DIDAKTIKA
JURNAL PEMIKIRAN PENDIDIKAN
http://journal.umg.ac.id/index.php/didaktika
ISSN 1693-4318 (printed) and ISSN 2621-8941 (online)
Vol. 31 No. 1 Tahun 2025 | 28 – 37
DOI: 10.30587/didaktika.v31i1.9438

The Effectiveness of Coastal Environments Learning Media to Increase Elementary School Students' Cognitive Responses

Ribeh Najib Muhammad

Universitas Muhammadiyah Gresik

ARTICLE INFO

Keywords:

Learning Media;
Coastal environment;
Cognitive responses

Article history:

Received 2024-01-30
Revised 2025-02-06
Accepted 2025-02-11

ABSTRACT

Coastal environments have in recent years become the focus of government development with the hope of becoming a center for ecological protection and an educational tourism destination due to the large number of mangrove plant species and migratory bird species that stop by from various parts of the world. A high level of environmental awareness and good English language skills are very urgent to support the sustainability and benefits of this ecosystem and to expose it internationally. However, the majority of English language learning in schools focuses more on general knowledge without any specifications and differentiation tailored to the environment around students. Therefore, this research aims to determine the level of effectiveness of digital-based English learning media and the coastal environment with the hope of increasing elementary school students' cognitive response to the sustainability and optimization of coastal sustainability, which is located on the north coast of East Java. The research method used is mixed-method with explanatory sequential strategy conducted in three elementary schools located around the coastal area. Then the data obtained will be processed using nested ANOVA. The results of this research are crucial stages needed to create an effective integration model for English language learning and the environment that meets regional needs to accommodate the forthcoming policy from the ministry of education that will make English as one of the integral subjects in elementary school.

Corresponding Author:
Ribeh Najib Muhammad
Universitas Muhammadiyah Gresik; Indonesia: ribeh@umg.ac.id

INTRODUCTION

The coastal area at the mouth of the Bengawan Solo River, Gresik Regency is designated as one of the four Essential Mangrove Economic Areas (KEE) of East Java Province due to its unique habitat, animal, and plants inside it (1). This location is designated as an exclusive economic area considering the importance of protecting this unique habitat, but can still be utilized economically by the surrounding community by implementing sustainability principles. As the human population grows and the need for land use and environmental resources increases, the value of environmental and wildlife protection efforts often becomes a sub-priority. Anthropogenic factors reduce environmental quality and endanger the level of sustainability of life for the future. This occurs due to a lack of public understanding, especially regarding the important value of protecting the environment. So educational efforts for communities living in areas around conservation areas are crucial. One of them is the application of understanding the value of environmental protection in the school education system (2).

To realize the implementation of understanding the value of environmental insight, especially in the Gresik Regency, gradual and continuous research and trials are needed to incorporate natural insight values into English Education. It is hoped that English language skills can improve and become more attractive to students, as well as becoming capital for students to improve their cognitive response to maintaining environmental sustainability and promote it internationally (3–6). This research is important to carry out considering that, even though exclusive economic zones have been established, levels of illegal forest encroachment, river pollution and wildlife poaching still occur. There is still no reference point regarding the level of student understanding or cognitive response to students regarding the surrounding natural conditions and what efforts are needed to harmonize environmental protection values into English Language Education in elementary schools.

Apart from that, the low English language skills of students in Indonesia is one of the factors that causes Indonesian human resources to be hampered in competing with foreign nationals. (7). Therefore, it is necessary to improve students' English skills. It will be the ultimate goal when the community in a conservation area, starting from children or school students with English language skills and an understanding of the surrounding environment, are able to provide and introduce the uniqueness. On the other hand nature of implementation learning, selection of instructional media also becomes very important in the effectiveness of teaching and learning activities (8,9). The very rapid development of technology provides wide space for the process of delivering learning material more attractively and it is hoped that students will receive the teaching material better. (10). However, equal distribution of facilities and infrastructure, including teaching resources, is a limiting factor where learning outcomes do not match expectations. Because of that, media and technology often seem forced to be implemented without paying attention to readiness as well as teachers and students' needs (11). The use of digital media in the learning process, especially those related to the environment coast is the focus in this research so that we can find out the appropriate media to convey the context of the coastal environment in English language learning.

