REFERENCES

- Akcay, H. Durmaz, A., Tuysuz, C., and Feyzioglu, B., (2006), Effects Of Computer Based Learning On Students' Attitudes And Achievements Toward Analytical Chemistry, *The Turkish Online Journal of Educational Technology* (TOJET), 5(1)
- Agogo P.O., (2003). A practical guide to the teaching of difficult in Nigerian secondary school. *Knowledge Review: A Multi-disciplinary J.* 6(3): 32-34
- Agwai, V., (2008). Strategies for improving students interest in learning scientific concepts. J. Res. Educ. 2: 225 230
- Agogo and Onda, (2014). Identification of Students' Perceived Difficult Concepts in Senior Secondary School Chemistry in Oju Local Governmenrt Area of Benue State, Nigeria. *Global Educational Research Journal*: ISSN-2360-7963, Vol. 2(4): 044-049
- Ardac, D., and Akaygun, S., (2004). Effectiveness of multimedia-based instruction that emphasizes molecular representations on students' understanding of chemical change. *Journal of Research in Science Teaching*, 41(4), 317– 337
- Arkun and Akkoyunlu, (2008). A Study on the development process of a multimedia learning environment according to the ADDIE model and students' opinions of the multimedia learning environment. Interactive Educational Multimedia, Number 17, 1-19
- Bloom, B.S, and David R.K., (1956). Taxonomy of educational objectives: The classdification of educational goals, by a committe of college and university examiners. Handbook 1: Cognitive domain, New York, Longmans
- Bojczuk, M., (1982). Topic difficulties in O-and A-level chemistry. School Sci. Rev., 64: 545-551
- Bransford, J. D., Brown, A. L., & Cocking, R. R. (1999). How people learn. Washington, DC: National Academy Press
- Briggs, L., (1977). Instructional Design Englewood Cliffs, NJ: Educational Technology Publications
- Clark, R. C., and Mayer, R. E., (2003). E-learning and the science of instruction. San Francisco, CA: Jossey-Bass
- Cochran, W.G., (1963). Sampling Techniques, 2nd Ed., New York: John Wiley and Sons, Inc.

- C. Rauen, (2001). Using simulation to teach critical thinking skills: you can't just throw the book at them. Crit Care Nurs Clin North Am, 13, 93–103
- David F. Treagust, Gail Chittleborough, (2001). Chemistry: A matter of understanding representations, in Jere Brophy (ed.) Subject-specific instructional methods and activities (Advances in Research on Teaching), Volume (8) Emerald Group Publishing Limited, 239 – 267
- D. Robert, (2011). Teaching with Simulations. Harvard Business School Publishing, Univ. of New Brunswick, Canada
- de Jong, T., and van Joolingen, W. R., (1998). Scientific discovery learning with computer simulations of conceptual domains. Review of Educational Research, 68, 179–201.
- Dick, W., Carey, L., and Carey, J.O., (1990). The systematic design of instruction. Glenview, Illinois: Scott, Foresman/Little, Brown Higher Education.
- D. Stetieh and O. Sarhan, (2007). IT: Education and E-learning, 1st ed, Dar Wael for publication, Amman, Jordan.
- Ebel, R.L. (1972). Essential of Educational Measurement. New Jersey: Prentice Hall, Inc.
- Finley, F.N., J. Stewart and W.L. Yarroch, (1982). Teachers' perceptions of important and difficult science content. Sci. Educ., 66: 53-538.
- Friesen, S., (2009). What did you do in school today? Teaching Effectiveness: A Framework and Rubric. Toronto: Canadian Education Association
- Gabel, D. L., (1993). Use of the Particle Nature of Matter in Developing Conceptual Understanding, *Journal of Chemical Education*, 70(3), 193-194
- Gabel, D., (1998). The complexity of chemistry and implications for teaching. In
 B.J. Fraser & K.G. Tobin (Eds.), International handbook of science education (pp. 233 ± 248). Boston, MA: Kluwer Academic Publishers
- Greenbowe, T.J., (1994). An interactive multimedia software program for exploring electrochemical cells. *Journal of Chemical Education*, 71, 555-557
- Gosling, D. and Moon, J., (2001). How to write learning outcomes and assessment criteria London: SEEC Office, University of East London
- Guan, Y.-H., (2009). A Study on the Learning Efficiency of Multimedia-Presented, Computer-Based Science Information. *Educational Technology & Society*, 12 (1), 62–72

