

Human-Centered AI for Enhancing Public Transportation Literacy: A Case Study of the Bali Transport Quest Program

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ABSTRACT

Public transportation literacy is essential for promoting sustainable mobility and fostering responsible travel behaviour among younger generations. However, conventional transportation education often faces challenges in providing engaging and effective learning experiences. This study examines the implementation of a Human-Centered Artificial Intelligence (Human-Centered AI) approach in the development and delivery of Bali Transport Quest, a public transportation education program organized by the Bali Provincial Department of Transportation in collaboration with UPTD Trans Bali/Trans Sarbagita. A descriptive quantitative case study employing a one-group pre-test–post-test design was conducted. The program involved 128 students from three educational levels, comprising 66 elementary school students from SD Negeri 29 Dangin Puri, 33 junior high school students from SMP Negeri 9 Denpasar, and 29 senior high school students from SMA Negeri 2 Denpasar. Artificial Intelligence was used to assist in developing educational videos, presentation materials, mascot storytelling, learning content, and assessment questions, while all AI-generated outputs were reviewed and validated by transportation professionals before implementation. Educational activities were adapted to each educational level through board game-based learning for elementary school students and Quizizz-supported interactive learning for junior and senior high school students. Learning outcomes were evaluated using a simple random sample of 30 students (10 from each educational level). The average test score increased from 90.3 to 99.7 (approximately 10.4%), with elementary school students improving from 83 to 100, junior high school students from 89 to 99, and senior high school students from 99 to 100. Quizizz learning analytics recorded class accuracy rates of 66% for junior high school students and 72% for senior high school students. These findings suggest an association between participation in the Bali Transport Quest Program and improved short-term transportation literacy among the analytical sample, while illustrating how Human-Centered AI can support educational content development under continuous human oversight.

Keywords: Human-Centered Artificial Intelligence, Transportation Literacy, Sustainable Mobility, Game-Based Learning, Public Transportation.

1. INTRODUCTION

The rapid advancement of digital technologies has transformed various sectors, including education and public transportation. As cities strive to achieve sustainable mobility, improving public transportation literacy has become increasingly important, particularly among younger generations who will become future transport users and decision-makers. Transportation literacy (Simanjuntak, 2024) refers to individuals' knowledge, understanding, and ability to use transportation systems safely, efficiently, and responsibly while recognizing their environmental, social, and economic implications. It extends beyond factual knowledge by encompassing informed decision-making, responsible travel behaviour, and awareness of sustainable mobility principles. Improving transportation literacy is therefore considered an important strategy for encouraging informed travel choices and supporting the long-term

adoption of sustainable transportation systems (Fuady et al., 2026). However, many public transportation education initiatives continue to rely on conventional lecture-based approaches that often fail to attract students' attention or encourage active participation. Consequently, limited transportation literacy remains a challenge that may reduce public acceptance of sustainable transport systems and influence future travel behaviour. Recent developments in Artificial Intelligence (AI) have created new opportunities to enhance educational practices through personalized learning materials, interactive content, automated instructional design, and digital learning experiences. Nevertheless, concerns regarding information accuracy, ethical considerations, transparency, and excessive dependence on automated systems indicate that AI should complement rather than replace human expertise. This perspective is reflected in the concept of Human-Centered Artificial Intelligence (Human-Centered AI), which emphasizes collaboration between AI technologies and human professionals to ensure that AI-generated outputs remain accurate, ethical, transparent, and aligned with users' needs. Previous studies have demonstrated the potential of AI to support educational content development and improve learning engagement, while research on game-based learning has reported positive effects on students' motivation and conceptual understanding. Likewise, studies in transportation education suggest that interactive educational approaches can improve students' awareness of sustainable mobility and responsible public transport use. However, most existing studies have focused either on AI as an autonomous educational technology or on interactive learning strategies without explicitly examining how Human-Centered AI can be integrated into government-led transportation education while maintaining expert validation, accountability, and public-sector responsibility. Consequently, empirical evidence regarding the practical implementation of Human-Centered AI in public transportation education remains limited (Khamis, 2025).

