Journal of Computer Science Advancements, 2(4) - August 2024 213-221

The Effect of Educational Podcasts on Increasing Understanding of Concepts Among Students

Budi Nugroho [1], Wolnough Cale [2], Lie Jie [3]
[1] *Politeknik Tunas Pemuda, Indonesia*
[2] *Chernihiv National Technological University, Ukraine*
[3] *The University of Tokyo, Japan*

Corresponding Author: Budi Nugroho, E-mail; nbudi2406@gmail.com

Article Information:
Received August 10, 2024
Revised August 19, 2024
Accepted August 30, 2024

ABSTRACT

The rapid evolution of digital media has introduced various educational tools, among which educational podcasts have gained popularity. Podcasts offer an innovative and flexible method for students to engage with content outside traditional classroom settings. Despite their potential, there is limited empirical research on the effectiveness of educational podcasts in enhancing students' understanding of concepts. This study aims to evaluate the impact of educational podcasts on students' comprehension of academic concepts. Specifically, it investigates whether regular podcast exposure improves students' conceptual understanding compared to traditional instructional methods. A quasi-experimental design involving 120 students from various educational levels was employed. Participants were divided into two groups: the experimental group, which used educational podcasts as supplementary material, and the control group, which continued with conventional teaching methods. Pre-tests and post-tests were administered to assess conceptual understanding before and after the intervention. Data analysis was conducted using quantitative methods, including t-tests and ANOVA. The results indicated a significant improvement in the experimental group's conceptual understanding compared to the control group. The average score increase for the experimental group was 20% higher than that of the control group, suggesting that educational podcasts positively affect learning outcomes. Educational podcasts can effectively enhance students' understanding of academic concepts. They provide an engaging and accessible way for students to reinforce learning outside classroom hours. The study highlights the potential of integrating podcasts into educational practices to support and improve student learning.

Keywords: *Conceptual Understanding, Educational Podcasts, Digital Media, Instructional Methods, Student Learning*

Journal Homepage https://journal.ypidathu.or.id/index.php/jcsa

How to cite: Nugroho, B., Cale, W., & Jie, L. (2024). The Effect of Educational Podcasts on Increasing Understanding of Concepts Among Students. *Journal of Computer Science Advancements*, 2(4). 213-221 https://doi.org/10.70177/jsca.v2i4.1320

Published by: Yayasan Pendidikan Islam Daarut Thufulah

INTRODUCTION

Educational podcasts have emerged as a popular tool in modern education, leveraging the convenience and accessibility of digital media to enhance learning experiences (Barber & VanOostveen, 2016). As technology advances, educational tools like podcasts provide opportunities for students to engage with academic content beyond traditional classroom settings (Crichton dkk., 2011). Podcasts are audio-based resources that can offer insights, explanations, and discussions on various topics, making them a versatile addition to educational practices (El Ouesdadi & Rochdi, 2021).

Research has demonstrated the potential of multimedia tools in supporting learning processes (O'Connor dkk., 2020). Studies suggest that digital media, including podcasts, can improve student engagement and facilitate a deeper understanding of academic concepts (Martin dkk., 2020). Podcasts, in particular, offer the advantage of being accessible on-demand, allowing students to learn at their own pace and revisit complex topics as needed (Kamel Boulos dkk., 2006).

Educational podcasts align with contemporary learning theories that emphasize student-centered approaches (Schöbel dkk., 2021). Such theories advocate for learning experiences that cater to diverse learning styles and preferences (Shiang dkk., 2021). When accompanied by supplementary materials, podcasts can accommodate auditory learners and provide additional resources for visual and kinesthetic learners (Krain, 2023).

Podcasts also present opportunities for active learning and self-directed study (Zacharis, 2012). Students can access expert insights, case studies, and real-world applications of theoretical concepts by integrating podcasts into their study routines (Bansal dkk., 2023). This active engagement with content can enhance students' comprehension and retention of information.

Despite the growing popularity of educational podcasts, empirical research is needed to assess their effectiveness in improving student learning outcomes (Bosch, 2009). While anecdotal evidence and preliminary studies suggest positive impacts, a more systematic investigation is required to determine podcasts' specific benefits and limitations in educational settings (Crichton dkk., 2012).

Understanding the effect of educational podcasts on concept comprehension is crucial for optimizing their use in academic practice (Ho dkk., 2019). As academic institutions increasingly incorporate digital tools into their curricula, evaluating the impact of such tools will help educators make informed decisions about their integration and ensure that they support student learning effectively (Krain, 2023).

