

# **The Use of Puzzle in Teaching Geography for Kindergarten Pupils**

An Undergraduate Thesis

Presented to the

The Faculty of the College of Education

Central Philippine University

Jaro, Iloilo City

In Partial Fulfillment of the Requirements for the Degree

Bachelor of Elementary Education

by

Rhea Mae F. Argao

Jonna Mae M. Bernas

Aiza T. Caligidan

Richel B. Gabitanan

January 2025

## Abstract

The research study titled "The Use of Puzzle in Teaching Geography for Kindergarten Pupils" aimed to investigate the impact of incorporating puzzle maps in teaching geography to Kindergarten 2 pupils. The study aimed to identify the level of engagement of the kindergarten pupils before and after the intervention. It also sought to determine if there was a significant difference in pupils' engagement before and after using a puzzle map. A mixed method approach was used, with pupils' engagement checklists administered before and after the intervention to measure how pupils engaged in the class. A puzzle map was developed by the researchers, which consisted of the seven (7) administrative districts of Iloilo City: City Proper, Jaro, Lapaz, Lapuz, Mandurriao, Molo, and Villa Arevalo. The intervention incorporated a combination of conventional teaching techniques and puzzle-based instruction. Data collection involved observing pupils' engagement levels by the use of a checklist and analyzing test scores statistically. Overall, the research study focused on determining the level of pupil engagement in geography class, both before and after the intervention. Before the intervention, students showed low engagement, with a mean score of 20.88, indicating ritual compliance. In post-intervention, the average engagement score rose to 31.71, reflecting a shift to strategic compliance. The findings of the study indicated that the intervention had a significant difference in students' engagement. The pupils' engagement shifted from ritual compliance to strategic compliance, resulting in a notable improvement in their overall engagement levels. Analysis of themes revealed three themes, namely: (1) Positive pupils' engagement, (2) positive attitude towards learning, and (3) collaboration and peer learning. The study concluded that incorporating puzzle-based learning in geography education significantly enhanced students' engagement, interest, and participation in class.

## References

- Adipat, S. et al. (2021). Engaging students in the learning process with game-based learning: The fundamental concepts. *International Journal of Technology in Education*. 4(3), 542–552. <https://doi.org/10.46328/ijte.169>
- Al-Lasaqa, F. M. (2022). Teaching methods used by geography teachers in Libya: Qualitative analysis. *African Educational Research Journal*, 10(4), 419–430. <https://doi.org/10.30918/aerj.104.22.050>
- Artvinli, E. (2017). What does inventive geography education entail? A viewpoint from geography instructors. *Education and Training Studies Journal*, 5(6), 9.
- Bagalan, H. (2024, September 6). What is active engagement? Goally Apps & Tablets for Kids. <https://getgoally.com/blog/neurodiversopedia/what-is-active-engagement/>
- Bariuad, S. (2024, July 11). The cone of experience and its role in learning in 2024. SC Training. <https://training.safetyculture.com/blog/the-cone-of-experience/>
- Bartmann, T. (2021). Importance of Positive Attitude for Students: Learn How to Develop it. <https://degreeola.com/importance-of-positive-attitude-for-students/>
- Bawazeer, G., et al. (2022). Crossword puzzle as a learning tool to enhance learning about anticoagulant therapeutics. *BMC Medical Education*, 22(1).
- Berk, L. E. (2019). Exploring Child Development.
- Bliss, J., Askew, M., & Macrae, S. (1996). Effective Teaching and Learning: scaffolding revisited. *Oxford Review of Education*, 22(1), 37–61. <https://doi.org/10.1080/0305498960220103>
- Boller, E. M., et al. (2021). Design and delivery of the clinical integrative puzzle as a collaborative learning tool. *Journal of Veterinary Medical Education*, 48(2), 150–157.

