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Framework, Development, And Evaluation of Geography Literacy-Based Learning Model For Enhancing Students' Life Skills In Indonesian Senior High School

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ABSTRACT

This study developed a geography instruction framework based on geographic literacy to enhance high school students' life skills. This study was motivated by the limited relevance of conventional geography education to students' real-life needs, particularly for those who do not pursue higher education. The model was designed using the ASSURE framework, which includes learner analysis, objective formulation, selection and utilization of media, student engagement, systematic evaluation, and revision. The participants consisted of 37 11th-grade students from SMA Negeri 7 Tasikmalaya.. Data were collected using questionnaires constructed based on indicators of geographic literacy and essential life skills questionnaires. The results from the limited trial indicated significant improvements in both hard skills (spatial data analysis and decision-making) and soft skills (communication and collaboration). The model systematically integrates geographic content, geospatial skills, and spatial perspectives into contextual and cooperative learning activities. These findings demonstrate that geographic literacy can serve as an effective pedagogical approach to equip students with essential 21st-century life skills. The model offers practical guidance for geography teachers in designing learning experiences that are more relevant, applicable, and meaningful.

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1. Introduction

Education is a fundamental pillar of national development. It is not merely about transferring knowledge, but also about shaping students' character and equipping them with essential life skills (Choueiri and Mhanna, 2013; FitzPatrick et al., 2014). According to National Education Policy Permendikbudristek No. 5 of 2022, one of the core competencies of senior high school graduates is their ability to live independently. Therefore, school learning should aim not only at academic achievement, but also to foster practical competencies relevant to real-life contexts (Rönnlund et al., 2013). However, research indicates that instructional practices in schools, including geography education, remain predominantly focused on the transmission of factual knowledge, rather than on developing applicable skills (Novarlia et al., 2013; Sugiyanto et al., 2018). This contradicts the essential nature of geography, which is inherently contextual and applicable in daily life. Geography education should empower students to develop spatial thinking, environmental awareness, and decision-making skills based on geospatial data, all of which are transferable to real-world problem-solving (López-Meneses et al., 2025; Handoyo et al., 2024).

Empirical data from Tasikmalaya City further underscores the urgency of the reform. Data from the Regional Education Office in 2021 show that approximately 42% of general senior high school (SMA) graduates have not continued to higher education over the last five years, with some schools reporting over 51%. Moreover, data from the City's Manpower Office in 2021 indicated that 55.25% of jobseekers in the city were aged 15–19 years. This age range includes graduates from both SMA and vocational high schools (SMK), suggesting that a large proportion of students directly enter the labor market after graduation. While SMK students are typically trained in technical or job-specific competencies, this training does not necessarily include essential life skills, such as communication, collaboration, critical thinking, and spatial decision-making. The limited trial in this study involved 37 students from an SMK in Tasikmalaya, revealing that even vocational students, despite being oriented toward employment, require holistic skill development to thrive in rapidly changing professional environments. If schools fail to equip students with such competencies, educational risks are reduced to a diploma-oriented process rather than a transformative one. Education should empower students to independently confront real-world challenges. Burks et al. (2009) emphasized that cognitive skills developed through education significantly influence individual preferences, strategic behavior, and long-term economic outcomes.

Geography, as a discipline, is not confined to map reading or the memorization of place names. It involves analyzing the interactions between humans and the environment, understanding spatial dynamics, and interpreting social and physical phenomena. Consequently, geography holds strategic potential for supporting life skill development. Sugandi (2015) highlighted that geography education should integrate geospheric concepts with practical skills and habits that promote spatial reasoning. Similarly, Bustin (2019) emphasized that the capability approach in geography education can empower learners to lead meaningful lives by applying geographic knowledge to real-world problems. To realize this potential, instructional approaches must extend beyond conceptual mastery and include real-world problem solving. Geographic literacy has emerged as a promising pedagogical framework in this context. It nurtures spatial thinking, the ability to analyze geographic data, and informed decision-making skills based on human–environment interactions (Edelson, 2014b; Liu et al., 2019). Through geographic literacy, students are not only able to answer where phenomena occur but also why they occur and what the consequences will be.

Kerski (2015) identified three core components of geographic literacy: geographic content, geospatial skills (e.g., map interpretation and GIS), and geographic perspectives. When integrated into classroom instruction, these components enhance students' ability to manage spatial information and make sustainable decisions based on it. Edelson (2014a) expanded on this by proposing the concept of geoliteracy, which comprises three essential elements: interactions, interconnections, and implications. In local educational contexts, geographic literacy also supports students in identifying and developing their regional potential. For example, Tasikmalaya is renowned for its local industries in embroidery, furniture, and weaving. These cultural assets have economic value that can be maximized through spatial analyses and environmental understanding. Darusman (2016) noted that the embroidery tradition in Tasikmalaya evolved into a creative economic sector. Thus, literacy-based geography instruction can help students recognize their spatial potential and identify opportunities for regional development and improvement.

Previous research has highlighted various relevant aspects; however, it has not offered a comprehensive pedagogical solution. For instance, Arrowsmith et al. (2011) and Le et al. (2018) examined the link between geography curricula, employability skills, and social studies literacy but did not explicitly offer a systematic learning model that integrates geographic literacy to enhance the life skills of Indonesian senior high school students. Similarly, Sugiyanto et al. (2018) focused on developing geographic literacy to improve teacher competencies, rather than on a model tested directly on students to enhance their life skills. Novarlia et al. (2013) identified the problem of the dominance of factual knowledge transfer in geography education but did not develop and validate a learning model as a concrete solution. Therefore, the research gap in the literature lies in the lack of a tested and validated pedagogical framework specifically designed to instill geographic literacy to equip students with applicable life skills in the context of Indonesian senior high schools. The urgency of this research is reinforced by empirical data showing that a large proportion of senior high school graduates do not continue higher education and directly enter the workforce, meaning that schools have a crucial responsibility to provide relevant and functional life skills. This study aimed to fill this gap by developing, implementing, and evaluating a geography literacy-based learning model designed to address this challenge.

Based on the background and identified research gap, the main research question for this study was formulated as follows: How can a valid, practical, and effective geography literacy-based learning model be framed, developed, and evaluated to enhance the life skills of senior high school students? This main question is further divided into the following sub-questions: (1) What are the characteristics of a geography literacy-based learning model that is suitable for enhancing the life skills of senior high school students in Indonesia? (2) How do experts and practitioners assess the validity and practicality of the learning model? (3) To what extent does the implementation of this model in a limited trial show the potential to enhance students' life skills, encompassing both hard skills (e.g., spatial data analysis and decision-making) and soft skills (e.g., communication and collaboration)?.

