

Exploring Students' Learning Experiences Using Augmented Reality in a Social Studies Course on Flood Risk Reduction

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Received : 21 September 2026
Revised : 5 Oktober 2026
Accepted : 5 Oktober 2026
Online : 6 Oktober 2026
Published : 6 Oktober 2026

Parameter
Volume 38, Issue 1
P-ISSN : 0216-261X
E-ISSN : 2620-9519



Abstract

National identity is a fundamental basis of a nation's character, social cohesion, and continuity. However, the rapid development of digital technology and globalization has created new challenges for young people by exposing them to diverse cultural values, lifestyles, and perspectives that may influence their understanding and expression of national identity. This study examines the role of young people in maintaining national identity in the digital era and analyzes the contributions of family, school, and the state through synergistic value internalization. The study employs a qualitative-descriptive approach using a narrative literature review. Fifty scholarly sources, mainly published between 2020 and 2025, were purposively selected through Google Scholar based on thematic relevance and source credibility. The collected literature was analyzed inductively using thematic content analysis and cross-checked through source triangulation. The synthesis identified six major themes: the digital rearticulation of national identity, cultural globalization and identity risks, young people's active use of digital media, family-school-state synergy, a multiperspective theoretical framework, and structural challenges. The findings indicate that young people can function as active agents in maintaining national identity when their digital participation is critical, productive, and supported by contextual civic and character education. The family provides the foundation for value formation, schools strengthen these values through learning and school culture, while the state establishes supportive policy frameworks. Therefore, maintaining national identity in the digital era requires integrated digital literacy, civic and character education, contextual cultural learning, and sustained collaboration among families, schools, and the state. These efforts should position young people not merely as recipients of national values but as active participants in interpreting, preserving, and communicating national identity within dynamic digital environments.

Keywords: learning experiences; Augmented Reality; social studies; flood risk reduction

1. INTRODUCTION

Experience plays an important role in children's learning about disaster risk reduction (DRR) (Amri, 2016). Experiential knowledge and practical skills can help children protect themselves, assist others, and adapt to disaster risks (Dyregrov, 2018; English, 2021). WHO (2011) estimated that children account for approximately 30–50% of disaster-related deaths. Limited access to assistance and insufficient knowledge of how to seek help can increase children's vulnerability and contribute to psychological distress (Sheehy, 2024). These concerns support the integration of DRR education into schools, particularly in disaster-prone countries such as Indonesia.

Flooding is a recurrent hazard in Jakarta. The city's multiyear flood records provide the local context for examining this recurring risk. During the most recent seven-year period covered by the data (2019–2026), Jakarta recorded 68 flood events across different locations (DKI Jakarta, 2026). Flood risk is closely associated with physical conditions, land-use change, drainage systems, settlement patterns, community behavior, and institutional capacity (Ha, 2026). Its causes and consequences involve relationships between people, geographical space, economic activities, public policy, and social life (Zhao, 2026). These connections make flood risk reduction a relevant topic for Social Studies. The subject provides a setting for examining how environmental and social factors shape flood risk and how people respond before, during, and after a flood.

In Indonesia, the Satuan Pendidikan Aman Bencana (SPAB) program places disaster prevention and risk reduction education within efforts to protect school communities (Permendikbud Nomor 33, 2019). Pada tingkat global, Comprehensive School Safety t the global level, the Comprehensive School Safety Framework emphasizes safe learning facilities, school disaster management, and risk reduction and resilience education (GADRRRES, 2022; Nickerson et al., 2021). hese priorities indicate that disaster education needs to go beyond definitions. Students need learning activities that connect knowledge with decisions, actions, and local conditions (Rahma, 2024). Such activities should help students relate disaster risk concepts to situations they may encounter in everyday life.