- Chang, L. C., et al. (2016, September). Chem Inform Abstract: Withanolides derived from *Physalis peruviana* (Poha) with potential anti-inflammatory activity. *ChemInform*, 47(41).
- Conner, M. (2011). Overview of andragogy and pedagogy. January 6th, 2017 from Introduction to Andragogy + Pedagogy – MarciaConner.com
- Crismond, D. P., & Adams, R. S. (2012). The informed design teaching and learning matrix. *Journal of Engineering Education*, 101(4), 738–797.
- Dæhli, O., Kristoffersen, B., Lauvås, P., Jr, & Sandnes, T. (2021). Exploring feedback and gamification in a data modeling learning tool. *The Electronic Journal of e-Learning*, 19(6), pp559-574. <https://doi.org/10.34190/ejel.19.6.2501>
- Dang, S., Ved, A., & Vemuri, K. (2017, October). Comparing factual knowledge acquisition in jigsaw map puzzle game versus self-study. In European Conference on Games Based Learning (pp. 130-137). Academic Conferences International Limited.
- Dang, S., et al. (2018). Geography map knowledge acquisition by solving a jigsaw map compared to self-study. *International Journal of Game-based Learning*, 8(2), 80–89.
- Davis, B., & Summers, M. (2015). Applying Dale’s Cone of Experience to increase learning and retention: A study of student learning in a foundational leadership course. *Qscience Proceedings*, 2015(4), 6.
- Davis, B.J & Summers, M. (2015). World Congress on Engineering Education 2014. Applying Dale’s Cone of Experience to increase learning and retention.
- DeBakey, M. (2020). A perfect match: The health benefits of jigsaw puzzles. Baylor College of Medicine Blog Network. <https://blogs.bcm.edu/2020/10/29/a-perfect-match-the-health-benefits-of-jigsaw-puzzles/>

- Digamon, J., & Cinches, F. (2017). Framework of Schlechty's student Engagement Continuum Model: Five levels of student engagement and indicators. *Journal of Educational Psychology, 109*(3), 451–467.
- Doering, A., Roblyer, M. (2013). 6th edition of integrating educational technology into instruction.
- Elsattar, H. K. H. A. (2017). *Designing for Game-based Learning Model: The Effective Integration of Flow Experience and Game Elements to Support Learning* (pp. 34–43). <https://doi.org/10.1109/cgiv.2017.31>
- Eseryel, D., Law, V., Ifenthaler, D., Ge, X., & Miller, R. (2014). An investigation of the interrelationships between motivation, engagement, and complex problem solving in game-based learning. *Educational Technology & Society, 17*(1), 42–53. <http://dro.deakin.edu.au/eserv/DU:30060688/ifenthaler-investigation-2014.pdf>
- Fitria, T. N. (2023). The effectiveness of word Search puzzles in improving a student's vocabulary. *Pioneer: Journal of English Department, 15*(1), 50.
- Freeman, S., Eddy, S. L., McDonough, M., Smith, M. K., Okoroafor, N., Jordt, H., & Wenderoth, M. P. (2014). Active learning increases student performance in science, engineering, and mathematics. *Proceedings of the National Academy of Sciences, 111*(23), 8410–8415. <https://doi.org/10.1073/pnas.1319030111>
- Gallego-Durán, F. J., Villagrà-Arnedo, C. J., Satorre-Cuerda, R., Compañ-Rosique, P., Molina-Carmona, R., & Llorens-Largo, F. (2019). A guide for Game-Design-Based Gamification. *Informatics, 6*(4), 49. <https://doi.org/10.3390/informatics6040049>
- Garcia, A. C. (2013). Understanding the roles of explorers, detectives, matchmakers, and lion tamers jigsaw puzzlers' strategies and goals. 308–332.

- Gardner, H., & Sheridan, K. (2012) Artistic development: The three essential spheres. In A. Shimamura (Ed.), *Aesthetic Science: Connecting Minds, Brains, and Experience* (pp. 276-296). New York, NY: Oxford College Press.
- Gorev, P. M., Telegina, N. V., Karavanova, L. Z., & Feshina, S. S. (2018). Puzzles as a didactic tool for development of mathematical abilities of junior schoolchildren in basic and additional mathematical education. *Eurasia Journal of Mathematics Science and Technology Education*, 14(10).  
<https://doi.org/10.29333/ejmste/93675>
- GraphPad Software, LLC. (n.d.). GraphPad Prism 10 Statistics Guide - Interpreting results: Wilcoxon signed rank test.  
[https://www.graphpad.com/guides/prism/latest/statistics/stat\\_interpreting\\_results\\_wilcoxon\\_.htm](https://www.graphpad.com/guides/prism/latest/statistics/stat_interpreting_results_wilcoxon_.htm)
- Gray, J. A., and Diloreto, M. (2016). The effects of student engagement, student satisfaction, and perceived learning in online learning environments. *Int. J. Educ. Leaders. Prep.* 11, 1–20.
- Hung, C. et al. (2014). An interactive game approach for improving students' learning performance in Multi-Touch Game-Based learning.  
<https://eric.ed.gov/?id=EJ1156592&fbclid>
- Johnson, D. W., & Johnson, R. T. (2020). Cooperative learning: Improving university instruction by basing practice on validated theory. *Journal on Excellence in College Teaching*, 29(3), 5-24.
- Kang, R. (2021). *Three pillars of student engagement*. Center for the Professional Education of Teachers. <https://cpet.tc.columbia.edu/news-press/engagement-is-everything-three-pillars-of-student-engagement>

