AJST
journal.amca2012.org

AMCA JOURNAL OF SCIENCE AND TECHNOLOGY
e-ISSN 2774-8324
Vol 2, No 1, February 2022, 28-31
DOI 10.51773/ajst.v2i1/264

Application of the AIR learning model using song media to improve students' mathematical representational ability

Nanda Ayu Anggraini[1], Eka Fitria Ningsih[1], Choirudin[1,*], Rani Darmayanti[2], and Diyan Triyanto[3]

[1]Universitas Ma'arif Lampung, Indonesia
[2]Yayasan Assyfa Learning Centre Pasuruan, East Java, Indonesia
[3]MIS Al Khoiriyah Metro, Lampung, Indonesia
[*]Corresponding author: choirudin.umala@gmail.com

KEYWORDS
auditory intellectual repetition
learning model
mathematical representation

ABSTRACT One of the overarching goals of teaching mathematics is the capacity for mathematical representation. Someone must be able to communicate through visuals, graphics, diagrams, or other types of representation. The learning model must enable students to play an active role in class, learn more through experiments, ask questions, and receive answers to their questions. This study aimed to determine the increase in students' mathematical representation abilities after following the Auditory intellectual repetition (AIR) learning model assisted by song media. This research method is a quantitative method with the One Group Pretest-Posttest design. The research was conducted at Ma'arif 5 Metro Middle School in the even semester of the 2022/2023 school year. The sample for this research was class VII students, totaling 23 students. The test instrument is used for data collection. The data analysis technique uses a paired sample t-test. The conclusion of this study states that the Auditory intellectual repetition (AIR) learning model using song media can improve students' mathematical representation skills.

1. INTRODUCTION

One of the most essential disciplines taught in each educational unit is Mathematics (Fernández, 2020). However, students find mathematics difficult because of its abstract nature. Most students who study mathematics in class find it difficult to justify their answers (Siswanto et al., 2018), are afraid to answer questions (Manohara et al., 2019; Papirakis et al., 2022), and are shy about voicing their opinions. The ability to represent mathematically is necessary for studying Mathematics (Winarti & Suharto, 2017).

Various factors can influence student representation ability. Inefficient learning processes and learning activities that do not involve students are one of the contributing factors (Manohara et al., 2019). Currently, learning mathematics in the classroom is not enough to prepare students to participate in learning. In addition, teacher-centered learning hinders students from participating in learning (Gutiérrez, 2020; Papirakis et al., 2022). This is because they only receive information from educators and are not given the freedom to develop mathematical concepts according to their thinking (Trio, 2019). Many educators still hold the belief that students are only recipients of information. Thus, the teacher remains at the center of the learning experience. Many teachers still teach mathematics by showing students examples of problems, exercises, and how to solve them (Hiwa, 2018; Shabrina et al., 2021).

In general, mathematics education in Indonesia is of low quality. According to the results of the 2018 Program for International Student Assessment (PISA), Indonesian education is ranked 75th best out of 80 countries, with a decrease in PISA scores in every subject, including mathematics, which fell from 386 to 379 (Rahayuningsih, 2017). The Trends in International Mathematics and Science Study (TIMSS) results are almost no different from those in PISA. With an average score of 39, Indonesia ranks 44th out of 49 countries in 2015 (Rizkiardi et al., 2018). According to the results of the 2022 public education report card for junior high school level, learning outcomes in numeracy skills show that less than 50% of students at the junior high school level have reached the minimum competency level for numeration.

One of the overarching goals of teaching mathematics is the capacity for mathematical representation. Someone can represent through visuals, graphics, diagrams (**?**), or other types of representation to communicate something. The learning model must enable students to play an active role in class, learn more through experiments, ask questions, and receive answers to their questions. The Auditory intellectual repetition (AIR) learning model is one of the choices to optimize student activity in the classroom (Senkal , 2021; Siregar et al., 2021).

Teachers can improve the quality of a fun learning experience by utilizing the media (Côté, 2021; Ulva & Suri, 2019). The song is one of the media used to increase motivation

and attract student interest in learning. Media use is an option for teachers to improve the quality of fun learning. The song is a distinct rhythmic sound (Indriani et al., 2018). People who listen to music are inspired to copy some or all of the words from a song (Harahap, 2018; Luo et al., 2022). Song was chosen as the best media to help students understand math formulas Liu & Song (2021) because it would be a more effective way of presenting the subject matter. Songs play an important role in teaching mathematics as they help students remember Math formulas (Risnawati et al., 2018).