2. Method

This study employed a Research and Development (R&D) approach aimed at producing and evaluating the effectiveness of a literacy-based geography-learning model to enhance students' life skills. The development process was guided by the ASSURE model, which stands for Analyze Learners, State Objectives, Select

Methods, Media and Materials, Utilize Media and Materials, Require Learner Participation, and Evaluate and Revise (Gustafson and Branch, 1997).

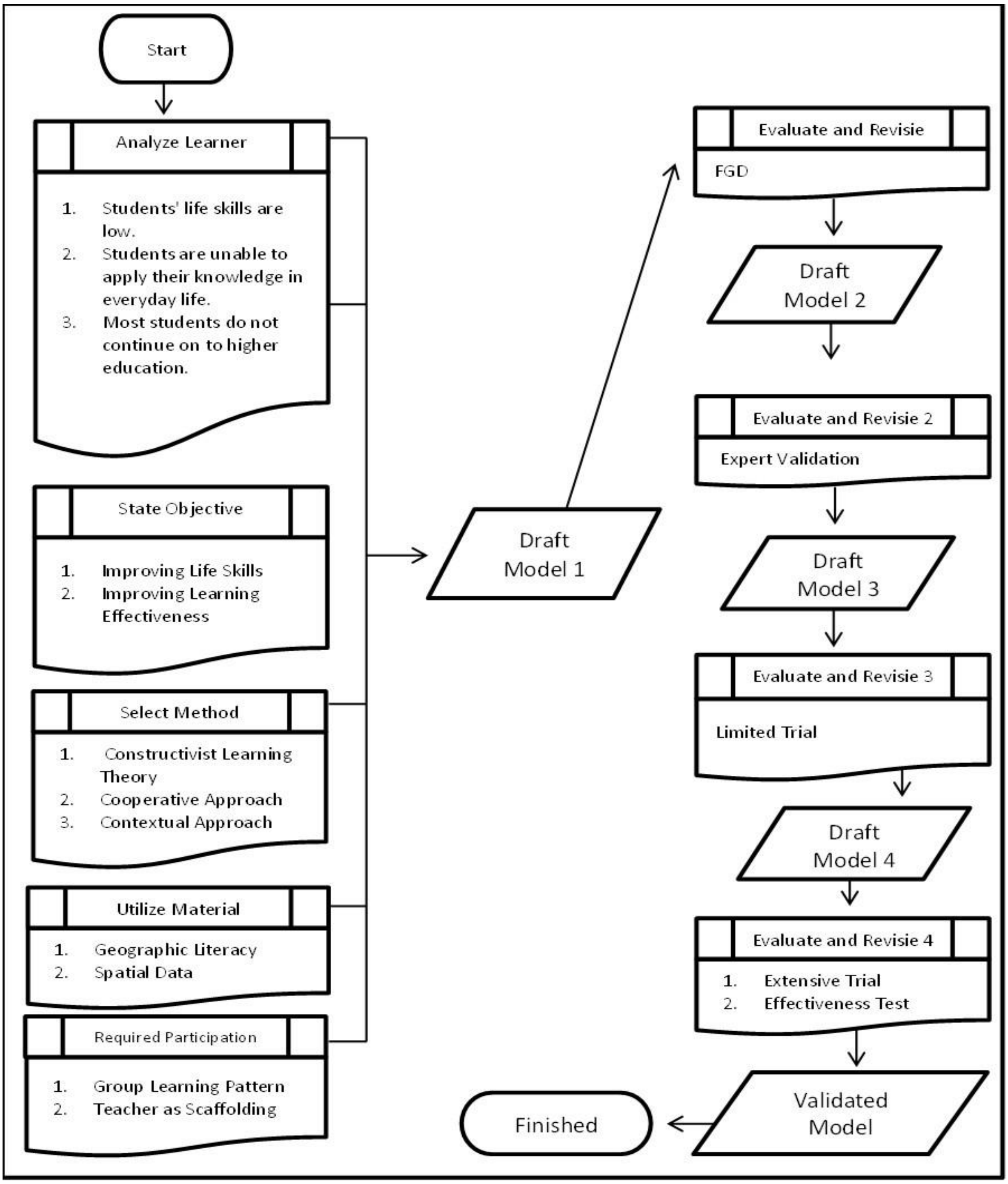

Figure 1. Model Development Flow

2.1. Participants

This research involved several categories of participants across different stages to ensure the quality and applicability of the developed material. The first stage involved Focus Group Discussions (FGD) with 14 geography teachers from five senior high schools in Tasikmalaya. This discussion aimed to validate the initial draft and assess its feasibility for use in diverse school contexts in the Philippines. In the second stage, expert validation was conducted by two geography education experts. They evaluated the instructional model, teaching modules, and student worksheets based on criteria including pedagogical soundness, content relevance, clarity of language, and visual quality. Finally, a limited field trial was conducted involving 37 students from SMA Negeri 7 Tasikmalaya. These students participated in the classroom implementation of the model to examine its effectiveness in improving learning outcomes and in supporting classroom engagement.

2.2. Model Development Procedure

The development of the geography-learning model in this study adopted a systematic and iterative approach based on the ASSURE framework. This framework was selected because it provides a comprehensive instructional design structure that integrates pedagogical and technological considerations. Model development involved multiple stages of drafting, each followed by a cycle of expert review, user feedback, and subsequent revision to ensure that the instructional product met both academic standards and practical classroom requirements. However, in this study, the primary focus was on the limited trial phase. Broader implementation trials and formal effectiveness testing across wider educational contexts are beyond the scope of this study and will be elaborated upon in future research. This is illustrated in Figure 1.

2.1.2 Stage 2: State Objectives

Based on the findings of the analysis stage, the next step was to formulate specific and measurable learning objectives for the course. These objectives encompass not only the cognitive domain, but also the affective and psychomotor domains, manifested as life skills. The objectives were formulated at two levels: (a) A General Objective, which was to enhance students' overall life skills through literacy-based geography learning; (b) Specific Objectives, which were detailed as follows: (1) to improve students' hard skills in analyzing spatial data (such as interpreting thematic maps, graphs, and tables) for decision-making; (2) to enhance students' soft skills, such as communication, group collaboration, and critical thinking in solving contextual problems; and (3) to strengthen students' understanding of geography content as relevant and applicable knowledge.

