From sheet to screen: Teachers' needs for science literacy-based explanatory text writing learning in vocational schools

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Abstract - This study aims to describe the profile and needs of teachers in learning to write science literacy-based explanatory texts at Vocational High Schools (SMK) in Cianjur, Jawa Barat. Employing a descriptive qualitative method, data were collected via an online questionnaire distributed to 19 Indonesian language teachers. The questionnaire instrument consisted of closed and open questions covering respondents' identity, teaching experience, learning challenges, and needs for teaching materials. The results show that most teachers, with varying teaching experience, have taught explanatory texts. However, learning still predominantly focuses on mechanical aspects and has not been optimally integrated with elements of science literacy. Conventional textbooks are still the primary source of learning, while utilizing digital media and contextual materials is minimal. Teachers also expressed the need for teaching materials linking text structures with scientific understanding relevant to students' lives. In addition, training for teachers in integrating science literacy into writing instruction is urgently needed. These findings confirm the importance of developing science literacy-based writing e-modules to solve classroom learning challenges and improve students' critical thinking, information literacy, and writing skills in a contextual and meaningful way.

Keywords: Explanatory Text, Science Literacy, Teachers' Needs, Vocational School, Writing Skills

1. Introduction

The literacy skills of Indonesian students, especially reading and writing, are still relatively low. Based on the PISA results in 2022, Indonesia ranked 69th out of 81 countries with a reading literacy score of 359, far below the OECD average of 487 (PISA 2022 Results (Volume I), 2023). This lack of literacy impacts students' ability to understand and produce texts, including explanatory texts that demand logical and scientific thinking skills (Ayu Apriliana & Anggrella, 2024).

Explanatory texts are a type of writing that aims to describe how certain phenomena occur, whether natural or social. By presenting information coherently and logically, explanatory texts help readers understand the background and processes underlying certain events (Anshori & Damaianti, 2022; Kosasih, 2016). In the context of vocational high schools, the ability to write explanatory texts is essential because it supports vocational learning that requires a scientific understanding of practical phenomena (Sofia & Anshori, 2024). This skill improves students' academic achievement and provides essential competencies for the world of work, where clear, logical, and evidence-based communication is highly valued.

Writing texts requires planned steps and learning resources per learning needs (Ramadhanti et al., 2023). Writing skills cannot be acquired naturally, but must undergo a continuous process of learning and practice (Khasanah & Yulianto, 2024; Munaiseche et al., 2024). Therefore, learning to write must be designed systematically and oriented towards developing students' competencies.

Ideally, learning to write explanatory texts does not only focus on structure and linguistic aspects. It also needs to integrate scientific understanding of a phenomenon to align with the principles of science literacy (Maryanti & Haryadi, 2022). Science literacy includes scientific knowledge, critical thinking skills, attitudes, and the ability to relate scientific concepts to real-life contexts. Integrating science literacy in learning to write explanatory texts is expected to improve students' understanding in depth and application (Haruna et al., 2024). Thus, science literacy includes scientific knowledge and the ability to apply it in real-life contexts.

However, the results of research by Rufaidah et al. (2022) and Santi et al. (2023) showed that writing learning in SMK still focuses on mechanical aspects and has not touched on scientific and contextual content aspects. Research by Eden (2024) also, many teachers tend to teach writing as a separate skill from scientific content, so students do not get the opportunity to develop a deep understanding of the material they write about.

This is exacerbated by the lack of teaching materials supporting science literacy integration. A study conducted by Febrianti et al. (2022) found that available teaching materials are often not designed to connect scientific concepts with students' daily lives, hindering their ability to apply scientific knowledge in relevant contexts. In addition, other studies have also emphasized that the lack of training for teachers in integrating science literacy into writing instruction is also a significant obstacle (Fajariyah Akbari, 2023; Hutami & Pratiwi, 2024; Niswaty et al., 2023).

Collaborating efforts between educators, curriculum developers, and educational researchers are needed to overcome these challenges. This collaboration aims to design teaching materials that emphasize structure and language and enrich students' scientific understanding. In addition, training for teachers in integrating science literacy into writing lessons is essential. This training aims to enable students to develop writing skills that are not only mechanical but also meaningful and contextualized.

Science literacy is critical in language learning, especially at the Vocational High School level. Several previous studies emphasize the urgency of science literacy in improving the quality of language learning. One of them is a study conducted by Alfiah & Bramastia (2024) This shows that science literacy contributes significantly to developing students' communication skills. With good science literacy, students can understand scientific concepts in depth and convey them clearly and precisely. These skills become essential in the world of work, especially in cross-disciplinary collaborative situations, where students are required to express ideas logically, construct data-based arguments, and work together effectively. In addition, strong communication is also needed when students have to interact with superiors, clients, or other parties who may not have the same technical background.

