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EFFECTIVENESS OF GAMIFICATION IN IMPROVING SKILLS IN DEVELOPING DIGITAL AND NONDIGITAL RESOURCES

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ABSTRACT

The study investigated the effectiveness of gamification in improving skills in developing digital and nondigital resources among the 30 sophomore teacher education students at Benguet State University-Bokod Campus. The research employed pretest and posttest with experimental and control groups to compare the outcomes of gamification intervention and normal instruction methods. The mean, mean percentage score, standard deviation, independent and dependent t-tests were used in analyzing the data. The results suggest that both groups initially possessed basic skills in developing digital and non-digital resources. Following the gamification intervention, the control group's mean score improved, indicating a basic skill level. In contrast, the experimental group's mean score exhibited an increase, reflecting a proficient level of skill. These results demonstrate that while the control group showed some improvement, they remained within the basic skill category. Contrary, the experimental group progressed from basic to proficient skill level. The findings suggest that gamification had a positive effect in enhancing skills in developing both digital and non-digital resources among sophomore teacher education students. The significant improvement observed recommends the importance of integrating gamification into teacher education programs and the need to provide trainings and seminars to educators to effectively implement gamification techniques into teaching practices. Further studies may examine the long-term effects of gamification on skill retention and application in real-world teaching scenarios.

KEYWORDS: *Gamification, skills in developing digital and nondigital resources*

INTRODUCTION

Today's learners have short attention spans and are easily distracted during lecture hours due to various factors, including the evolution of technology. The technological shift has significantly altered the learning styles of digital natives and technology adopters. With these challenges, educators are confronted with the challenge of finding strategies to motivate, excite, and engage students through educational learning. Various studies have found these strategies positively connect with learners' academic performance.

On the other hand, technological advancement has significantly transformed teaching dynamics, empowering teachers to create lively and interactive learning environments that cultivate student engagement, collaboration, and academic achievement. Given the increasing digital reliance of today's educators and learners, the integration of new learning modalities in today's situation is suitable in an educational setting. It is presumed that gamification in education empowers skill improvement by integrating learning with games, strengthening the impact of instructional material development.

Developing instructional material resources, including customized or personalized resources, has been a concern for decades. Based on the researcher's experiences, pre-service teachers frequently need help producing digital and non-digital resources, resulting in poorly done assignments and projects. In the 21st century, educators must possess the essential skill of creating digital and non-digital resources to be effective in their teaching endeavors. The absence of competence in preparing these resources may hinder students' efficacy while teaching and interacting with their future students.

The infusion of gamification technology into globalization has gathered attention as a promising approach to engage and motivate students in the contemporary learning landscape, resulting in enhanced academic attainment. According to Hipol et al. (2020), incorporating technology has dramatically improved the capabilities of learners and expanded the range of educational opportunities. In light of this, gamification can effectively catalyze skill development in crafting digital and non-digital instructional materials. In digital resources, gamified learning platforms enable creators to refine their skills in structuring content, designing interactive elements, and optimizing user experiences. In developing non-digital instructional materials, gamification can elevate the creation process by infusing creativity into content design.

As Rashied (2018) outlined, gamified approaches enhance the efficacy of conveying complex concepts, making learning more interactive and memorable. By using game mechanics such as rewards, challenges, or progression systems, educators can effectively captivate audiences, sustain attention, and facilitate a more profound understanding of the subject matter, regardless of whether it is conveyed through digital or non-digital instructional materials.

Gamification is a pedagogical and assessment approach rooted in innovative technological trends that shape education. The study is about integrating gamification technology to improve skills in developing digital and non-digital resources in teaching and learning. It is anchored on the National Research Agenda for Teacher Education (2019-2023) on Theme A.2: Content Knowledge and its Application within and Across Curriculum Areas. Specifically, it is under Pedagogical and assessment approaches that support the teaching and the learning of 21st-century competencies and fluencies. Likewise, it is anchored on the Research and Development Agenda (2019-2023) of the College of Teacher Education on technological trends under innovative technologies in education. Combining gamification with these emerging technologies drives education towards dynamic, interactive, and adaptive learning experiences. It caters to individual needs, fosters skills beyond academic knowledge,

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and encourages a lifelong learning mindset in an increasingly technology-driven world.

Educators actively seek innovative methods to enhance students' academic achievement, aiming to produce graduates who are knowledgeable and globally competitive in the workforce. Hence, the study aimed to investigate the impact of gamification, a strategy incorporating game elements into developing digital and non-digital resources prepared by sophomore teacher education students. By exploring how gamification can enhance instructional development skills, the study's findings suggest the integration of gamification into lessons. The integration could improve the ability of students to create effective educational materials, ultimately leading to better academic performance and equipping students with the competencies required in a dynamic, technology-driven global market.