2.1.3 Stage 3: Select Methods

At this stage, the most appropriate strategies and learning tools are selected to achieve the objectives. Selection of Methods: The instructional approach was based on a combination of three theories. Constructivist Theory was chosen as the philosophical foundation to encourage students to actively construct their knowledge. Cooperative Learning was selected to explicitly train the soft skills of collaboration and communication. Contextual Teaching and Learning were used to bridge academic concepts with students' real-life situations, particularly by raising local geographical issues in Tasikmalaya, Indonesia. Selection of Media and Materials: The researcher specifically developed teaching materials to ensure their relevance. The selected media included digital and printed thematic maps, infographics on regional potential, local problem-based case studies, and secondary data sources (tables and graphs) from the BPS and other relevant agencies. All of these materials were designed to serve as "geographic information" to be processed by students in the next stage.

2.1.4 Stage 4: Utilize Materials

This stage focused on how the selected media and materials were implemented in the learning flow. The utilization procedure was systematically designed as follows: (a) A Teacher's module was prepared as a guide for the teacher to present core material and manage the classroom; (b) Student Worksheets (Lembar Kerja Peserta Didik or LKPD) were designed as the primary instrument for students. The LKPD contained work instructions, geographic data (maps and tables) to be analyzed, and guiding questions that prompted students to think critically and find solutions. The use of these materials was structured to position the teacher as a facilitator while the students were at the center of the learning process.

2.1.5 Stage 5: Require Learner Participation

Active participation was designed as the core of this model to ensure that students were not passive learners. The strategy employed was small-group discussion. Groups were formed heterogeneously based on the students' initial academic abilities to foster peer tutoring dynamics. Each group was assigned a problem-based task from the LKPD, requiring them to discuss and analyze data, formulate arguments, and finally present their findings. The teacher provided scaffolding, offered intensive support at the beginning of the task, and gradually reduced assistance as the group's independence grew.

2.3. Expert Validation

Two expert reviewers and university-level geography educators evaluated the instructional model and its supporting materials (modules and worksheets). The evaluation covered aspects such as conceptual framework, instructional principles, learning syntax, social systems, media support, and targeted outcomes. Validation scores indicated strong feasibility, with feedback used to refine instructional steps and integrate clearer indicators of life-skill development.

2.4. Limited Field Trial

A limited-scale implementation was conducted with 37 students from SMA Negeri 7, Tasikmalaya. The implementation was conducted collaboratively, with the geography teacher serving as the primary instructor and the researcher acting as a facilitator and observer. Prior to classroom implementation, the researcher conducted a coordination meeting and short technical briefing with the teacher to ensure a shared understanding of the model's instructional syntax, learning materials, and assessment procedures. During implementation, the teacher delivered the lessons using the developed teaching module and LKPD (*Lembar Kerja Peserta Didik* or Student Worksheets), which are structured activity sheets designed to guide students through the learning process and assess their performance in applying geographic concepts. Students' cognitive and skill-based achievements were assessed using the LKPD and individual post-test scores. Observations were also conducted by school administrators, and students provided feedback through perception questionnaires.

The trial results showed a positive trend in the students' group performance and understanding of geographic concepts. Statistical analysis of the pre- and post-test scores revealed a significant improvement in both hard skills (e.g., data analysis and decision-making) and soft skills (e.g., communication and collaboration). These outcomes demonstrate the practical potential and readiness of the model for broader classroom use.

2.5. Research Instruments

To obtain comprehensive and valid data throughout the stages of instructional model development, a series of research instruments was systematically employed. In the initial phase, data were gathered FGD with 14 geography teachers. A semi-structured discussion guide served as the primary instrument, containing open-ended prompts aimed at eliciting in-depth insights into the instructional model's feasibility, time allocation, and contextual relevance across various school environments.

In the expert validation stage, a structured evaluation rubric is developed to assess the essential components of the model. This rubric encompassed indicators such as the quality of instructional design, logical coherence of the model's syntax, underlying philosophical foundations, effectiveness of supporting media, and clarity with which life-skill outcomes were articulated. The rubric was adapted from the instructional model evaluation framework proposed by Joyce and Calhoun (2015) with modifications to suit the context of geography education and life skills integration in South Africa. Two independent experts in geography education employed this rubric to provide objective evaluation and critical feedback, thereby contributing to model refinement and academic robustness.

During limited field trials, performance-based assessment tools were used to examine student engagement and learning outcomes. These instruments included LKPD and instructional modules designed to facilitate and assess collaborative learning processes and students' ability to engage in problem-solving tasks. Additionally, pre- and post-test instruments were administered to measure the development of students' life skills as a result of the intervention. The assessment comprised both multiple-choice and scenario-based items, with 10 items measuring hard skills and 14 items evaluating soft skills. The hard skills component focused on students' abilities in spatial data analysis, including the interpretation of thematic maps, the analysis of geographic tables and graphs, and drawing conclusions from spatial patterns. The soft skills component assesses competencies such as communication (e.g., articulating geographic arguments clearly), collaboration (e.g., participating effectively in group tasks), and decision-making (e.g., selecting appropriate solutions based on spatial scenarios). Each item was scored using a rubric with performance levels ranging from 1 (beginner) to 4 (proficient), accompanied by descriptors that specified observable behaviors or criteria. This rubric was designed to ensure consistent scoring and capture both the cognitive and behavioral dimensions of life skills.

To complement these measures, a student perception survey using a Likert scale was administered after the intervention. This instrument aimed to capture students' subjective evaluations of the instructional model, including the perceived effectiveness of learning materials, classroom interactions, and overall benefits to their cognitive and affective learning experiences.

2.6. Data Analysis

Data collected through various research instruments were analyzed using quantitative and qualitative methods to ensure comprehensive interpretation and methodological rigor. Quantitative analysis began with the application of descriptive statistical techniques to summarize student demographic profiles, perception survey outcomes, and validation scores provided by expert reviewers. Measures such as mean, standard deviation, and percentage agreement were calculated to describe the central tendencies and variations in the data.

Prior to conducting inferential statistical tests, normality testing was performed using the Shapiro-Wilk and Kolmogorov-Smirnov methods. These tests were applied to the pre- and post-test scores to examine whether the data met the assumptions of normal distribution, thereby validating the appropriateness of the subsequent parametric analyses. Subsequently, a paired sample t-test was employed to assess the differences in students' life skill scores before and after the implementation of the instructional model during the limited field trial. This analysis aimed to determine whether the observed improvements in student competencies were statistically significant and could be attributed to intervention.