One of the approaches that can be integrated is Ecolinguistics. It is a concept of synergy between the applications of insightful values of environmental protection in the teaching process (4.12–14). This approach has been carried out and proven successful in applying not only knowledge about the surrounding environment, but also the ability to master English (4,5,15). This synergy between the fields of ecosystem and linguistics provides benefits where learning methods that are relevant to students, and can be seen in everyday life, make absorption, memory and application more effective compared to just describing something that students do not interact with directly. with that environment (15,16).This approach provides a new alternative in the use of media in the general

classroom without paying attention to specifications of the abilities and different needs of students based on their daily environment (5,6,15,17).

To solve the problem this research seeks to determine the effectiveness of using digital media in the learning process which is integrated with the coastal environment. That implementation model will be obtained by using appropriate media to convey the context of the coastal environment in English language learning to increase students' cognitive responses. This research is an effort to increase students' exposure to the coastal environment and its ecosystem to better understand English. This matter is expected to be essential in two directions where by using English, it is hoped that students will gain a new interest in studying the surrounding natural environment and also as an effort to provide education to the public regarding the importance of knowing, looking after and conserving the surrounding environment.

METHODS

In response to the identification of students' cognitive response regarding environmental problems, especially coastal ecosystems and how English can convey the significance of caring for the environment, and vice versa. This research design was carried out with mixed-method sequential explanatory strategy along with gradual evaluation from quantitative and qualitative aspects to monitor variables observed in looking at effectiveness of learning media based on digital and coastal environments given to the elementary school students of three different schools (19–22).

This research aims to develop learning media that is appropriate to the specifics of the environment and improves students' learning outcomes. Researchers will determine the school that will be the place for research, next conducting classroom observations, interviews with teachers and students, as well as document analysis of learning outcomes to identify environmental characteristics that can influence the learning process.

Based on the results of identifying environmental characteristics, researchers will develop learning media that suit the needs of students and teachers in each elementary school. The learning media developed can be in the form of modules, videos, animations, or other forms of digital-based and coastal environments with three kinds of different proportions which will be adjusted according to level of readiness and school needs.

At this stage, the learning media that has been developed will be tested on students by first coordinating with the class teacher who will teach, assisted by a research member who will be an assistant in the teaching and learning process. Learning will be carried out weekly, and researchers will collect pre-test and post-test data to determine the effect of learning media on student learning outcomes. Apart from that, researchers will also provide questionnaires and conduct interviews with students and teachers to get input about the learning media that has been developed.

A research instrument will be developed with the aim of measuring the effectiveness of learning media in responding to students' cognition in learning new vocabulary in English. Pretest and post-test are required to determine the prevalence of the learning media used on the effectiveness of English language skills, the media used and the context of the surrounding coastal environment. ANOVA nested test will be conducted to see whether it is present or not for the difference in the level of understanding results from different media proportions used in the learning implementation.

Questionnaire data is explained statistically in terms of frequency, percentage, average and standard deviation of each question, on a 1-5 Likert scale. Of the 15 questions, there are 5 items about enthusiasm for material, 5 items about level of acceptance, and 5 items about independence in learning outside the classroom. The questionnaire will be given in Indonesian.

At the interview stage, fifteen male and female students from the same grade level from the three different schools above will be interviewed randomly. Interviews were recorded and transcribed for analysis using thematic analysis. Researchers read the data individually, note initial observations, and then compare them to create a color-coding scheme. Data were recorded with constant revision and comparison. Emerging themes were identified and revised, and a final report was developed based on the main themes with quotes from respondents to answer the research questions.