The need for contextual learning creates opportunities to use technology to connect classroom content with real-world environments. Augmented reality (AR) integrates virtual objects into physical surroundings, allowing users to view and interact with digital information in a real-world setting (Coştu, 2025; Najmi, 2023; Zulfiqar et al., 2023). Interactive AR

environments have been examined for their potential to support engagement, motivation, self-efficacy, skills, and knowledge acquisition (Cai, 2021; Lu, 2022; Novianti, 2026). AR has also been used to teach about disasters, including floods, through activities that support engagement, motivation, and collaborative knowledge construction (Tien Chi H, Mu-Yen C, 2019; Yao, 2026). Its educational benefits depend on pedagogical design and students' experiences, not only on the features of the technology (Baabdullah, 2022; Gil Parga, 2024; Suwadi, 2025) (Gil Parga et al., 2023).

Learning experiences refer to how students make sense of their interactions with content, tasks, teachers, peers, learning resources, and the environment during a course (Oller, 2021; Sardone, 2019). Knowledge tests indicate what students can answer at a particular time. Evaluating learning experiences addresses whether activities are clear, relevant, participatory, adequately supported, and applicable beyond the classroom (Ma & Wen, 2018; Wu., 2026). This evaluation helps explain how students participate in, understand, and respond to the learning process (Billett, 2019; Brodin, 2016; Joseph, 2026). Examining these experiences can therefore identify aspects of Social Studies instruction that need to be maintained or improved to support the learning objectives.

Research has reported the potential benefits of AR for learning achievement alongside persistent technical challenges (Akçayır, 2017; Baabdullah, 2022). In disaster-related contexts, studies have examined learning effectiveness, motivation, engagement, knowledge construction, preparedness, and evacuation training (Bourhim, 2022; Huda, 2026; Mitsuahara, 2021; Yao, 2026). Researchers have also developed realistic representations of disaster situations, while questions remain about training outcomes and participants' experiences of these representations (Mitsuahara, 2021; Schmidt & Stumpe, 2025). Related applications address environmental and spatial topics relevant to Social Studies (Kacham., 2025; Nunes, 2018; Yao, 2026). These developments justify closer attention to students' experiences in AR-supported Social Studies lessons on flood risk reduction. This study therefore explores how students evaluate their learning experiences through closed-ended questionnaire responses and written accounts of their participation in AR-supported activities.

2. RESEARCH METHODOLOGY

This study used a mixed-methods approach to explore students' learning experiences with augmented reality (AR) in Social Studies lessons on flood risk reduction. A mixed-methods

approach integrates quantitative and qualitative data within a single study, allowing the two types of data to complement one another and provide a more comprehensive understanding of the phenomenon under investigation (Creswell, 2005). Quantitative data were collected through closed-ended questionnaire items to identify patterns in students' responses across various aspects of their learning experiences, while qualitative data were obtained through open-ended questions that allowed students to describe their experiences during AR-supported learning activities (Braun, 2021). The quantitative data were analyzed using descriptive statistics, whereas students' written responses to the open-ended questions were analyzed using thematic analysis. The quantitative and qualitative findings were then integrated at the interpretation stage to provide a fuller account of students' learning experiences, enabling the patterns identified in the quantitative data to be interpreted alongside the explanations provided in students' written responses.

3. RESULTS AND DISCUSSION

Results

The learning experience examined in this study was based on students' interactions with an AR-supported flood risk reduction environment. Figure 1 presents the AR flood simulation experienced by students during the Social Studies learning activities. The simulation visualized a residential area exposed to flood conditions through three-dimensional objects, including a house, rainfall, vegetation, clouds, and rising water levels. These visual elements represented the flood-related context explored by students during the learning process. The AR environment therefore provides the contextual basis for interpreting students' learning experience results presented in the subsequent analysis.

