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Historical understanding as means to strengthen students' national integration in Papua

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Abstract
One of the important issues in a multicultural society is national integration, marked by its historical and ethnic diversity. Education is one of the strategic forums in developing social cohesion, identity, and inclusive citizenship in today's young generation. Through a mixed method with a sequential description design, this study aims to find out how students' understanding of science and history is related to the attitude of national integration in Papua. Quantitative data on the understanding of local and national science and history concepts, and integrative attitudes were obtained through structured questionnaires on high school students. Meanwhile, qualitative data on students' sense of national togetherness was obtained through observation of teachers' teaching practices in the classroom. Results indicated that students generally had a good understanding of science and history and moderate integrative attitudes. Pearson correlation analysis revealed a moderate relationship between science understanding and integration attitudes, while the relationship with history understanding was strong. Regression analysis further showed that students' understanding of science and history contributed substantially to the development of national integration attitudes. Qualitative findings suggest that contextual learning strengthens integrative values. Science lessons incorporated local ecosystem examples, whereas history lessons emphasized the contributions of Papuan figures to national development. These findings highlight the importance of contextual and interdisciplinary learning approaches to enhance students' national integration attitudes in culturally diverse settings.

Keywords: *history; science; student national integration.*

The understanding of history and science as a means of strengthening students' national integration

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INTRODUCTION

Indonesia's multicultural and multiethnic national context demands the presence of education that is able to build national integration in the midst of diversity. Papua, as an integral part of Indonesia, has a unique cultural, linguistic, and historical wealth, but it is also a region that is vulnerable to issues of separatism, marginalization, and development inequality. In this context, education plays an important role as an instrument to strengthen national identity (Hakim & Darojat, 2023; Kristiawan et al., 2022).

One strategic approach to strengthening national integration is through an understanding of science and history (Bardosh et al., 2020). These two disciplines have different but complementary functions in shaping students' intellectual and civic development. Science education fosters critical, rational, and empirical thinking through systematic observation, experimentation, and evidence-based reasoning. Such competencies help students develop analytical skills and scientific literacy that enable them to understand social and natural phenomena objectively.

On the other hand, History Education plays an important role in fostering students' awareness of History and national awareness. The step of teaching about History, the story of the nation's struggle, and getting to know historical figures is one way to build the basis of national identity in students. Through this step, history learning is placed as a way to develop students' knowledge and sense of nationalism. Previous research shows that History Education plays an important role in building national integration and identity.

Such an explanation means positioning the learning of history and science as mutually supportive. Learning History as the basis for developing identity, shared historical knowledge, and nationalism. While science learning creates rational and critical thinking as well as analysis. Integrating these two perspectives is able to foster scientific knowledge and social awareness in students. Although the subject matter is different, it will be interrelated and supportive. Student activities in scientific literacy of the nation's history will create rational, critical, and pragmatic thinking (Putra et al., 2025; Widiya & Radia, 2023). In a multicultural society, the existence of national integration is a major concern, especially in countries with complex national histories, as well as diverse cultures and ethnicities. Both perspectives of learning play an important role. Lankah teaches about national history, and the struggle for independence will shape and strengthen national integration. Studying History, students will cultivate national awareness, national attitudes, and principles, as well as solidarity. Students' knowledge of national history linked to the realities of the contemporary social environment can help them understand the reasons why the importance of national cohesion and solidarity is held firmly in a pluralistic society.

Studies from Canada, Australia, New Zealand, and the United States show that education plays a pivotal role in strengthening civic identity, promoting social cohesion, and building

inclusive forms of citizenship among young people (Camangian & Cariaga, 2022; Harris & Johns, 2021; Orazani et al., 2023). In contexts where indigenous communities have historically faced marginalization, such as First Nations in Canada or Aboriginal groups in Australia, schools serve not only as academic institutions but also as social spaces where national identity is negotiated, reconstructed, and mediated. Similar conditions and situations occur in science education, which increasingly integrates local ecological knowledge and environmental understanding, enabling students to connect this knowledge to their cultural and social contexts. International research shows that collaboration between history and science education can strengthen students' nationalism when learning is connected to sociocultural identity, the history of the nation's struggle, and civic responsibility. By connecting historical perspectives with scientific understandings of the environment and society, education can foster a more inclusive perspective that can support the development of national cohesion while respecting the diversity of existing cultural traditions.

