & Higgins, C. C. (2001). Determining appropriate sample size in survey research, Organizational Research, 19(1), 43–50.

Barzdžiukienė, R., Urbonienė, J., & Klimovienė, G. (2006). Developing critical thinking through cooperative learning. *Kalbų Studijos*, (9), 77-84.

Bayazit, I. (2013). An Investigation of Problem Solving Approaches, Strategies, and Models Used by the 7th and 8th Grade Students When Solving Real-World Problems. Educational Sciences: Theory and Practice, 13(3), 1920-1927.

Baylor, L. & Ritchie. (2002). What factors facilitate teacher skill, teacher morale, and perceived student learning in technology-using classrooms? *Computers & Education*, 39, 395–414.

Bayraktar, S. (2001). A meta-analysis of the effectiveness of computer-assisted instruction in science education. *Journal of research on technology in education*, *34*(2), 173-188.

BCED (2002). *Getting started with integrating ICT: A guide for teachers*. British Columbia: Ministry of Education Standard Department.

Bers, T. H., McGowan, M., & Rubin, A. (1996). The disposition to think critically among community college students: The California Critical Thinking Dispositions Inventory. *Journal of General Education, 45,* 197–223.

Bidaki, M. Z., Sanati, A. R., & Semnani, M. N. (2013). Students' attitude towards two different virtual methods of course delivery. *Procedia - Social and Behavioral Sciences*, *83*, 862–866. doi:10.1016/j.sbspro.2013.06.162.

Birkenholz, R. J., & Stewart, B. R. (1991). The use of instructional technologies in agricultural education. *Journal of Agricultural Education*, 32(2), 40-48.

Blok, H., Oostdam, R., Otter, M. E., & Overmaat, M. (2002). Computer-assisted instruction in support of beginning reading instruction: A review. *Review of educational research*, *72*(1), 101-130.

Brookfield, S. D. (2012). *Teaching for critical thinking*. John Wiley & Sons, San Francisco, USA.

Brown, A. H., & Green, T. D. (2015). *The essentials of instructional design: Connecting fundamental principles with process and practice*. Routledge.

Brown, J. S., & Adler, R. P. (2008). Minds on fire: open education, the long tail, and learning 2.0. *EDUCAUSE Review*, 43(1), 16–32.

Broyles, T. W. (2004). Curriculum and facilities for agricultural education: an agriscience approach. Virginia Polytechnic Institute and State University: PhD. Thesis.

Bruce, B., & Levin, J. (2001). Roles for new technologies in language arts: inquiry, communication, construction, and expression, in Baek, Y., Jung, J., & Kim, B. (2008). What makes teachers use technology in the classroom? Exploring the factors affecting facilitation of technology with a Korean sample. *Computers & Education*, *50*(1), 224-234.

Bruner, J. S. (1996). *Toward a theory of instruction*. Massachusetts, Harvard University press.

Burbach, M. E., Matkin, G. S., & Fritz, S. M. (2004). Teaching critical thinking in an introductory leadership course utilizing active learning strategies: A confirmatory study. *College Student Journal*, *38*(3), 482.

Burbach, M. E., Matkin, G. S., Quinn, C. E., & Searle, T. P. (2012). The Impact of Preparing Agriculture Faculty to Influence Student Critical Thinking Disposition. *Journal of Agricultural Education*, *53*(2), 1-14.

Burris, S. (2005). Effect of problem-based learning on critical thinking ability and content knowledge of secondary agriculture students. University of Missouri-Columbia: PhD. Thesis.

Byrne, D. (2002). *Interpreting quantitative data*. London: Sage.

Carr, W., & Kemmis, S. (2003). *Becoming critical: education knowledge and action research*. London: Routledge.

Cavanaugh, C. 2001. The effectiveness of interactive distance education technologies in K–12 learning: A meta-analysis. *International Journal of Educational Telecommunications,* 7 (1), 73–78.

Chacón, T.C. (2009). A survey of school psychology faculty members' knowledge, skills, and attitudes regarding distance education and distance education technologies. (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses.

Chang, J.-C., Yeh, Y.-M., Chen, S.-C., & Hsiao, H.-C. (2011). Taiwanese technical education teachers' professional development: an examination of some critical factors. *Teaching and Teacher Education*, *27*(1), 165–173. doi:10.1016/j.tate.2010.07.013

Chelliah, J., & Clarke, E. (2011). Collaborative teaching and learning : overcoming the digital divide?, *19*(4), 276–285. doi:10.1108/10748121111179402

Clark-Carter, D. (2004). *Quantitative Psychological Research: A Student's Handbook*. USA: Psychology Press.