Figure 2 illustrates the recommended actions that students should understand and prepare before a flood occurs. The first action emphasizes understanding weather information and flood warnings to recognize potential hazards at an early stage. Students are also introduced to evacuation routes and designated assembly points that can be used when evacuation becomes necessary. Preparing an emergency bag containing essential supplies is presented as an important component of household flood preparedness. The figure also highlights preventive measures at the community and environmental levels, including avoiding development in flood-prone areas and constructing flood protection infrastructure such as embankments. These actions provide students with a broader understanding that flood risk

reduction involves individual preparedness, evacuation planning, appropriate land use, and structural mitigation measures.



Figure 1. Augmented Reality Flood Simulation for Flood Risk Reduction Learning

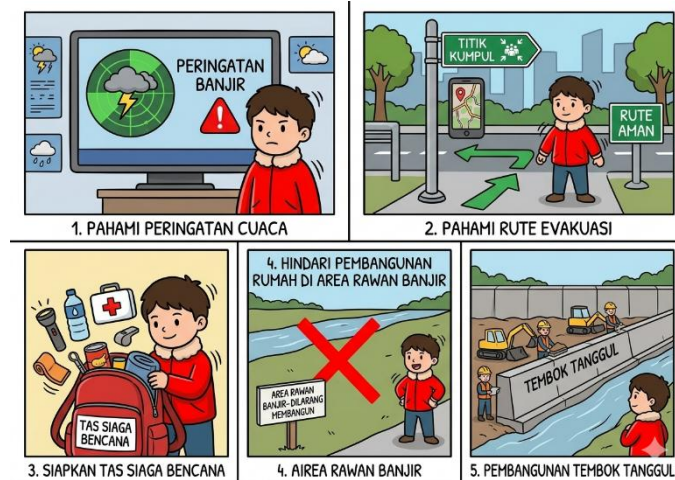


Figure 2. Recommended Actions Before a Flood for Flood Risk Reduction Learning



Figure 3. Recommended Actions During a Flood for Flood Risk Reduction Learning



Figure 4. Recommended Actions After a Flood for Flood Risk Reduction Learning

Figure 3 illustrates the recommended actions that students should take when a flood occurs. The first action emphasizes evacuating to higher and safer ground to reduce exposure to rising floodwater. Students are also encouraged to turn off the electricity supply and move important documents and valuable items to higher locations to prevent electrical hazards and property damage. Preparing and storing clean water is highlighted because access to safe water may become limited during a flood. The figure also emphasizes the importance of staying away from areas with strong flood currents, which may contain debris and other hazards. These actions help students understand that appropriate responses during a flood involve personal safety, household protection, access to essential resources, and awareness of environmental hazards.

Figure 4 illustrates the recommended actions that students should understand and follow after a flood occurs. Students are encouraged to avoid contaminated floodwater and remain cautious of electrical equipment that may still pose a risk after flooding. Cleaning houses and surrounding areas is also emphasized to remove mud, waste, and other residues left by floodwater. The figure further highlights the importance of accessing designated disaster shelters when necessary and ensuring the health and safety of family members after the event. These actions introduce students to the recovery stage of flood risk reduction, where attention shifts from immediate emergency response to health protection, environmental safety, and post-disaster recovery.

The learning experience provided through AR allowed students to explore flood risk reduction as a sequence of actions before, during, and after a flood. Rather than presenting flood

preparedness as isolated information, the visual and interactive environment connected preventive measures, emergency responses, and post-flood recovery within a contextual learning experience. This structure enabled students to encounter flood-related situations through representations that were closely connected to situations they may experience in everyday life. In the context of Social Studies, such experiences are relevant because flood risk reduction involves interactions between individuals, communities, the environment, and collective responses to disaster risks. The use of AR therefore provided a learning environment in which students could engage with flood risk reduction content through contextual visualization and interaction. This learning experience provides an important basis for understanding the positive student responses toward AR-supported learning identified in the quantitative and qualitative results of this study.