In line with these findings, Saputra (2023) emphasizes that science literacy in language learning enables students to connect scientific knowledge with real-world phenomena. Language serves as a means of thinking, solving problems, and understanding scientific concepts, which are highly relevant in social and professional life (Alejandro, 2024; Krauss, 2024). Through practical language skills, students can interpret scientific information, think critically, and communicate ideas. This close link

between language and science literacy is essential in shaping individuals sensitive to social and technological issues.

Amidst the global push to prioritize academic writing in English, academic writing in Indonesian continues to play a strategic role, especially in vocational secondary education. Mastery of academic writing in Indonesian provides a foundation for students to develop critical thinking and scientific argumentation skills, while also strengthening linguistic identity and preparing for the transition to academic writing in English (Muhsin et al., 2024; Shofiah et al., 2024). Thus, strengthening academic literacy in Indonesian is not contrary to global practices but rather a relevant and sustainable pedagogical step to equip students to face academic and professional demands in the global era. In this framework, teachers' role is vital to ensure the integration of academic literacy and science literacy in writing learning in vocational schools.

However, there is still little research that specifically examines the needs of teachers in implementing science literacy-based writing instruction in vocational schools. Understanding these needs is crucial because teachers are the main facilitators in student-centered learning, whose challenges and needs must be addressed to ensure effective instructional design. Based on this gap, this study was guided by the following research question: What challenges and needs do teachers face in teaching science literacy-based explanatory texts in vocational schools? The findings of this study are expected to serve as a basis for designing teaching resources that specifically address teachers' instructional needs. By strengthening teachers' capacity, these resources can create more relevant, contextual, and practical learning opportunities for students.

2. Method

This study uses a qualitative descriptive method. The qualitative descriptive method aims to describe the object of study narratively (Anggito & Setiawan, 2018; Sugiyono, 2023). The research respondents were determined using purposive sampling with the following criteria: (1) teachers who actively teach the Indonesian language at vocational high schools, (2) have experience teaching explanatory texts, and (3) are willing to participate voluntarily. The questionnaire link was distributed to all members of the Indonesian language teacher communication group of the West Cianjur Regency vocational high schools, coordinated by the coordinator, which consisted of 22 people. Of these, 19 teachers were willing to fill out the questionnaire and became research participants. The respondents comprised 63% women and 37% men with an average age of 38 years and approximately 12 years of teaching experience. This region was chosen because it has an active and well-organized community of teachers, which facilitated data collection coordination and was considered representative in providing an initial overview of teachers' needs.

The research instrument was a questionnaire developed based on the principles of qualitative research instrument development according to Sugiyono (2023). The questionnaire consisted of closed and open-ended questions. Closed questions were used to obtain quantitative data on the frequency of learning media use, the types of teaching materials commonly used, and the extent to which teachers applied science literacy elements in learning. Open questions explored teachers' perceptions of science literacy's challenges, needs, and relevance in teaching explanatory text writing. The questionnaire consisted of 23 questions divided into four sections, namely: (1) identity (Q = 3), (2) teacher profile and experience in teaching explanatory texts (Q = 7), (3) teachers' challenges in teaching explanatory texts (Q = 7), and (4) teachers' needs for teaching materials for writing explanatory texts in class (Q = 6).

To ensure content validity, the questionnaire was reviewed by two experts, namely a lecturer in Indonesian language education and a researcher in science literacy. Both provided input on the clarity of the wording, relevance, and suitability of the questions to the research objectives. Based on this input, several questions were revised in terms of language and several indicators were rearranged to make the instrument easier to understand and more relevant to the research focus.

The research procedure was carried out in six stages: (1) drafting the questionnaire based on the research objectives, (2) expert review to ensure content validity and readability, (3) distribution of the final questionnaire online via Google Form to all teachers who met the criteria in the communication group, (4) giving respondents two weeks to complete the questionnaire with periodic reminders, (5) data verification to ensure the completeness and consistency of the answers, and (6) qualitative descriptive data analysis.

Data validity was maintained by applying Lincoln (2017) four criteria of trustworthiness, namely (1) credibility, maintained through method triangulation by combining quantitative and qualitative data and expert validation of the instruments; (2) transferability, achieved through contextual descriptions of

the respondents and the research setting at vocational schools in Cianjur Regency; (3) reliability, maintained by systematically recording all research procedures as an audit trail; and (4) confirmation, ensured by basing the analysis entirely on respondent data and storing the original data for re-examination purposes.

Quantitative data from closed questions were analyzed descriptively to obtain percentages that describe the profile and needs of teachers. Qualitative data from open-ended questions were analyzed using thematic analysis (Akramul Kabir, 2024; Sandhiya & Bhuvaneswari, 2024). The coding process was carried out manually in three stages (Liu, 2022). The first stage was open coding to identify and label important answers, the second was axial coding to group similar codes into broader categories, and the third was selective coding to compile the main themes that explained the challenges and needs of teachers. The coding process was carried out carefully and cross-checked by the research team to ensure the consistency and reliability of the analysis results.