Qualitative data were analyzed using content analysis techniques. Open-ended responses obtained from FGD and expert feedback were systematically coded and categorized to identify recurring themes, suggestions, and concerns. These qualitative insights played a critical role in guiding revisions to the instructional model and in ensuring its contextual relevance and pedagogical validity.

Triangulation strategies were used to enhance the validity of the findings. Data were cross-examined across multiple sources, including direct classroom observations, analyses of student-produced learning products LKPD, and teacher reflections. This triangulated approach allows for a more nuanced understanding of the model's implementation and its effects on teaching and learning.

3. Results and discussion

3.1. Initial model draft

Based on a comprehensive analysis of learner characteristics, instructional needs, and relevant theoretical foundations, the research team developed an initial draft of the geography instructional model based on the principles of geographic literacy. The conceptual foundation of the model is based on three interrelated theoretical frameworks. First, the geographic literacy framework, as articulated by Kerski (2015) and Edelson (2014a), which encompasses geographic content knowledge, geospatial analytical skills, and spatial perspectives, serves as the model's epistemological basis. Second, constructivist learning theory informs the pedagogical orientation of the model by emphasizing active learner engagement, contextual learning experiences, and the co-construction of knowledge through meaningful social interaction. Third, the life skills education framework contributed a competency-based dimension by integrating both the cognitive and non-cognitive abilities necessary for solving complex real-world problems, drawing from the works of Burks et al. (2009) and Choueiri and Mhanna (2013).

The instructional syntax of the initial model draft was structured into four sequential phases designed to promote geographic understanding and development of life skills. In the first phase, Understand (*Pahami*), students engaged with teacher-guided instruction through brief lectures and facilitated discussions aimed at building a foundational conceptual understanding. In the second phase, Master (*Kuasai*), students collaborated in small groups to interpret and analyze geographic data such as maps, graphs, and tables, and presented their findings to their peers. The third phase, Apply (*Gunakan*), requires students to utilize spatial perspectives to address real-life, locally relevant problems and make informed decisions. Finally, in the Reflect (*Refleksi*) phase, students engage in reflective activities to consolidate their learning, assess the applicability of their knowledge to everyday life, and receive motivational and conceptual reinforcement from teachers.

Throughout the instructional sequence, the teacher's role evolved from a content deliverer in the initial phase to a facilitator of collaborative inquiry in the analysis phase and ultimately to a motivator and clarifier during the reflection phase. The model emphasizes student-centered pedagogy, the use of contextualized instructional materials, and the incorporation of project-based tasks tailored to the socio-environmental context of Tasikmalaya. This initial draft served as the basis for further critical evaluation and refinement through a FGD involving educational practitioners.

3.2. Focus Group Disscussion (FGD)

The first evaluation stage involved a FGD with 14 geography teachers from five senior high schools in Tasikmalaya. The FGD aimed to examine the feasibility of the initial draft model in an actual classroom context. Teachers generally agreed with the model's philosophical and theoretical foundations as well as its instructional principles.

However, several technical adjustments were proposed: 1) Time allocation for the "Core Content" phase was considered too short; teachers recommended extending it from 15 to 30 minutes; 2) The availability of geospatial data was noted as a challenge; teachers suggested the development of thematic teaching materials based on accessible spatial information. These inputs were incorporated into Draft Model 2, which was refined and forwarded for expert validation. The following is presented in Table 1 to explain the improvements in the post-FGD model.

Table 1. Focus Group Discussion Results

No	Discussion Topic	Conclusion	Action Taken
1	Philosophical and theoretical foundation of the model	Teachers agreed with no suggestions	No action taken
2	Application of principles in the learning model	Teachers agreed with no suggestions	No action taken
3	Learning model syntax	1. Time allocation for each learning step was unclear2. Time for the “core content” step needs to accommodate diverse material characteristics	1. Included ideal time allocation for each learning step in the teaching module2. Increased “core content” step time from 15 to 30 minutes
4	Social system of the model	Teachers agreed with no suggestions	No action taken
5	Supporting system of the model	Researchers need to consider that spatial data, which is the main teaching material, is difficult for teachers to obtain	Developed thematic teaching materials based on spatial data to support the model
6	Instructional and accompanying effects of the model	Teachers agreed with no suggestions	No action taken

3.3. Expert validation

Based on expert validation, the model was evaluated by two experts in geography education using seven assessment criteria: philosophical foundation, theoretical foundation, instructional principles, learning syntax, social systems, supporting components, and implementation relevance. The model achieved an average score of 4.4 out of five, reflecting high validity. The experts provided several key suggestions to enhance the effectiveness of the model. They recommended that the learning syntax should clearly emphasize the development of life skills and that the sequence of instructional steps—Understand (*Pahami*), Master (*Kuasai*), and Apply (*Gunakan*)— should be presented in a more detailed and structured manner. Furthermore, they underscored the importance of ensuring that localized and accessible instructional media are available to support implementation in diverse classroom contexts. In addition to the model, both the learning module and LKPD underwent expert validation and received similarly high average scores of 4.5 out of 5. Minor revisions have been made to improve the language clarity and visual presentation of the assessment components. These improvements contributed to the refinement of the model and resulted in final Draft Model 3. Experts were also asked to evaluate the learning module and LKPD based on four specific aspects: content suitability, presentation quality, language use, and graphic design. The results of this expert validation process, detailed in Table 2, indicate the strong overall feasibility and quality of the instructional materials. Each aspect received high ratings, confirming that the materials aligned well with the intended learning objectives, and were appropriate for classroom implementation. These findings reinforce the credibility and usability of supporting components developed in conjunction with the model.

Table 2. Expert Validation Test Results

No	Evaluation Aspect	Expert 1	Expert 2	Average
A. Learning Model Evaluation				
1	Philosophical Foundation	5.0	5.0	5.0
2	Theoretical Foundation	5.0	4.3	4.6
3	Instructional Principles	5.0	4.0	4.5
4	Syntax	4.5	3.5	4.0
5	Social System	5.0	4.0	4.5
6	Supporting Components	4.0	4.0	4.0
7	Implementation Relevance	5.0	4.0	4.5
	Total Average (Model)			4.4
B. Module and LKPD Evaluation				
1	Content Suitability	5.0	5.0	5.0
2	Presentation Quality	5.0	4.4	4.7
3	Language Use	4.7	4.0	4.3
4	Graphic Design	4.2	4.0	4.1
	Total Average (Module and LKPD)			4.5

Table 3 summarizes expert feedback on the developed learning model, module, and LKPD instrument. In the evaluation of the learning model, most components—such as the philosophical and theoretical foundation, instructional principles, social system, and instructional impact—were deemed appropriate and required no changes. However, two key improvements were suggested: the syntax should explicitly emphasize the development of life skills, particularly the ability to analyze spatial data, and the instructional steps (understanding, mastering, and appealing) should be more clearly elaborated. Additionally, experts advised on the provision of localized thematic teaching materials to support effective model implementation.