- Hajah, N.B., (2008). Makmal maya chemical °based approach cognitivism, constructivism and contextual (VLAB-CHEM) (Indonesian). Ph.D. Thesis, Universiti Kebangsaan Malaysia
- Honey, M. A., & Hilton, M., (2011). Learning science through computer games and simulations. Washington, DC: National Academies Press
- Johnstone, A.H., (1991). Why Science is Difficult to Learn? Things are Seldom What they Seem" Journal of Computer Assisted Learning, 7, 75-83
- Johnstone, A.H., (1993). The development of chemistry teaching. J. Chem. Educ., 70: 701-705
- Johnstone, A.H., (2000). Teaching of Chemistry—Logical or Psychological?, Chemistry Education: Research and Practice in Europe, 1(1), 9-15
- J. Huppert, S. M. Lomask and R. Lazarowitz, (2002). Computer simulations in the high school: students' cognitive stages, science process skills and academic achievement in microbiology. *International Journal of Science Education*, 24(8), 803-821.
- J. G. Ross, (2012). Simulation and Psychomotor Skill Acquisition: A Review of the Literature, Clinical Simulation in Nursing, 8(9), 429–435.
- K. Hawkins, M. Todd and J. Manz, (2008), A unique simulation teaching method. *J Nurs Educ*, 47(11), 524-527,
- Kim, M., & Hannafin, M., (2011). Scaffolding problem-solving in technologyenhanced learning environments (TELEs): Bridging research and theory with practice. Computers and Education, 56, 403–417.
- Koebler, Jason, (2011). *Many Stem teachers don't hold certificates*. U.S News and WorldreportEducation.www.usnews.com/education/blogs/highschoolnote s/2011/10/26/teacher
- Kuhlthau, C.C., (2010). Guided Inquiry: School Libraries in the 21st Century. School of Communication and Information, Rutgers The State University of New Jersey, USA 16(1). 17-28
- Lambert, N. M., & McCombs, B. L., (1998). *How students learn*. Washington, DC: American Psychological Association
- Lorin, A., (2001). A Taxonomi for Learning, Teaching and Assesing: A Revision of Bloom's Taxonomy of Educational Objectives. A Bridged Edition Addison Wesly Longman, Inc
- Tien, L.L and Osman, (2014). Development of Interactive Multimedia Module with Pedagogical Agent (IMMPA) in the Learning of Electrochemistry:

Needs Assessment. *Research Journal of Applied Sciences, Engineering and Technology* 7(18): 3725-3732

- Lin, H.S., T.C. Yang, H.L. Chiu and C.Y. Chou, (2002). Students' difficulties in learning electrochemistry. Proc. Natl. Sci. Counc. ROC(D), 12(3): 100-105
- Lindgren, R., & Schwartz, D. L., (2009). Spatial learning and computer simulations in science. *International Journal of Science Education*, 31(3), 419–438
- Mailumo, P.H, Agogo PO, Kpagh J.E., (2009). Education in Fundamental Chemistry. Makurdi: *Journal of Publishers* (Nig.) Ltd.
- Mahajan and Singh, (2005). University Students. Performance In Organic Chemistry At Undergraduate Level: Perception Of Instructors From Universities In The Sadc Region. Chemistry, Vol. 14.
- Mayer, R. E., & Moreno, R., (2002). Aids to computer-based multimedia learning. *Learning and Instruction*, 12, 107-119.
- Mayer, R. E., & Moreno, R., (1998). A Split-Attention Effect in Multimedia Learning: Evidence for Dual Processing System in Working Memory. *Journal of Educational Psychology*, 90, 312-320.
- Mayer, R. E., (1997). Multimedia learning: are we asking the right questions? *Educational Psychologist*, 32, 1–19.
- Mayer, R. E., (1999a). Research-based principles for the design of instructional messages: the case of multimedia explanations. *Document Design*, 1, 7–20.
- Mayer, R. E., (1999b). Multimedia aids to problem solving transfer. *International Journal of Educational Research*, *31*, 611–623
- McCawley, P. F., (2009). Methods for Conducting an Educational Needs Assessment: Guidelines for Cooperative Extension System Professionals. BUL 870. University Of Idaho Extension
- Ministry of Education and Culture (Kemendikbud), (2016).Statistik Sekolah Menengah Atas. Kementerian Pendidikan dan Kebudayaan. Pusat Data dan Statistik Pendidikan dan Kebudayaan
- Moreno, R., & Mayer. R. E., (1999). Cognitive principles of multimedia learning: The role of modality and contiguity. *Journal of Educational Psychology*, 91, 358-368.