Coakes, S. J. (2006), "SPSS: Analysis without anguish: Version 14.0 for Windows", Milton, Qld: John Wiley & Sons, in Shammout, A. B., (2007) Evaluating an extended relationship marketing model for Arab guests of five-star hotels. Victoria University, Melbourne, Australia. PhD. Thesis.

College of Southern Nevada (2011). Modern instructional methods. College of Southern Nevada Online Campus - 63 5 W. Charleston Blvd.- W2C, Las Vegas, Nevada. Retrieve from www.csn.edu/pages/2359.asp.

Collins, A. & Halverson, R. (2010). The second educational revolution: Rethinking education in the age of technology. *Journal of Computer Assisted Learning*, 26 (1), 18-27.

Conole, G. & Culver, J. (2010). The design of cloudworks: applying social networking practice to foster the exchange of learning and teaching ideas and designs, *Computers & Education*, 54 (3), 679-92.

Corbetta, P. (2003). *Social research: Theory, methods and techniques*. Oxfort: Sage.

Cortina, J. M. (1993). What is coefficient alpha? An examination of theory and applications. *Journal of applied psychology*, *78*(1), 98.

Cox, M. J. (2013). Formal to informal learning with IT: research challenges and issues for e-learning. *Journal of Computer Assisted Learning*, *29*(1), 85–105. doi:10.1111/j.1365-2729.2012.00483.x

Cranford, S. L. (2011). Advanced methods of teaching history / social studies (EDCI 667) – Secondary, George Mason University, Graduate School of Education, 1–10 (Unpublished).

Cress, U. & Kimmerle, J. (2008). A systemic and cognitive view on collaborative knowledge building with wikis. International. *Journal of Computer-Supported Collaborative Learning*, 3 (2). 105-122.

Creswell, J. W. (2002). *Educational research: Planning, conducting, and evaluating quantitative and qualitative approaches to research.* Upper Saddle River, NJ: Merrill/Pearson Education.

Cruickshank, D. R., Jenkins, D. B., & Metcalf, K. K. (1999). *The act of teaching* (2nd eds.). Boston: McGraw-Hill Companies.

Cuban, L. (2001).*Oversold & underused: Computers in the classroom*. Cambridge, MA: Harvard University Press.

Davis, F.D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technologies, *MIS Quarterly,* 13(3), 319–340.

Douthwaite, B., Keatinge, J. D. H. & Park, J. (2002). Learning selection: an evolutionary model for understanding, implementing and evaluating participatory technology development, *Agricultural Systems*, 72, 109-31.

Driscoll, D. L. (2011). Introduction to primary research: Observations, surveys, and interviews. *Writing Spaces: Readings on Writing*, *2*, 153-174.

Earle, R.S. (2002). The integration of instructional technology into public education: Promises and challenges. *Educational Technology, 42*(1), 5–13.

Edgar, D. W., Amaral, K., & Edgar, L. D. (2009). Networks of communication and knowledge transfer among students in a college of agriculture introductory course. In *Proceedings of the American Association of Agricultural Education Research conference*, Reno, NV.

Edgar, L., Johnson, D., & Cox, C. (2012). A 10-year assessment of information and communication technology tasks required in undergraduate agriculture courses. *Computers & Education*, *59*(2), 741–749. doi:10.1016/j.compedu.2012.03.008

Edwards, R. (1997). *Changing places? Flexibility, lifelong learning and a learning society*. London, Routledge publishing.

Elton, L. (2003). Dissemination of innovations in higher education: a change theory approach, *Tertiary Education and Management*, 9, 199-214.

Emir, S. (2013). Contributions of teachers' thinking styles to critical thinking dispositions (Istanbul-Fatih Sample). *Educational Sciences: Theory and Practice*, 13(1), 325-347.

Englert, C., Tarrant, K. & Rozendal, M. (1993). Educational innovations: achieving curricular change through collaboration, *Education & Treatment of Children*, 16 (4), 441-73.

Errington, E. (2004). The impact of teacher beliefs on flexible learning innovation: some practices and possibilities for academic developers, *Innovations in Education and Teaching International*, 41 (1), 39-47.

