

Audio-Based Gamification for Inclusive SDGs Learning in State Schools for Visually Impaired Teachers

Gamifikasi Berbasis Audio untuk Pembelajaran Inklusif SDGs bagi Guru Tunanetra di Sekolah Negeri

Majidah Majidah^{1)*}, Alfian Akbar Gozali²⁾, Ranita Windriani³⁾

¹⁾Magister Akuntansi/School of Economics and Business, Telkom University, Bandung, Indonesia

²⁾Software Engineering, School of Applied Science, Telkom University, Bandung, Indonesia

³⁾Directorate of Information Technology Center, Telkom University, Bandung, Indonesia

*Corresponding author: majidah@telkomuniversity.ac.id

Received July 2025, Accepted December 2025, Published December 2025

ABSTRACT. *Education plays an essential role in producing quality graduates, and the right to quality education is guaranteed by law, including for people with disabilities. To realise quality education, teachers need to update their knowledge to equip students with the skills to understand environmental issues and, hopefully, obtain decent jobs, thereby contributing to sustainable, environmentally friendly economic growth. Therefore, it is necessary to conduct community service for visually impaired teachers on the Sustainable Development Goals for Visually Impaired Teachers using an audio-based gamification learning method, which is an innovative, inclusive learning method. Sixty special needs schoolteachers attended this community service activity, but only 65% participated in the assessment. The percentage of correct answers was relatively high, and the completion time was adequate. From each multiple-choice and true/false evaluation, five winners were selected based on the number of correct answers and the fastest completion time. The results of the audio-based assessment indicate that the learning materials and methods used were well absorbed.*

Keywords: Audio; gamification; sustainable development goals

ABSTRAK. Pendidikan berperan penting dalam menghasilkan lulusan yang berkualitas dan hak memperoleh pendidikan yang berkualitas dijamin oleh undang-undang, termasuk bagi para disabilitas. Untuk mewujudkan Pendidikan yang berkualitas tersebut, perlu para Guru mengupdate pengetahuan untuk membekali peserta didik, sehingga memperoleh Pendidikan yang berkualitas, memahami isu lingkungan dan diharapkan peserta didik dapat memperoleh pekerjaan layak, sehingga berkontribusi pada pertumbuhan ekonomi berkelanjutan dan berwawasan lingkungan. Oleh karena itu perlu dilakukan pengabdian masyarakat bagi Guru Tunanetra tentang Sustainable Development Goals Bagi Guru Tunanetra dengan metode pembelajaran gamifikasi berbasis audio yang merupakan inovasi pembelajaran inklusif. Kegiatan abdimas ini diikuti oleh 60 Guru SLB, tetapi yang mengikuti penilaian hanya 65%. Tingkat jawaban yang benar relatif banyak dengan waktu pengerjaan memadai. Dari masing-masing penilaian pilihan ganda dan salah atau benar, ditetapkan masing-masing lima pemenang berdasarkan jawaban yang benar dan waktu pengerjaan tercepat. Dari hasil penilaian berbasis audio menunjukkan bahwa materi dan metode pembelajaran yang digunakan dapat diserap dengan baik.

Kata kunci: Audio; gamifikasi; sustainable development goals

INTRODUCTION

Education plays a crucial role in developing superior human resources. As a basic human need, education serves to improve the quality of life and welfare of society. Therefore, Law No. 20 of 2003 concerning the National Education System, in Article 5, paragraph 1, emphasizes that every Indonesian citizen has the right to quality education. ((Presiden Republik Indonesia, 2003). This provision is also emphasized in Law No. 8 of 2016 concerning Persons with Disabilities, specifically Article 5, Paragraph 1, letter e, which states that persons

with disabilities have the right to access education. The guarantee of quality education, as provided by both regulatory forms, forms the basis for selecting the target partner in community service activities, namely the State Special School A in Pajajaran, Bandung.

SLBN A-Bandung, or State Special School A in Bandung, is a school for visually impaired students where this community service programme is carried out. The address of SLBN A-Bandung is Jl. Pajajaran No. 50, Pasirkaliki, Cicendo District, Bandung. The school has 20 permanent teachers, 15 regular students, and 54 students in study groups. This community service programme involves all 60 permanent and non-permanent teachers.