- Morrison, G. R., Ross, S. M., Kemp, J. E., & Kalman, H. K., (2007). *Designing effective instruction*. (5th Ed). Hoboken, NJ: John Wiley & Sons, Inc.
- Murdoch, K. and Wilson, J.,(2004). Learning Links. Curriculum Corporation, Melbourne.
- Nakhleh, M., (1992). Why Some Students Don't Learn Chemistry: Chemical Misconceptions, *Journal of Chemical Education*, 69(3), 191-196
- Nazir, M. I. J., Aftab Haider Rizvi, Ramachandra V. Pujeri, (2012). Skill Development in Multimedia Based Learning Environment in Higher Education : An Operational Model. *International Journal of Information* and Communication Technology Research, 2(11), 820-828
- P. J. Morgan, D. Cleave-Hogg, J. McIlroy and J. H. Devitt., (2002). A comparison of experiential and visual learning of undergraduate medical students. Anesthesiolog, 2–25, 96
- Plass, J.L., Milne, C., Homer, B.D., Schwartz, R.N., Hayward, E.O., Jordan, T., Verkuilen, J., Florrie Ng, Wang, Y., Barrientos, J., (2012) Investigating the Effectiveness of Computer Simulations for Chemistry Learning. Journal Of Research In Science Teaching. 49(3), 394–419
- R. I. Uchegbu, M. C. Anozieh, C. N. Mbadiugha, C. O. Ibe, P. C. Njoku, (2015). Teachers' Perception of the Impediments to Chemistry Teaching in Secondary Schools in Imo State, Nigeria. *Open Science Journal of Education.* 3(5), 26-31
- R. H. Eaves and A. J. Flagg, (2001). The US Air force pilot simulated medical unit: a teaching strategy with multiple Applications. J Nurs Educ, 40, 110–115
- Roziah, A., (2005). Development and effectiveness of multimedia package thinking skills for chemistry subjects (In Malaysian). Ph.D. Thesis, Universiti Kebangsaan Malaysia.
- Samba RMO, Eriba J.O., (2012). Background information on teaching difficult science concepts. In Samba RMO and Eriba JO. (Eds). Innovative Approaches in teaching difficult science concepts (pp.1–5) Makurdi, Nigeria: Destiny Ventures
- Santos and Arroio, (2016). The representational levels: Influences and contributions to research in chemical education. *Journal of Turkish Science Education*. 13(1), 3-18. DOI: 10.12973/tused.10153a
- Schmid, S., A. Yeung, A.V. George and M.M. King, (2009). Designing Effective E-learning Environments-should We Use Still Pictures, Animations or Interactivity? In: Gupta-Bhowan, M., S. Jhaumeer-Laulloo, H. Li Kam

Wah and P. Ramasami (Eds.), Chemistry Education in the ICT Age Mauritius. Springer Science + Business Media B.V., 235-248

- Seels, B., and Glasgow, Z., (1998). Making instructional design decisions (2nd ed.). Upper Saddle River, NJ: Merril, Prentice-Hall.
- Sirhan, (2007). Learning Difficulties in Chemistry: An Overview. Journal Of Turkish Science Education.4(2)
- Heinich, R., Molenda, M., Russel, J.D., & Smaldino, S.E. (1996). *Instructional media and technologies for learning.* Fifth eEdition, NJ: Printice-Hall,Inc.
- Sund, R.B., and L.W. Trowbridge, (1983). Teaching science by Inquiry in the Second School. 2nd Edn., Merrill Columbus, Ohio.
- Taber,K.S., (2009),ChallengingMisconceptionsintheChemistryClassroom:Resources toSupportTeachers.SCQ-IECEducacióQuímicaEduQnúmero4,13-20DOI:10.2436/20.2003.02.27http://scq.iec.cat/scq/index.html
- Taber, K. S., (2002). Alternative Conceptions In Chemistry: Prevention, Diagnosis And Cure? London: The Royal Society of Chemistry.
- Talib, O., Matthews, R., Secombe, M., (2005), Computer-animated instruction and students' conceptual change in electrochemistry: Preliminary qualitative analysis
- van Merrienboer, J. J. G., (1997). *Training Complex Cognitive Skills*, Educational Technology Publications, Englewood Cliffs, NJ.
- Wu, H. K., Krajcik, J.S., Soloway, E., (2001), Promoting Understanding of Chemical Representations: Students' Use of a Visualization Tool in the Classroom. *Journal Of Research In Science Teaching*. 38 (7). 821-842. Jhon Wiley & Sons, Inc