Table 1. Learning Experiences Using Augmented Reality in a Social Studies Course on Flood Risk Reduction Scores

Scales	N	Min	Max	M	SD
Learning Experience	95	26.00	120.00	1026,200	18.28746
AR Learning Experience	95	16.00	80.00	665,900	11,33572
Conventional Learning Media	95	10.00	40.00	360,300	6,95174

Table 1 presents the descriptive statistics of students' learning experiences after participating in augmented reality (AR)-supported Social Studies learning on flood risk reduction. Based on the descriptive statistics presented in Table 1, the students' total learning experience scores ranged from 26 to 120, with a mean score of 102.62 (SD = 18.28). The instrument consisted of 25 items rated on a five-point Likert scale. The mean score indicates that students generally reported highly positive learning experiences when using augmented reality (AR) in Social Studies learning on flood risk reduction. The analysis of the learning experience dimension showed that AR-supported learning obtained a mean score of 665.90 (SD = 11.33), indicating a high level of student learning experience. The use of AR was also relevant to disaster preparedness content, particularly the flood risk reduction subtheme. Through AR-supported activities, students were able to interact with digital objects and information related to the learning content. Such interactions provided an interactive environment for students to experience flood risk reduction learning in Social Studies.

In comparison, descriptive statistics for learning experiences using conventional media showed a moderate level, with a mean difference of 360.30 (SD = 6.95). The difference in mean scores indicates distinct patterns of learning experience between AR-supported learning and learning using conventional media. Students demonstrated a higher level of learning experience when AR was integrated into the learning activities. This pattern suggests that the use of AR provided a different learning experience compared with conventional media in presenting flood risk reduction content. Statistical significance of this difference should be established through an appropriate inferential statistical test, since descriptive statistics alone cannot determine whether the observed difference is statistically significant.

Table 2. Correlations among the Dimensions of Students' Learning Experience

Learning Experience Total	Learning Relevance	Augmented Reality Experience	Real-World Contextual Relevance
1			
0.46**	1		
0.72**	0.38**	1	
0.48**	0.35**	0.43**	1

Table 3 presents the Pearson correlation coefficients for the relationships between students' overall learning experience and its dimensions, namely Learning Relevance (LR), Augmented Reality Experience (ARE), and Real-World Contextual Relevance (RWCR). The results showed positive relationships between the overall learning experience and all three dimensions. Learning Experience Total was positively correlated with Learning Relevance ($r = .46, p < .01$), Augmented Reality Experience ($r = .72, p < .01$), and Real-World Contextual Relevance ($r = .48, p < .05$). Among these dimensions, Augmented Reality Experience demonstrated the strongest correlation with the overall learning experience, indicating that students who reported more positive experiences when interacting with AR also tended to report more positive overall learning experiences.

At the sub-dimension level, positive correlations were also observed among Learning Relevance, Augmented Reality Experience, and Real-World Contextual Relevance. Learning Relevance was positively correlated with Augmented Reality Experience ($r = .38, p < .01$) and

Real-World Contextual Relevance ($r = .35$, $p < .01$). In addition, Augmented Reality Experience was positively correlated with Real-World Contextual Relevance ($r = .43$, $p < .01$). These findings indicate that students' experiences with AR were associated with both the perceived relevance of the learning activities and their connection to real-world contexts.

Correlation analysis revealed that the dimensions of students' learning experiences were positively related to one another. The strongest relationship was found between Augmented Reality Experience and the overall Learning Experience ($r = .72$), while the correlations among the three sub-dimensions were comparatively moderate ($r = .35$). This pattern suggests that Augmented Reality Experience was particularly closely associated with students' overall learning experiences in the AR-supported Social Studies course on flood risk reduction, while Learning Relevance and Real-World Contextual Relevance represented related but distinct aspects of the learning experience.