To address this gap, this study examines the implementation of the Bali Transport Quest Program, a public transportation education initiative organized by the Bali Provincial Department of Transportation in collaboration with UPTD Trans Bali/Trans Sarbagita. Rather than allowing AI to independently generate educational content, transportation professionals employed AI as a collaborative assistant to develop educational narratives, presentation materials, visual learning resources, mascot storytelling, educational videos, and Quizizz assessment questions. All AI-generated outputs were subsequently reviewed, revised, and validated by transportation experts before being implemented in educational activities. The program also adopted age-appropriate learning strategies, including board game-based learning for elementary school students and Quizizz-supported interactive learning for junior and senior high school students (Ling et al., 2021).

Accordingly, this study addresses the following research question: How can a Human-Centered AI approach support the development and implementation of a government-led public transportation education program, and what learning outcomes are associated with students' participation in the program? To answer this question, the study evaluates immediate changes in transportation literacy using a one-group pre-test–post-test design and descriptive learning analytics. Given the absence of a comparison group, the study does not seek to establish causal effects of Human-Centered AI; rather, it examines how the Human-Centered AI approach was implemented and explores its association with short-term learning outcomes.

The novelty of this research lies in demonstrating a practical implementation of Human-Centered AI within a government-led public transportation education program. Unlike

previous studies that primarily examine AI as an autonomous educational technology, this study presents a human-in-the-loop framework in which AI functions as a design assistant while transportation professionals retain responsibility for reviewing, validating, and approving all educational content before classroom implementation. By documenting this collaborative workflow, the study contributes practical evidence on the responsible adoption of Human-Centered AI in the public sector and provides a reference model for government agencies seeking to strengthen transportation literacy through educational innovation while maintaining professional oversight.

2. METHODS

2.1 Research Design

This study employed a descriptive quantitative case study to examine the implementation of the Bali Transport Quest Program, a public transportation education initiative developed by the Bali Provincial Department of Transportation using a Human-Centered Artificial Intelligence (Human-Centered AI) approach. A case study design was considered appropriate because it enables an in-depth investigation of a contemporary educational program within its real-world context, allowing researchers to explore the interaction between instructional strategies, technological support, and learning outcomes (Yin, 2018).

The Human-Centered AI framework was adopted to position Artificial Intelligence (AI) as a collaborative design assistant rather than an autonomous educational decision-maker (Kasneci et al., 2023). AI was used to support transportation professionals in developing educational materials, including learning content, presentation materials, educational videos, mascot storytelling, and assessment questions. All AI-generated outputs were subsequently reviewed, revised, and validated by transportation experts before classroom implementation to ensure technical accuracy, educational relevance, and consistency with transportation regulations. This collaborative workflow reflects the core principles of Human-Centered AI, which emphasize human oversight, transparency, accountability, and shared responsibility in AI-assisted processes (Ben Shneiderman, 2022).

To evaluate students' immediate learning outcomes, the study employed a one-group pre-test–post-test design, in which the same participants completed identical assessments immediately before and after participating in the Bali Transport Quest Program. This design was intended to examine short-term changes in transportation literacy associated with participation in the educational program. Because the study did not include a comparison group or random assignment, the findings should be interpreted as evidence of an association between participation in the program and changes in transportation literacy rather than as causal evidence that the observed improvements were attributable solely to the Human-Centered AI approach or any individual instructional component. Other factors, such as facilitator guidance, interactive learning activities, or testing effects, may also have contributed to the observed outcomes.

2.2 Research Procedure

The implementation of the Bali Transport Quest Program consisted of five consecutive stages, beginning with instructional planning and ending with learning evaluation.

2.2.1 Educational Planning

The first stage involved identifying transportation issues relevant to students and determining the learning objectives of the program. Transportation professionals from the Bali Provincial Department of Transportation designed educational competencies covering public transportation systems, sustainable mobility, transportation etiquette, environmental awareness, and road safety. Learning objectives were adapted according to students' educational levels to ensure that instructional materials were developmentally appropriate.

