

Geographic Literacy Through the Use of Interactive Digital Maps in College Geographic Classes

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Abstract

This study examines the utilization of interactive digital maps as a pedagogical tool to enhance students' geographic literacy in college-level geography courses. It investigates the effectiveness of interactive maps in comparison to traditional map tools, particularly in relation to content comprehension and the quality of class discussions. Furthermore, the study explores the impact of interactive digital maps on students' spatial thinking skills across various branches of geography and their application to real-life situations. It also analyzes how the integration of interactive mapping technologies influences student engagement, motivation, and self-efficacy, as well as the instructional activities designed to further develop geographic literacy.

The study employed a mixed-methods design, combining quantitative and qualitative approaches. A validated survey questionnaire was used for data collection, along with focus group discussions conducted with participants' consent. The respondents were first-year Social Studies students from the College of Teacher Education at Batangas State University–TNEU, Lemery Campus.

Findings revealed that utilizing interactive digital maps increased students' geographic literacy in terms of learning content and class discussion. It was also assessed that interactive digital maps in college geography classes have a significant effect on students' spatial thinking skills. However, integrating this strategy shows no significant effect on students' learning of geography in terms of engagement, motivation, and self-efficacy. The study concludes that the use of interactive digital maps is an effective strategy for teaching geography subjects. As a result, the researcher proposed various classroom activities that supports and enhance students' geographic literacy.

Keywords: *geography, geographic literacy, interactive digital maps, learning content, class discussion, branches of geography, real-life situations, student engagement, motivation, self-efficacy*

Introduction

Social Studies is a crucial subject for all Filipino students at this present time. Its primary aim is to develop learners to become citizens who are —investigative, critical thinkers, responsible, productive, environment-friendly, patriotic, and values-oriented, with both nationalistic and global perspectives on social and historical topics. Traditionally, in the context of learning geography, student often experience difficulty in understanding static maps, which limits their ability to develop deeper understanding of their subject and results to low engagement, low motivation, and poor academic performance thereby affecting their geographic literacy. To meet the goals of the social studies program, teachers incorporate the use of interactive technological devices in the four-corner classroom.

In light of this problem, this action research proposes the integration of interactive digital maps as an instructional tool to bridge the gap between theoretical knowledge and real-world understanding in geography among first-year students. This approach responds to the observed disconnection between students' classroom learning and their awareness of global spatial relationships and geographic contexts. By incorporating multimedia-based learning activities, particularly the use of interactive digital maps, the study aims to provide learners with a more meaningful and immersive learning experience. These tools allow students to visualize geographic information dynamically, explore spatial patterns, and connect abstract concepts to real-life situations. Furthermore, the study seeks to enhance student engagement, participation, and motivation in geography classes by shifting from traditional lecture-based instruction to a more interactive and student-centered learning environment. Through this approach, learners are expected to develop stronger geographic literacy, improved spatial thinking skills, and a deeper appreciation of geography as a discipline relevant to everyday life.

This study is anchored on the enhancement of students' geographic literacy through the development of spatial thinking skills, global awareness, and higher-order critical thinking competencies necessary for navigating an increasingly complex and interconnected world. It seeks to cultivate globally competent learners who are capable of critically analyzing geographic phenomena and sociocultural issues from diverse and multidimensional perspectives. Furthermore, the study promotes the integration of technological competencies with geographic literacy, emphasizing the effective use of digital tools in interpreting spatial data and understanding real-world geographic patterns. Such integration is intended to better prepare learners for the demands of a technology-driven and globally interconnected society. Lastly, this research aims to examine and advance innovative, experiential, and visually oriented pedagogical strategies aligned with contemporary educational paradigms, thereby contributing to more dynamic, learner-centered, and effective Social Studies instruction.

Review of Related Literature

This part of the study deals with the concepts and other valuable information relative to the research problem. This includes the related studies and related literature of the study. The following literature and studies present valuable information about the the use of interactive digital maps, which includes geographic literacy, interactive digital maps, learning content, class discussion, spatial thinking skills, branches of geography, real-life situations, student-engagement, motivation, and self-efficacy.

In the current educational discourse, geography courses emphasizes the goal of educating individuals as contemporary global citizens who are capable of understanding and evaluating human-environment relationships. Dikmenli (2020) defines literacy as the ability to transform knowledge and comprehension into a skill. This involves problem-solving, reasoning, and critical and creative thinking processes. Similarly, Thomas (2021) explains that geographically literate individuals should have an understanding of what people already know and should know about geography. This is essential in developing geographic literacy, as it enables individuals to acquire the critical thinking and interpretation skills needed to evaluate both local and global information.