Indonesia has the same challenges; its various regions are socio-politically asymmetrical and rich in cultural diversity. For example, in the Papua region with complex areas, the representation of national identity and integration (Konečná, 2026; Senis et al., 2024). Students in learning often find the context of the material irrelevant and contextual with the diverse and unique culture and history of their region. As a result, they are unable to integrate their knowledge into the national identity. They were not introduced to local figures such as Silas Papare and Frans Kaisiepo. In contrast to science learning, which often focuses students on abstract contexts but is integrated into the social and ecological context of their area (Sudarsono & Setiawan, 2025). The existence of these two learnings has the potential to support national integration through meaningful learning and is rooted in diverse local contexts.

The situation faced today is in the form of learning that is not relevant to local reality, and does not describe the history of Papua in national development (Fatubun, 2023; Rupiassa et al., 2024). Then the approach used is still very abstract and not yet contextual to their real lives and national identity. Similarly, the study of History is only focused on national history without delving into the history and figures in Papua who played an important role, such as Silas Papare, Frans Kaisiepo, or even Marthen Indey, as their local identity (Handoko & Imawan, 2021). Furthermore, science learning is still irrelevant to nature and culture in Papua, as it does not reflect the truth of biodiversity, the environment, and local technology that can be developed to its potential (Bowaire & Sriyati, 2025).

Some of these conditions are significant challenges for the national integration of students with the increasingly complex and broad social context of society, customs, and culture. The existence of schools is not solely responsible for carrying out educational activities, but rather plays a role in creating students with nationalism and national awareness or integration that is qualified. Education is crucial for building understanding, tolerance, and national identity in a multicultural society. Therefore, find out how different it is.

The understanding of history and science as a means of strengthening students' national integration

Science and history are two important disciplines in shaping students' perspectives through distinct yet interrelated and supportive concepts. Science education develops logical or rational thinking, data-driven reasoning, and analytical and critical skills. History education provides students with an understanding of national history, national struggles, and the development of social identity. Despite their potential contributions, studies that examine how students' understanding of science and history jointly relate to attitudes toward national integration remain limited. Based on this background, this research aims to analyze students' understanding of science and history as two educational domains that may contribute to strengthening national integration. Specifically, this study seeks to examine the relationship between students' knowledge of science and history and their attitudes toward nationalism, as well as to explore how current learning approaches support or hinder the development of integrative attitudes among students.

Integrative education in Papua requires a holistic and contextual approach (Prasojo et al., 2019; Tuuk & Ratulangi, 2025). Learners need to feel that the knowledge they learn does not only come from outside, but also has a connection to their local environment, culture, and history. In this way, they become not only "curriculum users" but also part of the process of shaping the meaning of national education. On the other hand, in the era of globalization and information disruption, learners in Papua also face various external influences through social media, the internet, and global popular culture (Nugroho, 2020; Wicaksono et al., 2025). Without a strong and contextualized foundation of understanding history and science, learners are vulnerable to disinformation, identity alienation, and apathy towards national issues (Vakulik et al., 2024; Waight et al., 2022). This research is important to carry out, as shown by the results of the bibliometric analysis in the following figure 1.