2.2.2 Human-Centered AI Content Development

The second stage focused on developing educational content using a Human-Centered AI approach. ChatGPT (OpenAI, GPT-5.5) and Google Gemini were used as instructional design assistants to generate initial drafts of educational narratives, presentation materials, mascot storytelling, educational video scripts, visual learning content, and multiple-choice assessment questions. The prompts were prepared by transportation professionals based on predetermined learning objectives related to public transportation, sustainable mobility, transportation etiquette, environmental awareness, and road safety.

All AI-generated outputs were subsequently reviewed, revised, and validated by two transportation professionals from the Bali Provincial Department of Transportation before classroom implementation. The validation process assessed technical accuracy, consistency with transportation regulations, educational relevance, age appropriateness, and clarity of language. This collaborative workflow ensured that AI functioned solely as a content development assistant, while transportation professionals retained full responsibility for approving all educational materials prior to implementation.

2.2.3 Educational Implementation

Educational activities were conducted using instructional methods tailored to each educational level. Elementary school students participated in board game-based learning integrated with storytelling sessions featuring the transportation mascot Tara and facilitator-guided discussions. Interactive game-based learning was selected because it promotes student engagement and active participation during learning activities (Kumar et al., 2024). Junior high school and senior high school students participated in multimedia presentations, educational videos, Quizizz-based interactive learning, and classroom discussions regarding sustainable transportation and responsible public transport usage. Throughout the implementation process, transportation professionals served as facilitators, providing explanations, moderating discussions, and answering students' questions.

2.2.4 Learning Evaluation

Students completed pre-test assessments immediately before participating in the educational activities and post-test assessments immediately after program completion. The assessment instrument was reviewed by two transportation professionals from the Bali Provincial

Department of Transportation to ensure that the questions were technically accurate, aligned with the learning objectives, and appropriate for each educational level before implementation.

For junior high school and senior high school students, Quizizz was additionally used as an interactive digital learning platform. Besides supporting classroom engagement, Quizizz automatically recorded students' responses, participation, and class accuracy, providing supplementary information regarding learning performance.

2.3 Participants and Data Acquisition

The Bali Transport Quest Program involved 128 students from three educational levels in Bali, consisting of 66 students from SD Negeri 29 Dangin Puri, 33 students from SMP Negeri 9 Denpasar, and 29 students from SMA Negeri 2 Denpasar. All participants attended the educational activities designed according to their educational level. For the quantitative evaluation, a subset of participants was selected to complete the pre-test and post-test assessments. For statistical analysis, ten participants from each educational level were selected using simple random sampling, resulting in an analytical sample of 30 students. An equal number of participants was selected from each educational level to enable balanced comparisons across educational groups while maintaining manageable statistical analysis. This sample was used to evaluate changes in transportation literacy before and after the educational intervention. Meanwhile, all junior high school and senior high school students participated in the Quizizz activities, allowing class-level learning performance to be analyzed using Quizizz learning analytics.

Educational Level	Total Participants	Pre-test & Post-test Sample	Quizizz Participants
Elementary School	66	10	–
Junior High School	33	10	33
Senior High School	29	10	29
Total	128	30	62

Primary quantitative data were obtained from students' pre-test and post-test scores using the same ten-item multiple-choice assessment administered before and after the educational intervention. The instrument was designed to measure students' understanding of public transportation, sustainable mobility, transportation etiquette, and road safety.

For junior high school and senior high school students, Quizizz was additionally employed as an interactive learning platform and digital assessment tool. Quizizz automatically generated learning analytics, including participant attendance, total attempts, and class accuracy, which were used as supporting evidence to evaluate students' learning performance during the educational activities.

In addition to quantitative data, qualitative observations were conducted throughout the implementation process to document students' participation, interaction, enthusiasm, and

responses during classroom activities. These observations were used to complement the quantitative findings and provide a more comprehensive evaluation of the Human-Centered AI-supported educational program.

2.4 Data Analysis

The collected data were analyzed using both descriptive and inferential statistical methods. Descriptive statistics, including the mean, standard deviation, minimum score, and maximum score, were calculated to summarize students' learning performance before and after the educational intervention.