Ertmer, P., Ottenbreit-Leftwich, A., Sadik, O., Sendurur, E., & Sendurur, P. (2012). Teacher beliefs and technology integration practices: a critical relationship. *Computers & Education*, 59(2), 423–435.

ETD (2002). *Overview of the Masterplan II for ICT in Education*. Singapore: Educational Technology Division, Ministry of Education. <http://www.moe.gov.sg/edumall/mp2/mp2.htm>.

Facione, N., & Facione, P. (1996). Assessment design issues for evaluating critical thinking in nursing. *Holistic Nursing Practice*, 10, 41–53.

Facione, P. A., Sanchez, C. A., Facione, N. C., & Gainen, J. (1995). The disposition toward critical thinking. *The Journal of General Education, 44* (1), 1–25.

Feldt, L. S. (1969). A test of the hypothesis that Cronbach's alpha or kuder-richardson coeffecient twenty is the same for two tests. *Psychometrika*, *34*(3), 363-373.

Fishbein, M., & Ajzen, I. (1975*). Belief, attitude, intention, and behavior: An introduction to theory and research.* Reading, MA: Addison-Wesley. Retrieved 9 June, 2011 from http://people.umass.edu/aizen/f&a1975.html.

Fisher, A. (2002). *Critical thinking; an introduction*, Malaysia: Cambridge university press.

Flowers, J., & Osborne, E. W. (1988). The problem solving and subject matter approaches to teaching vocational agriculture: Effects on student achievement and retention. *Journal of the American Association of Teacher Educators in Agriculture*, *29*(1), 20-26.

Gaytan, J. A., & Slate, J. R. (2003). Multimedia and the college of business: a literature review. *Journal of Research on Technology in Education, 35*(2), 186–205.

George, D., & Mallery, M. (2010). SPSS for windows step by step: a simple guide and reference, 17.0 update (10a ed.) Boston: Pearson.

Gokhale, A. A. (1995). Collaborative learning enhances critical thinking, *Journal of Technology Education,* 7 (1). Retrieved from http://scholar.lib.vt.edu/ ejournals/JTE/v7n1/pdf/gokhale.pdf.

Goktas, Y., Gedik, N., & Baydas, O. (2013). Enablers and barriers to the use of ICT in primary schools in Turkey: a comparative study of 2005–2011. *Computers & Education*, *68*, 211–222. doi:10.1016/j.compedu.2013.05.002

Graham, D. L. (2001). Employer perceptions of the preparation of agricultural and extension education graduates. *Journal of Southern Agricultural Education Research,* 51(1), 88–101.

Hackbart, S. (1996). *The Educational Technology Handbook: A Comprehensive Guide*, Educational Technology. NJ, Englewood Cliffs.

Halpern, D. F. (1999). Teaching for critical thinking: helping college students develop the skills and dispositions of a critical thinker. *New directions for teaching and learning*, 80, 69-74.

Hamidi, F., Rostami, M. K., & Rahimi, M. (2011). Comparing barriers to using learning resources among Iranian university students and instructors. *Procedia Computer Science*, *3*, 122–127. doi:10.1016/j.procs.2010.12.021.

Hanna, A. (2007) Questionnaire in education research, Faculty of education, university of Plymouth, http://www.edu.plymouth.ac.uk/RESINED/QUESTS/index.htm#

Heick, T. (2012). 9 Characteristics of 21st Century Learning, TeachThought. Retrieved on 12/11/2013 from http://www.teachthought.com/learning/9-characteristics-of-21st-century-learning/.

Heick, T. (2013). Merging Basic Lesson Design with Technological Pedagogical Knowledge, TeachThought. Retrieved on 12/11/2013 from http://www.teachthought.com/learning/merging-basic-lesson-design-with-technological-pedagogical-knowledge.

Hemmi, A., Bayne, S., & Land, R. (2009). The appropriation and repurposing of social technologies in higher education. *Journal of Computer Assisted Learning*, *25*(1), 19-30.

Henderson, C. & Dancy, M. (2008). Physics faculty and educational researchers: divergent expectations as barriers to the diffusion of innovations, *American Journal of Physics*, 76 (1), 79-91.