Expert evaluation of the learning module and student worksheet indicated that, overall, both content and presentation met the expected pedagogical standards. The materials were deemed relevant, coherent, and aligned with the model's instructional objectives. Nonetheless, one expert identified the need to revise the language used in student worksheets to enhance their suitability for the target learners' developmental stage and comprehension abilities. This feedback underscores the importance of linguistic alignment in students' cognitive readiness to facilitate meaningful engagement and knowledge acquisition.

Additionally, concerns were raised regarding the representativeness of a specific visual element embedded in one assessment item. The image in question was considered to convey the intended geographic concept inadequately and was replaced with a more accurate and contextually appropriate visual representation. This revision aimed to improve students' interpretive accuracy and reduce potential misconceptions arising from misaligned graphical content in textbooks.

Collectively, these expert recommendations inform a series of targeted revisions that strengthen the instructional clarity, accessibility, and practical applicability of the model. Adjustments were made to improve textual and visual elements and ensure greater alignment with pedagogical best practices and learner-centered design principles. Expert feedback, along with the corresponding corrective measures undertaken by the research team, is systematically presented in Table 3, which serves as a reference for the validation outcomes and iterative refinement process employed in this study.

Table 3. Suggestions from experts

No	Discussion Topic	Expert 1	Expert 2	Action Taken
A. Learning Model Evaluation				
1	Philosophical and theoretical foundation of the learning model	-	-	No changes
2	Application of principles in the learning model	-	-	No changes
3	Syntax of the learning model	Life skills to be achieved must be specified	Description of the syntax should be elaborated	1. Inclusion of spatial data analysis as a targeted life skill; 2. Detailing the steps: Understand, Master, and Apply
4	Social system of the learning model	-	-	No changes
5	Supporting system of the learning model	Local-based teaching materials must be provided in advance	-	Formulate the need for thematic teaching materials for model implementation
6	Instructional and accompanying effects of the learning model	-	-	No changes
B. Module and LKPD Evaluation				
1	Content Aspect	-	-	No changes
2	Presentation Aspect	-	-	No changes
3	Language Use	Review of language use in LKPD	-	Revised sentence structure in module content to fit student age level
4	Graphic Design	-	Image in assessment question 1 is not representative	Replaced image in assessment question number 1

With refinements made based on expert validation, Draft Model 3 was finalized. This version integrates improvements in instructional syntax, supporting materials, and assessment components to ensure its theoretical robustness and practical feasibility. To guide classroom applications, the Implementation Flow of the Geographic Literacy-Based Learning Model was developed, as shown in Figure 2. This flow outlines the step-by-step structure beginning with identifying learning objectives, selecting relevant geographic issues, and progressing through the stages of "Understand," "Master," and "Apply." It also highlights the integration of spatial data analysis and life-skill development throughout the learning process. Following validation, Draft Model 3 proceeded to limited trials, wider implementation, and effectiveness testing to assess its impact on student engagement, geographic reasoning, and life skills outcomes.