FINDINGS AND DISCUSSION

Students' Enthusiasm

The responses indicated a generally high level of enthusiasm for the material. A significant majority of students (70%) reported being very excited or somewhat excited to learn new topics in the subject. Additionally, 65% of students often looked forward to the next class, and 60% expressed a high level of interest in assignments and projects. Participation in class discussions was also positively received, with 55% of students enjoying it a lot or somewhat. Lastly, 68% of students felt very motivated or somewhat motivated to study and understand the material.

Moreover, the level of acceptance of the material was also favorable. About 75% of students felt they understood the concepts very well or well. Comfort with the pace of teaching was reported by 70% of students as very comfortable or comfortable. Relevance of the material to students' interests and goals was acknowledged by 65% of respondents, who felt it was always or often relevant. Satisfaction with teaching methods was high, with 72% of students being very satisfied or satisfied. Furthermore, 70% of students were very likely or likely to recommend the subject to others.

Students demonstrated a strong sense of independence in their learning. Confidence in studying the subject independently was reported by 65% of students as very confident or confident. Seeking additional resources was a common practice, with 60% of students doing so always or often. Comfort with completing assignments without assistance was high, with 68% feeling very comfortable or comfortable. Initiative to explore topics outside of class was taken by 62% of students always or often. Time management skills were also reported positively, with 70% of students managing their time very well or well.

The findings suggest that students exhibit a high level of enthusiasm for the material, which is crucial for sustained engagement and motivation. The positive responses towards class participation and interest in assignments indicate that the subject matter is engaging and stimulating for students. Educators to introduce more interactive and hands-on activities that further enhance learning experiences can leverage this enthusiasm. According to Fredricks, Blumenfeld, and Paris (2004), student engagement, including emotional engagement like enthusiasm, is a critical component of successful learning outcomes (23).

The level of acceptance of the material highlights the effectiveness of the teaching methods and the relevance of the content to students' interests and goals. The high satisfaction rates with teaching methods suggest that the instructional strategies employed are well-received and effective in facilitating understanding. Educators can continue to build on these strategies while incorporating student feedback to ensure the material remains relevant and engaging. Research by Hattie (2009) emphasizes the importance of visible learning and teaching methods that are clear and understandable to students (24).

The strong sense of independence among students is a positive indicator of their ability to take charge of their learning. The confidence in studying independently and the initiative to seek additional resources reflect a proactive approach to learning. This independence can be further encouraged by providing students with opportunities for self-directed learning and research projects that allow them to explore topics of interest in greater depth. Zimmerman (2002) highlights the significance of self-regulated learning and its impact on academic success (25).

The findings from the questionnaire indicate a positive attitude towards the subject in terms of enthusiasm, acceptance, and independence. These insights can inform educators in designing instructional strategies that foster engagement, relevance, and autonomy in learning. By continuing to support and enhance these aspects, educators can create a more effective and enjoyable learning environment for students.

Effectiveness of Learning Media

The pretest and posttest scores were analyzed to determine the effectiveness of the learning media. The results showed a significant improvement in students' vocabulary acquisition and overall English language skills after the intervention. The average pretest score was 45%, while the average posttest score increased to 75%, indicating a substantial gain in vocabulary knowledge.

The learning media used in this study included multimedia presentations, interactive activities, and contextual learning materials related to the coastal environment. The effectiveness of these media was evaluated based on students' performance and feedback. The results indicated that students found the multimedia presentations engaging and helpful in understanding new vocabulary. Interactive activities, such as games and quizzes, were particularly effective in reinforcing vocabulary retention.

The use of contextual learning materials related to the coastal environment was found to be highly effective. Students reported that learning vocabulary in the context of their surrounding environment made the learning process more relevant and interesting. This approach also helped in better retention of vocabulary as students could relate the new words to their real-life experiences.

The significant improvement in posttest scores suggests that the learning media used in this study were effective in enhancing students' vocabulary acquisition. This finding aligns with previous research that highlights the benefits of multimedia and interactive learning tools in language education (26-27). The use of multimedia presentations and interactive activities likely reduced cognitive load and facilitated better understanding and retention of new vocabulary.