Pre-service teachers often need help producing digital and non-digital resources, leading to poorly done assignments and projects. In today's era, proficiency in creating adequate resources across digital and traditional platforms is vital. The lack of competence in this area may not only compromise the quality of educational materials but also hinder the efficiency of future educators. This underscores the urgent need for comprehensive skill development among educators to ensure an enriching and impactful educational experience for all learners. Creating influential digital and non-digital resources is a must for the future teachers of the 21st century, according to Furqan (2023), to integrate gamification technology into teaching and learning to enhance skills in producing digital and non-digital resources (Rashied, 2018).

OBJECTIVES

The main goal of the study is to assess the effect of gamification on improving the skills of the sophomore teacher education students of Benguet State University-Bokod Campus in developing digital and non-digital resources in the subject Technology for Teaching and Learning 2 during the second semester of the academic year 2023-2024.

METHODOLOGY

The study utilized a quantitative research design to analyze the numerical data gathered from the target participants. An experimental research method, featuring a pretest and posttest, was employed to determine the quantitative relationship between the gamification intervention and the respondents' skill levels in developing both digital and non-digital resources. The participants of the study were the sophomore Bachelor of Technical-Vocational Teacher Education and Bachelor of Technology and Livelihood Education students who enrolled in Technology for Teaching and Learning 2 during the second semester of the academic year 2023-2024. Simple random sampling was employed, with participants selected randomly using the draw lots method. A researcher-made test served as the primary instrument for data collection. The study involved both a control and an experimental group. Initially, both groups took a pre-test to assess their prior knowledge. The control group received standard instruction, while the experimental group was exposed to gamified learning through quizzes on Kahoot, Quizizz, and Quizalize, integrated with their lessons. Each session involved online participation via QR codes and real-time feedback on a TV screen. After the intervention, both groups took a post-test, with the control group completing a written test and the experimental group taking gamified quizzes. Data were processed using mean, mean percentage, standard deviation and independent and dependent t-test. All inferences were drawn at the 0.05 level of significance.

RESULTS AND DISCUSSION

Before the implementation of gamification, both groups exhibited a basic level of skills in developing digital and non-digital resources, with the control group having a mean score of 16.7 and the experimental group having a mean score of 18.6. This indicates similar levels of skills before the intervention. Therefore, the initial skill levels among participants were relatively homogenous across both groups. The results align with the study of Caballero et al. (2022) on the role of gamification in the academic performance of students, which revealed that the experimental group exhibited a higher mean score but also demonstrated more significant variability in performance compared to the control group, indicating more consistent performance within the control group of respondents, which is similar to the findings of this study, laying the basis for assessing the impact of gamification on skill enhancement.

After the conduct of gamification intervention, the control group improved their skill performance but remained at a basic level with mean score of 17.73. In contrast, the experimental group achieved a higher mean score of 23, signifying a proficient skill level. This confirms the findings of the study of Caballero et al. (2022), which revealed that gamification improved the experimental group's academic performance compared to the control group. This implies that it has a positive impact on the learner's academic success. These results suggest that gamification positively influences learners' academic success, underscoring its potential as an effective educational strategy.

The independent t-test results before the gamification intervention showed no significant difference in pretest scores between the experimental and control groups, with a t-value of -1.58, p-value of 0.126, and a mean difference of -1.93. This indicates that both groups had similar skill levels in developing digital and non-digital resources. These findings align with previous studies by Caballero et al. (2022) and Sahin and Namli (2016), suggesting that both groups were homogeneous at the start, providing a solid basis for comparing the effects of gamification.

The independent t-test results for the posttest scores showed a significant difference between the experimental and control groups, with a t-value of -4.64, a p-value of 0.000075, and a mean difference of -5.27. These findings indicate that the gamification intervention had a significant positive impact on the experimental group's skill development in digital and non-digital resources, leading to a substantial increase in their posttest scores compared to the control group. This supports previous research by Caballero et al. (2022) and Papellero (2021), highlighting gamification as an effective strategy for enhancing student learning outcomes.

The paired samples dependent t-test for the control group showed no significant difference between the pretest and posttest scores, with a t-value of -0.680, a p-value of 0.508, and a mean difference of -1.00. This suggests that, while there was a slight improvement in the control group's skills in developing digital and non-digital resources, the change was not statistically significant. These findings align with previous research by Sahin and Namli (2016), indicating that the observed improvements were not substantial enough to attribute them to the intervention.