Furthermore, learning is a meaningful process, thus, it is required to be more interactive, and relevant in today's time. The presence of technology in education, plays a vital role in providing creativity, critical-thinking, and innovative skills on students (Leavy et.al., 2023). Coupled with Robinson (2024), the use of interactive digital maps greatly enhances students' skills, as it helps them develop a comprehensive understanding of spatial relationships and allows them to present multiple data sets simultaneously.

Geography focuses on the relationship of people and the environment (National Geographic, 2025). In the same way, it includes the basic concepts of the course, namely discussing the difference between absolute location and relative location (Carlson, 2020). Moreover, using digital maps in class discussions, teachers and students engage interactively in a learning environment that fosters experiences catering to different learning styles.(Smith 2024). As Peterson (2020) also discussed, learning the course of geography is not only done within the classroom, but also from the outside world.

With regard to the use of interactive digital maps in the branches of geography and real-life situations, Liben (2021) explains that due to the broad application of geography, students are engaged in spatial thinking when interacting with their environment and when giving interpretations within spatial contexts. Similarly, Shrestha (2025) mentions that geography focuses on two main branches: human geography, which examines the relationship between humans and the environment, and physical geography, which focuses on Earth's natural systems. In relation to real-life applications, Calvignac and Smolinski (2020) assert that the use of interactive digital maps helps students navigate locations by providing accurate data, features, and real-time information. Consequently, these tools assist individuals in finding the quickest routes while providing real-time traffic updates (Momani et al., 2022). Weizhuo (2023) also mentioned that students gain exposure of global issues through the use of interactive digital maps, helping them see the spatial dimensions of worldwide phenomena.

In relating to engagement, motivation, and self-efficacy of students, Naibaho (2022) cited that interactive digital maps enable students to visually organize knowledge in a non-linear fashion, fostering deep learning and improving memory recall, representing a very effective teaching tool that can improve students' performance and engagement. It was also discussed by Sweller (2020) that students knowledge is created via active engagement with the instructional materials. In addition, motivation is crucial for fostering learning and has a strong correlation with student achievement (Zalts et.al., 2021). More so, the factors that shape motivation are further strengthened by how students respond to teaching methods, instructional strategies, and student-centered curriculum design (Tatipang et.al., 2022). By giving students concrete, hands-on learning experiences and enabling them to actively engage with the contents, it also successfully raises student motivation while strengthening their comprehension and memory of

geographic subject. (Lin et.al., 2021). Furthermore, as cited by Bandura (1977) self-efficacy refers to an individual's capacity, the extent to which they possess the qualities necessary to deal with challenging circumstances, and evaluation of the events. Additionally, students' degree of self-efficacy promotes and facilitates their learning, their drive and guarantees that they remain motivated (Tavares, 2021).

Statement of the problem

1. How may the use of the interactive digital maps in college geography classes affect students/ geographic literacy compared to traditional map tools, in terms of:
 - 1.1 learning content;
 - 1.2 class discussion.

2. How affective is the use of interactive digital maps on students' spatial thinking skills in terms of the following:
 - 2.1 branches of geography;
 - 2.2 real-life situations.

3. How do interactive digital maps influence students in learning geography, in terms of:
 - 3.1 engagement;
 - 3.2 Motivation; and
 - 3.3 self-efficacy.

4. What are the challenges encountered by the respondents in utilizing digital maps?

5. Based on the results of the study, how may the use of interactive digital maps be enhanced?

Objectives

This study aims to examine the use of interactive digital maps in geography classes to enhance the geographic literacy of first-year college students.

Materials and Methods

This part describes the research design, subjects of the study, data gathering procedure, data gathering instrument, and data analysis plan.

Research Design

This study aims to examine the use of interactive digital maps in geography classes to enhance the geographic literacy of first-year college students. The study utilized mixed methods of research, incorporating both qualitative and quantitative type of research. Researcher-made questionnaire and focus group discussion was utilized to examine the effectiveness of interactive digital maps on enhancing geographic literacy, students' spatial thinking skills, influence in learning geography, and the challenges encountered.

The questionnaire was used to gather data from first-year college students within a short period of time, while focus group discussions were utilized to allow respondents to provide in-depth opinions, beliefs, and insights.