Inferential statistical analysis was performed on the 30 students who completed both the pre-test and post-test assessments (10 students from each educational level). A paired-samples t-test was used to determine whether there was a statistically significant difference between pre-test and post-test scores because the same participants completed both assessments (Andy Field, 2018). Statistical significance was evaluated at the 95% confidence level ($\alpha = 0.05$).

To assess the magnitude of the educational intervention, Cohen's d effect size was calculated and interpreted according to Cohen's (Cohen, 2013) criteria, where values of 0.20, 0.50, and 0.80 represent small, medium, and large effects, respectively.

Quizizz learning analytics, including class accuracy, total attempts, and participant completion rates, were analyzed descriptively for all junior high school and senior high school participants. These data were used as supplementary evidence to support the interpretation of the statistical findings obtained from the pre-test and post-test analyses.

Finally, classroom observation results were integrated with the quantitative findings to provide a comprehensive evaluation of the effectiveness of the Human-Centered AI approach implemented in the Bali Transport Quest Program.

3. RESULTS AND DISCUSSIONS

3.1 Participant Characteristics

A total of 128 students participated in the Bali Transport Quest Program, consisting of 66 elementary school students, 33 junior high school students, and 29 senior high school students. The program was implemented across three educational levels using instructional strategies tailored to students' cognitive development. Elementary school students participated in board game-based learning integrated with storytelling activities, whereas junior high school and senior high school students engaged in multimedia presentations, Quizizz-based interactive learning, educational videos, and classroom discussions. These differentiated learning strategies were designed to promote active participation and improve students' understanding of public transportation and sustainable mobility.

Table 1. Distribution of Participants

Education Level	Number of Participants	Percentage (%)
Elementary School	66	51.56

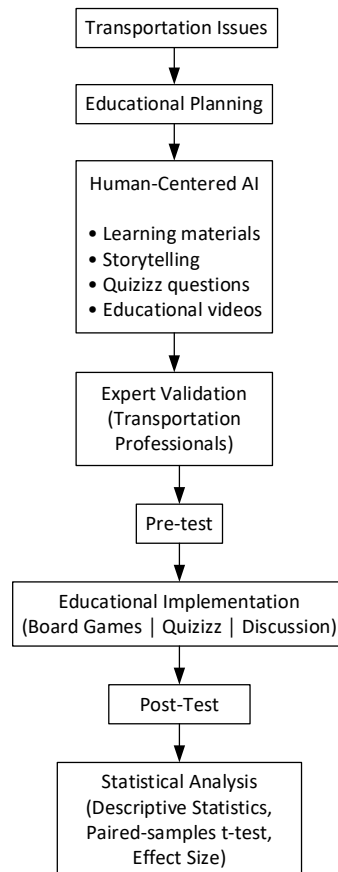
Junior High School	33	25.78
Senior High School	29	22.66
Total	128	100.0

As presented in Table 1, elementary school students constituted the largest proportion of participants (51.56%), followed by junior high school students (25.78%) and senior high school students (22.66%). This participant distribution enabled the implementation of educational approaches specifically designed for each educational level.

3.2 Human-Centered AI Implementation

The Bali Transport Quest Program was implemented using a Human-Centered AI framework in which Artificial Intelligence supported the development of educational content while transportation professionals retained responsibility for validating all learning materials before classroom implementation.

Figure 1. Research Framework of the Bali Transport Quest Program



As illustrated in Figure 1, the program began with the identification of transportation issues and educational planning. AI was subsequently utilized to assist in developing learning materials, storytelling content, Quizizz questions, and educational videos. All AI-generated outputs were reviewed and validated by transportation professionals before classroom implementation. Students completed pre-test assessments prior to the learning activities and post-test assessments immediately after the intervention. Finally, descriptive and inferential statistical analyses were conducted to evaluate students' learning outcomes following participation in the educational program.