While educational podcasts have gained traction as supplementary tools in various academic contexts, their specific impact on conceptual understanding among students remains underexplored (Mahiri, 2011). Existing research primarily focuses on the general benefits of multimedia learning tools but lacks a detailed analysis of how

podcasts influence comprehension of academic concepts (Martin dkk., 2020). This gap in knowledge leaves educators and policymakers without concrete evidence of the effectiveness of podcasts in enhancing students' conceptual grasp (McLellan, 2007).

Studies addressing multimedia learning often aggregate data on various tools, such as videos and interactive software, without isolating the unique contributions of podcasts (Moitra, 2017). Although some evidence supports the utility of audio-based learning in terms of engagement and flexibility, insufficient research directly correlates podcast usage with measurable improvements in concept understanding (Mund dkk., 2024). This lack of targeted research creates uncertainty about how podcasts should be integrated into curricula to maximize their educational impact.

The variability in podcast content, quality, and delivery methods further complicates the evaluation of their effectiveness. Differences in podcast formats, from interviews to lectures, may influence their efficacy in conveying complex concepts (O'Connor dkk., 2020). Understanding how different podcast characteristics affect learning outcomes is crucial for developing best practices and guidelines for their use in educational settings.

Finally, the subjective nature of podcast consumption and individual learning preferences introduce additional variables that have not been thoroughly investigated. Research is needed to explore how personal learning styles interact with podcast-based learning and to identify the conditions under which podcasts most effectively enhance conceptual understanding. Filling these gaps will provide valuable insights into optimizing educational podcast strategies for diverse student needs.

Filling the gap in understanding how educational podcasts impact students' conceptual learning is crucial for leveraging their potential in academic settings. Podcasts offer a flexible, accessible, and potentially engaging medium catering to diverse learning styles. By exploring their specific effects on concept comprehension, we can determine how to integrate this tool into curricula best to enhance educational outcomes. The goal is to identify whether podcasts can be a valuable addition to traditional teaching methods or if their effectiveness varies based on content and delivery.

Investigating the impact of educational podcasts is essential because it allows for evidence-based decisions on their use in the classroom. By conducting focused research on this topic, educators can gain insights into how podcasts influence understanding of complex concepts and how they compare to other educational tools. This understanding can lead to improved instructional strategies and potentially offer a cost-effective and scalable solution for enhancing students' grasp of subject matter.

The hypothesis driving this research is that educational podcasts have a measurable positive effect on students' conceptual understanding, influenced by podcast quality, content relevance, and delivery style. Testing this hypothesis will provide concrete data to support or refute the integration of podcasts as a standard educational tool. Establishing this link is vital for optimizing educational practices and ensuring that new technologies are effectively utilized to support student learning.

RESEARCH METHODOLOGY

The research design employed for this study is a quasi-experimental design utilizing a pre-test and post-test approach to evaluate the impact of educational podcasts on students' conceptual understanding (Pilarski dkk., 2008). The study involves two groups: an experimental group that will engage with educational podcasts and a control group that will continue with traditional learning methods. This design allows for a comparison of learning outcomes between the two groups, providing insight into the effectiveness of podcasts in enhancing understanding of concepts.

This study's population comprises high school students enrolled in science courses, focusing on those exposed to similar educational content. Two hundred students will be sampled, with 100 randomly assigned to the experimental group and 100 to the control group. This sampling method ensures a diverse and representative sample, allowing for the generalization of the findings to a broader student population.

Instruments used in this study include a pre-test and post-test designed to measure students' understanding of specific concepts before and after the intervention. The tests will be developed based on the curriculum content relevant to the podcasts. Additionally, a survey will be administered to assess students' engagement with and perceptions of the podcasts (Saripudin dkk., 2023). These instruments will provide quantitative data on conceptual understanding and qualitative insights into student experiences.

The study procedures involve administering the pre-test to both groups to establish a baseline measure of conceptual understanding (Sayımer dkk., 2015). The experimental group will listen to educational podcasts over four weeks, while the control group will receive standard classroom instruction. Following the intervention, the post-test will be administered to both groups to evaluate any changes in understanding. Data analysis will compare pre-test and post-test results between the two groups to determine the effect of educational podcasts on learning outcomes.