Previous research stated that the Auditory Intellectually Repetition (AIR) model effectively increased students' mathematical representation capacity (Alan & Afriansyah, 2017; Ridia & Afriansyah, 2019). Unlike previous research, the researcher tries to combine the Auditory Intellectual Repetition (AIR) learning model with song media. The novelty of the researcher is the use of song media as a learning medium. Applying the Auditory Intellectual Repetition (AIR) learning model with the help of song media is expected to make learning fun so that students are enthusiastic and active in learning, train students' memory of subject matter, and improve students' mathematical representation skills.

2. METHOD

This research method is quantitative. Quantitative research is a way to test the theory by looking at how variables relate to one another (Widiastari & Suniasih, 2020). Quantitative research is a research technique based on the philosophy of positivism that observes specific populations/samples, collects and uses instruments, and then analyzes quantitative/statistical data to evaluate pre-existing hypotheses (Yunita Kawi et al., 2019).

This research is experimental. Experimental research is used to see causation by deliberately treating the subject being observed (Rangkuti, 2021). This study will apply the Auditory intellectual repetition (AIR) learning model using song media to see if there is an increase after being given treatment.

The research design uses the One Group Pretest-Posttest design, which is a research design that is directed to one group without a comparison group but previously used a pretest (pretest). Measurements are made after the action. Therefore, the research flow is the initial test, treatment, and final test. This will review the impact of the treatment given (Mulianti et al., 2022).

The sample of this research was class VII students, with a total of 23 students. The sampling technique uses cluster random sampling. Cluster random sampling is a method to take a random sample from a group. When selecting this sample, it is essential to understand that it was obtained from a batch. So it is the group that's randomized, not the research subject/object (Hidayati & Darmuki, 2021).

This research data collection technique is in the form of tests and documentation. Documentation is a data collection method that provides evidence of research implementation. At the same time, the test aims to see students' mastery or absorption level of their' mathematical representation abilities.

Prerequisite analysis tests are in the form of normality and homogeneity tests before testing the hypothesis. The homogeneity test was carried out using the Harley method, while the normality test used the Lilliefors method. Testing the hypothesis in this study used the paired-sample T-test (Afrida, 2020).

3. RESULT AND DISCUSSION

Before carrying out the research, the researcher prepared learning tools. The preparation of learning tools by researchers included designing lesson plans and syllabi and preparing song media. Researchers made two songs with different themes. The first song contains selling price, buying price, profit, and loss material, which uses the arrangement of the JKT 48 song entitled "fortune cookie". The second song contains gross material, tare, net, tax, and single interest, which uses the arrangement of Tuti Wibowo's song "No Comment". After preparing the learning tools, the researcher strengthened the data-measuring instrument—consolidation of data-measuring instruments- by testing the validity and reliability tests. The instrument measured was a description test totaling four questions.

The research test instrument was validated by three validators, namely Wawan, M.Pd. (Lecturer at Ma'rif Lampung University), Dr. Agus Setiawan, M.Pd. (Lecturer at Ma'arif Lampung University), and M. Jaelani, S.Pd. (teacher of SMP Ma'arif 5 Metro). The validation calculation uses Aiken's content validity.

Testing the normality of data distribution is the first step in data analysis. A variance homogeneity test must be conducted if the data is normally distributed. Test decision Because L-count < L-table = 0.1036 < 0.173, it can be concluded that the sample is normally distributed. The homogeneity test results found that the F-value was 1.909, meaning that the population variance is homogeneous.

The value of the t count is 33.43. The value of t0.05;22 is known to be 1.717. Because t count ≥ t table = 33.43 ≥ 1.717, H0 is rejected. Because H0 is rejected, it means H1 is accepted. In conclusion, using song media, the Auditory Intellectual Repetition (AIR) learning model can improve students' mathematical representation abilities. Previous research also revealed that the student's capacity for mathematical representation was significantly improved by the Auditory Intellectual Repetition (AIR) approach (Ikawati & Kowiyah, 2021). Representation is closely related to the Auditory Intellectually Repetition (AIR) learning model, a learning model that focuses on active student learning and contributes to the development of their knowledge both alone and in groups (Deryhlazov et al., 2017). The Auditory Intellectually Repetition (AIR) learning model is said to be successful because it emphasizes three learning factors, namely Auditory (Christine et al., 2020), Intellectual (Septian, 2020), and Repetition (Song & Kim, 2022). Learning to listen (Wan et al., 2022), pay attention (Wang et al., 2023), speak (Liu et al., 2013), express opinions (Zhang et al., 2022), respond (Rhodes et al., 2022), present (Mukai et al., 2018), and explain all takes place at the Auditory stage, which involves the sense of hearing. At the intellectual stage, thinking skills must be developed through presenting data into mathematical models through reasoning, construction, applying ideas, asking and answering questions, and solving problems. At the repetition stage, questions and answers are exchanged between the teacher and students to help students understand the concept more thoroughly.