The paired sample t-test for the experimental group revealed a significant difference between pretest and posttest scores, with a t-value of -2.84, a p-value of 0.013, and a mean difference of -4.33. This indicates that the gamification approach used in the study significantly improved the experimental group's skills in developing digital and non-digital resources. The findings suggest that the gamified learning environment enhanced learning

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outcomes, aligning with previous research on the positive impact of gamification on learner engagement and performance. The results reinforce the potential of gamification as an effective instructional strategy for skill development, supporting studies by Ghai and Tandon (2022) and Wahid (2018), which highlight the benefits of gamification in educational contexts.

CONCLUSIONS

The experimental and control group respondents possess the basic skill in developing digital and nondigital resources before the gamification.

After the gamification, the skill level of the experimental group remarkably increased from basic to proficient, while the control group's skill level remained in the basic category.

There is no significant difference between the pretest scores of the experimental and control groups.

There is a significant difference between the post-test scores of the experimental and control groups.

There is no significant difference between the pretest and posttest scores of the control group.

There is a significant difference between the pretest and posttest scores of the experimental group.

Recommendations

Both groups possessed basic skills before the gamification; considering the result, it is recommended that educators be supported with continuous training and resources on effective teaching strategies and student engagement techniques to enhance teaching and learning.

The experimental group's skill level increased after the gamification, which suggested adapting differentiated instruction with technolgy integration to cater to individual student needs and interests. Utilize adaptive learning technologies and provide opportunities for self-paced learning.

It is highly recommended that additional learning interventions and capacity-building activities be implemented as remediation to tackle the challenges faced by the learners, thereby ensuring sustainable development outcomes.

The results showed a significant difference in posttest scores; the control group's skills remained at the basic level while the experimental group's increased to proficient. The researcher endorsed developing well-thought-out and captivating gamification techniques to enhance student learning.

The pretest and posttest of the control group that did not receive the gamification intervention showed little skill improvement. Hence, it is important to give timely feedback and reflection to support teachers in implementing various concepts or strategies in their teaching activities.

Given the remarkable improvement in the experimental group's skills following the implementation of gamification, it is strongly recommended that this approach be integrated into teacher education courses, particularly in technology for teaching and learning subjects. The integration of gamification will enhance students' abilities to create both digital and non-digital resources, preparing future teachers for the demands of the digital era.

Future research on the effectiveness of gamification in boosting teacher education programs and its influence on students' learning outcomes is recommended.

TABLE

Table 1

Population, Sample Size, and Percentage Distribution of the Respondents

Respondents	Population	Sample	Percentage (%)
Bachelor of Technical-Vocational teacher Education (BTVTEd)	21	15	50
Bachelor of Technology and Livelihood Education (BTLEd)	26	15	50
Total	57	30	100

Table 2

Level of Skills in the Pretest of the Experimental and Control Groups

Group	N	Mean	Mean Percent Score	SD	Interval Level Description
Pretest Control Group	15	16.7	55.67%	1.52	Basic
Pretest Experimental Group	15	18.6	62%	3.03	Basic

Table 3

Level of Skills in the Posttest of the Experimental and Control Groups

Group	N	Mean	Mean Percent Score	SD	Interval Level Description
Posttest Control Group	15	17.73	59.1%	3.13	Basic
Posttest Experimental Group	15	23	76.67%	3.68	Proficient

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Table 4

Independent t-test Results for Pretest of the Experimental and Control Groups

	Pretest	T value	df	P value	Mean difference	Remarks
(Control Group)	(Experimental Group)	-1.58	28	0.126	-1.93	Not significant

Table 5

Independent t-test Results for Posttest of the Experimental and Control Groups

	Pretest	T value	df	P value	Mean difference	Remarks
(Control Group)	(Experimental Group)	-4.64	28	0.000075	-5.27	Significant

Table 6

Paired Samples Dependent t-test Results for Pretest and Posttest of the Control Group

Control Group		T value	df	P value	Mean difference	Remarks
(Pretest)	(Posttest)	-0.68	14	0.508	-1.00	Significant

