

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

GAME-BASED LEARNING: ITS EFFECTS ON STUDENTS'
PERFORMANCE IN PHYSICS

A Thesis Presented to the
Faculty of the Graduate School
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West Visayas State University
La Paz, Iloilo City

In Partial Fulfilment
of the Requirements for the Degree
Master of Arts in Education
(Physics)

by

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Abstract

This quasi-experimental research was conducted to determine the performance of 80 grade 8 students in Physics class. A total of two (2) sections with forty (40) students each were utilized for this study. One section (40 students) was the experimental group exposed to game-based learning and the other section was the control group exposed to inquiry-based instruction in Physics. The choice whether a certain group was subjected to game-based or inquiry-based instruction was done through the toss-coin method. This pretest-posttest method of research utilized a 60-item researcher-made test in Physics. The statistical tools used were mean and standard deviations for descriptive statistics and *t*-test for independent and dependent samples for 0.05 alpha level for inferential statistics. The findings showed that students were Fairly Satisfactory in terms of the level of their performance in Physics before the intervention has been made. After the intervention, the performance of both the experimental group and the control group became Satisfactory. No significant difference existed between the pre-treatment performances and post-treatment performances of the experimental and control group. However, significant differences were noted between the pre- and post-treatment performances of each group. Moreover, the study revealed no significant

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difference in the mean gain performance between experimental group and control group. This implied that both of the interventions have a positive effect on students' performance in Physics.

Furthermore, the study showed that learning experiences of the students in the experimental group varies with the controlled group. However, learning experiences of students from either group showed that the intervention was helpful and beneficial to them.

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References

- Abellar (2012). Addressing the challenges of inquiry-based learning through technology and curriculum design. *The Journal of the Learning Sciences*, 8(3-4), 391–450.
- Abrams, E., Southerland, S.A., & Silva, P.C. (2008). *Inquiry in the classroom: Realities and opportunities*. Information Age Publishing.
- Amazigo, S.C & Zuiker, W. Situationally embodied curriculum: Relating formalisms and contexts. *Science Education* 91 (5), 750-782, (2000).
- Ang, J. (2012). *students' science skills and knowledge in guided and open inquiry-based learning*. Unpublished master's thesis. West Visayas State University, Iloilo City, Philippines.
- Annetta, J. (2009). *Benchmarks for science literacy*. New York: Oxford University Press.
- Ardales, V., (2008). *Basic concepts and methods in research (3rd ed.)*. Educational Publishing House, Manila, Philippines. ISBN#978-971-513-245-9
- Arthur, D., (2004). *The Effect of Inquiry-based instruction on Students' Participation and Attitudes in a Third Grade Science Classroom*. (Master's thesis). University of Central Florida, Orlando, Florida, 2005
- Avedon, L.A. & Minogue, J. Investigating the Impact of Video Games on High School students' engagement and learning about genetics. *Computers and Education*, 53 (1) 74-85.

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- Baker, (2002). The —classroom flip: Using web course management tools to become the guide on the side. In 11th International Conference on College Teaching and Learning, 2000.
- Carpina, J. (2014). *Inquiry's allure and illusion: Why it remains just beyond our reach*. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Philadelphia, PA.
- Darnell, J. (2001). Games in Classroom. Retrieved from <http://jasonohler.com/index.cfm>
- Department of Education. (2013). *K to 12 curriculum guide: Science*. Philippines: Author
- Department of Education. (2013). *K to 12 curriculum guide: Science*.
- Dewey, J. (1963). *Democracy and Education: An Introduction to the Philosophy of Education*, (New York, The Macmillan company, c1916,1917, 1921).
- Dubbels, D.J. Engaging Students in active learning. *Journal of Educational Psychology*, 92, 724-733. (2007)
- EdTech Review.(2013). *ISTE standards for teachers*. Retrieved from <http://www.iste.org/standards/ISTE-standards/standards-for-teachers>
- Editorial Team. (2013). Retrieved from <http://www.iste.org/standards.aspx>
- Educational Corporation (Singer, S. & Hilton, M.L.). *Investigations in high school science*. Washington, DC: National Academies Press. 2014
- Eggen, P., & Kauchak, D. (1996). *Exploring science in the elementary school*. Chicago:Rand McNally College Publishing

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Gee, J.P., *Video Games: What They Can Teach Us About Audience Engagement*. Nieman Reports, 52-54. (2010)

Gray, P. & Chiappe. *Improving Multi-Tasking Ability through Action Video games*, 2001.