3.3 Learning Outcomes

To evaluate students' learning outcomes following participation in the Bali Transport Quest Program, students' transportation literacy was assessed using pre-test and post-test instruments. A paired-samples *t*-test was performed on a representative sample of ten students from each educational level to determine whether the educational intervention produced significant improvements in learning outcomes. In addition, Quizizz learning analytics were used to complement the statistical findings for junior high school and senior high school students.

3.3.1 Elementary School Students

The learning outcomes of elementary school students were evaluated through pre-test and post-test assessments. Table 2 presents the descriptive statistics of students' scores before and after participating in the Bali Transport Quest, Program.

Table 2. Descriptive Statistics of Elementary School Students

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Nilai Pretest	10	70	90	83.00	8.233
Nilai Posttest	10	100	100	100.00	.000
Valid N (listwise)	10				

As shown in Table 2, the mean pre-test score was 83.00 (SD = 8.233), with scores ranging from 70 to 90. Following the educational intervention, the mean post-test score increased to 100.00 (SD = 0.000), indicating that all students achieved the maximum score on the post-test. This result suggests a substantial improvement in students' transportation literacy after the intervention. To determine whether this improvement was statistically significant, a paired-samples t-test was conducted.

Table 3. Paired-Samples t-Test Results (Elementary School)

		Paired Samples Statistics			
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1.	Nilai Pretest	83.00	10	8.233	2.603
	Nilai Posttest	100.00	10	.000	.000

Paired Samples Correlations					
		N	Correlation	Significance	
				One-Sided p	Two-Sided p
Pair 1	Nilai Pretest & Nilai Posttest	10	.	.	.

Paired Samples Test										
		Paired Differences						Significance		
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	One-Sided p	Two-Sided p
					Lower	Upper				
Pair 1	Initial Posttest - Final Posttest	-17.080	8.293	2.983	-22.899	-11.111	-6.530	8	.000	.000

Paired Samples Effect Sizes					95% Confidence Interval	
			Standardizer ^a	Point Estimate	Lower	Upper
Pair 1	Nilai Pretest - Nilai Posttest	Cohen's d	8.233	-2.065	-3.173	-.925
		Hedges' correction	9.009	-1.887	-2.900	-.845

a. The denominator used in estimating the effect sizes.
Cohen's *d* uses the sample standard deviation of the mean difference.
Hedges' correction uses the sample standard deviation of the mean difference, plus a correction factor.

Table 3 shows that the paired-samples *t*-test identified a statistically significant improvement in students' scores after the educational intervention ($t(9) = -6.530, p < .001$). The mean score increased from 83.00 to 100.00, with a large effect size (Cohen's $d = -2.065$), indicating that the intervention had a substantial positive impact on elementary school students' transportation literacy.

3.3.2 Junior High School Students

The effectiveness of the Bali Transport Quest Program among junior high school students was also evaluated using pre-test and post-test assessments. The descriptive statistics are presented in Table 4.

Table 4. Descriptive Statistics of Junior High School Students

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
nilai pretest	10	80	100	89.00	7.379
nilai posttest	10	90	100	99.00	3.162
Valid N (listwise)	10				

As shown in Table 4, the average score increased from 89.00 in the pre-test to 99.00 in the post-test, indicating that junior high school students demonstrated improved transportation literacy after completing the educational activities.

Table 5. Paired-Samples *t*-Test Results (Junior High School)

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	nilai pretest	89.00	10	7.379	2.333
	nilai posttest	99.00	10	3.162	1.000

Paired Samples Correlations					
		N	Correlation	Significance One-Sided p	Two-Sided p
Pair 1	nilai pretest & nilai posttest	10	-.048	.448	.896

Paired Samples Test									
		Paired Differences		95% Confidence Interval of the Difference				Significance	
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	One-Sided p
Pair 1	nilai pretest - nilai posttest	-10.000	8.165	2.582	-15.841	-4.199	-3.873	9	.004

Paired Samples Effect Sizes					
		Standardizer ^a		95% Confidence Interval	
			Point Estimate	Lower	Upper
Pair 1	nilai pretest - nilai posttest	Cohen's d	8.165	-1.225	-2.040
		Hedges' correction	8.934	-1.119	-1.864

a. The denominator used in estimating the effect sizes.
Cohen's d uses the sample standard deviation of the mean difference.
Hedges' correction uses the sample standard deviation of the mean difference, plus a correction factor.