Hennessy, S., Onguko, B., Harrison, D., Ang'ondi, E. K., Namalefe, S., Naseem, A., & Wamakote, L. (2010). Developing the use of information and communication technology to enhance teaching and learning in East African schools: Review of the

literature. *Centre for Commonwealth Education & Aga Khan University Institute for Educational Development–Eastern Africa Research Report, (1).*

Heo, M. (2009). Design considerations for today's online learners: A study of personalized, relationship-based social awareness information. *International journal on E-Learning*, *8*(3), 293.

Hicks, A., & Graber, A. (2010). Shifting paradigms: teaching, learning and Web 2.0. *Reference Services Review*, *38*(4), 621–633. doi:10.1108/00907321011090764

Hodell, C. (2015). *ISD from the ground up: A no-nonsense approach to instructional design*. American Society for Training and Development.

Holden, H., Ozok, A. A., & Rada, R. (2008). Technology use and perceptions in the classroom: Results from an exploratory study among secondary education teachers. *Interactive Technology and Smart Education, 5*(2), 113-134.

Hopson, M. H., Simms, R. L., & Knezek, G. A. (2001). Using a technology-enriched environment to improve higher-order thinking skills. *Journal of Research on Technology in education*, *34*(2), 109-119.

Horne, M. (2010). A New Role for CTE. *Techniques: Connecting Education and Careers (J1)*, *85*(4), 10-11.

Hunt, D. M. (2005). Web-based distance learning: substitute or alternative to the traditional classroom: making the delivery method decision. *Online Journal of Distance Learning Administration*, *8*(3).

Hunter, M. C. (1982). *Mastery teaching*. Thousand Oaks, CA: Corwin Press.

İşman, A. (2012). Technology and technique: An educational perspective. *The Turkish Online Journal of Educational Technology, 11*(2), 207–213.

Ivankova, N. V. (2002). A sample mixed methods dissertation proposal. *Education*, *48*(1), 93-135.

Ivankova, N., & Stick, S. (200). Students' persistence in a distributed doctoral program in educational leadership in higher education: a mixed methods study. *Research in Higher Education, 48*(1), 93-135. DOI: 10.1007/s11162-006-9025-4

Jennings, N. R. & Wooldridge, M. J. (1996). Software Agents. *Journal of IEE Review*, 42(1) 17-20.

Johnson, L., Adams Becker, S., Estrada, V. & Freeman, A. (2014). *NMC Horizon Report: 2014 K-12 Edition*. Austin, TX: New Media Consortium.

Johnson, L., Adams-Becker, S., Cummins, M., Estrada, V., Freeman, A., & Ludgate, H. (2013). NMC Horizon Report: Higher Education Edition. *Report. The New Media Consortium*.

Jonassen, D. H., Carr, C., & Yueh, H. P. (1998). Computers as mind tools for engaging learners in critical thinking. *TechTrends*, *43*(2), 24-32.

Kaminski, K., Switzer, J., & Gloeckner, G. (2009). Workforce readiness: a study of university students' fluency with information technology. *Computers and Education*, 53, 228–233.

Kang, Z., & Ting, K. Y. (2013). Student attitudes towards teaching methods used in universities the UK. *Review of European Studies*, *5*(4), 71.

Keengwe, J., Onchwari, G. & Wachira, P. (2008). Computer technology integration and student learning: barriers and promise, *Journal of Science Education and Technology*, 17, 560-5.

King, N. G. (2000). Preparing high school students for the new millennium and beyond. *Education, 121*(1), 4–7.

Kinuthia, W. & Dagada, R. (2006). E-learning delivery: exploratory study of ICT in higher education in South Africa, *International Journal on E-Learning*, 7 (4), 623-39.

Koehler, M. J., & Mishra, P. (2008). Introducing TPACK, in AACTE committee on innovation & technology (Eds.), Handbook of technological pedagogical content knowledge for educators (pp. 3–29). New York, NY: Routledge.

Kostoglou, V., Vassilakopoulos, M., & Koilias, C. (2013). Higher technological education specialties and graduates' vocational status and prospects. *Education+ Training*, *55*(6), 520-537.

Krejcie & Morgan (1970). Determining sample size for research activities. *Educ Psychol Meas*., *38*, 607–610.

Kuhlemeier, H., & Hemker, B. (2007). The impact of computer use at home on students' Internet skills. *Computers & Education, 49*(2), 460–480.