Table 3. Student's Learning Experience Levels in Using Augmented Reality within the Systematic Structural Approach

Category	F	%
Highly Positive Learning Experience	42	44.21
Moderately Positive Learning Experience	28	29.47
Low/Negative	17	17.89
Undecided/Unclear	8	8.42
Total	95	100.00

Table 3 presents the descriptive analysis findings regarding students' learning experience levels in using augmented reality (AR) in the Social Studies course on flood risk reduction. The students' open-ended responses were analyzed through descriptive coding and categorized according to the patterns emerging from their reported learning experiences. The results showed that 44.21% of the students reported a highly positive learning experience, while 29.47% indicated a moderately positive learning experience. In contrast, 17.89% of the students reported a low or negative learning experience, and 8.42% provided responses that were undecided or unclear. The findings indicate that 73.68% of the students reported highly or moderately positive learning experiences, suggesting that most students perceived their experiences with AR-supported learning positively. The responses also revealed variations in students' learning experiences, as some students reported low, negative, or unclear

experiences during the learning process. Table 4 presents the descriptive analysis findings regarding students' experience levels with augmented reality (AR) technology in the Social Studies course on flood risk reduction. The results showed that 41.05% of the students reported a highly positive AR experience, while 32.63% reported a moderately positive experience. In contrast, 18.95% of the students reported a low or negative AR experience, while 7.37% provided undecided or unclear responses. The findings indicate that 73.68% of the students reported highly or moderately positive experiences with AR technology during the learning process. These results suggest that most students responded positively to the use of AR in learning about flood risk reduction, although variations in their experiences were still identified.

Table 4. Students' Experience Levels with Augmented Reality Technology in the Social Studies Course on Flood Risk Reduction

Category	F	%
Highly Positive AR Experience	39	41.05
Moderately Positive AR Experience	31	32.63
Low/Negative	18	18.95
Undecided/Unclear	7	7.37
Total	95	100.00

Table 5. Students' Perceptions of the Relationship between Learning Experience and Augmented Reality in Flood Risk Reduction Learning

Category	F	%
Students who stated that AR strongly supports their learning experience in understanding flood risk reduction	34	35.79
Students who stated that AR supports their learning experience, but its effectiveness depends on the learning activities	27	28.42
Students who stated that AR makes flood risk reduction learning more contextual and connected to real-world situations	20	21.05
Students who were undecided or unclear about the relationship between AR and their learning experience	8	8.42
Students who stated that AR had little or no contribution to their learning experience	6	6.32
Total	95	100.00

Open-ended responses were analyzed using descriptive coding. The emerging themes were interpreted alongside the quantitative findings to provide a broader understanding of students' learning experiences with augmented reality (AR). Table 5 presents the findings from students' open-ended responses regarding the relationship between their learning experiences and the use of AR in Social Studies learning on flood risk reduction. Students reported different experiences with AR during the learning process. Their responses ranged from strong support for learning to limited or unclear contributions of AR.

The findings showed that 35.79% of the students stated that AR strongly supported their learning experience in understanding flood risk reduction. This category represented the largest proportion of student responses. Another 28.42% reported that AR supported their learning experience, but its contribution depended on how AR was integrated into the learning activities. This finding highlights the role of learning activities in shaping students' experiences with AR. Students' positive experiences were therefore associated with both the use of AR and its integration into the learning process.

The results also showed that 21.05% of the students perceived AR as making flood risk reduction learning more contextual and connected to real-world situations. These students perceived a connection between the learning content and situations that could occur in everyday life. The use of AR provided a context through which students could relate flood risk reduction concepts to real-world situations. The three positive categories accounted for 85.26% of the student responses. This distribution indicates that most students perceived AR as contributing positively to their learning experiences, although the nature of their experiences varied.

A different pattern was found among 8.42% of the students who provided undecided or unclear responses. For these students, the contribution of AR to their learning experiences was not clearly expressed. The remaining 6.32% stated that AR had little or no contribution to their learning experience. These responses demonstrate that students did not experience AR-supported learning in the same way. The findings therefore reflect variations in how students perceived the role of AR in supporting their understanding of flood risk reduction and connecting the learning content with real-world contexts.