Subject of the Study

The participants of this study were 40 First Year BSED Social Studies students, composed of 5 males and 35 females, of Batangas State University-TNEU Lemery Campus, and were conducted during the first semester of the academic year 2025-2026. No sampling technique was used as the entire population of first year social studies students' was part of the study.

Data Gathering Instruments

The researcher collected information from websites, books, and related studies to develop questions for the focus group discussion and a self-constructed questionnaire, which served as the primary data-gathering instrument. The instrument then underwent the processes of construction, validation, administration, retrieval, and scoring.

Construction. The questionnaire was developed following a quantitative approach and was informed by relevant literature, including books, journals, dissertations, and online sources. It consisted of three parts: (1) the use of interactive digital maps and their effects on students' geographic literacy in terms of learning content and class discussions, (2) impact on students' spatial thinking skills with respect to the branches of geography and real-life situations, and (3) the influence of digital maps on students' learning of geography in terms of engagement, motivation, and self-efficacy. The draft was reviewed and revised based on the evaluator's comments and suggestions.

Validation. The instruments was validated based on clarity, accuracy and relevance of items, incorporating feedback and suggestions from validators who are experts in field and research.

Administration. Upon the approval of the dean and department chairperson, the finalized questionnaire was distributed to the target respondents.

Retrieval. Questionnaire were collected from first year social studies students of Batangas State University-The National Engineering University-Lemery Campus, ensuring completeness among participants.

Scoring of Responses. The gathered data were tallied and submitted to statistician for analysis. Items were also interpreted from strongly agree, agree, disagree, and strongly disagree.

Focus group discussion. The researcher constructed questions based on journals, websites, and researchers, that gathered responses from students on the challenges encountered.

Data Gathering Procedure

Before the distribution and administration of the survey questionnaire, the researcher prepared a letter of request addressed to the college department chairperson, seeking permission to administer the research instrument to the student-respondents. Upon receiving approval, the researcher administered the survey questionnaire using printed copies. The researcher then received the responses from the respondents, completing the data-gathering process. Subsequently, the collected data were sent to the statistician for analysis using appropriate statistical tools.

Data Analysis Plan

To interpret the data gathered, the following statistical measures were used to answer the research questions.

Frequency. This was used to measure the number of occurrences of a particular score in a given set of data. In this study, frequency was used to track the effectiveness of interactive digital maps on students geographic literacy on geography classes.

Percentage. To determine the proportion of students who responded to each item in the survey questionnaire regarding the use of interactive digital maps in geography classes.

Focus group discussion. This was used to gather qualitative data on students' experiences, perceptions, and challenges in using interactive digital maps to strengthen their geographic literacy.

Thematic Analysis. In this study, it was used to identify patterns, themes, and meanings in the data gathered through focus group discussions that informed the effectiveness of interactive digital maps on students' geographic literacy in geography courses.

Coding. It allowed the researcher to explore patterns, connect data points, and draw meaningful conclusions based on the students' answers in the focus group discussion.

Results and Discussions

Table 1. Effect of Interactive Digital Maps on Students' Geographic Literacy in Terms of Learning Content and Class Discussion

Variable	B	Std. Error	t-value	p-value	Decision on H ₀	Interpretation
Constant	1.183	0.527	2.245	0.031		
Independent Variable	0.644	0.143	4.508	<0.001	Reject H ₀	Significant

Model Summary: $R = 0.590$; $R^2 = 0.348$

Regression Model: $F = 20.318$; $p = <0.001$

As shown in Table 1, the use of interactive digital maps in college geography classes and students' geographic literacy compared to traditional maps in terms of learning content and class discussion are correlated ($R = 0.590$). In addition, only 34.8% of the total variation in students' geographic literacy, compared to traditional maps in terms of learning content and class discussion, can be explained by the use of interactive digital maps in college geography classes. Furthermore, the regression model significantly predicts students' geographic literacy compared to traditional maps in terms of learning content and class discussion ($F = 20.318$, $p < 0.001$), indicating that the model is a good fit for the data.

Moreover, the use of interactive digital maps in college geography classes has a significant effect on students' geographic literacy compared to traditional maps in terms of learning content and class discussion, as indicated by $p < 0.001$. The following equation can be used to predict students' geographic literacy compared to traditional maps in terms of learning content and class discussion from the use of interactive digital maps in college geography classes:

Students' geographic literacy compared to traditional maps in terms of learning content and class discussion = 0.644 (use of interactive digital maps in college geography classes).