Kung, Y., Chang, S., & Feng, D. (2010). Exploration of modern instructional technology and reformation from the perspectives of e-learning. *Ntnu.edu.tw*. Retrieved from http://www.ntnu.edu.tw/acad/rep/r98/b980004-1.pdf

Kunsela, W., & Noakes, H. L. (1957). *Planning building facilities for vocational agriculture*. New York State Education Department. Division of School Buildings and Grounds. (ERIC Document Reproduction Service No. 036 984).

Kuskaya-mumcu, F., & Koçak-usluel, Y. (2013). Teachers ' perceptions related to levels of ICT implementation. *Procedia - Social and Behavioral Sciences*, *83*, 729–733. doi:10.1016/j.sbspro.2013.06.137

Kutluca, T. (2010). Investigation of teachers' computer usage profiles and attitudes toward computers. *International Online Journal of Science*, *2*(1), 81-97.

Kwok, C. N. (2007). Replacing face-to-face tutorials by synchronous online technologies: Challenges and pedagogical implications. *The International Review of Research in Open and Distributed Learning*, *8*(1).

Laal, M. (2013). Lifelong learning and technology. *Procedia - Social and Behavioral Sciences*, *83*, 980–984. doi:10.1016/j.sbspro.2013.06.182

Lai, C., & Kritsonis, W. (2006). The advantages and disadvantages of computer technology in second language acquisition. *Online Submission*, *3*(1). Retrieved from http://eric.ed.gov/?id=ED492159

Lee, Y. H., Waxman, H., Wu, J. Y., Michko, G., & Lin, G. (2013). Revisit the effect of teaching and learning with technology. *Journal of Educational Technology & Society*, *16*(1), 133-146.

Lever-Duffy, J., McDonald, J., & Mizell, A. (2003). *Teaching and learning with technology*. Boston: Pearson Education.

Li, B. (2009). The use of e-learning in pre-service teacher education. *Campus-Wide Information Systems*, *26*(2), 132–136. doi:10.1108/10650740910946855.

Lim, K. H., & Benbasat, I. (2000). The effect of multimedia on perceived equivocality and perceived usefulness of information systems. *MIS Quarterly,24*(3), 449–471.

Long, L., Zhaohui, L., Gengsheng, W. and Xiaoqin, Y. (2008). Modern education technology with creativity of continuing education, IACEE 11th World Conference on Continuing Engineering Education. Georgia Institute of Technology: 1-3.

Lou, Y., Abrami, P. C. & d'Apollonia, S. (2001). Small group and individual learning with technology: A meta-analysis. *Review of educational research*, 71 (3), 449-521.

Lundy, L.K., Irani, T.A., Ricketts, J.C., Eubanks, E.E., Rudd, R.D., Gallo-Meagher, M. & Fulford, S.G. (2002, December). A mixed-methods study of undergraduate dispositions toward thinking critically about biotechnology. Paper presented at the National Agricultural Education Research Conference, Las Vegas, NV.

Lwoga, E. (2012). Making learning and Web 2.0 technologies work for higher learning institutions in Africa. *Campus-Wide Information Systems*, *29*(2), 90–107. doi:10.1108/10650741211212359.

Lynn, P., Erens, B., & Sturgis, P. (2012). A strategy for survey methods research in the UK, (May). Retrieved from http://surveynet.ac.uk/srn/Vision for Survey Methods.pdf.

Ma, X., Wang, R. and Liang, J. (2008). The e-learning system model based on affective computing, Proceedings of the 7th International Conference on Web-based Learning, ICWL 2008, Jinhua, August, 54-6.

Majumdar, S. (2011). Teacher education in TVET: Developing a new paradigm. *International Journal of Training Research*, *9*(1-2), 49-59.

Maloney, E. (2007). What Web 2.0 can teach us about learning. *Chronicle of Higher Education*, 53(18), B26.

Marzano, R. J., & Brown, J. L. (2009). *A Handbook for the Art and Science of Teaching*. USA: ASCD.

Mathieson, K. (1991). Predicting user intentions: comparing the technology acceptance model with the theory of planned behavior. *Information systems research*, *2*(3), 173-191.

McDonald, J. K., Yanchar, S. C., & Osguthorpe, R. T. (2005). Learning from programmed instruction: Examining implications for modern instructional technology. *Educational Technology Research and Development*, *53*(2), 84–98. doi:10.1007/BF02504867.

McEachron, D. L., Bach, C., & Sualp, M. (2012). Digital Socrates: a system for disseminating and evaluating best practices in education. *Campus-Wide Information Systems*, *29*(4), 226-237.