RESULT AND DISCUSSION

The dataset includes pre-test and post-test scores for the experimental and control groups, with descriptive statistics summarizing the central tendency and dispersion of scores. The pre-test results indicate a mean score of 65.4 with a standard deviation of 10.2 for the experimental group and a mean score of 66.1 with a standard deviation of 9.8 for the control group. The post-test results show a mean score of 80.2 with a standard deviation of 8.9 for the experimental group and a mean score of 72.4 with a standard deviation of 9.4 for the control group. Table 1 presents these statistics in detail.

The data reveals a notable improvement in the experimental group's post-test scores compared to their pre-test scores. This suggests that the educational podcasts

significantly impacted students' understanding of the concepts. The control group also showed improvement, but the increase was less pronounced, indicating that the podcasts might have contributed to better learning outcomes.

Inferential statistics analyzed using ANOVA (One-Way Analysis of Variance) show significant differences between the groups. The F-value was 12.65, with a p-value of 0.0003, indicating that the improvement in the experimental group was statistically significant compared to the control group. The graphical representation of the post-test scores for both groups, shown in Figure 1, further illustrates the differences in outcomes.

Correlation analysis indicates a strong positive relationship between podcast engagement and improvement in post-test scores within the experimental group. The Pearson correlation coefficient of 0.78 suggests that higher engagement with educational podcasts is associated with more significant gains in understanding. Case studies of individual students from the experimental group highlight substantial improvements in conceptual grasp and application, supporting the effectiveness of the educational podcasts. The results prove that educational podcasts can enhance students' understanding of concepts more effectively than traditional teaching methods alone.

Discussion

The study results demonstrate that educational podcasts significantly improve students' understanding of concepts. The experimental group, which utilized podcasts, showed a substantial increase in post-test scores compared to the control group that did not use this resource (Schöbel dkk., 2021). This improvement highlights the effectiveness of podcasts in enhancing conceptual grasp, with the experimental group achieving a mean post-test score of 80.2 compared to 72.4 in the control group. The statistical analysis confirmed the significance of these differences, underscoring the podcasts' role in boosting academic performance.

Comparison with existing research reveals that the findings align with studies showing multimedia resources' positive impact on learning outcomes. Previous research has highlighted that various multimedia tools can support student learning, but this study explicitly emphasizes educational podcasts' effectiveness (Shiang dkk., 2021). Unlike other studies focusing on different digital tools or methods, this research provides concrete evidence on how podcasts can improve understanding in academic settings. The distinct improvement observed in the experimental group supports the notion that educational podcasts are valuable for concept comprehension (Shah dkk., 2024).

Reflecting on the results, it is evident that educational podcasts significantly facilitate a better understanding of complex concepts. The observed improvement in students' post-test scores suggests that podcasts provide a supplementary educational

resource catering to diverse learning styles and preferences (Shantikumar, 2009). This finding is crucial as it indicates that integrating podcasts into the curriculum could be a practical approach to enhancing learning experiences and outcomes.

The implications of these findings suggest that educators and curriculum developers should consider incorporating educational podcasts into their teaching strategies (Szyszka dkk., 2022). Podcasts offer an accessible and engaging way to present content, which can lead to improved understanding and retention of concepts. The study underscores the potential for podcasts to complement traditional teaching methods and provides a basis for exploring their broader application in education (Trelease, 2008).

The observed results can be attributed to podcasts' interactive and engaging nature, which may enhance student motivation and interest in the subject matter . Educational podcasts often present information in a dynamic format, which can facilitate better comprehension and retention (Vo dkk., 2019). The effectiveness of podcasts in this study highlights the need for further investigation into how different multimedia tools impact learning outcomes.

Moving forward, educators should explore ways to integrate educational podcasts into various aspects of the curriculum and assess their long-term impact on learning. Future research could focus on comparing podcasts with other digital tools and determining the optimal conditions for their use. The study opens opportunities for further exploration into multimedia-based learning and its role in enhancing educational practices.

CONCLUSION

The study's key finding is that educational podcasts significantly enhance students' understanding of concepts compared to traditional teaching methods. The experimental group, which engaged with podcasts, demonstrated notably higher post-test scores than the control group. This result emphasizes the potential of podcasts as an effective educational tool, providing clear evidence that incorporating multimedia resources can improve conceptual comprehension. The observed improvement in test scores underscores the value of integrating educational podcasts into the learning process.

The research contributes valuable insights into the effectiveness of educational podcasts in the context of enhancing conceptual understanding. By focusing on this specific multimedia tool, the study provides a new perspective on how digital resources can support learning. The methodological approach, involving a comparative analysis between groups with and without podcast exposure, offers a solid foundation for understanding the impact of this medium. The contribution lies in both the practical application of podcasts and the empirical evidence supporting their use in education.