Discussion

This study examines students' learning experiences with augmented reality (AR) in Social Studies learning on flood risk reduction. The descriptive account suggests that students

evaluated the learning activities favorably. This pattern concerns perceived experience rather than demonstrated improvement in knowledge or preparedness. Akçayır (2017) identified positive attitudes and motivation among the benefits reported in AR education research. This literature provides a context for interpreting favorable evaluations, but it does not establish the outcomes of the present course. The educational significance of the reported experience therefore lies in students' perceptions of the learning process, not in a demonstrated causal effect of AR.

An international comparison is provided by Di Serio (2013), who examined middle-school students' motivation in a visual art course. Students rated attention and satisfaction more favorably in the AR environment than in the slide-based environment. This resembles the favorable evaluations in the present study, where 73.68% of students reported highly or moderately positive learning experiences. However, motivation in visual art and learning experience in flood risk reduction are different constructs, so their scores cannot be compared directly. The earlier study supports interpreting AR as a potentially engaging presentation medium; the present findings extend this discussion to students' perceptions of locally relevant disaster content within Social Studies.

The organization of the learning content may help explain students' reported evaluations. Figure 1 presents a three-dimensional representation of a flood-affected residential setting. The accompanying illustrations in Figures 2–4 organize the content into actions before, during, and after a flood. These materials place the hazard and possible responses within a shared visual context. Gil Parga (2024) identified understanding complex or abstract information as a relevant use of AR in education. This provides a pedagogical rationale for representing flood-related situations visually. Whether this organization explains students' evaluations remains an interpretation rather than a mechanism tested in the present study.

A closer international comparison is the Taiwanese study by Lu (2022), which examined AR-enhanced collaborative disaster education with 85 fifth-grade students using a pretest–posttest quasi-experimental design. Both AR-supported activity groups improved in knowledge acquisition, and the board-game group achieved higher posttest performance than the alternative collaborative activity group. These results show that learning arrangements can matter even when both groups use AR. This provides a useful comparison with the present finding that 28.42% of students perceived AR's contribution as dependent on its integration

into learning activities. The studies therefore converge on the relevance of instructional design, while differing in age group, hazard coverage, and outcome measurement. The present junior high school study contributes learner accounts of flood risk reduction in Social Studies; it does not replicate the earlier study's achievement effects.

Indonesian research offers a direct flood-related comparison. Fuedsi (2024) evaluated AR-based tidal-flood mitigation education with 30 students at SD Islam Hasanuddin 04 in Semarang using pretest and posttest measurements. They reported improved understanding and preparedness following the educational activities. Both studies situate AR within flood education relevant to Indonesian learners, but the Semarang study addressed tidal flooding among elementary pupils and assessed change across two measurement points. The present study instead examines the experiences of 95 junior high school students after AR-supported Social Studies activities. Favorable experiences may support participation in disaster education, but they cannot be treated as evidence of the same preparedness gains. This comparison identifies a complementary contribution: preparedness assessment examines what students can demonstrate, whereas experience data help explain how they perceive the learning process.

Research on AR-enhanced collaborative disaster education among elementary school students provides a relevant comparison for the present study Lu (2022). That study reported support for engagement, motivation, and collaborative knowledge construction. Both studies used AR-based representations to present disaster-related content. The present study focuses on junior high school students' reported learning experiences in Social Studies. Its descriptive evidence should not be treated as equivalent to the quasi-experimental evidence reported in the earlier study. The comparison therefore highlights a shared educational context without implying an equivalent level of effectiveness.

The Social Studies learning materials connect environmental conditions with social responsibilities in flood risk reduction. The content moves from household preparedness to evacuation planning and community recovery. This structure provides opportunities to discuss how individual decisions relate to shared risks. Rahma, (2024) proposed a school ecosystem-based framework that connects disaster risk education with ecological understanding and the school community. The present materials can be interpreted in relation to that framework because they address more than the physical occurrence of flooding. Their curricular relevance

lies in linking environmental settings, collective action, and responsibility. Whether students developed these connections requires direct assessment.