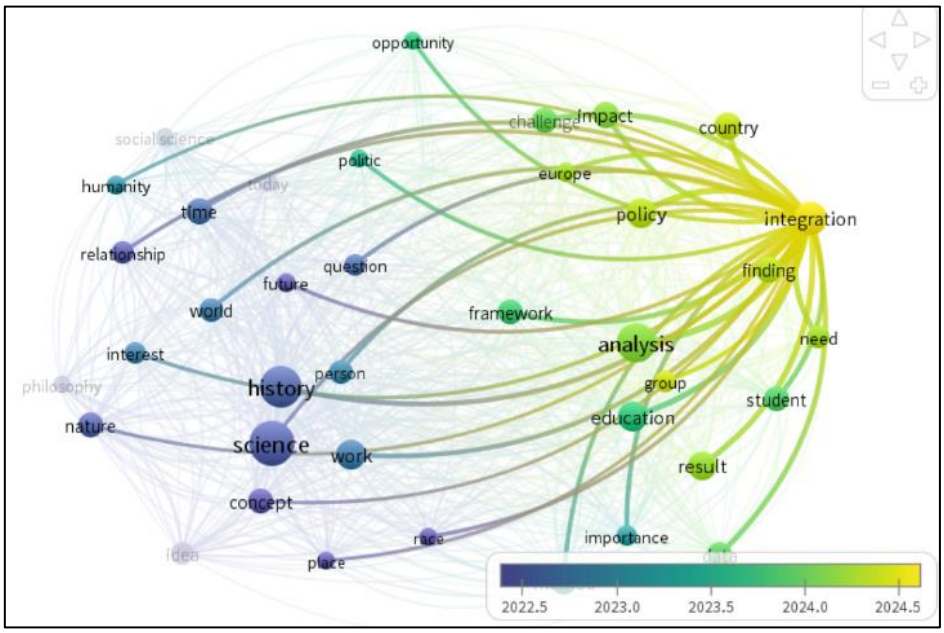

Figure 1. Visualization of national integration as a research topic

The urgency of this research is further supported by the results of the bibliometric analysis presented in Figure 1. The visualization indicates that studies on national integration have been widely discussed in relation to political, social, and cultural dimensions, while the intersection between history education, science education, and national integration in the context of school learning remains relatively limited. The image, it shows national integration as a macro-social issue, but there is still little research that shows the influence of learning history and science on students to foster an attitude of national integration in the classroom. This condition causes the existing references to not sufficiently understand the role of the two disciplines to be able to encourage national integration in students in areas with socio-cultural dynamics, such as Papua. Raising this point is the initial reference for the purpose of research in studying history and science learning in supporting national integration. Specifically, we know how these two disciplines affect each other in the development of students' integrative attitudes and build a more solid and united Papuan society.

This research is focused on high school students in several districts and cities in Papua. The achievements of the integration of these two disciplines are at least able to provide a comprehensive picture of the function and role of education in creating national integration. Another hope is that it can be a literature for education policy makers to develop a curriculum that is more relevant and contextual to local and national needs. Overall, it represents an academic and practical contribution in solving education-related problems as a bridge between local cultural and traditional identities and national identities, and understanding science and history can be used as subjects that are able to create a more inclusive, empowered, and united nation in diversity.

METHOD

Research Design

This study was carried out by designing a sequential description on the mixed method, which consisted of the initial quantitative phase, followed by the qualitative phase (Haynes-Brown, 2023; Lall, 2021). The use of this method is able to increase the explanatory power of the findings through the collaboration of numerical trends with contextual and interpretive explanations. Patterns in students' understanding of science, history, and integrative attitudes are identified in this design, and teachers then provide in-depth insights into these patterns (Draucker et al., 2020; Hwang et al., 2025).

Sampling and Participants

The selection of Jayapura and Nabire as research locations was based on both theoretical and practical considerations. Jayapura is the administrative and educational center of Papua, with relatively diverse school characteristics and student demographics, while Nabire is a semi-rural setting where varying socio-cultural dynamics influence issues of national integration and identity formation (Konorop, 2025; Manik et al., 2023). Including both areas allowed the study

to capture variations in educational experiences across urban and non-urban regions, thereby increasing the ecological validity of the findings.

The quantitative sample consisted of 76 students from four secondary schools in Jayapura and Nabire, Papua: two senior high schools and two vocational schools. A purposive sampling strategy was chosen for several reasons. These included easily accessible institutional permission, the need to involve school representatives from diverse educational settings, and the need for easy logistical access. The advantage of using this method is the combination of convenience sampling with the principle of purposive sampling, as a result of which the researcher has the opportunity to choose a sample that is in line with the research objectives. Educational research often uses purposive sampling methodologies when aiming to examine contextual characteristics, rather than achieving statistical representations of more complex populations.

The school selection is aimed at accommodating urban and semi-rural educational environments, because in this study, these two environments are different in infrastructure, learning resources, and socio-educational environment. As a result of not allowing for a random population distribution, the composition of the sample reflects variations in the context of student learning. This variation is necessary in uncovering different perspectives regarding students' understanding of History and science towards national integration. Another circumstance is that purposive sampling will limit statistical generalization. As a result, research findings should be considered as context-specific insights into the relationship between students' disciplinary understandings and integrative attitudes.

This research was carried out in grades 10-12 with a total of 76 students. Students were selected through the purposive sampling method. The number of students by gender was 37 male students (48.7%) and 39 female students (51.3%). Then as many as 48 eight participants came from high school (SMA), and 28 from junior high school (SMK). This distribution represents the proportion of schools participating in the data collection, with the number of students from high school greater than from junior high school. The goal of student participation at both levels is to provide a broader representation of the secondary education context of students' understanding of science and history, and to realize national integration. This composition allows the sample to reflect a variety of academic backgrounds relevant to the teaching of science and history in Papua. In the initial stage, data were collected with a closed Likert scale questionnaire, which was distributed to 76 students from Jayapura and Nabire, Papua. The questionnaire consists of three main components, namely (1) understanding the concept of science, (2) understanding the national and local historical narratives, and (3) students' integrative attitudes, which include aspects of nationalism, openness to diversity, and a sense of belonging to the Indonesian nation.