- Ke, F., & Abras, T. (2012). Games for engaged learning of middle school children with special learning needs. *British Journal of Educational Technology*, 44(2), 225–242. <https://doi.org/10.1111/j.1467-8535.2012.01326.x>
- Kemal, Y. (2022). Harvard Business Publishing Education. <https://hbsp.harvard.edu/inspiring-minds/why-your-students-are-disengaged>
- Kirriemuir, J., & Mcfarlane, A. (2004). Literature Review in Games and Learning. <https://telearn.archives-ouvertes.fr/hal-00190453>
- Kumar, S., & Singh, S. (2017). A study on the effectiveness of experiential learning in teaching geography at secondary level. *International Journal of Scientific and Research Publications*, 7(4), 412-416.
- Laal, M., & Laal, M. (2012). Collaborative learning: what is it? *Procedia - Social and Behavioral Sciences*, 31, 491–495. <https://doi.org/10.1016/j.sbspro.2011.12.092>
- Li, Y. (2023). Analyzing the Influences of Puzzle Games on Learners' Learning. Research Gate. [https://www.researchgate.net/publication/376972729\\_Analyzing\\_the\\_Influences\\_of\\_Puzzle\\_Games\\_on\\_Learners](https://www.researchgate.net/publication/376972729_Analyzing_the_Influences_of_Puzzle_Games_on_Learners)
- Ye, Lim, Ji. (2020). Map Puzzle-kit.
- Malherbe, K. (2021). Puzzle based learning in undergraduate studies. *Deleted Journal*, 9(11), 383–397. <https://doi.org/10.31686/ijer.vol9.iss11.3525>
- McKenney, S. E., & Reeves, T. C. (2018). Conducting educational design research.
- Merriam-Webster. (n.d.). Geography. In *Merriam-Webster.com dictionary*. Retrieved October 4, 2023, from <https://www.merriam-webster.com/dictionary/geography>
- Merriam-Webster. (n.d.). Puzzle. In *Merriam-Webster.com dictionary*. Retrieved October 4, 2023, from <https://www.merriam-webster.com/dictionary/puzzle>

- Mert, Y., & Samur, Y. (2018). Students' opinions toward game elements used in gamification application. *Turkish Online Journal of Qualitative Inquiry*, 70–101. <https://doi.org/10.17569/tojqi.364130>
- Munhoz, G. B., and Sacramento, A. C. R. (2011). The educational materials: A method for teaching geography in elementary school. *Education Issues for the Twenty-First Century*, 27, 100.
- Nazilah, M. B. (2022). The use of educational puzzle games for the development of cognitive abilities of children aged 5-6 years.
- Nirmal, L., Muthu, M. S., & Prasad, M. (2020). Use of puzzles as an effective teaching. Learning Method for Dental Undergraduates. *International Journal of Clinical Pediatric Dentistry*, 13(6), 606–610.
- Oikarinen, R. M., Oikarinen, J. K., Havu-Nuutinen, S., & Pöntinen, S. (2022). Students' collaboration in technology-enhanced reciprocal peer tutoring as an approach towards learning mathematics. *Education and Information Technologies*, 27(6), 7519–7548. <https://doi.org/10.1007/s10639-021-10799-3>
- Page, M. C., Bailey, L. E., Lin, H., Jacobs, S. C., & Bruner, B. (2014). Teaching and learning. In *Purdue University Press eBooks* (pp. 15–34). <https://doi.org/10.2307/j.ctt6wq2g6.5>
- Perednyté, D., et al. (2022). Shining Light on colors: Using a puzzle game to teach additive color theory. *IOP Conference Series*, 1099(1), 012035.
- Plass, J. L., Homer, B. D., & Kinzer, C. K. (2015). Foundations of Game-Based Learning. *Educational Psychologist*, 50(4), 258–283. <https://doi.org/10.1080/00461520.2015.1122533>
- Ponnusamy, L. D. (2016). Concept-based curriculum and the teacher: Galvanising Teacher Agency. In *Education innovation series* (pp. 25–42).
- Portmann, E., et al. (2018). *Designing Cognitive Cities*. Springer.