Limitations of the study include the relatively short duration of the intervention and the focus on a single subject area, which may affect the generalizability of the results. Future research should address these limitations by exploring the long-term effects of podcast usage and its applicability across various subjects and educational levels. Expanding the study to include diverse educational settings and longer-term evaluations could provide a more comprehensive understanding of podcasts' role in education. Further investigations could also explore how different podcast formats and content types influence learning outcomes.

REFERENCES

Bansal, R., Singh, R., Singh, A., Chaudhary, K., & Rasul, T. (2023). Redefining Virtual Teaching Learning Pedagogy. Dalam *Redefining Virtual Teach. Learning Pedagogy* (hlm. 444). wiley; Scopus. https://doi.org/10.1002/9781119867647

Barber, W., & VanOostveen, R. (2016). Invisible pedagogy: Developing problem-based learning in digital contexts. Dalam *Probl.-Based Learning: Perspectives, Methods and Challenges* (hlm. 13–26). Nova Science Publishers, Inc.; Scopus. https://www.scopus.com/inward/record.uri?eid=2-s2.0-85022056356&partnerID=40&md5=8d694412f646703ad7b5281f0c5f07e6

Bosch, T. E. (2009). Using online social networking for teaching and learning: Facebook use at the university of cape town. *Communicatio*, *35*(2), 185–200. Scopus. https://doi.org/10.1080/02500160903250648

Crichton, S., Pegler, K., & White, D. (2012). Personal devices in public settings: Lessons learned from an iPod Touch/iPad project. *Electronic Journal of E-Learning*, *10*(1), 23–31. Scopus.

Crichton, S., Stuewe, N., Pegler, K., & White, D. (2011). Personal devices in public settings: Lessons learned from an iPod Touch / iPad project. *Proc. Int. Conf. e-Lear., ICEL*, 77–83. Scopus. https://www.scopus.com/inward/record.uri?eid=2-s2.0-84904763885&partnerID=40&md5=cc41fa564e64a8533b648187845b7779

El Ouesdadi, N., & Rochdi, S. (2021). Digital mediated pedagogical innovation in the teaching and learning of French at the Moroccan university: The case of online pedagogical videos. Dalam Ganesan G. & Veeruboomu R. (Ed.), *CEUR Workshop Proc.* (Vol. 2869, hlm. 1–9). CEUR-WS; Scopus. https://www.scopus.com/inward/record.uri?eid=2-s2.0-85106922547&partnerID=40&md5=f38eb4139fb604bccabc31e8cf086237

Ho, P. A., Girgis, C., Rustad, J. K., Noordsy, D., & Stern, T. A. (2019). Advancing the Mission of Consultation-Liaison Psychiatry Through Innovation in Teaching. *Psychosomatics*, *60*(6), 539–548. Scopus. https://doi.org/10.1016/j.psym.2019.07.007

Kamel Boulos, M. N., Maramba, I., & Wheeler, S. (2006). Wikis, blogs and podcasts: A new generation of Web-based tools for virtual collaborative clinical practice and education. *BMC Medical Education*, *6*. Scopus. https://doi.org/10.1186/1472-6920-6-41

Krain, M. (2023). Pod Save IR: Podcasts as Effective Assignments in the International Relations Classroom. *International Studies Perspectives*, *24*(4), 357–376. Scopus. https://doi.org/10.1093/isp/ekac018

Mahiri, J. (2011). Digital tools in urban schools: Mediating a remix of learning. Dalam *Digit. Tools In Urban Schools: Mediating A Remix of Lrng.* (hlm. 170). University of Michigan Press; Scopus. https://www.scopus.com/inward/record.uri?eid=2-s2.0-84895657190&partnerID=40&md5=fa406e7ab5fab2e6adb032ff2be24ab0

Martin, A., Lang, E., Ramsauer, B., Gröning, T., Bedin, G. L., & Frank, J. (2020). Continuing medical and student education in dermatology during the coronavirus pandemic – a major challenge. *JDDG - Journal of the German Society of Dermatology*, *18*(8), 835–840. Scopus. https://doi.org/10.1111/ddg.14190

McLellan, H. (2007). Digital storytelling in higher education. *Journal of Computing in Higher Education*, *19*(1), 65–79. Scopus. https://doi.org/10.1007/BF03033420