The data obtained was analyzed with descriptive statistics, aiming to identify general patterns in student scores in each variable measured. This analysis was conducted to collect key variabilities and trends (research findings) on students' understanding of science, history, and

national integration. The Pearson correlation test was then used to test the relationship between academic understanding (science and history) and students' attitudes toward national integration. This technique was selected because the variables were measured on interval scales and the analysis aimed to determine the strength and direction of the linear relationship between the variables. Prior to conducting the correlation analysis, statistical assumptions were tested, including normality and linearity of the data distribution, to ensure that the use of Pearson correlation was appropriate.

Furthermore, the selection of qualitative informants was based on the categorization of quantitative scores into high, medium, and low groups. These categories were determined using score distribution criteria derived from the mean and standard deviation of the dataset. Students representing each category were then purposively selected to provide diverse perspectives during the qualitative phase, thereby supporting the sequential explanatory mixed-methods design of the study. The results of this stage then became the basis for determining qualitative informants purposively, namely, students with high, medium, and low scores. The indicators of the three types of questionnaires are shown in Table 1.

Table 1. Quantitative data questionnaire grid

Types Of Questionnaires	Indicator	Sub-Indicators
Level of Understanding of Science Concepts (Dirman & Mufit, 2022; Hasnawati et al., 2022)	Understanding of basic science concepts	Explain the basic concepts of physics, chemistry, and biology appropriately
	Relate science concepts to daily life.	Give examples of the application of science concepts in local contexts (Papua nature, traditional technology)
	Understanding of the scientific method	Explain the steps of the scientific method and its use in problem-solving
	Science literacy in social and environmental contexts	Linking science to environmental or social issues in Papua
Level of Understanding of National and Local History (Basri et al., 2022; Wahyudi, 2024)	Understanding important events in national history	Identifying figures, events, and chronology of Indonesian history
	Recognition of local figures in national history	Mentioning the role of Papuan figures in the national struggle (Frans Kaisiepo, Marthen Indey)
	Linkages between local and national history	Explain the relationship between Papuan local history and the history of the Indonesian nation.
	Reflective attitude towards the meaning of history	Able to draw lessons from historical events for the life of the nation
Integrative Attitude (Powers, 2022; Rivers, 2020)	Pride in being part of the Indonesian nation	Showing pride in state symbols, language, and national culture
	A sense of belonging and responsibility to the nation	Demonstrate active participation in national activities at school and in the community
	Openness to diversity	Appreciate differences in ethnicity, religion, and culture in common life
	Commitment to unity	Rejecting actions that divide the nation or promote intolerance

The second stage was conducted through in-depth interviews with 10 history and science teachers. The qualitative sample of 10 teachers was chosen to achieve depth rather than breadth.

Teachers with at least five years of experience were purposively selected to ensure they possessed sufficient professional background to comment meaningfully on contextualized pedagogy, student understanding, and local–national identity integration. This sample size is consistent with qualitative methodological standards emphasizing saturation of themes in semi-structured interviews.

The interviews aimed to explore how students interpreted the learning materials they received, and how they saw the relationship between science and history materials and their national identity as Papuans and Indonesian citizens. Interviews were semi-structured and recorded with participants' permission for transcription and analysis. Qualitative data were analysed using a thematic analysis approach, through the stages of transcription, open coding, and categorization until the main themes (Kiger & Varpio, 2020; Xu & Zammit, 2020), reflecting the meaning of the subject matter in the formation of integrative attitudes were obtained. This qualitative analysis serves to explain and deepen the findings from the previous quantitative data.

Validity and Reliability

In addition to expert review and internal consistency analysis, further steps were taken to ensure validity and reliability. During the instrument refinement stage, experts evaluated each item using three criteria: clarity, relevance to construct, and linguistic appropriateness for high school students in Papua. Items that are categorized as "unclear" or "less relevant" are removed or revised. All items retained have met the item-total correlation above 0.40, which supports the validity of the construct. The initial trial was carried out on a small sample of 20 students from schools that were not included in the final sample to determine the level of reliability of the items. The follow-up is in the form of refining the item and composing, as well as clarifying possible answer options.

To ensure the validity of the data, triangulation techniques were carried out from sources and methods, such as cross-examination of interviews, and validation of instrument experts before the questionnaire was distributed. The emphasis on research ethics is also one of the keys to data validity, by providing maximum explanation to participants about the purpose and needs of data collection, as well as maintaining confidentiality and freedom of the press in stopping participation without consequences.