The learning process of this research has advantages and disadvantages. The advantage of this research learning process is that it makes learning fun and attracts students'

interest. The drawback is that the AIR Intellectually Repetition Auditory learning model takes quite a long time, so the learning process is not optimal.

4. ACKNOWLEDGEMNT

Thanks to Universitas Ma'arif Lampung, Yayasan Assyfa Learning Centre Pasuruan East Java and MIS Al Khoiriyah Metro that have assisted in the completion of this study.

5. CONCLUSION

Based on the hypothesis test results by calculating the t-test of two paired samples, the results obtained that the Auditory Intellectual Repetition (AIR) learning model using song media can improve students' mathematical representation abilities. To improve the quality of education, the researchers put forward several suggestions, namely, the AIR learning model requires a relatively long time, so teachers must be able to manage learning time well so that students do not get bored and achieve all the achievements of the competency indicators.

References

Afrida, A. (2020). Model Pembelajaran Auditory Intellectualy Repetition Bernuansa Etnomatematika Untuk Meningkatkan Kemampuan Komunikasi dan Pemahaman Matematis Siswa SMK. *JS (Jurnal Sekolah)*, *5*(1). https://doi.org/10.24114/js.v5i1.23308

Alan, U. F., & Afriansyah, E. A. (2017). Kemampuan Pemahaman Matematis Siswa Melalui Model Pembelajaran Auditory Intellectualy Repetition Dan Problem Based Learning. *Jurnal Pendidikan Matematika*, *11*(1). https://doi.org/10.22342/jpm.11.1.3890.

Cheng, T. H. Z., Creel, S. C., & Iversen, J. R. (2022). How Do You Feel the Rhythm: Dynamic Motor-Auditory Interactions Are Involved in the Imagination of Hierarchical Timing. *Journal of Neuroscience*, *42*(3). https://doi.org/10.1523/JNEUROSCI.1121-21.2021

Christine, A., Putri, S., Malik, R., Bobbi, M., & Poter, D. (2020). Pengaruh Gaya Belajar Auditori dan Visual terhadap Kelulusan Ujian Teori Blok Biomedik 2 Mahasiswa Fakultas Kedokteran Universitas Tarumanagara Semester Ganjil 2018. *Tarumanagara Medical Journal*, *2*(2).

Côté, V. (2021). Differential Auditory Brain Response Abnormalities in Two Intellectual Disability Conditions: SYNGAP1 Mutations and Down Syndrome. *Clinical Neurophysiology*, *132*(8), 1802–1812. https://doi.org/10.1016/j.clinph.2021.03.054

Deryhlazov, L. V., Kukharenko, V. M., Perkhun, L. P., & Tovmachenko, N. M. (2017). The Models of Distance Forms of Learning in National Academy of Statistics, Accounting and Audit. *Scientific Bulletin of the National Academy of Statistics, Accounting and Audit*, *3*. https://doi.org/10.31767/nasoa.3.2017.10

Fernández, M. M. (2020). Simultaneous auditory-visual support in grammatical intervention in subjects with intellectual disability. *Revista de Educacion*, *2020*(389), 117–142. https://doi.org/10.4438/1988-592X-RE-2020-389-457

Gutiérrez, J. A. R. (2020). Auditory sequential memory and verbal memory in students with intellectual disability. *Electronic Journal of Research in Educational Psychology*, *18*(51), 279–302. https://doi.org/10.25115/EJREP.V18I51.3041

Harahap, N. (2018). Preservation of Lullabies Songs in Forming Character Based on Local Wisdom. *International Journal of Linguistics, Literature and Culture*. https://doi.org/10.21744/ijllc.v5n1.479

Hidayati, N. A., & Darmuki, A. (2021). Penerapan Model Auditory Intellectually Repetition (AIR) untuk Meningkatkan Kemampuan Berbicara Pada Mahasiswa. *Jurnal Educatio FKIP UNMA*, *7*(1). https://doi.org/10.31949/educatio.v7i1.959

Hiwa, S. (2018). Functional near-infrared spectroscopy study of the neural correlates between auditory environments and intellectual work performance. *Brain and Behavior*, *8*(10). https://doi.org/10.1002/brb3.1104

Ikawati, O. N., & Kowiyah, K. (2021). Visual, Auditory, and Kinesthetic Learning Model on the Mathematics Problem Solving Ability. *Desimal: Jurnal Matematika*, *4*(1). https://doi.org/10.24042/djm.v4i1.7362

Indriani, H., Ratu Ilma Indra Putri, & Darmawijo. (2018). Lintasan belajar barisan dan deret aritmatika dengan pendekatan pmri menggunakan konteks kain songket palembang. *Prosiding Seminar Nasional STKIP PGRI Sumatera Barat*, *4*(1).