Table 5 shows that the paired-samples *t*-test identified a statistically significant improvement in students' scores after the educational intervention ($t(9) = -3.873$, $p = .004$). The mean score increased from 89.00 to 99.00, with a large effect size (Cohen's $d = -1.225$), indicating that the intervention had a substantial positive impact on junior high school students' transportation literacy.

To complement these findings, Quizizz learning analytics from all participating junior high school students were analyzed.

Table 6. Quizizz Learning Analytics (Junior High School)

Name	Value
Game Started On	Tue 09 Jun 2026,10:43 AM
Game Type	Instructor-paced quiz
Participants	33
Total Attempts	33
Class Accuracy	66%
Game Ends On	Tue 09 Jun 2026,10:55 AM

The Quizizz results indicate that students achieved an overall class accuracy of 66%, indicating that approximately two-thirds of the quiz items were answered correctly during the learning session. The interactive digital assessment also provided immediate feedback, encouraging active participation and reinforcing students' understanding throughout the educational activities.

3.3.3 Senior High School Students

The transportation literacy of senior high school students was assessed using pre-test and post-test instruments. Table 7 summarizes the descriptive statistics.

Table 7. Descriptive Statistics of Senior High School Students

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
nilai pretest	10	90	100	99.00	3.162
nilai posttest	10	100	100	100.00	.000
Valid N (listwise)	10				

As shown in Table 7, the average score increased slightly from 99.00 in the pre-test to 100.00 in the post-test, indicating a modest improvement in senior high school students' transportation literacy following the educational intervention.

Table 8. Paired-Samples *t*-Test Results (Senior High School)

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	nilai pretest	99.00	10	3.162	1.000
	nilai posttest	100.00	10	.000	.000

Paired Samples Correlations									
		N	Correlation	Significance					
				One-Sided p	Two-Sided p				
Pair 1	nilai pretest & nilai posttest	10							

Paired Samples Test									
		Paired Differences		95% Confidence Interval of the Difference		t		df	
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper		One-Sided p	Two-Sided p
Pair 1	nilai posttest - nilai pretest	-1.000	3.162	1.000	-3.262	1.262	-1.000	.8	.343

Paired Samples Effect Sizes					
		Standardizer ^a		95% Confidence Interval	
		Point Estimate	Lower	Upper	
Pair 1	nilai pretest - nilai posttest	Cohen's d	3.162	-.316	-.944
		Hedges' correction	3.460	-.289	-.863

a. The denominator used in estimating the effect sizes.
Cohen's d uses the sample standard deviation of the mean difference.
Hedges' correction uses the sample standard deviation of the mean difference, plus a correction factor.

As shown in Table 8, although the mean score increased slightly from 99.00 in the pre-test to 100.00 in the post-test, the paired-samples *t*-test indicated that the difference was not statistically significant ($t(9) = -1.000, p = .343$). In addition, the effect size was small (Cohen's $d = -0.316$), suggesting that the educational intervention had a limited practical impact on senior high school students' transportation literacy. This finding is likely attributable to a ceiling effect, as most students had already achieved near-perfect scores on the pre-test, leaving little room for measurable improvement.

Quizizz learning analytics further showed that all **29 participating students** completed the assessment with an overall **class accuracy of 72%**, as presented in Table 9.

Table 9. Quizizz Learning Analytics (Senior High School)

Name	Value
Game Started On	Wed 10 Jun 2026,10:50 AM
Game Type	Instructor-paced quiz
Participants	29
Total Attempts	29
Class Accuracy	72%
Game Ends On	Wed 10 Jun 2026,11:01 AM

The Quizizz results indicate that senior high school students achieved an overall class accuracy of 72%, indicating that approximately 72% of the quiz items were answered correctly during the interactive learning session.