Messina, L., & Tabone, S. (2012). Integrating technology into instructional practices focusing on teacher knowledge, *46*(2011), 1015–1027. doi:10.1016/j.sbspro.2012.05.241

Minocha, S. (2009). Role of social software tools in education: a literature review. *Education + Training*, *51*(5/6), 353–369. doi:10.1108/00400910910987174

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for integrating technology in teacher knowledge. *Teachers College Record, 108*(6), 1017-1054.

MOE (2000). *Guidelines for information and communications technology training in elementary and secondary schools*. Seoul: Ministry of Education and Human Resources Development (MOE).

Molenda, M. (2003). In search of the elusive ADDIE model. *Performance improvement*, *42*(5), 34-37.

Moran, J., Ferdig, R. E., Pearson, P. D., Wardrop, J., & Blomeyer, R. L. (2008). Technology and reading performance in the middle-school grades: A meta-analysis with recommendations for policy and practice. *Journal of Literacy Research*, *40*(1), 6-58.

Muijs, D. (2010). *Doing quantitative research in education with SPSS*. London: Sage.

Myers, B. E., & Dyer, J. E. (2006). The influence of student learning style on critical thinking skill. *Journal of Agricultural Education*, *47*(1), 43.

Nandy, K. (2012). Understanding and quantifying effect sizes. California: University of California Los Angeles (UCLA). Retrieved from http://nursing.ucla.edu/workfiles/research/Effect%20Size%204-9-2012.pdf.

National Bereau of Statistics (NBS). (2011). Total access to ICT by device in Nigeria, 2011 Annual Socio-Economic Report: Access to ICT.

Nogalski, B., & Wojcik-Augustyniak, M. (2012). The use of modern technologies in higher schools as one of the elements of value innovation. in knowledge and learning: global empowerment*; proceedings of the management, knowledge and learning international conference*. International School for Social and Business Studies, Celje, Slovenia. pp. 424-434.

Norris, S. & Ennis, R. (1989). *Evaluating critical thinking*, Pacific Grove, CA: Critical thinking press & software.

Nwana, O.C. (1983). Curriculum designing for the junior senior secondary school. *The Nigeria Principal Journal of ANCOPPS* 1(4), 25-33.

Nwezeh, C. M. T. (2010). The impact of internet use on teaching, learning and research activities in Nigerian universities: A case study of Obafemi Awolowo University. *The Electronic Library*, *28*(5), 688–701. doi:10.1108/02640471011081960

Ojedokun, A.A. & Owolabi, E.O. (2003). Internet access competence and use of the internet for teaching and research activities by University of Botswana academic staff, *African Journal of Library, Archives and Information Science*, 11 (1), 43-53.

Onyia, C. R., & Onyia, M. (2011). Faculty perception for technology integration in nigeria university system: Implication for faculty quality curriculum design. International Journal of Business and Social Science, 2(12), 81-92.

Osborne, E., & Hamzah, R. (1989). Use of problem solving teaching among secondary agriculture teachers in Illinois. *Journal of Agricultural Education*, *30*(3), 29-36.

Ottenbreit-Leftwich, A. T., Brush, T. a., Strycker, J., Gronseth, S., Roman, T., Abaci, S., … Plucker, J. (2012). Preparation versus practice: how do teacher education programs and practicing teachers align in their use of technology to support

teaching and learning? *Computers & Education*, *59*(2), 399–411. doi:10.1016/j.compedu.2012.01.014

Oviawe, J., & Oshio, L. (2011). Impact of information and communication technology on teaching and learning ability of education students in universities in Edo state, Nigeria. *International Review of Social Sciences and …*, *2*(1), 126–133. Retrieved from http://irssh.com/yahoo_site_admin/assets/docs/12_IRSSH-99-V2N1.51195546.pdf

Pallant, J. (2011). SPSS survival manual: a step by step guide to data analysis using SPSS for program. (4th ed.). Australia, Allen & Unwin.

Paul, W. R. (1993). *Critical thinking: How to prepare students for a rapidly changing world*. Santa Rosa, CA: Foundation for Critical Thinking.

Penberty, D. & Millar, S. (2002). The "hand-off" as a flawed approach to disseminating innovation: lessons from chemistry, *Innovative Higher Education*, 26(4), 251-70.