Figure 1. Image of the building, teachers, and students of SLBNA-Bandung
Source: Solehudin-detik.com (2019)

The curriculum at SLBNA Bandung equips students with Information and Communication Technology (ICT) skills. However, the facts show that teachers at the school lack knowledge of global issues, such as the Sustainable Development Goals (SDGs) and the year in which they are to be achieved. Learning about SDGs needs to be incorporated into the SLBNA curriculum to raise global awareness of issues such as global warming and climate change (Koçulu & Topçu, 2024).

Learning about the SDGs aims to build awareness among teachers and students as global citizens about the economy and global climate change, for the welfare of humanity, including the Indonesian people. This will equip students for the world of work, including entrepreneurship and self-employment, with the hope that graduates of SLBN A can secure decent employment as guaranteed by Law No. 8 of 2016, Article 5, Paragraph 1, Point f. (Presiden Republik Indonesia, 2016). Learning with audio-based gamification methods to facilitate learning and make participants active and adaptive towards sustainable development goals.

Learning with audio-based gamification methods enhances the learning process, making participants more active and adaptable to the Sustainable Development Goals. The application of gamification in learning will motivate learners and increase their engagement in learning (Almelhes, 2024). Gamification pedagogy helps create a sense of competence and clear learning objectives, so that students are more active learners than with traditional methods (Bräuer & Mazarakis, 2024). Audio-based gamification is an effective accessibility technique, as audio serves as a visual substitute for the visually impaired (Agrimi et al., 2024). Particularly in terms of disability, gamification has been shown to increase learning motivation, engagement, and participation among learners with disabilities (Jadán-Guerrero et al., 2023). Audio-based gamification utilizes the advantages of auditory learning pathways for blind students and minimizes barriers to accessing information in visual media (Ramos Aguiar et al., 2023). Referring to self-determination theory, gamification can increase.

METHOD

The method used in this community service activity is gamification, which is an approach that adapts game elements to encourage positive learning behavior. Audio-based gamification is an innovative and inclusive learning method for individuals with visual impairments. The applied gamification is audio-based, a learning technique that uses audio in both learning and assessment by integrating game techniques and components into audio-based learning (Gachkova & Somova, 2019; Prameswari et al., 2025). This approach is based on a conceptual framework that aims to improve understanding, encourage active

participation, and develop skills among participants, especially the target community (Ariani, 2020; Gachkova, 2016). In addition to gamification, mentoring methods are also applied directly to participants to strengthen their understanding and skills (Sabela et al., 2022). SDG learning focuses on Goals 4 (Quality Education), 8 (Decent Work and Economic Growth), 12 (Responsible Consumption and Production), and 13 (Climate Action) through a game-based learning approach (Sabela et al., 2022). The stages of implementing community service activities are explained as follows.

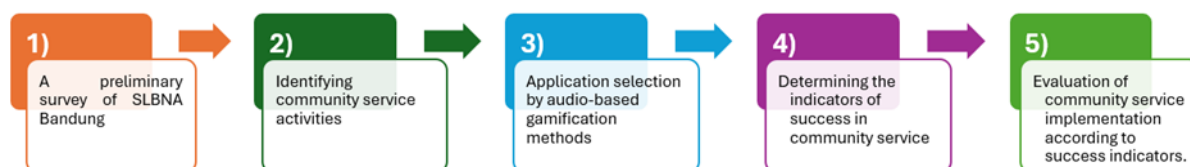


Figure 2. Stages of Community Service Implementation

The stages in the implementation of community service activities, as shown in Figure 2, are described as follows:

- 1) A survey was conducted to identify the needs and readiness of schools and teachers as the target community.
- 2) Activities were identified based on the needs of the target partners; community service activities were designed based on the partners' needs, namely training on Sustainable Development Goals (SDGs), including quality education, decent work and growth, responsible consumption and production, and climate change mitigation, using audio-based gamification.
- 3) Application selection using audio-based gamification methods; selection of application software in accordance with these methods, using Khoot to answer questions on SDGs 4, 8, 12, and 13.
- 4) Determining the indicators of success in community service; success is considered achieved if participants or target communities can answer questions accurately and quickly, thereby obtaining the top five highest scores.
- 5) Evaluation of community service implementation according to success indicators; the evaluation process is conducted based on the implementation of the gamification method in terms of timeliness and accuracy of answers as per point 3), thereby determining the top five participants as winners.

Based on these five stages and utilizing the audio-based Kahoot application, the implementation of this inclusive innovative learning was assisted by eight students who accompanied the participants both during the presentation of the material and during the evaluation stage.