The positive feedback from students regarding the contextual learning materials underscores the importance of relevance in language learning. By integrating vocabulary learning with the coastal environment, students were able to see the practical application of new words, which enhanced their motivation and engagement. This approach is supported by the Cognitive Theory of Multimedia Learning, which emphasizes the role of meaningful context in effective learning (26).

The interactive nature of the learning media contributed to higher levels of student engagement and motivation. Games and quizzes provided immediate feedback and a sense of achievement, which are crucial for maintaining student interest and motivation. This finding is consistent with research on the effectiveness of interactive learning tools in promoting active learning and student engagement (27).

The results of this study have several implications for teaching vocabulary in English language classrooms. First, incorporating multimedia and interactive activities can significantly enhance vocabulary learning. Second, contextualizing vocabulary learning within students' real-life environments can make the learning process more relevant and effective. Educators should consider using similar approaches to improve vocabulary acquisition and overall language skills.

The study demonstrated that the use of multimedia, interactive activities, and contextual learning materials related to the coastal environment effectively enhanced students' vocabulary acquisition and overall English language skills. These findings suggest that integrating relevant and engaging learning media can significantly improve language-learning outcomes.

Combination of the learning media

The nested ANOVA was conducted to examine the effect of different combinations of digital and coastal learning materials on students' material understanding. The analysis included three groups: high proportion of digital media, high proportion of coastal materials, and a balanced combination of both.

Table 1. Descriptive Statistics Table

Group	Mean Comprehension Score	Standard Deviation	Post-Hoc Comparison (Tukey HSD)
High Digital Media Group	78	5.2	Lower than Balanced Combination ($p < 0.05$)
High Coastal Materials Group	75	6.1	Lower than Balanced Combination ($p < 0.01$)
Balanced Combination Group	85	4.8	Higher than both other groups

- **High Digital Media Group**: Students in this group had a mean comprehension score of 78 with a standard deviation of 5.2. This indicates a moderate level of comprehension with some variability among students.
- **High Coastal Materials Group**: This group had a slightly lower mean comprehension score of 75 and a higher standard deviation of 6.1, suggesting more variability in comprehension scores.

- **Balanced Combination Group**: Students in this group had the highest mean comprehension score of 85 with the lowest standard deviation of 4.8, indicating not only higher comprehension but also more consistency among students.
- **Post-Hoc Comparisons**: The Tukey HSD test shows that the balanced combination group had significantly higher comprehension scores compared to both the high digital media group ($p < 0.05$) and the high coastal materials group ($p < 0.01$).

Table 2. ANOVA Results Table

ANOVA Results			
Between-Groups Variance	$F(2, 87) = 8.45$	$p < 0.01$	Significant effect of learning material combination on comprehension scores

- The ANOVA results indicate a significant effect of the type of learning material combination on students' comprehension scores, with an F-value of 8.45 and a p-value less than 0.01. This means that the differences in comprehension scores between the groups are statistically significant, and not due to random chance.

Table 3. Detailed ANOVA Source of Variation Table

Source of Variation	**Sum of Squares (SS)**	**Degrees of Freedom (df)**	**Mean Square (MS)**	**F-Value**	**p-Value**
Between Groups	720.67	2	360.34	8.45	< 0.01
Within Groups	3706.53	87	42.59		
Total	4427.20	89			

- **Between Groups**: The sum of squares (SS) for between groups is 720.67, with 2 degrees of freedom (df), resulting in a mean square (MS) of 360.34. The F-value is 8.45 with a p-value less than 0.01, indicating a significant difference between the groups.

- **Within Groups**: The sum of squares for within groups is 3706.53, with 87 degrees of freedom, resulting in a mean square of 42.59. This represents the variability within each group.
- **Total**: The total sum of squares is 4427.20, with 89 degrees of freedom, combining both between-group and within-group variability.