REFERENCES

1. *Aguilar, C., & Coliman, B. (n.d.). Basic FAQS. https://help.quizalize.com/en/articles/982602-basic-faqs*
2. *Aina, J., & Abdulwasiu, A. (2023). Teachers' effective use of educational resources and their effect on students' learning. Universitepark Bulten, 12(2), 83-98. DOI:10.22521/unibulletin.2023.122.4*
3. *Akyuz, D. (2018). Measuring technological pedagogical content knowledge (TPACK) through performance assessment. Computers & Education. https://doi.org/10.1016/j.compedu.2018.06.010*
4. *Al Azawi, R., Bulshi, M., & Farsi, F. (2016). Educational gamification vs. game-based learning: Comparative Study. International Journal of Innovation, Management and Technology. DOI:10.18178/ijimt.2016.7.4.659*
5. *Allen, M. (2017). The SAGE encyclopedia of communication methods (Vols. 1-4). Thousand Oaks, CA: SAGE Publications, Inc. DOI: https://doi.org/10.4135/9781483381411*
6. *Antonaci, A., Klemke, R., & Specht, M. (2019). The effects of gamification in online learning environments: A systematic literature review. Informatics. DOI:10.3390/informatics6030032*
7. *Bilbao, P., Dequilla, M., Rosano, D., & Boholano, H. (2019). Technology for teaching and learning 1. LORIMAR Publishing Inc.*
8. *Brew, E., Nketiah, B., & Koranteng, R (2021). A literature review of academic performance, an insight into factors and their influences on academic outcomes of students at senior high schools. Open access library journal. DOI:10.4236/oalib.1107423*
9. *Bukoye, R. (2019). Utilization of instruction materials as tools for effective academic performance of students: implications for counselling. Proceedings. DOI:10.3390/proceedings2211395*
10. *Caballero, L., Ferrer, M., & Tiria, R. (2022). The role of gamification in the academic performance of junior high school students in language subject. International Journal of Scientific Research in Multidisciplinary https://www.isroset.org/journal/IJSRMS/full_paper_view.php?*
11. *Caponetto I., Earp, J., & Ott, M. (2014). Gamification and education: A literature review. Proceedings of the 8th European conference on games-based learning - ECGBL 2014. 1. 50-57. https://www.researchgate.net/publication/266515512*
12. *Dichev, C., & Dicheva, D. (2017). Gamifying education: What is known, what is believed and what remains uncertain: A critical review. International Journal of Educational Technology.DOI:10.1186/s41239-017-0042-5*
13. *eGyanKosh (2018). Unit 5. Non-digital teaching learning resources.https://egyankosh.ac.in/bitstream/123456789/46308/1/Unit-5.pdf*
14. *Fulton, J. (2019). Theory of gamification – motivation (Doctoral dissertation, William Howard Taft University). Gamification in education, 2020. Institute of Education Sciences. https://eric.ed.gov/?id=ED607091*
15. *Furqan, F. (2023). The analysis of students' digital literacy skills level in instructional practice in English Department at Universitas Negeri Padang (Doctoral dissertation, Universitas Negeri Padang). Journal of English Language Teaching. https://ejournal.unp.ac.id/index.php/jelt/article/view/123271*
16. *Haripriya (2013). What is quizizz? https://support.quizizz.com/hc/enus/articles/203610052-What-is-Quizizz*
17. *Irwin, V. (2023). Achievement levels. National Center for EducationStatistics.https://nces.ed.gov/nationsreportcard/ndehelp/webhelp/achievement_levels.htm.*
18. *Ghai, A., & Tandon, U. (2022). Integrating gamification and instructional design to enhance usability of online learning. Educ Inf Technol 28, 2187–2206. https://doi.org/10.1007/s10639-022-11202-5*
19. *Gueudet, G., & Pepin, B. (2023). External Context-Related Research: Digital resources as transformers of the mathematics teachers' context. The Evolution of Research on Teaching Mathematics. https://doi.org/10.1007/978-3-031-31193-2_10*
20. *Hipol, A., Cabahug, R., & Bongon, R. (2020). Impact of blended learning instruction in academic performance of grade 10 students in a selected private high school in San Juan City, Philippines. Journal of Physics. DOI:10.1088/1742-6596/1470/1/012052*
21. *Karamert, O., & Vardar, A. (2021). The effect of gamification on young mathematics learners' achievements and attitudes. Journal of Educational Technology and Online Learning, 4(2), 96-114. https://dergipark.org.tr/en/pub/jetol/issue/62619/904704*
22. *Kiryakova, G., Angelova, N., & Yordanova, L. (2014). Gamification in education. https://www.researchgate.net/publication/320234774*
23. *Landers, R. (2014). Developing a theory of gamified learning: Linking serious games and gamification of learning. Simulation & Gaming, 45(6), 752-768. https://doi.org/10.1177/1046878114563660.*