The pedagogical value of AR also depends on what students are asked to do with the visual content. Oller (2021) identified learning activities, educational agents, and mediating tools as dimensions for examining connections across learning contexts. This perspective positions technology within instructional design rather than treating it as the sole source of meaningful experience. A practical implication is to pair the visualization with questions about the situations it represents. Students could explain why a location is vulnerable or compare the responsibilities of households and communities. These are directions for instructional development, not activities confirmed by the current data. Such tasks would make the representation a resource for reasoning rather than an endpoint of the lesson.

Evidence from a broader international synthesis reinforces this interpretation. Na and Yun (2024) analyzed 45 experimental studies in K–12 settings and reported a positive overall effect of AR on motivation, with differences associated with AR type and collaborative learning arrangements. Their findings support considering how AR is embedded in pedagogical practice. They also contextualize the present variation between strong support for AR and support conditional on the learning activities. Nevertheless, motivation effects aggregated across experimental studies do not establish an effect on flood preparedness in this sample. For instructional development, the comparison supports examining the task structure, opportunities for peer discussion, and teacher guidance alongside the visual features of the application.

The mixed-methods design is intended to connect questionnaire ratings with students' written explanations. Braun (2021) showed how qualitative surveys can capture diverse experiences and perspectives. They also emphasized the importance of question design because written surveys do not allow immediate follow-up or clarification. A meaningful integration would connect specific ratings with traceable response categories and representative excerpts. Evidence from students' written responses is needed to distinguish appreciation of the technology from appreciation of the learning content or instructional support. Unclear responses should be analyzed separately from negative experiences unless their wording supports a negative interpretation.

Potential barriers also deserve attention when interpreting AR-supported learning experiences. (Akçayır & Akçayır, 2017) identified usability problems as recurring challenges

that can require additional guidance and reduce available learning time. These issues offer questions for further investigation, not established explanations for the responses in this study. It would be inappropriate to attribute students' evaluations to device problems, anxiety, or unequal participation without supporting evidence. Future evaluation could document the assistance students request and the difficulties they describe. This would help teachers identify whether problems arise from operating the application, understanding the content, or following the activities.

The interpretation draws solely on students' self-reported experiences during the course. These reports do not demonstrate knowledge retention or effective responses during an actual flood. The descriptive analysis also does not establish that AR-supported learning outperforms instruction using conventional media. A comparison would require equivalent measures and clearly specified learning conditions. Future research could combine student accounts with observations, scenario-based assessments, and follow-up measures. This would help examine whether favorable experiences are accompanied by sustained understanding and appropriate decisions. The study's contribution is therefore its learner-centered examination of contextual flood risk reduction learning, rather than proof that AR alone improves preparedness.

4. CONCLUSIONS

The Students' self-reported scores suggest favorable learning experiences with augmented reality (AR) in Social Studies lessons on flood risk reduction. The learning materials organized flood-related actions into preparedness, emergency response, and recovery. This sequence provided a context for addressing individual preparedness, community responses, and environmental responsibilities. The educational value of AR should therefore be assessed through students' learning experiences rather than inferred from the presence of technology alone. Clear learning activities and appropriate instructional support remain priorities for developing AR-supported lessons. Interpretation remains limited to descriptive and self-reported evidence. These data do not establish improvements in knowledge, changes in safety behavior, or superiority over conventional media. Future research should combine questionnaires with classroom observations and follow-up assessments. Integrating these sources would help clarify how students' reported experiences relate to demonstrated understanding and sustained learning. Comparisons across learning media should employ equivalent measures and research designs suited to evaluating their

educational effects. Future research should explore how instructional design, students' prior experiences of flooding, and access to technology shape learning experiences in AR-supported Social Studies lessons across different school contexts. Classroom observations and in-depth interviews with students and teachers could clarify how AR is integrated into learning activities and how students connect flood risk reduction concepts with everyday situations.

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