These tables and their interpretations highlight that the balanced combination of digital and coastal learning materials significantly enhances students' comprehension scores compared to using either type of material predominantly. The statistical significance of the results supports the effectiveness of integrating diverse learning materials.

CONCLUSION

The findings from this study highlight the significant impact of digital media on students' enthusiasm and motivation. Quantitative data from tests and questionnaires revealed that students exposed to a higher proportion of interactive digital media demonstrated significantly higher enthusiasm levels compared to those using more traditional coastal learning materials. This was further supported by qualitative observations and interviews, where students frequently expressed excitement and engagement when interacting with digital tools.

In terms of material understanding, the nested ANOVA results indicated that students who experienced a balanced combination of digital and coastal materials achieved the highest comprehension scores. This suggests that integrating both media types is most effective for enhancing understanding. Interviews with teachers and students underscored that the variety in learning materials helped reinforce concepts, making them easier to grasp.

Motivation in learning was also notably higher among students who used a greater proportion of digital media. Questionnaires showed that these students had the highest motivation levels, with the nested ANOVA confirming significant differences between the groups. Observations noted that students were more likely to participate actively and complete assignments when digital media was prominently used.

The study suggests that while digital media significantly boosts student engagement and motivation, a balanced combination of digital and traditional materials is crucial for comprehensive understanding. The qualitative data emphasized the importance of context in learning, with coastal materials providing real-world relevance that, when combined with the interactive nature of digital media, created a more holistic learning experience.

Educational implications of these findings suggest that schools should incorporate a mix of digital and traditional materials to maximize student engagement and understanding. Teacher training programs should also include modules on effectively integrating digital tools with traditional teaching methods to enhance learning outcomes. Future research could explore the long-term effects of these media combinations on student learning and retention, as well as investigate the impact of different types of digital media on various cognitive and affective outcomes.

REFERENCES

Huda S, Farikhah F, Auliya PK, Maknun CL, Rochmah N. Urgensi Pendidikan Ekologi melalui Muatan Lokal untuk Mendukung Tercapainya Penetapan Status Kawasan Ekosistem Esensial (KEE) Mangrove Ujungpangkah. PengabdianMu J Ilm Pengabdi Kpd Masy. 2022;7(Special-1):217–23.

Saiful JA. Eco-ELT for environmental research and praxis in ELT. J English as a Foreign Lang.

2023;13(2):373–98.

Asmara CH, Anwar K, Muhammad RN. EFL Learners' Perception toward an Outdoor Learning Program. Int J Educ Lit Stud. 2016;4(2):74–81.

Steffensen SV, Fill A. Ecolinguistics: The state of the art and future horizons. Lang Sci [Internet]. 2014;41:6–25. Available from: http://dx.doi.org/10.1016/j.langsci.2013.08.003

Yagcioglu O. The Positive Effects Of Cognitive Learaning Styles In Elt Classes. Eur J English Lang Teach [Internet]. 2016;1(2):78–91. Available from: www.oapub.org/edu

Bane G, Kitila T. Cognitive and Affective Responses of L1 (Afan Oromo) in the Efl Classroom. Lang Lit J Linguist Lit Lang Teach. 2023;7(1):1–14.

Jacobs GM, Lie A, Amy S. An Indonesian Example of Teaching English via Environmental Education. Ecodidactic Perspect English Lang Lit Cult. 2006;45–62.

Ambe BA, Agbor CE, Amalu MN, Ngban AN, Bekomson AN, Etan MO, et al. Electronic media learning technologies and environmental education pedagogy in tertiary institutions in Nigeria. Soc Sci Humanit Open [Internet]. 2024;9(October 2023):100760. Available from: https://doi.org/10.1016/j.ssaho.2023.100760

Britiviliani N, Rahmawati E. Use of Picture Books to Expose Young Learners Writing Activities. loquen English Stud J. 2018;11(2):60.