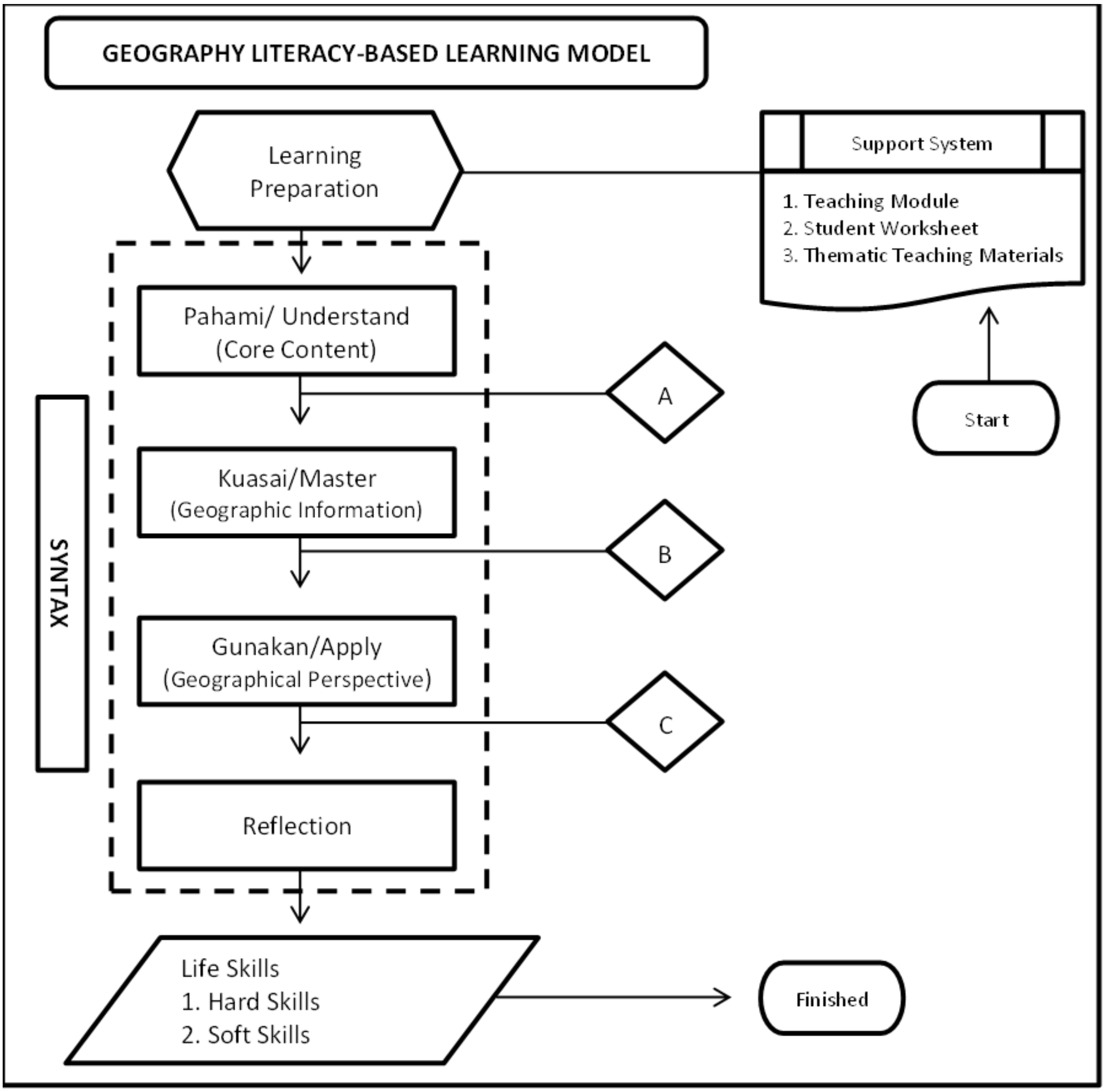

Figure 2. Implementation Flow of Geographic Literacy-Based Learning Model

3.4. Limited field trial

The draft learning model, validated by experts, was then subjected to a limited number of trials. This limited trial aimed to assess the suitability of implementing the model's development objectives. A geographic literacy-based learning model was implemented in the groups. Learning outcomes were assessed using the LKPD. These learning outcomes are grades given by the teacher based on student performance on the LKPD. Although knowledge assessment was conducted individually, the table below displays the accumulated correct answers based on the population knowledge assessment rubric grouped according to the learning group. The results of the learning process are shown in Figure 3.

Figure 3 illustrates the learning process achievement across the six student groups based on three key indicators: LKPD 1, LKPD 2, and the Knowledge Test. Each line in the graph represents the average score achieved by the groups in different phases of the instructional intervention. Overall, there was a consistent improvement from LKPD 1 to LKPD 2, reflecting the increased effectiveness of collaborative learning when the model was implemented. Notably, Group 3 had the highest LKPD 1 score (65), whereas Group 6 had the highest LKPD 2 score (73), indicating active engagement and growing competence in later sessions. The knowledge test results also demonstrated significant outcomes, with all groups achieving scores above 78; Group 2 obtained the highest score of 92.71. This suggests that the instructional model not only improved group collaboration, but also strengthened individual conceptual understanding. As Figure 3 shows, the integration of geographic literacy through the model consistently contributed to both cognitive and practical learning.

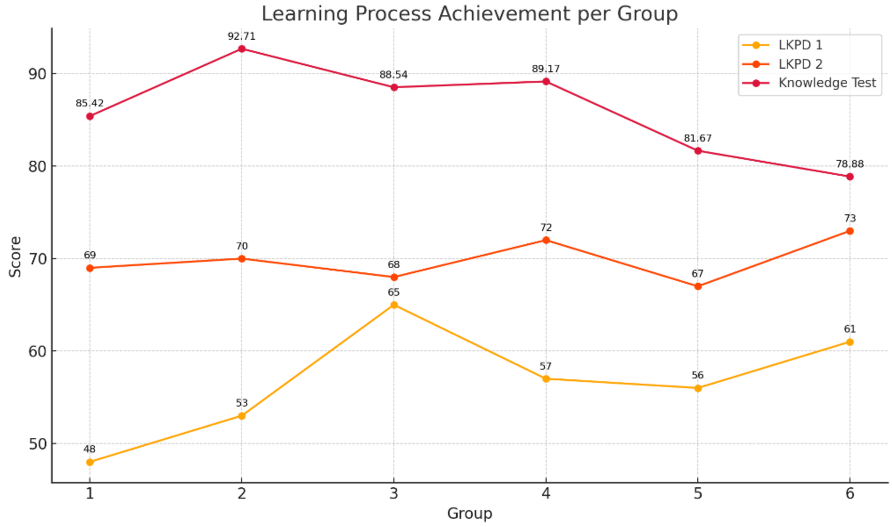

Figure 3. Learning Process Achievement Results

After the model was implemented in two subsequent meetings, students were asked to complete a questionnaire to reflect their post-implementation responses to the geographic literacy-based learning model. This study assessed participants' responses to the learning process and outcomes. The results of the student responses after the limited trials are presented in Table 4.

Table 4. Student Responses After Limited Trial

No	Statement	Responses %				
		STS	DS	NS	A	SA
1	In geography class, the teacher motivated me	0	0	0	25.8	74.2
2	The teacher explained the material concisely	0	0	0	64.5	32.3
3	The teacher supported and encouraged me during discussions	0	9.7	9.7	48.4	32.3
4	I understood concepts that can be applied in daily life	0	0	0	87.1	12.9
5	The teacher provided learning facilities	0	0	3.2	45.2	51.6
6	I easily understood the core concepts discussed in the session	0	0	3.2	71	25.8
7	The teacher made it easier for me to use geographic information	0	3.2	9.7	41.9	45.2
8	The teacher made it easier for me to use geographic perspectives	0	0	0	45.2	54.8
9	The geography lesson was meaningful and enjoyable	0	9.7	6.5	45.2	38.7

Description:
STS, Strongly Disagree, DS = Disagree, NS = Neutral, A = Agree, SA = Strongly Agree.

The data in Table 4 reveal a strong positive perception of the implementation of the geography-learning model. Most students agreed or strongly agreed with each statement, indicating cognitive and affective engagement. Notably, 74.2% strongly agreed that the teacher successfully motivated them during the lesson and 87.1% agreed that they could apply the concepts learned to real-life situations. This indicates a high level of instructional relevance and successful content contextualization. The responses to statements 5, 6, and 7 demonstrated that students felt supported in terms of facilities, understanding of core content, and use of geographic information, with over 90% positive agreement in each case. Particularly encouraging was the response to Statement 8, where 100% of students agreed or strongly agreed that the teacher helped them apply geographic perspectives, which is the core aim of the model. While most responses were favorable, a small proportion of students provided neutral or slightly negative responses to statements regarding teacher support in discussions and lesson enjoyment (Statements 3 and 9), suggesting potential variability in individual classroom dynamics and group interaction comfort levels. Overall, the results confirmed that the model fostered meaningful, enjoyable, and applicable learning experiences for students, aligning with the goals of geographic literacy and life skills development.