This means that for every one-unit increase in the use of interactive digital maps in college geography classes, there is a corresponding 0.644-unit increase in students' geographic literacy compared to traditional maps in terms of learning content and class discussion.

Table 2. Effect of Interactive Digital Maps on Students' Spatial Thinking Skills in Terms of Geography Branches and Real-Life Applications

Variable	B	Std. Error	t-value	p-value	Decision on H_0	Interpretation
Constant	2.377	0.546	4.353	<0.001		
Independent Variable	0.302	0.148	2.041	0.048	Reject H_0	Significant

Model Summary: $R = 0.314$; $R^2 = 0.099$

Regression Model: $F = 4.166$; $p = 0.048$

As shown in Table 2, the use of interactive digital maps in college geography classes and students' spatial thinking skills in terms of branches of geography and real-life situations are correlated ($R = 0.314$). In addition, only 9.9% of the total variation in students' spatial thinking skills

in terms of branches of geography and real-life situations can be explained by the use of interactive digital maps in college geography classes. Furthermore, the regression model significantly predicts students' spatial thinking skills in terms of branches of geography and real-life situations ($F = 4.166$, $p = 0.048$), indicating that the model is a good fit for the data.

Moreover, the use of interactive digital maps in college geography classes has a significant effect on students' spatial thinking skills in terms of branches of geography and real-life situations, as indicated by $p = 0.048$. The following equation can be used to predict students' spatial thinking skills in terms of branches of geography and real-life situations from the use of interactive digital maps in college geography classes:

Students' spatial thinking skills in terms of branches of geography and real-life situations = 0.302 (use of interactive digital maps in college geography classes).

This means that for every one-unit increase in the use of interactive digital maps in college geography classes, there is a corresponding 0.302-unit increase in students' spatial thinking skills in terms of branches of geography and real-life situations.

Table 3. Influence of Interactive Digital Maps on Students' Learning of Geography in Terms of Engagement, Motivation, and Self-Efficacy

Variable	B	Std. Error	t-value	p-value	Decision on H ₀	Interpretation
Constant	2.686	0.577	4.657	<0.001		
Independent Variable	0.223	0.156	1.426	0.162	Failed to Reject H ₀	Not Significant

Model Summary: $R = 0.225$; $R^2 = 0.051$

Regression Model: $F = 2.034$; $p = 0.162$

As shown in Table 3, the use of interactive digital maps in college geography classes and learning geography in terms of student engagement, motivation, and self-efficacy are not correlated ($R = 0.225$). In addition, only 5.1% of the total variation in learning geography in terms of student engagement, motivation, and self-efficacy can be explained by the use of interactive digital maps in college geography classes. Furthermore, the regression model does not significantly predict learning geography in terms of student engagement, motivation, and self-efficacy ($F = 2.034$, $p = 0.162$), indicating that the model is not a good fit for the data. Moreover, the use of interactive digital maps in college geography classes has no significant effect on learning geography in terms of student engagement, motivation, and self-efficacy, as indicated by $p = 0.162$.

Table 4. Challenges in Using Interactive Digital Maps Among Respondents

Test Variable Name	Mean	Standard Deviation	Interpretation
1. Limited internet access makes it difficult for the interactive maps to be used effectively.	3.47	.679	Agree
2. I experience technical problems (e.g., lag, loading issues) when using digital maps.	3.17	.781	Agree
3. I find it challenging to interpret complex map data.	2.98	.800	Agree
4. Some digital maps are too complex or confusing to navigate.	2.95	.749	Agree
5. Not all lessons are suitable for digital map integration.	3.03	.862	Agree
6. I feel anxious or unsure when operating interactive digital maps on my own.	2.80	.791	Agree
7. Using interactive maps sometimes takes too much class time.	2.37	.740	Disagree
8. My device (phone/laptop) is not always compatible with digital maps.	2.55	.932	Agree
9. I experience distractions when using digital maps during class.	2.68	.888	Agree
10. I lack proper training in using digital mapping tools.	2.67	.764	Agree
Composite Mean	2.87	.576	Agree

Legend: 3.50 – 4.00 Strongly Agree
 2.50 – 3.49 Agree
 1.50 – 2.49 Disagree
 1.00 – 1.49 Strongly Disagree

As shown in the table, it was revealed that the challenges encountered by the respondents in utilizing interactive digital map is interpreted as agree, having a composite mean of 2.87. This indicates that there are problems encountered by students when utilizing interactive digital maps in geographic

classes. Moreover, these challenges should be given solutions to provide a quality education to all learners. Using interactive digital maps in geographic classes greatly affects students geographic literacy.