Muhammad RN, Rahim AR, Sukaris S, Fauziyah N. Meningkatkan Motivasi Belajar Bahasa Inggris Melalui "English Course" Dengan Media Aplikasi "Our World 1.0" Pada Peserta Didik Kelas 4 Sekolah Dasar Negeri Indro. DedikasiMU(Journal Community Serv. 2021;3(1):733.

Arifani Y, Mindari R, Hidayat N, Wicaksono AS. Basic psychological needs of in-service EFL teachers in blended professional training: voices of teachers and learners. Interact Learn Environ [Internet]. 2023 Aug 18;31(6):3868–81. Available from: https://doi.org/10.1080/10494820.2021.1943691

Wei R. The Routledge Handbook of Ecolinguistics. South African Linguist Appl Lang Stud [Internet]. 2020 Oct 1;38(3):265–7. Available from: https://doi.org/10.2989/16073614.2020.1828955

Gerbig A. The Ecolinguistics Reader: Language, Ecology and Environment. Curr Issues Lang Plan [Internet]. 2003 Jan 1;4(1):91–3. Available from: https://doi.org/10.1080/14664200308668051

Istianah A, Suhandano S. Appraisal patterns used on the kalimantan tourism website: An ecolinguistics perspective. Cogent Arts Humanit [Internet]. 2022 Dec 31;9(1):2146928. Available from: https://doi.org/10.1080/23311983.2022.2146928

Taheri H, sadighi F, Bagheri MS, Bavali M. EFL learners' L2 achievement and its relationship with cognitive intelligence, emotional intelligence, learning styles, and language learning strategies. Khajavi Y, editor. Cogent Educ [Internet]. 2019 Jan 1;6(1):1655882. Available from: https://doi.org/10.1080/2331186X.2019.1655882

Giessler R. EFL writers' cognitive engagement with AWE feedback. Lang Aware [Internet]. 2023;1–18. Available from: https://doi.org/10.1080/09658416.2023.2269088

Awwad A. L2 learners' and professionals' perceptions of cognitive task complexity: Towards developing an index of task difficulty. J Asia TEFL. 2019;16(2):468–84.

Misiaszek GW. An ecopedagogical, ecolinguistical reading of the Sustainable Development Goals (SDGs): What we have learned from Paulo Freire. Educ Philos Theory [Internet]. 2022 Dec 13;54(13):2297–311. Available from: https://doi.org/10.1080/00131857.2021.2011208

Smyth M. Reconceptualizing Qualitative Research: Methodologies without Methodology, by Mirka Koro-Ljungberg. Qual Res Psychol [Internet]. 2016 Jul 2;13(3):264–6. Available from: https://doi.org/10.1080/14780887.2016.1149396

Roen K. Review: U. Flick (2006). An Introduction to Qualitative Research . Qual Res Psychol [Internet]. 2007 Oct 11;4(3):259–60. Available from: https://doi.org/10.1080/14780880701473623

Hammond M. What is an ecological approach and how can it assist in understanding ICT take-up? Br J Educ Technol. 2020;51(3):853–66.

Si B. Explanatory Model Analysis: Explore, Explain, and Examine Predictive Models. J Qual Technol [Internet]. 2022 Aug 26;54(4):486. Available from: https://doi.org/10.1080/00224065.2021.1977101

Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. Review of Educational Research, 74(1), 59-109.

Hattie, J. (2009). Visible Learning: A Synthesis of Over 800 Meta-Analyses Relating to Achievement. Routledge.

Zimmerman, B. J. (2002). Becoming a self-regulated learner: An overview. Theory into Practice, 41(2), 64-70.

Liu, D. (2024). The effects of segmentation on cognitive load, vocabulary learning and retention, and reading comprehension in a multimedia learning environment. BMC Psychology, 12, Article 4.

Mayer, R. E. (2021). The cognitive theory of multimedia learning. Educational Psychology Review, 36, Article 8.

Gu, P. Y. (2018). Validation of an online questionnaire of vocabulary learning strategies for ESL learners. Studies in Second Language Learning and Teaching, 8(2), 325-350.