The focus of this limited trial was on the technical readiness and implementation aspects of the geographic literacy-based learning model. However, it is equally important to see how the implementation of the geographic literacy-based learning model affects the improvement of life skills, which is the dependent variable in this study. Pre- and post-tests were conducted before and after the first and second treatment, respectively. The instrument used was a previously developed life-skill measurement instrument for geographical learning. There were 10 questions measuring hard skills, and 14 questions measuring soft skills. The following are the results of the pre- and post-tests on life skill improvement in the limited trial. Before conducting the paired and independent sample t-tests, a normality test was performed. The results of the normality test for the pre- and post-test data from the limited trial classes are presented in Table 5.

Table 5. Normality Test

	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pretest	.105	37	.200*	.961	37	.216
Posttest	.130	37	.114	.969	37	.375

Based on the output in Table 5 of the normality tests in the Shapiro-Wilk test section in the limited trial class of 37 students, the sig value for the pretest results was 0.216 and the sig value for the posttest was 0.375. The sig values for the pretest and posttest were greater than 0.05, so it can be concluded that the pretest and posttest data in the limited trial class were normally distributed. After ensuring that the data were normally distributed, a paired sample t-test was conducted to determine the difference between the average pretest and posttest results in the limited trial class.

Table 6. Descriptive data of Paired Sample t Test

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pretest	33.2670	37	2.64867	.43544
	Posttest	52.1416	37	2.83026	.46529

Based on Table 6, the average pretest score in the limited trial class was 33.2670, whereas the average posttest score was 52.1416. The average pretest score was 33.0762 < 52.1416, indicating an average difference between the pretest and posttest scores.

Table 7. Paired Samples Test

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	Pretest - Posttest	-18.87459	1.60469	.26381	-19.40962	-18.33957	-71.547	36	.000

Based on the paired sample test in Table 7, sig. The (2-tailed) value is 0.000. The sig. The (2-tailed) value of 0.000 < 0.05 means that there is an average difference between the pretest and posttest. The average post-test result for the limited trial class increased by 19.04486. This indicates that the geographic literacy-based learning model has an influence.

3.5. Discussion

To develop a geography learning model based on geographic literacy, we drew upon established frameworks, empirical needs assessments, and relevant educational policies to address contemporary educational challenges. The foundation of this model is rooted in the structural components outlined by Joyce and Calhoun (2015), which encapsulate the theoretical framework, instructional syntax, social systems, and teacher roles (Meechandee and Meekaew, 2024). Specifically, the motivation for crafting this model aligns with the Indonesian Regulatory framework in Permendikbudristek No. 5 of 2022, which mandates that senior high school education endow students with competencies that enable them to live independently and effectively utilize their knowledge (Mukminan et al., 2024). This focus is bolstered by the Organization for Economic Cooperation and Development (OECD), which highlights that education, particularly in subjects such as geography, should prepare students with practical life skills applicable in real-world scenarios (Oberle et al., 2024).

The pressing necessity for such a model is illustrated by regional data indicating that a significant portion of high school graduates in Tasikmalaya City opt not to pursue higher education, with employment statistics showing a high prevalence of jobseekers aged 15-19 (McFarlane, 2024). This analysis signals an urgent requirement for educational interventions that cultivate applicable skills among students, as supported by Khaouja et al. (2019), who stressed the importance of aligning educational outcomes with job-market demands. Furthermore, Nambiar et al. (2019) emphasized that the responsibility of schools extends beyond traditional academic teaching; they must also instill vital skills, such as negotiation and digital literacy, which are essential for success in today's society (Yıldırım and Ünlü, 2021).

The findings suggest that many current instructional practices in geography education remain heavily focused on rote learning and cognitive transfers, which do not sufficiently engage students (Zuhria et al., 2023). For instance,Somantri (2022) identified a disconnect between geographic content and its practical application in students' lives, resulting in disengagement and low motivation (Somantri, 2022). It is essential that geography education transitions from a purely cognitive domain toward a more applied orientation, where students not only comprehend concepts, but also develop critical skills and habits for real-world applications (Eliza et al., 2024). Bustin (2019) articulated the necessity of geography learning frameworks that encompass both theoretical understanding and practical life skills, framing geographic knowledge as integral to achieving a valued life.

The model's development involved a comprehensive needs analysis, revealing gaps in students' abilities to link geographic theory to real-life situations, and their lack of problem-solving skills based on geographical principles. Initial testing through FGD with geography teachers indicated the need for enhanced clarity and time management in instructional steps, particularly in the model's preliminary phase labeled "*Pahami*" (Understand) (Zuhria et al., 2023). Based on expert feedback, the model was refined to emphasize spatial data analysis, which has become a vital skill, as noted by Setiawan (2016), making students well equipped for various applications of geographic knowledge (Eliza et al., 2024).

The incorporation of hard skills related to spatial data handling illustrates the performance-oriented aspect of geographic literacy (Yıldırım and Ünlü, 2021). Additional components, such as constructivist learning theories, have been utilized to enhance the model, allowing contextualized learning experiences that resonate with students' lives (Fuad et al., 2023). Grouping students based on ability levels and improving instructional materials have emerged as key enhancements aimed at promoting effective learning experiences (Li et al., 2022). Reports on the positive effects of cooperative learning approaches substantiate the model's design, allowing diverse student abilities to contribute to collaborative learning environments (Zuhria et al., 2023).

The iterative development process culminated in the final version of the model, named Model Pembelajaran PAKUAN (Pahami, Kuasai, Gunakan), designed to integrate geographic literacy with essential life skills while adhering to the 21st-century competencies outlined by the OECD (Oberle et al., 2024). This model is a proactive educational strategy that endeavors to bridge the gap between academic knowledge and practical application, thereby equipping students with the skills necessary to face the complexities of contemporary society. Although promising outcomes have emerged from limited field trials, further research is required to gauge the broader implementation effectiveness and ensure the sustainability of the model in the educational ecosystem. Nonetheless, the model was successfully formulated as shown in Table 8.