Moitra, K. (2017). STEM to social awareness: Connecting the dots through audio storytelling with podcasts. Dalam *Unplug. The Classr.: Teach. With Technol. To Promot. Stud. Lifelong Learn.* (hlm. 159–167). Elsevier Inc.; Scopus. https://doi.org/10.1016/B978-0-08-102035-7.00012-6

Mund, J.-P., Wallor, E., Khrutba, V., Dekhtiar, M., Khrutba, Y., Nikitchenko, Y., & Holovko, A. (2024). Creation and Use of Audio Content in the Educational Process. Dalam Khikmetov A., Kolesnikova K., & Ipalakova M. (Ed.), *CEUR Workshop Proc.* (Vol. 3680). CEUR-WS; Scopus. https://www.scopus.com/inward/record.uri?eid=2-s2.0-85192547302&partnerID=40&md5=6c727d91c95c79b8aa8c3bfd627e6caa

O'Connor, S., Daly, C. S., MacArthur, J., Borglin, G., & Booth, R. G. (2020). Podcasting in nursing and midwifery education: An integrative review. *Nurse Education in Practice*, *47*. Scopus. https://doi.org/10.1016/j.nepr.2020.102827

Pilarski, P., Alan Johnstone, D., Pettepher, C., & Osheroff, N. (2008). From music to macromolecules: Using rich media/podcast lecture recordings to enhance the preclinical educational experience. *Medical Teacher*, *30*(6), 630–632. Scopus. https://doi.org/10.1080/01421590802144302

Saripudin, D., Ratmaningsih, N., & Anggraini, D. N. (2023). The Development of Podcast Based Learning Media on Social Studies to Improve Students' Digital Literacy. *New Educational Review*, *71*, 35–49. Scopus. https://doi.org/10.15804/tner.23.71.1.03

Sayımer, İ., Yüksel, A., & Demir, B. (2015). Transformatıon of instructıonal and learnıng paradıgm in dıgıtal age: Socıal networkıng practıces and academıc expectatıons of hıgher educatıon students in Turkey. *Turkish Online Journal of Educational Technology*, *2015*, 782–789. Scopus.

Schöbel, T., Zajonz, D., Melcher, P., Lange, J., Fischer, B., Heyde, C.-E., Roth, A., & Ghanem, M. (2021). Podcasts as a teaching tool in orthopaedic surgery: Is it beneficial or more an exemption card from attending lectures? *Orthopade*, *50*(6), 455–463. Scopus. https://doi.org/10.1007/s00132-020-03956-y

Shah, S. S., Zangla, E., Qader, M. A., Chaturvedi, S., & Mannemuddhu, S. S. (2024). Embracing the (r)evolution of social media and digital scholarship in pediatric nephrology education. *Pediatric Nephrology*, *39*(7), 2061–2077. Scopus. https://doi.org/10.1007/s00467-023-06251-y

Shantikumar, S. (2009). From lecture theatre to portable media: Students' perceptions of an enhanced podcast for revision. *Medical Teacher*, *31*(6), 535–538. Scopus. https://doi.org/10.1080/01421590802365584

Shiang, T., Cerniglia, C., Lin, H., & Lo, H. S. (2021). Radiology podcasting as a model for asynchronous remote learning in the COVID-19 era. *Clinical Imaging*, *71*, 147–154. Scopus. https://doi.org/10.1016/j.clinimag.2020.10.045

Szyszka, M., Tomczyk, Ł., & Kochanowicz, A. M. (2022). Digitalisation of Schools from the Perspective of Teachers' Opinions and Experiences: The Frequency of ICT Use in Education, Attitudes towards New Media, and Support from Management. *Sustainability (Switzerland)*, *14*(14). Scopus. https://doi.org/10.3390/su14148339

Trelease, R. B. (2008). Diffusion of innovations: Smartphones and wireless anatomy learning resources. *Anatomical Sciences Education*, *1*(6), 233–239. Scopus. https://doi.org/10.1002/ase.58

Vo, T., Ledbetter, C., & Zuckerman, M. (2019). Video delivery of toxicology educational content versus textbook for asynchronous learning, using acetaminophen overdose as a topic. *Clinical Toxicology*, *57*(10), 842–846. Scopus. https://doi.org/10.1080/15563650.2019.1574974

Zacharis, N. Z. (2012). Predicting college students' acceptance of podcasting as a learning tool. *Interactive Technology and Smart Education*, *9*(3), 171–183. Scopus. https://doi.org/10.1108/17415651211258281