Data Analysis

In analyzing quantitative data, SPPS Version 26 is used. First, the main statistics are obtained in the form of category percentages, standard deviations, and average values. Then, in testing the correlation between science, history learning, and students' integrative attitudes, Pearson correlation was used. But first, it is necessary to meet the assumptions of linearity and normality through the Kolmogorov-Smirnov test, Q-Q plot, and scatterplot. Furthermore, multiple regression tests were used to determine the level of correlation between History and science

knowledge in influencing integrative attitudes. Before that, the tolerance value (VIF) is also used to control multicollinearity, so that after everything is met, the analysis can be carried out.

In balancing contextual constraints and empirical accuracy results, appropriate methodological steps are needed. Sample selection using probability techniques will be impractical in Papua, which is geographically dispersed with limited infrastructure. As a result, sample selection with purposive sampling techniques will be more appropriate. The existence of samples with this technique is able to produce better quantitative and qualitative measurements on indicators of cultural elements, knowledge, and integrative attitudes of students. This provides analytical depth that neither quantitative nor qualitative designs alone can provide.

RESULTS AND DISCUSSION

Result

Distribution of Students' Science and History Comprehension Scores

This study involved 76 high school students in two regions in Papua. Data collection was conducted through a questionnaire with three main variables: (1) understanding of science concepts, (2) understanding of national and local history, and (3) integrative attitudes. The questionnaire data were processed in the form of percentage category trends. Descriptive analysis showed that students' understanding of science concepts tended to be in the moderate to high range. The average score for science understanding was 67.42 (SD = 11.85) on a 100-point scale. Table 2 presents the distribution across the predetermined categories. These categories were determined based on percentage thresholds of the total achievable score, referring to the assessment references in the methods section.

Table 2. Distribution of science concept understanding score

Category	Score Range	Number of Students	Percentage (%)
Very High	81 – 100	8	10,5%
High	61 – 80	32	42,1%
Medium	41 – 60	25	32,9%
Low	21 – 40	11	14,5%
Total		76	100%

The majority of students (52.6%) have an understanding of science concepts in the high and very high categories. This shows that the understanding of science is quite good, although there are still about 14.5% of students who need further development because they are in the low category. The mean score for students' understanding of national and local history was 71.33 (SD = 13.14). Table 2 shows the categorical distribution based on the same scoring thresholds.

Table 3. Score distribution of understanding of national and local history

Category	Score Range	Number of Students	Percentage (%)
Very High	81 – 100	12	15,8%
High	61 – 80	28	36,8%
Medium	41 – 60	24	31,6%

Category	Score Range	Number of Students	Percentage (%)
Low	21 – 40	12	15,8%
Total		76	100%

A total of 52.6% of students have an understanding of national and local history in the high and very high categories. However, there were still 31.6% in the medium category and 15.8% in the low category, indicating a gap in historical understanding among students. Students' integrative attitudes had a mean score of 73.89 (SD = 12.54). Table 3 summarizes the categorical scores.

Table 4. Distribution of an integrative attitude

Category	Score Range	Number of Students	Percentage (%)
Very High	81 – 100	15	19,7%
High	61 – 80	34	44,7%
Medium	41 – 60	20	26,3%
Low	21 – 40	7	9,2%
Total		76	100%

The majority of students (64.4%) showed a good integrative attitude. They showed pride in the nation, commitment to unity, and openness to diversity. However, there are 9.2% of students with low levels of nationalism who need a more relevant and contextualized learning approach.

Relationship between Science and History Understanding with Students' Integrative Attitude

Table 5. Correlation test results between variables

Correlations				
		Integrative Attitude	**Science Understanding**	**History Understanding**
Pearson Correlation	**Integrative Attitude**	1.000	.463	.796
	Science Understanding	.463	1.000	.379
	History Understanding	.796	.379	1.000

There is a significant positive correlation between the understanding of science and history and the integrative attitude of students. The correlation between science understanding and integrative attitude is in the medium category (0.463). This correlation is able to form a rational and responsible mindset in the context of nationality. Next, the correlation between understanding history and integrative attitudes is in the strong category (0.796). This correlation has a strong role in shaping student nationalism. The results of the correlation test above are supported by Figure 1, which shows the influence.