RESULTS AND DISCUSSION

The community service activity with gamified learning began with a presentation on SDGs 4, 8, 12, and 13. The activity continued with a question-and-answer session on the material presented. Another question-and-answer session followed this. Using the gamification learning method, participants who asked questions during the question-and-answer session were given prizes. The final stage was an assessment stage using the Khoot tool, where participants competed to answer correctly and quickly to earn rewards. The presentation and awarding of prizes to the questioners are shown in Figure.

The next stage is the assessment process using a competition system based on gamification learning methods, with two types of assessment questions as follows:

- 1) Assessment of all SDG material with 15 multiple-choice questions. The first question is for testing purposes; therefore, the evaluation and scoring questions are numbered 14.
- 2) Assessment of all SDG materials with 15 True & False questions. The first question is for testing purposes, so the total number of questions is 14.
- 3) The assessment uses audio-based "Khoot" software. During the evaluation, students on the community service team assist visually impaired teachers in clarifying questions; the teachers then answer them using mobile phones or personal computers.



Figure 3. Presentation of Materials and Awarding of Prizes to Questioners

The results of the multiple-choice assessment are shown in Figure 4. As showed at Figure 4, the average of 38 participants answered questions 2 and 4 correctly. This question was related to the quality of education. The participation rate for this quiz was 65%. The obstacle faced at the beginning of the assessment was that participants were not yet fully adapted. The role of students as mentors helped participants clarify what was being asked in the questions without revealing the correct answers.

The results of the multiple-choice questions determined five winners based on the highest number of correct answers and the fastest completion time, as shown in Figure 5. The top five winners of the multiple-choice questions from the 14 questions tested, as shown in Figure 5, were determined based on the number of correct answers and the fastest completion time to determine the 1st to fifth place winners. Meanwhile, the results of the True and False Assessment are as show at Figure 6.