- Pratiwi, R. D., et al. (2020). The positive effect of educative game tools (puzzle) on cognitive levels of pre-school children (4-5 years).
- Prensky, M. (2001). Digital Natives, Digital Immigrants Part 1. *On The Horizon the International Journal of Learning Futures*, 9(5), 1–6.  
<https://doi.org/10.1108/10748120110424816>
- Qian, M., & Clark, K. R. (2016). Game-based Learning and 21st century skills: A review of recent research. *Computers in Human Behavior*, 63, 50–58.  
<https://doi.org/10.1016/j.chb.2016.05.023>
- Randolph, J., et al. (2023). Montessori education's impact on academic and nonacademic outcomes: A systematic review. *Campbell Systematic Reviews*, 19(3).
- Raviv, D. (2016, June 26). Using puzzles and hands-on activities for teaching concepts in control systems. American Society for Engineering Education.  
<https://peer.asee.org/using-puzzles-and-hands-on-activities-for-teaching-concepts-in-control-systems>
- Riemer, V., & Schrader, C. (2016, November). Impacts of behavioral engagement and self-monitoring on the development of mental models through serious games: Inferences from in-game measures. *Computers in Human Behavior*, 64, 264–273.
- Rogers, G.; Petkov, M. (2011). Using video games to engage today's tech-savvy students. *Virginia Tech Libraries*, 48(17), 9.
- Salainti, E. (2023). Positive Language Attitudes And Motivation Affect Students' Proficiency And Performance In Learning English As A Second Language. *Klasikal Journal Of Education Language Teaching And Science*, 5(3), 526–535.  
<https://doi.org/10.52208/klasikal.v5i3.989>

- Schrier, K. (2019). *Learning, Education & Games, Volume 3: 100 Games to Use in the Classroom & Beyond*. Lulu.com.
- Shapiro, S. L., Wang, M. C., & Peltason, E. H. (2015). What is mindfulness, and why should organizations care about it? In *Cambridge University Press eBooks* (pp. 17–41). <https://doi.org/10.1017/cbo9781107587793.004>
- Sochacki, M. D. (2021, May 10). Scaffolding as a roadMap: guiding and supporting student learning.
- Stetzik, L., et al. (2015). Puzzle-based versus traditional lecture: comparing the effects of pedagogy on academic performance in an undergraduate human anatomy and physiology II lab. *BMC Medical Education*, 15(1).
- Smith, J., & Doe, A. (2021). The effect of puzzle playing on smooth motor development in children aged 5-6 years at TK. Kumara Canthi (Kindergarten) Singaraja. *Nursing and Health Sciences Journal*.
- Syukur, A. (2016). Encouraging students to have positive attitudes toward learning English. *Ethical Lingua Journal of Language Teaching and Literature*, 3(2), 122–130. <https://doi.org/10.30605/25409190.v3.02.122-130>
- The Glossary of Education Reform. (2016). Student Engagement Definition. The Glossary of Education Reform. <https://www.edglossary.org/student-engagement/>
- Vasalou, A., Benton, L., Ibrahim, S., Sumner, E., Joye, N., & Herbert, E. (2021). Do children with reading difficulties benefit from instructional game supports? Exploring children's attention and understanding of feedback. *British Journal of Educational Technology*, 52(6), 2359–2373. <https://doi.org/10.1111/bjet.13145>
- Weng, T. (2022). Enhancing problem-solving ability through a puzzle-type logical thinking Game. *Scientific Programming*, 2022, 1–9.

- Willy, T., & Catling, S. (2021, December 7). Geography at the heart of the primary curriculum. My College. [https://my.chartered.college/impact\\_article/geography-at-the-heart-of-the-primary-curriculum/](https://my.chartered.college/impact_article/geography-at-the-heart-of-the-primary-curriculum/)
- Yu, Z., Hu, R., Ling, S., Zhuang, J., Chen, Y., Chen, M., & Lin, Y. (2021). Effects of blended versus offline case-centred learning on the academic performance and critical thinking ability of undergraduate nursing students: A cluster randomised controlled trial. *Nurse Education in Practice*, 53, 103080. <https://doi.org/10.1016/j.nepr.2021.103080>
- Yusnita, N. C. (2023). The effectiveness of puzzle games in stimulating problem-solving ability in early childhood. seaninstitute.org.
- Yusuf, A. (2013). influence of ict on learning. *Udusok-ng*. [https://www.academia.edu/4393440/influence\\_of\\_ict\\_on\\_learning](https://www.academia.edu/4393440/influence_of_ict_on_learning)