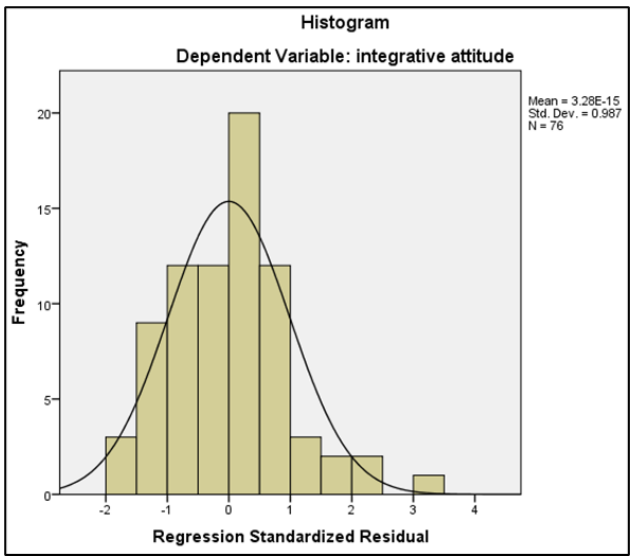

Figure 2. Distribution of students' national integration levels

Referring to the figure, the effect of understanding science and history on integrative attitudes can be considered statistically valid or true. The curve above also shows that the distribution of students' integrative attitudes has been evenly distributed or homogeneous as a result of their understanding of science and history. This achievement indicates that the data can be continued in the regression test, with the results shown in Table 6.

Table 6. Regression test results

Model Summary[b]

Model	R	R Square	Adjusted R-Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.036[a]	.63	.026	.45749	.061	.049	2	73	.035

a. Predictors: (Constant), Understanding History, Understanding Science

b. Dependent Variable: integrative attitude

The model explains 63.1% of the variance in integrative attitudes. These results suggest that while both variables contribute significantly, history understanding is a substantially stronger predictor. Importantly, the results indicate associations rather than direct causal influence, given the cross-sectional design of the study.

Teacher's Perspective on Students' Science and History Understanding

Analysis of interviews with teachers and students shows some thematic findings presented in Table 7.

The understanding of history and science as a means of strengthening students' national integration

Table 7. Summary of teachers' perspectives on learners' science and history understanding

Thema	Findigs
Relevance of History Material	Students feel more interested when the teacher relates the role of local Papuan figures such as Frans Kaisiepo and Silas Papare in the nation's struggle. This increases their sense of pride and belonging to Indonesia
Contextual learning as a solution	It was found that students with the application of contextual learning and the integration of local and national values were able to be more actively involved in discussions of existing issues of nationality, unity, and diversity.
Science and the local environment	Learning science with local props such as Papuan forests, rivers, and endemic species was reported by the teacher to increase their participation. The existence of contextual integration in this learning encourages students to think that they are part of the science-based history of the nation.

The results of the study show that there is a significant relationship between science and history knowledge and students' integrative attitudes. Specifically, the understanding of national and local history has a more curated influence than the understanding of science in the formation of nationalism. Such achievements still place the two disciplines in strong control in strengthening national integration, especially in complex areas such as Papua.

Discussion

The Role of History Education in National Identity Formation

Quantitative data analysis showed that students' history knowledge was stronger with their integrative attitude ($r = 0.796$) compared to science knowledge ($r = 0.463$). Indirectly, it shows that historical knowledge is more closely related to the affective aspects of nationalism, especially about local stories and national identity. Students with a qualified knowledge of national and Papuan history will tend to show greater pride, belonging, and commitment to unity. Referring to qualitative evidence, teachers consistently state that when learning about local figures such as Frans Kaisiepo or Silas Papare, students are able to engage and think critically more actively. Students gain greater knowledge of history and emotional experiences in the learning process when they go through contextual stories, helping them position themselves in a more complex national narrative.

In contrast, there is a moderate correlation between scientific understanding and integrative attitudes, which suggests the influence of more logistical and community-oriented scientific thinking. Critical reasoning and informed decision-making are driven by science, which can foster tolerance, openness, and social responsibility. Educators have found that when science lessons are integrated with local contexts such as Papua's forests, rivers, and biodiversity, students are better able to see themselves as part of the same national ecological community. The relationship with integrative attitudes is inherently more cognitive and less effective than history learning, as science learning tends to emphasize conceptual mastery rather than identity formation. Historical understanding is a stronger predictor of this correlation, and this difference helps explain it.

Table 2 shows that students' understanding of national and local history is at a "moderately high" level, with 25% of students in the "high" category and 54% in the "moderate" category.

Indicators used include an understanding of the chronology of the independence struggle, the role of local figures such as Frans Kaisiepo, and the ability to connect local history with national history. This data underscores the important role of history education in strengthening national integration through affective (emotional) channels (Harinaredi et al., 2025; Ortega-Sánchez et al., 2020). When the students realized that Papuan figures participated in the struggle for Indonesian independence, they felt part of the national narrative. This is in accordance with Anderson's (2006) view of "imagined community" where national identity is built through collective narratives that involve all elements of the nation (Nosova, 2024).