Liu, C., & Song, B. (2021). Impact Assessment of Big Data on Higher Education Management Based on Time-Varying Clustering Sampling Algorithm. *Computational Intelligence and Neuroscience*, 2021. https://doi.org/10.1155/2021/7954797

Liu, H., Yu, S., & Chen, Z. (2013). Developement of algebraic multigrid solvers using GPUs. *Society of Petroleum Engineers - SPE Reservoir Simulation Symposium 2013*, *2*. https://doi.org/10.2118/163661-ms

Luo, Y. Z., Kong, X. Y., & Ma, Y. Y. (2022). Effects of Multimedia Assisted Song Integrated Teaching on College Students' English Learning Interests and Learning Outcomes. *Frontiers in Psychology*, *13*. https://doi.org/10.3389/fpsyg.2022.912789

Manohara, N. Y., Setiawani, S., & Oktavinigtyas, E. (2019). Analisis Proses Berpikir Kombinatorik Siswa Dalam Menyelesaikan Permasalahan SPLTV Ditinjau Dari Gaya Belajar Auditorial. *Kadikma*, *10*(1), 95–104.

Mukai, N., Watanabe, T., Li, X. X., Quadrifoglio, L., Cai, Z., Li, X. X., Wang, L. L., Wirasinghe, S. C., Kattan, L., Saidi, S., Molenbruch, Y., Braekers, K., Caris, A., Shi, Z., Quadrifoglio, L., Dessouky, M. M., Palmer, K., Juan, C., Olmos, F., … Winter, S. (2018). Design and operation of Demand Responsive Transportation systems. *Transportation Research Part C: Emerging Technologies*, *138*(1).

Mulianti, D., Nuraina, N., & Wulandari, W. (2022). Peningkatkan Kemampuan Representasi Matematis Siswa Melalui Model Pembelajaran Auditory Intellectually Repetition (AIR) di Kelas VIII SMP Negeri 2 Teupah Barat. *Jurnal Pendidikan Matematika Malikussaleh*, *2*(1). https://doi.org/10.29103/jpmm.v2i1.7368

Papirakis, R. (2022). Auditors' self-actualization and ability to resist client pressure: Evidence from Canada. *Journal of International Accounting, Auditing and Taxation*, 47. https://doi.org/10.1016/j.intaccaudtax.2022.100468

Rahayuningsih, S. (2017). Penerapan Model Pembelajaran Matematika Model Auditory Intellectually Repetition (AIR). *Erudio Journal of Educational Innovation*, 3(2). https://doi.org/10.18551/erudio.3-2.6

Rangkuti, R. K. (2021). Pengaruh Model Pembelajaran Auditory Intellectually Repetition (AIR) Terhadap Kemampuan. *Jurnal Ilmiah Pendidikan Matematika Al-Qalasadi*, 5(1).

Rhodes, S. D., Tanner, A. E., Mann-Jackson, L., Alonzo, J., Song, E. Y., Smart, B. D., Garcia, M., McCoy, T. P., Schafer, K. R., & Wilkin, A. M. (2022). Outcomes From a Randomized Trial of a Bilingual mHealth Social Media Intervention to Increase Care Engagement Among Young Gay, Bisexual, and Other Men Who Have Sex With Men and Transgender Women With HIV. *Health Education and Behavior*, 49(6). https://doi.org/10.1177/10901981221125400

Ridia, N. S., & Afriansyah, E. A. (2019). Perbandingan Kemampuan Pemahaman Matematis Siswa melalui Auditory Intellectualy Repetition dan Student Teams Achievement Division. *Mosharafa: Jurnal Pendidikan Matematika*, VIII(3), 515–526.