Additionally, with the highest mean, limited internet access makes it difficult to use interactive maps effectively, with a mean value of 3.47, interpreted as “agree.” This indicates that the most challenging aspect of using interactive digital maps in geography classes is the limited internet connection, which hinders students’ participation in class discussions. Moreover, limited internet access not only restricts the use of technological devices in the classroom but also limits students’ opportunities to learn through these tools. This finding supports the study of Minga and Ghosh (2024), which revealed that issues such as inconsistent internet connectivity and power supply further complicate the integration of digital technologies into classroom teaching.

Focus Group Discussion Thematic Analysis

The findings of the focus group discussion revealed that students generally conceptualize geographic literacy as more than the ability to identify or memorize locations on a map. Instead, they view it as a combination of map interpretation, spatial reasoning, global awareness, and the ability to make informed decisions using geographic data. This suggests that students recognize geographic literacy as a higher-order skill that involves understanding the relationships between people, places, and environments (Liben, 2021). Such perception aligns with the view that geographic literacy is essential in analyzing and responding to global issues such as climate change, migration, and environmental change.

In terms of experience, the respondents reported positive engagement with interactive digital maps such as Google Earth, GIS tools, and online mapping platforms. Students emphasized the value of 3D visualization, real-time data interaction, and practical applications such as field navigation and data collection. These responses indicate that interactive digital maps enhance engagement by transforming geography lessons into more dynamic and experiential learning activities. The use of visual and interactive tools enables students to better connect theoretical knowledge with real-world contexts (Dudar et.al.,2021)

Furthermore, students noted that interactive digital maps improve their understanding of geographic concepts compared to traditional maps and textbooks. They highlighted features such as zooming capabilities, layered data visualization, and real-time updates as key factors that enhance comprehension. These tools allow learners to actively explore spatial information rather than passively viewing static representations. As a result, students are able to better grasp abstract concepts such as scale, distance, environmental change, and spatial distribution.

The findings also showed that interactive digital maps make learning more meaningful and practical, particularly when applied to topics such as plate tectonics, population distribution, climate zones, and landforms. Students described these tools as helpful in visualizing complex geographic processes and making lessons more engaging and understandable. This suggests that digital mapping technologies support experiential learning by making abstract geographic phenomena more concrete and observable.

In addition, respondents identified several benefits of using interactive digital maps in geography learning. These include increased engagement, access to real-time information, improved spatial thinking skills, enhanced collaboration, and the development of digital literacy. These findings indicate that the use of digital maps extends beyond geographic content learning and contributes to the development of 21st-century skills, which are essential in modern education.

Overall, the qualitative findings suggest that interactive digital maps play a significant role in enhancing students' geographic literacy by improving understanding, engagement, and skill development. However, while the benefits are evident, the effectiveness of these tools depends on proper integration into classroom instruction and access to adequate technological resources.

Conclusion

In light of the findings, several conclusions were drawn. The use of interactive digital maps improved students' geographic literacy in terms of learning content and class discussion compared to traditional maps. Students' spatial thinking skills also increased in terms of the branches of geography and real-life situations when interactive digital maps were utilized in college geography classes, and the results showed that interactive digital maps have a significant effect on students' spatial thinking skills. However, there was no significant effect of the use of interactive digital maps on students' learning of geography in terms of engagement, motivation, and self-efficacy. In addition, professors employ various strategies and activities that support the development of students' geographic literacy. Finally, the researcher developed classroom activities, including titles, objectives, instructions, and mechanics, to further enhance students' geographic literacy in college geography classes.

Recommendations

Based on the findings and conclusions drawn from the collected data, the researcher recommends that professors may use the prepared and proposed classroom activities developed in this study to further support the development of students' geographic literacy as part of the instructional strategies implemented in college geography classes. Instructors and professors are also encouraged to design and implement classroom activities that strengthen students' geographic literacy while providing meaningful guidance and support throughout the learning process. Furthermore, future researchers are encouraged to examine students' coping mechanisms in dealing with the challenges and difficulties encountered in the utilization of interactive digital maps. Lastly, a similar study may be conducted to explore more effective approaches and strategies for enhancing students' geographic literacy.

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