Barton & Levstik (2004) also emphasize the importance of a multiperspective approach in learning History (Gatsotis, 2023; Tribukait, 2021). In the context of Papua, this means presenting a national history that is not Java-centric, but also recognizes the role of figures from eastern Indonesia. When this is done, learners are better able to build emotional connections with national identity, as revealed in the interview data: "I just felt that I was also part of Indonesian history when the teacher told me about Frans Kaisiepo..."

History education theoretically functions as a means of building the nation's collective identity through a shared narrative of the past (Amboro, 2020; Popa, 2022; Susilo et al., 2025). In the context of Papua, when national history is presented without recognizing the contributions of local figures, students have the potential to feel alienated from national identity. Interview results in this study show that learners feel more involved and prouder to be part of the Indonesian nation when history materials include local figures such as Frans Kaisiepo and Silas Papare. This finding is in line with the opinion of Susanto & Purwanta (2022) that the meaning of history will be stronger if students can see themselves and their communities in the national narrative. Research by Wijayanti et al. (2025) states that strengthening national identity through history learning is very effective when national historical narratives are contextualized with students' local identities. As a result, in the context of Papua, history is not only a lesson about the "national past", but also about "the position and participation of Papua in Indonesian history".

Science Contribution to Citizenship Attitude and National Rationality

Science lessons, although not directly teaching nationalism, have an important role in the formation of critical thinking, objectivity, and responsibility for the common life (Gresinta et al., 2023). In modern civic education, scientific thinking contributes to building rational citizens who are able to make evidence-based decisions (Taschner & Almeida, 2024). In Papua, science learning approaches that link knowledge with local contexts, such as through rainforest ecosystems, and local agricultural technology. Other examples of environmental wisdom provide space for learners to understand that science is also part of local culture and a contribution to national development.

Based on the data shown in Table 1, the majority of learners (around 62%) are in the "moderate" category in terms of understanding science concepts, while only 11% are in the

"high" category. This understanding is assessed through indicators such as the ability to explain scientific concepts, the application of science in local life (e.g., agriculture, health, and environment), and scientific attitudes such as rational and critical thinking. The interpretation of this data indicates that although science is not directly related to the formation of national identity, through a scientific approach that fosters critical thinking, students can develop rationality-based national awareness. This is in line with scientific citizenship theory (Hodson, 2011), which emphasizes that science learning can form citizens who are able to weigh information objectively, make responsible decisions, and contribute to the welfare of society (Buber & Coban, 2023; Levy et al., 2021).

Results also show that most learners are still at the intermediate level. This achievement is an important indication that the approach to science learning in schools needs to be more contextualized, by including materials that are closer to the reality of students in Papua. Materials about local biodiversity, sustainable management of Papua's natural resources, and locally based traditional technology can be examples of such materials. Several studies have shown that contextualized science learning contexts show that the integration of local issues can increase student engagement and foster concern for the community and nation (Gebre & Polman, 2020; Levy et al., 2021). It is also in line with the scientific citizenship theory, where science learning is directed not only for concept mastery, but also for strengthening students' social and ecological responsibilities as citizens (Adamou et al., 2021; Roche et al., 2020). The results of this study show that students who have a high understanding of science show a significant correlation with nationalist attitudes. This indicates that although not as strong as the correlation of history lessons in shaping national identity emotionally, science has the power to influence the rational aspects in the process of forming national awareness.

Integration of Science and History: Synergy of Rationality and Affection in Nationalism Education

These two subjects, if developed in an integrated and contextual manner, can become important pillars in strengthening national integration. History shapes national affection through emotion, recognition, and shared narrative (Ernawati & Wijaya, 2023; Prihatiningsih, 2021). Science shapes national reasoning through logic, responsibility, and evidence-based decision-making (Dawson et al., 2024). In the context of Papua, strengthening these two areas must be done by taking into account the local characteristics and socio-cultural background of students. Learning that only emphasizes normative nationalism, such as memorizing national slogans or symbols, is not enough to foster authentic nationalism. Instead, learning that integrates local knowledge and experience into national history is a concrete form of reconciliation pedagogy (Siemens & Neufeld, 2022), that is, learning that recognizes diversity, voices justice, and facilitates social cohesion in a multicultural society (Abera, 2023; Datta, 2021).

Implications for Education in Peripheral Areas.