Risnawati, Amir, Z., & Sari, N. (2018). The Development of Learning Media Based on Visual, Auditory, and Kinesthetic (VAK) Approach to Facilitate Students' Mathematical understanding Ability. *Journal of Physics: Conference Series*, 1028(1). https://doi.org/10.1088/1742-6596/1028/1/012129

Rizkiardi, R. M., & Subali, B. (2018). Dampak Model Pembelajaran Auditory, Intellektualy, Repatition (AIR) Terhadap Minat Belajar Siswa. *Jurnal Ilmiah Pendidikan Dasar*, 5(2). https://doi.org/10.30659/pendas.5.2.112-120

Senkal, O. (2021). Role of Orff Music Therapy in Improving Auditory Processing Skills in Children with Intellectual Disability. *Nigerian Journal of Clinical Practice*, 24(7), 1005–1014. https://doi.org/10.4103/njcp.njcp_410_20

Septian, A. (2020). Somatic, Auditory, Visualization, Intellectually Learning Assisted by GeoGebra to Improve Student's Mathematical Representation Skills. *Journal of Physics: Conference Series*, 1657(1). https://doi.org/10.1088/1742-6596/1657/1/012023

Shabrina, R., Eliza, R., & Khaidir, C. (2021). Pengaruh Model Pembelajaran Auditory Intellectually Repetition (Air) Terhadap Kemampuan Pemahaman Konsep dan Penalaran .... *Journal Cerdas Mahasiswa*.

Siregar, H. L., Siregar, Y. P., & Hakim, L. (2020). Efektivitas Penggunaan Model Pembelajaran Auditory, Intellectually, Repetition (AIR) Terhadap Kemampuan Pemahaman Konsep Matematis Siswa. ... *Mathematic Education Journal*, 3(3).

Siswanto, R. D., Akbar, P., & Bernard, M. (2018). Penerapan Model Pembelajaran Kooperatif Tipe Auditorial, Intelectually, Repetition (AIR). *Journal On Education*, 1(1), 66–73. https://www.jonedu.org/index.php/joe/article/view.

Song, Y. M., & Kim, S. (2022). Effects of a Social and Emotional Competence Enhancement Program for Adolescents Who Bully: A Quasi-Experimental Design. *International Journal of Environmental Research and Public Health*, 19(12). https://doi.org/10.3390/ijerph19127339

Trio, N. (2019). Development of a valid student work sheet oriented on approach somatic, auditory, visual and intellectual (SAVI) assisted digital practicum tools. *Journal of Physics: Conference Series*, 1185(1). https://doi.org/10.1088/1742-6596/1185/1/012127

Ulva, M., & Suri, I. R. A. (2019). Pengaruh Model Pembelajaran Auditory Intellectualy Repetition (AIR) Terhadap Kemampuan Komunikasi Matematis Peserta Didik. UNION: *Jurnal Ilmiah Pendidikan Matematika*, 7(1). https://doi.org/10.30738/union.v6i3.3080

Wan, H., Weng, S., Du, H., Dong, D., Wang, B., & Yu, T. (2022). Innovative Design of Compact Heavy-Load Independent Transfer Device for Nuclear Engineering System. *Science and Technology of Nuclear Installations*, 2022. https://doi.org/10.1155/2022/5256808

Wang, Y., Xu, Y., Tabari, H., Wang, J., Wang, Q., Song, S., & Hu, Z. (2020). Innovative trend analysis of annual and seasonal rainfall in the Yangtze River Delta, eastern China. *Atmospheric Research*, 231. https://doi.org/10.1016/j.atmosres.2019.104673

Widiastari, N. Kd. M., & Suniasih, N. W. (2020). Pengaruh Model Pembelajaran Auditory, Intellectually, Repetition Berbasis Brainstorming Terhadap Kompetensi Pengetahuan IPS. *Jurnal Pedagogi Dan Pembelajaran*, 3(1). https://doi.org/10.23887/jp2.v3i1.24362

Winarti, E., & Suharto, B. (2017). Meningkatkan Motivasi dan Hasil Belajar Melalui Model Pembelajaran Auditory, Intellectually, Repetition pada Materi Larutan Penyangga di Kelas XI IPA SMA Muhammadiyah 1 Banjarmasin. Journal of Chemistry And Education (JCAE), 1(1).

Yunita Kawi, K. A., Suadnyana, I. N., & Manuaba, I. S. (2019). Pengaruh Model Pembelajaran Auditory, Intellectualy, Repetition Berbantuan Media Audio Visual terhadap Kompetensi Pengetahuan IPA. *International Journal of Elementary Education*, 3(1). https://doi.org/10.23887/ijee.v3i1.17658

Zhang, X., Jiang, J., Yuan, F., Song, W., Li, J., Xing, D., Zhao, L., Dong, W., Pan, X., & Gao, X. (2022). Estimation of water footprint in seawater desalination with reverse osmosis process. *Environmental Research*, 204. https://doi.org/10.1016/j.envres.2021.112374.