Harris, M., (2009). *Investigation into the Effectiveness of an Inquiry-based Curriculum in an Introductory Biology Laboratory*. (Master's thesis) A published Master of Science Teaching Thesis, University of Maine

Hassard, J. (2005). *The Art of Teaching Science*. New York: Oxford University Press.

Lederman, N.G. (2004). In L. B. Flick & N. G. Lederman (Eds.), *Scientific inquiry and nature of science: Implications for teaching, learning, and teacher education*. Dordrecht: Kluwer Academic Publishers.

Henry, K. *Designing Centers of Expertise for Academic Learning Through Video Games*. Theory Into Practice. 47, 240-251. (1996).

Kiernan, D. A. (2015). *Inquiry-Based Teaching in the College Classroom: The Nontraditional Student*. (Doctoral dissertation). Retrieved from <http://scholarcommons.sc.edu/etd/3169>

Kirikkaya, Iseri & Vurkaya. *What Video Games Have to Teach Us About Learning and Literacy*, 2015.

Lamanna, S. M. (2010). *Inquiry-Based Learning and Student Retention*. (Master's thesis). Education and Human Development, Paper 13.

Lederman, N.G. (2004). In L. B. Flick & N. G. Lederman (Eds.), *Scientific inquiry and nature of science: Implications for teaching, learning, and teacher education*.

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Dordrecht: Kluwer Academic Publishers.

Ling Gen Shan. Transformational Play as A Curricular Scaffold: Using Video games to support science education. *Journal of Science Education and Technology* 18, 305-320. (2009).

Ling Gen Shan. The Effect of Video Games on learning Outcomes of Biology and Interest Towards Biology. (2013)

Mc Laughlin, & Talbert, J.T. (1993). What is collaborative learning? In M. Maher A.M. Goodsell and V. Tinto, editors, *Collaborative Learning: A sourcebook for higher education*, (10-30). National Center on Postsecondary Teaching, Learning and Assessment, 1992.

Merriam-Webster's collegiate dictionary (10thed.). (1993). Springfield, MA: Merriam-Webster

Ornstein, R.E. A theory of fun for game design (1st ed.) Phoenix, AZ, Paraglyph Press.(2009)

Oyedeji, D. A Pedagogy of Multiliteracies; Designing Social Futures. *Harvard Educational Review*, 66(1), 1-14. (1992)

Papastergiou, Marina. Digital Game-Based Learning in High School Computer Science Education: Impact on Educational Effectiveness and Student Motivation. *Computers & Education*, January 2009, Vol. 52, No. 1, 1-12. doi: <http://dx.doi.org/10.1016/j.compedu.2008.06.004>

Prensky, M. (2001). Digital game-based learning. New York: McGraw Hill.

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- Taganahan, R. (2014). Concept maps as assessment in science inquiry learning: A report of methodology. *International Journal of Science Education, 22(12)*, 1221–1246.
- Shaffer, D., Squire, K., Halverson, R. & Gee, J.P. Educational and Social Benefits of Digital Games. (2012).
- Schultz, C. Learning and Leading with Technology, 34 (6), 30-33
- Suchman, R.J. (1966). *Developing Inquiry*. Chicago: Science Research Associates.
- Van Eck, R. N. (2013). *Building Games from Scratch by Educators and Programmers*.
- Vygotsky, L.S. (1978). *Mind and society: The development of higher mental processes*. Cambridge, MA: Harvard University Press
- Wang, P., Yen, Y., Wu, H., & Wu, P. (2013). *The Learning Effectiveness of Inquiry-based Instruction Among Vocational High School Students*. Center for Teacher Education, Cheng-Shiu University, Educational Research International IS ISSN-L: 2307-3713, ISSN: 2307-3721 Vol. 2 No. 2
- Wenglinsky, R.(2001). *Inquiry and the National Science Education Standards*. Washington, DC: National Academy Press.
- Young, A. (2013). *Teachers' understandings of an inquiry and reported use of scientific practices: A survey of NSTA conference attendees*. Master's thesis. University of Maine.