Pridmore, J. L., Bradley, R. V., & Mehta, N. (2010). Methods of instruction and learning outcomes: a theoretical analysis of two approaches in an introductory information technology course*. *Decision Sciences Journal of Innovative Education*, *8*(2), 289–311. doi:10.1111/j.1540-4609.2010.00258.x

Profetto-McGrath, J. (2003). The relationship of critical thinking and critical thinking dispositions of baccalaureate nursing students. *Journal of Advanced Nursing*, (43) 569–577.

Repko, A. F. (2008). *Interdisciplinary research: Process and theory.* Thousand Oaks, CA: SAGE Publications, Inc.

Rhema, A. and Miliszewska, I. (2010). Towards e-learning in higher education in Libya, *Issues in Informing Science and Information Technology*, (7), 423-7.

Rhoades, E. B., Irani, T., Telg, R., & Myers, B. E. (2008). Internet as an information source: attitudes and usage of students enrolled in a college of agriculture course. *Journal of Agricultural Education,* 49(2), 108–117. doi:10.5032/jae.2008.02108

Richardson, J. C., & Ice, P. (2010). Investigating students' level of critical thinking across instructional strategies in online discussions. *The Internet and Higher Education*, *13*(1), 52-59.

Russell, M., Bebell, D., O'Dwyer, L., & O'Connor, K. (2003). Examining teacher technology use implications for preservice and inservice teacher preparation. *Journal of Teacher Education*, *54*(4), 297-310.

Schneckenberg, D. (2009). Understanding the real barriers to technology-enhanced innovation in higher education, *Educational Research*, 51 (4), 411-24.

Schofield H. (2013). The philosophy of education (RLE Edu K): an introduction. UK: Routledge.

Schroeder, A. Minocha, S. & Schneider, C. (2010). The strengths, weaknesses, opportunities and threats of using social software in higher and further education teaching and learning. *Journal of Computed Assisted Learning*, 26 (3). 159-174.

Schwartz, J. (1995), "The right size byte: reflections of an educational software designer", in Perkins, D., Schwartz, J., West, M. and Wake, M. (Eds), Software Goes to School: Teaching for Understanding with New Technologies, Oxford University Press, Oxford, pp. 172-86.

Seels, B. B., & Richey, R. C. (1994). *Instructional technology: The definition and domains of the field.* Washington, DC: AECT. 42 (1), 5-13, January-February, 2002, ET Magazine Website: http://BooksToRead.com/etp

Selwyn, N. (2007). The use of computer technology in university teaching and learning: a critical perspective. *Journal of Computer Assisted Learning*, 23(2), 83–94

Semela, T., Bohl, T., & Kleinknecht, M. (2013). Civic education in Ethiopian schools: Adopted paradigms, instructional technology, and democratic citizenship in a multicultural context. *International Journal of Educational Development*, *33*(2), 156-164.

Şendağ, S., & Odabaşı, H. F. (2009). Effects of an online problem based learning course on content knowledge acquisition and critical thinking skills. Computers & Education, 53(1), 132-141.

Shapiro, C., & Varian, H. R. (2013). *Information rules: a strategic guide to the network economy*. Harvard Business Press.

Sharifi, A., & Imani, M. N. (2013). Identifications of skills required by high school teachers & students to apply ICT. *Procedia - Social and Behavioral Sciences*, *83*(2001), 841–845. doi:10.1016/j.sbspro.2013.06.158.

Sharifi, A., Imani, M. N., & Eslamieh, F. (2013). Investigation the role of information & communication technologies on student's collaborative learning. *Procedia - Social and Behavioral Sciences*, *83*, 932–936. doi:10.1016/j.sbspro.2013.06.174

Shrestha, K. M. (2009). Students' perspectives on the undergraduate education in the College of Agriculture and Natural Resources at Michigan State University. Michigan State University, East Lansing, MI. PhD Thesis.

Sipilä, K. (2011). No pain, no gain? Teachers implementing ICT in instruction. *Interactive Technology and Smart Education*, *8*(1), 39–51. doi:10.1108/17415651111125504

Smart, J., & Paulsen, M. (Eds.) (2011). *Higher education: Handbook of theory and research*. USA: Springer.

Smerdon, B., Cronen, S., Lanahan, L., Anderson, J., Iannotti, N., & Angeles, J. (2000). Teachers' tools for the 21st century: a report on teachers' use of technology. Statistical analysis report. Washington: National Center for Education Statistics (ED).