Table 8. A Geography Literacy-Based Learning Model named the PAKUAN Learning Model

Component	Description
Model Name	PAKUAN Learning Model (Understand, Master, and Apply)
Legal Basis	1. Law No. 20 Year 2003
	2. Government Regulation No. 57 Year 2021
	3. MoECRT Regulation No. 5 Year 2022
	4. MoECRT Regulation No. 7 Year 2022
	5. MoECRT Regulation No. 16 Year 2022
	6. MoECRT Regulation No. 21 Year 2022
	7. MoECRT Regulation No. 33 Year 2022
	8. Supreme Court Circular No. 7 Year 2012
Philosophical Foundation	Constructivist Learning Theory
Theoretical Foundation	1. Cooperative Learning Theory
	2. Contextual Learning Theory
	3. Geographic Literacy

Component	Description
Principles	1. Effective 2. Economical 3. Attractive 4. Enjoyable
Syntax	1. Understand (Core Content) 2. Master (Geographic Information) 3. Apply (Geographic Perspective) 4. Reflection
Teacher's Role	1. Understand Phase: Knowledge Conductor 2. Master and Apply Phases: Constructivist Facilitator (scaffolding) 3. Reflection Phase: Motivator
Supporting System	1. Teaching Module 2. Learning resources and media (geographic information via maps, tables, or graphs) 3. Geography literacy-based worksheets
Instructional Impact	1. Improve learning outcomes 2. Enhance spatial data analysis hard skills for problem-solving 3. Strengthen decision-making using spatial data
Accompanying Impact	1. Improve communication soft skills 2. Increase participation soft skills

The statistically significant improvement in students' life skills, as evidenced by the paired samples t-test results ($t=-71.547$, $p < .001$), provides robust empirical support for the model's effectiveness, which can be primarily explained by its deep grounding in constructivist principles. Unlike traditional models, which position students as passive recipients of information, the PAKUAN model's *'Kuasai'* (Master) and *'Gunakan'* (Apply) phases create an environment of active inquiry. The LKPD intentionally presented ambiguous real-world problems, such as identifying optimal locations for a new local business or assessing environmental risks in their community, rather than questions with a single correct answer. This methodology induced cognitive dissonance, compelling students to challenge their pre-existing assumptions and actively construct new knowledge by seeking, interpreting, and synthesizing spatial data. This process of building understanding through direct engagement and problem solving is the hallmark of constructivism and aligns perfectly with the findings of Fuad et al. (2023), who argue that meaningful learning is an act of internalizing and restructuring information rather than merely accumulating it. Therefore, the model serves as a direct pedagogical response to Novarlia et al. (2013) critique of fact-based instruction, shifting the educational paradigm from what is known about how to think geographically.

Beyond individual cognition, the model's social architecture, designed based on cooperative learning theory, was instrumental in fostering both cognitive and non-cognitive competencies. The progressive improvement in group performance observed between the completion of LKPD 1 and LKPD 2 (as illustrated in Figure 3) is indicative of more than just content mastery, demonstrating the development of effective teamwork and distributed cognitive skills. The deliberate formation of heterogeneous groups creates a microcosm of diverse perspectives and abilities, fostering a rich dynamic of peer tutoring and argumentation in the classroom. To complete their tasks, students were required to articulate their interpretations of geographic data, defend their spatial reasoning against differing viewpoints from their peers, and negotiate a consensus collaboratively. This process is a direct incubator for essential soft skills that are difficult to teach. This finding empirically supports Li et al. 's(2022) assertion that structured social interaction in heterogeneous learning groups not only accelerates conceptual understanding but also cultivates communication, negotiation, and collaborative problem-solving abilities that are central to 21st-century life skills and professional success.

The model's pronounced success in enhancing students' hard skills, particularly in spatial data analysis, is a direct outcome of its explicit and structured integration with geographic literacy frameworks. The PAKUAN syntax was intentionally engineered to sequence the three core literacy components identified by Kerski (2015) as follows: First, the *'Pahami'* (Understand) phase established foundational Geographic Content. Next, the *'Kuasai'* (Master) phase demanded the application of Geospatial Skills, as students had to directly manipulate, interpret, and derive meaning from the maps, graphs, and tables within their LKPDs. Finally, the *'Gunakan'* (Apply) phase cultivated a Geographic Perspective, requiring students to leverage their data analysis to make informed decisions and propose evidence-based solutions to the contextual problems presented. For instance, a student group did not just learn what a landslide hazard map was (content); they had to use it to delineate high-risk residential zones (skills) and then propose a viable mitigation strategy for the local government (perspective). This integrated progression systematically elevates students from lower-order memorization to higher-order spatial thinking, effectively operationalizing the geoliteracy concept promoted by Edelson (2014a) and transforming geography into a practical tool for understanding and shaping the world.

Situating this study within the broader academic discourse, the findings empirically validate the theoretical arguments of Bustin (2019) for a "capability approach" in geography education, but critically move from advocacy to application by providing a concrete, field-tested instructional model. While prior regional research, such as that by Sugiyanto et al. (2018), astutely identified the need for geographic literacy and focused on developing teacher-level competencies, this study provides a crucial subsequent step: direct student-level empirical evidence that a specific pedagogical syntax can successfully cultivate these skills in the classroom. Therefore, the primary contribution of this study is the development and validation of the PAKUAN learning model. This model offers a replicable framework that effectively bridges the persistent gap between national educational policy goals (Permendikbudristek No. 5 of 2022 in Indonesia) and practical realities of classroom implementation in Indonesia. It provides educators with an empirically supported pathway to transform geography from a content-heavy subject into a dynamic platform for developing the tangible life skills required by the 21st-century workforce, which is of particular importance to the significant cohort of students for whom senior high school is the final stage of formal education.

4. Conclusion

This study developed a geography learning model based on geographic literacy designed to improve students' life skills through a structured and contextualized instructional approach. The model was developed through a systematic process involving needs analysis, expert validation, limited field trials, and iterative refinement. Empirical data confirmed the necessity of equipping high school students, particularly those who do not continue higher education, with practical and transferable skills for independent living. The final product, the PAKUAN Model (Understand, Master, Apply), provides an integrative learning framework that emphasizes spatial thinking, problem solving, and decision-making abilities. The strength of the model lies in its grounding in national policy, educational theory, and classroom realities, which makes it a potentially relevant and applicable solution for geography education in Indonesia.

This study had several limitations. First, it was conducted as a limited-scale trial involving only 37 students from a single senior high school. This narrow scope restricts the generalizability of the findings, as the results may be specific to particular student demographics, school cultures, and participating teachers' instructional styles. Second, the intervention was implemented over a relatively short period of time. Consequently, this study could not assess the long-term retention of the acquired life skills or the sustained impact of the model over time. Finally, the assessment of life skills relied on structured tests and self-reported questionnaires, which may not fully capture the nuanced application of these skills in authentic real-world situations. Potential confounding variables, such as the novelty effect of the new teaching method, were not controlled for in this preliminary study. However, because the model was tested only in a limited-scale trial, its generalizability remains limited. Therefore, broader implementation through large-scale trials is necessary to validate its effectiveness across different school contexts before it can be recommended for widespread adoption. Future studies should explore long-term impacts and possible adaptations in diverse educational environments.

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