3.4 Discussion

The findings demonstrate that the Bali Transport Quest Program effectively improved transportation literacy across different educational levels. Elementary school students showed the greatest improvement, with a statistically significant increase in post-test scores and a very

large effect size, indicating that board game-based learning combined with storytelling effectively enhanced students' understanding of transportation concepts. Junior high school students also demonstrated significant learning gains, supported by both the paired-samples *t*-test results and a Quizizz class accuracy of 66%. In contrast, senior high school students did not exhibit a statistically significant improvement despite achieving the highest Quizizz class accuracy (72%). This finding is likely attributable to a **ceiling effect**, as students had already demonstrated high baseline knowledge during the pre-test, leaving limited room for measurable improvement after the educational intervention. These findings are consistent with previous studies indicating that interactive and game-based learning enhances students' engagement, motivation, and conceptual understanding (Plass et al., 2015).

The differing learning outcomes across educational levels suggest that age-appropriate instructional strategies played an important role in supporting transportation literacy (Leve et al., 2023). Board game-based learning appeared particularly suitable for elementary school students by encouraging active participation through storytelling and collaborative activities, whereas multimedia presentations and Quizizz effectively supported learning among junior and senior high school students. These findings reinforce previous studies highlighting the importance of aligning instructional methods with learners' cognitive characteristics to improve engagement and conceptual understanding.

Another important finding of this study is the successful implementation of the Human-Centered AI approach in developing transportation education materials. Artificial Intelligence supported the preparation of educational content, including storytelling, Quizizz questions, presentation materials, and educational videos, while transportation professionals remained responsible for reviewing and validating every AI-generated output before classroom implementation. This collaborative workflow ensured that instructional materials were both engaging and technically accurate, reflecting the core principles of Human-Centered AI, which emphasize human oversight, transparency, and accountability in AI-assisted decision-making (Ben Shneiderman, 2022).

From a practical perspective, the Bali Transport Quest Program demonstrates that Human-Centered AI can support government institutions in designing innovative and scalable educational programs without replacing human expertise. By reducing the time required to develop educational content while maintaining expert validation, the approach provides an effective strategy for improving transportation literacy among young learners. The integration of AI-assisted instructional design, interactive learning media, and transportation professionals offers a practical model that can be adapted by other public institutions seeking to promote sustainable mobility and strengthen public awareness of transportation issues.

4. CONCLUSION

This study evaluated the implementation of the Bali Transport Quest Program, a public transportation education initiative developed using a Human-Centered Artificial Intelligence (Human-Centered AI) approach. The findings suggest that the program effectively improved transportation literacy among elementary and junior high school students, as evidenced by significant improvements in pre-test and post-test scores. Although senior high school students did not show a statistically significant improvement, they achieved the highest Quizizz class

accuracy, indicating a strong level of transportation knowledge prior to the intervention. These results suggest that integrating interactive learning strategies, such as board games, storytelling, multimedia learning, and Quizizz, with AI-assisted instructional design can enhance students' understanding of sustainable transportation concepts.

An important contribution of this study is the demonstration of how Human-Centered AI can be practically implemented within a government-led educational program. Rather than replacing transportation professionals, Artificial Intelligence functioned as a collaborative tool that assisted in developing educational materials while maintaining expert validation to ensure technical accuracy and educational relevance. This collaborative approach enabled more efficient content development while preserving human oversight, making it a practical model for transportation agencies and other public institutions seeking to strengthen transportation literacy and promote sustainable mobility through educational innovation (Fuady et al., 2026).

This study has several limitations. First, the statistical analysis was conducted using a representative sample of 10 students from each educational level, while the educational program involved a larger number of participants. Consequently, the statistical findings may not fully represent the learning outcomes of all participants. Second, the study evaluated only short-term learning outcomes immediately after the educational intervention and did not assess long-term knowledge retention or changes in transportation behavior. Future research should involve larger and more diverse samples, apply longitudinal evaluation methods, and investigate whether Human-Centered AI-supported educational programs contribute to sustained improvements in transportation literacy and encourage greater use of public transportation.

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