The implications of the research are very significant in the development of curriculum and learning methodologies in the 3T (Remote, Outermost, and Disadvantaged) areas. Currently, not a few students in Papua feel that they have not found a curriculum that is relevant to them, as a result, they feel that their diversity is only symbolic and not part of the Indonesian nation. The presence of the curriculum should be an instrument of unifying the nation, not only the context of education and teaching, for example, science and history lessons presented in "regional languages".

The findings in this study also emphasize the urgency of teacher training in applying a multicultural contextual approach in learning. In this training, teachers are fostered in their ability to create relevant learning materials and social life, and the vision of the nation (Haug & Mork, 2021). Teachers with the ability to manage learning in a contextual and significant way form student nationalism attitudes (Abdullah & Abdullah, 2018; Vira et al., 2025).

General Findings on the Dynamics of National Integration in Papua

Analysis of qualitative and quantitative data shows that contextualization is very important for students. Integrative attitudes are usually shown by students when the learning materials they encounter are relevant to their socio-cultural and geographical life (Fitrianto & Farisi, 2025; Lu et al., 2025). The results of the classroom teacher's observation also found that the condition of students who tend to like discussions about diversity, nationality, and issues of national unity. Furthermore, if the discussion is directed to their role as Papuan people in supporting independence or practicing the values of the independence struggle.

International research emphasizes that educational content that emphasizes local culture and connects students to national narratives strengthens identity formation (Kristiawan et al., 2022; Wijayanti et al., 2025). Similar conditions are also found in other multicultural regions such as Canada and Australia. In this area, historical knowledge is the basis for emotional formation, while scientific knowledge forms national reasoning (Bedford, 2023; Karn, 2023). This symmetry shows that the process of formation and development of integration in Papua also applies the same principles to other regions around the world.

Moderating Causal Interpretations

The significant findings obtained in the study are still limited to the principle of causality of research latitude design. This study shows that students with a good knowledge of history and science tend to have stronger integrative attitudes, but this relationship is not clear enough. The existence of students with strong integrative skills may be interesting in academic material, but it may be that the strong integrative is influenced by family, environment, association, and school culture, namely as external factors (Kartal et al., 2024; Wan, 2022). As a result, the findings of this study need to be referred to as a correlational variable that forms the nation's integrative attitude in students, not as the main factor that creates direct results.

CONCLUSION

This study has important findings in the form of students' knowledge of science and history, which positively correlated with their integrative attitude towards Papua. Empirical data show that historical knowledge is more strongly correlated with indicators of nationalism, acceptance of diversity, and unity. Another result is that increasing national integration can be done through contextual learning, which is important to do in schools, such as in Papua. Through contextual learning, students are able to connect the concept of learning with life experiences, socio-cultural life, and stories about local figures. This method is able to foster a stronger sense of nationalism in border areas such as Papua.

Perspective on the importance of local history knowledge in the division of contextual science in curriculum formulation. The results of this research are able to expand and multiply studies on national integration, for example, in the Papua region. Then it can be expanded to subsequent research in other areas, with longitudinal or intervention-based designs that are able to measure and know that integrative attitudes develop at all times.

Limitations

Some of the limitations in this study are behind the success in presenting important insights on integrative attitudes influenced by science and historical knowledge. First, the study only involved a relatively small sample (76 students) from 2 education districts in Papua. Sample sizes are still limited to reinforce these important findings, making it difficult to generalize in a broad context.

Second, the sample may have an external influence on responding on a Likert scale, such as subjective attitudes, misinterpretations of questions, or social desires. The impact on the conclusion. The recapped interactive attitude is not completely natural and accurately represents the student at the time. Third, there is a time when variables are considered cross-sectional studies, so findings are seen as variable correlations, rather than empirical evidence of causality. A longitudinal research design is needed to understand the relationship of science and History knowledge variables in influencing student integration over a given time.

The involvement of the sample is larger and more varied, able to present research that answers these limitations, especially in diverse socio-cultural areas. The use of qualitative design will also provide broader insights through observation and interviews with students about their experiences in learning History and science. In addition, longitudinal research, it can present findings on the influence of the development of the world of education on students' integrative attitudes in a multicultural society.

Implications and Directions for Future Research

In the future, research can be directed to probability sample selection techniques with the aim of expanding the location and scope of educational dissertations. Then choose a longitudinal design in determining a stronger integrative attitude or vice versa when students, over time,

experience an increase in knowledge. The research mechanism is also suggested through experimental studies or interventions through learning with the local history module and contextual science concepts. Furthermore, the topic can be expanded on school culture, community profiles, and family backgrounds that can form national integration. And it can be done through comparative studies in comparing the Papua region with other regions in Indonesia about the learning context or local knowledge that forms national identity.

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