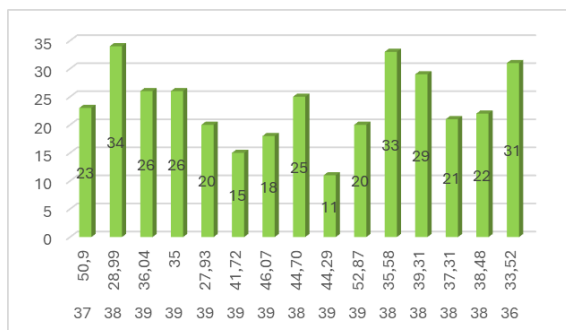


Figure 4. Multiple Choice Results for SDGs Questions

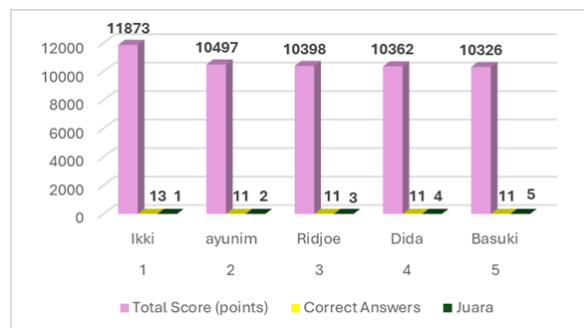


Figure 5. Top Five Winners of the Multiple Choice Questions

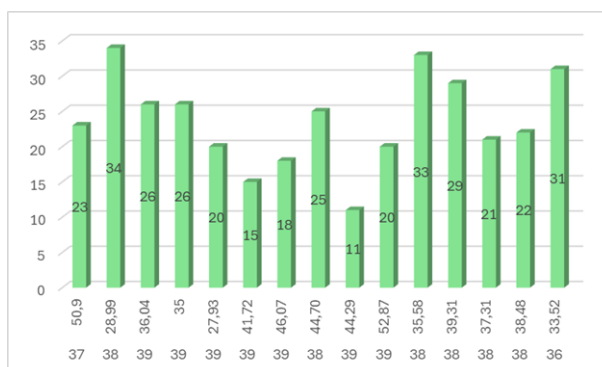


Figure 6. True/False Assessment

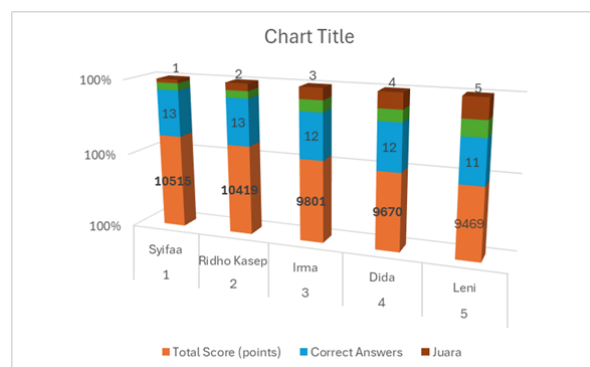


Figure 7. Top Five Winners of the True or False Assessment

Figure 6. Shows that the application of audio-based gamification methods was followed by a maximum of 39 people or approximately 65%. The question with the most correct answers was question number 2, related to SDG 4: quality education. Gamification learning, even though it is audio-based, requires guidance, which is provided by students who are members of the Abdimas Team. The results of the gamification selection to determine the winner, as shown in Figure 7.

The top five winners of the true or false assessment of the 14 questions tested, as shown in Figure 7, were determined based on the number of correct answers and the fastest completion time. The results show that the winners have an excellent understanding of the SDGs material that has been presented.

CONCLUSSION AND RECOMENDATION

Based on the analysis and discussion, it was concluded that audio-based gamification supported by assistants can be an alternative learning method for visually impaired teachers and students. The training material covers SDGs 4, 8, 12, and 13. The participation rate of teachers as training participants in answering questions through the audio-based gamification method was 65%. On average, training participants were able to complete the multiple-choice and true/false assessment questions within the allotted time. The two best assessments were questions related to the quality of education. It is recommended that SLBNA teachers utilize audio-based gamification as an alternative learning method. It is also recommended that gamification be applied in regular lectures as an innovative approach to learning.

UCAPAN TERIMAKASIH

We would like to express our gratitude to the Community Service Division of the Directorate of Research and Community Service at Telkom University for funding our community service activities under the Appropriate Technology scheme.

REFERENCES

- Afiefah, N. (2014). Pembelajaran dengan Metode Diskusi Kelas. *Jurnal Tarbawiyah*, 11(1), 53-65.
- Diana, A. (2020). Gamifikasi untuk Pembelajaran. *Jurnal pembelajaran Invatif*, 03(02), 144-149.
- Fauzi, Rahmayana, L., Wulandari, I., & Sudiharto, B. H. (2023). Mengapa Digitalisasi Akuntansi harus Dilakukan pada Perusahaan UMKM: Sebuah Tinjauan Pustaka. *Jurnal Aktiva: Riset Akuntansi dan Keuangan*, 5(1), 43-56.
- Gachkova, M., & Somova, E. (2016). Game based approach in E-learning. *Conference: Education and research in the information society*. Plovdiv, Bulgaria.
- Maulidina, M. A., Susilaningsih, & Abidin, Z. (2018). Pengembangan Game Based Learning Berbasis Pendekatan Saintifik pada Siswa . *Jinotep*, 4(2), 2405-8780.
- Presiden Republik Indonesia. (2003). Undang-undang Republik Indonesia No.20 tahun 2003 tentang Sistem Pendidikan Nasional. Jakarta: Sekretaris Negara Republik Indonesia.
- Presiden Republik Indonesia. (2016). Undang-Undang No.8 tahun 2016 tentan penyandang Disabilitas. Jakarta: Kementerian Sekretariat Negara Deputy Bidang Pembangunan Manusia.
- Presiden Republik Indonesia. (2017). Peraturan Presiden Republik Indonesia No.59 tahun 2017 tengan Pelaksanaan Pencapaian Tujuan pembangunan nasional Berkelanjutan. Jakarta: Sekretariat kabinat, Deputy Bidang Perekonomian.
- Presiden Republik Indonesia. (2022). Peraturan Presiden no.111 tahun 2022 tentang pelaksanaan Pencapaian Tujuan pembangunan berkelanjutan. Jakarta: Sekretaraaiat Negara Deputy Bidang perundang-undangan.
- Purnama, R. (2018). Standar AKuntansi Keuangan EMKM. Retrieved from Standar AKuntansi Keuangan EMKM: <https://www.ppak.co.id/artikel/standar-akuntansi-keuangan-emkm-2018>
- Sabela, R., Oktaviani, T., & Saryanto. (2022). Pendampingan Belajar dan Efektifitas. *Dedikasi*, 32-39.
- Wirabumi, R. (2020). Metode Pembelajaran Ceramah. *Annual Conference on Islamic Education and Thought*. Bogor.