Snyder, L. G., & Snyder, M. J. (2008). Teaching critical thinking and problem solving skills. *The Delta Pi Epsilon Journal*, *50*(2), 90-99.

Spector, J.M., Merrill, M. D., Elen, J. & Bishop, M.J. (Ed.). (2014). *Handbook of research on educational communications and technology* (4th Ed.). New York: Springer Science+Business Media.

Stattrek (2014). http://stattrek.com/statistics/random-number-generator.aspx.

Sternberg, R. J. (1997). *Thinking styles*. Cambridge: Cambridge University Press.

Stone, W., Jr. (2014). Teacher technology acceptance and usage for the middle school classroom. (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UNI No. 3611213).

Sullivan, G. M., & Feinn, R. (2012). Using effect size-or why the P value is not enough. *Journal of graduate medical education*, *4*(3), 279-282.

Summers, T. A., & Vlosky, R. P. (2001). Technology in the classroom: the LSU College of Agriculture faculty perspective. *Campus-Wide Information Systems*, 18(2), 79–84.

Syafii, W. & Yasin, R. M. (2013). Problem Solving Skills and Learning Achievements through Problem-Based Module in teaching and learning Biology in High School. *Asian Social Science,* 9 (12), 220.

Tabachnick, B.G. & Fidell, L.S. (2013). *Using multivariate statistics.* (6th ed). New Jersey. Pearson Education, Inc.

Teo, T. (2008). Pre-service teachers' attitudes towards computer use: A Singapore survey. *Australasian Journal of Educational Technology*, 24(4).

Tezci. E. (2009). Teachers' effect on ICT use in education: The Turkey sample. *Procedia Social and Behavioral Sciences,* 1, 1285-1294.

Tsai, C., & Chai, C. S. (2012). The "third"-order barrier for technology integration instruction: implications for teacher education. *Australasian Journal of Educational Technology*, 28(6), 1057–1060.

Uddin, S., & Jacobson, M. J. (2013). Dynamics of email communications among university students throughout a semester. *Computers & Education*, *64*, 95–103. doi:10.1016/j.compedu.2013.01.014.

Umar, A H. (2012). Novel program to promote critical thinking among higher education students: empirical study from Saudi Arabia. *Asian Social Science*, *8*(11), 193–205. doi:10.5539/ass.v8n11p193.

Umunadi, E. K. (2011). Provision of equipment and facilities in vocational and technical education for improving carrying capacity of Nigeria's tertiary institutions. In *1st International Technology, Education and Environment Conference* (p. 331).

Vasquez, O. (2006). A pedagogy of the future, *Pedagogies: An International Journal*, 1 (1), 43-8.

Ventura, R., & Quero, M. J. (2013). Using Facebook in university teaching: a practical case study. *Procedia - Social and Behavioral Sciences*, *83*(2008), 1032–1038. doi:10.1016/j.sbspro.2013.06.192.

Verhoeven, J. C., Heerwegh, D., & De Wit, K. (2010). Information and communication technologies in the life of university freshmen: an analysis of change. *Computers & Education*, 55, 53–66.

Vrana, R. (2010). ICT-supported communication of scientists and teaching staff at the Faculty of Humanities and Social Sciences in Zagreb. *New Library World*, *111*(9/10), 413–425. doi:10.1108/03074801011089332

Watson, G. (1980). *Watson-Glaser critical thinking appraisal.* San Antonio, TX: Psychological Corporation.

Webster, N., Ganpat, W., & Chester, C. (2013). Toward a model of promoting youth development in the Caribbean through agriculture investment. *Vulnerable Children and Youth Studies*, *8*(4), 366-374.

Wheeler, S. (2009). Learning space mashups: Combining web 2.0 tools to create collaborative and reflective learning spaces. *Future Internet*, 1(1), 3-13.

Wodzicki, K., Scwämmlein, E. & Moskaliuk, J. (2012). Actually, I want to learn: Study-relate Knowledge exchange on social networking sites. *Internet and Higher Education,* 15 (1). 9-14.

Wu, M. (1994). *Instruction Design*. Peking, Higher Education Press.

Zhou, Q., Hu, J. & Gao, S. (2010). Chemistry teachers' attitude towards ICT in Xi'an. *Procedia - Social and Behavioral Sciences*, *2*(2), 4629–4637. doi:10.1016/j.sbspro.2010.03.741.