ISSN (Online): 2455-3662
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Volume: 10| Issue: 12| December 2024|| Journal DOI: 10.36713/epra2013 || SJIF Impact Factor 2024: 8.402 || ISI Value: 1.188

24. *Margallo. L., Cacharro, C., Bergula, J., Villaflor, S., Agner, M., Bughao, C., Calumpag, J., Calvara, C, Jamen, K., Loresca, A., Maanad, D., Refuerzo, J., Ripalda, L., & Rabuya, C. (2023). Effectiveness of quizizz on students' learning motivation and engagement in a filipino*
25. *class. East Asian Journal of Multidisciplinary Research. https://www.academia.edu/117709950/*
26. *Mishra, P., & Koehler, M. (2006). Technological pedagogical content knowledge: A framework for integrating technology in teachers' knowledge. Teachers College Record, 108 (6), 1017–1054. DOI:10.1111/j.1467-9620.2006.00684*
27. *National Research Agenda for Teacher Education (2019-2023). National research agenda on teacher education2018-2023.https://www.scribd.com/document/520363124/National- research agenda-on-teacher-education-2018-2023-inclusive-education-only*
28. *National STEM education resources toolkit (2020).https://www.education.gov.au/australian-curriculum/national- stem-education-resources-toolkit*
29. *Obtial, A. (2024). Digital literacy and flexible learning experiences of technology and home economics learners at the Nueva Vizcaya State University Bambang Campus. Master Thesis. Nueva Vizcaya State University Bambang Campus*
30. *Ortega, L., Cabot, A., Lopez, E., Velarde, R., Teixeira, A., & Herraiz, J. (2020). Gamifying massive online courses: effects on the social networks and course completion rates. AppliedSciences. https://doaj.org/article/3643d27778714570a8a71c6f096614b5*
31. *Papellero, J. (2021). Gamification as an instructional strategy in motivating and improving the academic performance of students in practical research 2. International Journal of Trend in Scientific Research and Development.https://www.academia.edu/91929409/*
32. *Peng, P., & Kievet, R. (2020). A literature review of academic performance, an insight into factors and their influences on academic outcomes of students at senior high schools. Society Research in Child Development. https://doi.org/10.1111/cdep.12352*
33. *Polirstok, S. et. al (2017). Strategies to improve academic achievement in secondary school students: perspectives on grit and mindset. SAGE Open. DOI:10.1177/2158244017745111*
34. *Portana, H., Fronda, J., Policarpio, D., Rigat, K., & Llames, G. (2021). Effectiveness and acceptability of instructional materials in the enhancement of students' academic achievement. International Journal of Advanced Engineering, Management and Science (IJAEMS). https://www.researchgate.net/publication/348334247_*
35. *Rashied, S. (2018). The impact of gamification technology on students' performance and motivation in schools.pdf. Academia premium. https://www.academia.edu/38326874/*
36. *Sahin, M., & Namli, N. (2016). Gamification and effects on students' science lesson achievement. International Journal on New Trends in Education and their Implications. http://ijonte.org/FileUpload/ks63207/File/04.a.mehmet_can_sahin_.pdf*
37. *Santos, J., & Castro, R. (2021). Technological pedagogical content knowledge (TPACK) in action:application of learning in the classroom by pre- service teachers (PST). Social Sciences and Humanities Open. https://doi.org/10.1016/j.ssaho.2021.100110*
38. *Wahid, S., & Wahid, B. (2018). The effectiveness of gamification in improving student performance for programminglesson.https://www.researchgate.net/publication/332698117*
39. *Wang, A., & Tahir, R. (2020). The effect of using kahoot! for learning– A literature review. Science Direct. https://www.sciencedirect.com/science/article/pii/S0360131520300208*
40. *Yığ, K., & Sezgin, S. (2021). An exploratory holistic analysis of digital gamification in mathematics education. Journal of Educational Technology and Online Learning, 4(2), 115-136. https://dergipark.org.tr/en/pub/jetol/issue/62619/888096*
41. *Zaharin, F., Karim, N., Adenan, N., Junus, N., Tarmizi, R., Hamid, N., & Latib, L. (2021). Gamification in mathematics: students' perceptions in learning perimeter and area. Jurnal Pendidikan Sains Dan Matematik Malaysia, 11, 72-80. https://doi.org/10.37134/jpsmm.vol11.sp.7.2021*
42. *Zaric, N., Ropke, R., Lukarov, V., & Schroeder, U. (2021). Gamified learning theory: The moderating role of learners' learning tendencies. International Journal of Serious Games. https://www.researchgate.net/publication/354660157*