3. Results and Discussion

3.1 Teacher's Practices in Writing Explanatory Text: Current Challenges and Science Literacy Gaps

Teachers' practices in teaching exploratory text writing are known through their experiences teaching exploratory texts in class. Nineteen teachers who became respondents were known to have more than one year of teaching experience. The questionnaire results show that all respondent teachers have taught the material of writing explanatory texts in class. This can be seen in Figure 1 below.
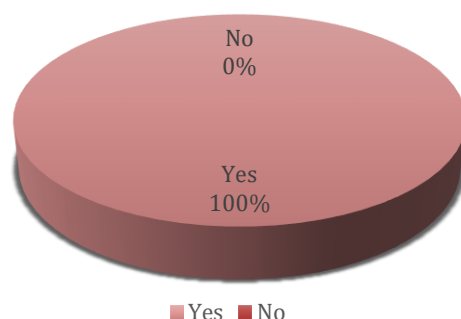

Figure 1. Teacher's Experience of Teaching Explanatory Text

The teachers' teaching experience of more than one year and their involvement in teaching explanatory texts show that this material is not unfamiliar to them. For teachers, teaching explanatory texts has become part of their daily professional journey that shapes how they understand writing challenges in the classroom. The fact that all respondents have taught this material shows that they share an experience that confirms that writing explanatory texts is not merely a curricular obligation, but a practice that continuously trains their pedagogical intuition in dealing with students' diverse abilities.

Teachers used various approaches to introduce the material in the initial learning activities. Nine teachers began by explaining the definition of explanatory texts. Three teachers used video media to illustrate an event. Two teachers asked students to read sample texts from books. Two other teachers described a phenomenon. Two other teachers asked students to read samples from newspapers or magazines. One teacher encouraged students to search for information independently on the Internet. This is illustrated in Figure 2 below.

Methods Used By Teachers In Early Learning Activities For Writing Explanatory Texts
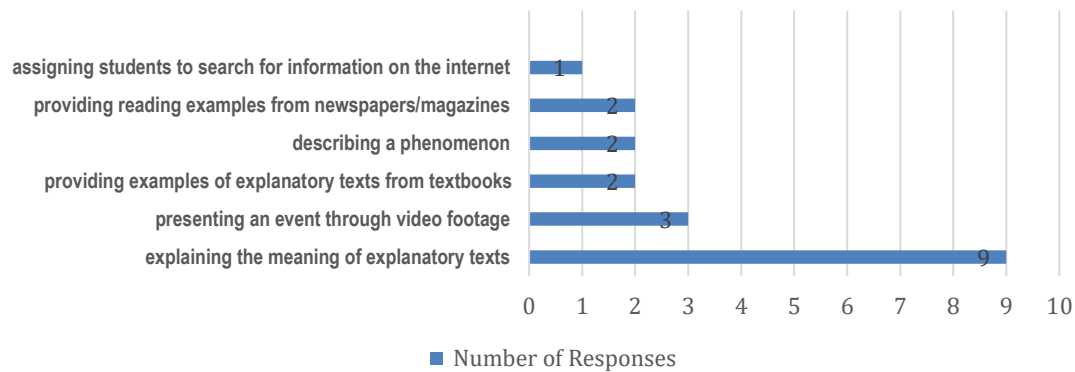

Figure 2. Methods Used by Teachers in Explanatory Text Learning

At first glance, this data distribution only shows variations in strategy. However, the meaning behind this practice reveals teachers' dependence on approaches that feel safe and familiar. The finding that nine teachers began the lesson by explaining the definition of explanatory text shows that conventional patterns are still dominant. Teachers are more comfortable transmitting knowledge than facilitating exploration. This strategy reflects a tendency to rely on lectures, which are considered the safest method, but simultaneously reveals limitations in applying science literacy approaches.

In contrast, many teachers tried to use videos, current events, or online searches. These efforts show a drive to make learning more contextual and relevant to students' realities. This situation highlights the tension between traditional knowledge-centered patterns and a new orientation that emphasizes discovery and contextualization. This new direction is in line with the PISA 2022 Results (Volume I) (2023) framework, which emphasizes observation, media utilization, and problem-solving. This dynamic is also consistent with the findings of Rufaidah et al. (2022) that teachers still tend to teach writing as a mechanical skill separate from scientific content.

Based on the questionnaire results, the profile of teaching materials used in explanatory text writing instruction is as follows: 58% of teachers still rely on textbooks, 26% use digital modules, 11% use Student Worksheets (LKS), and the rest combine books with online articles. This is illustrated in Figure 3 below.
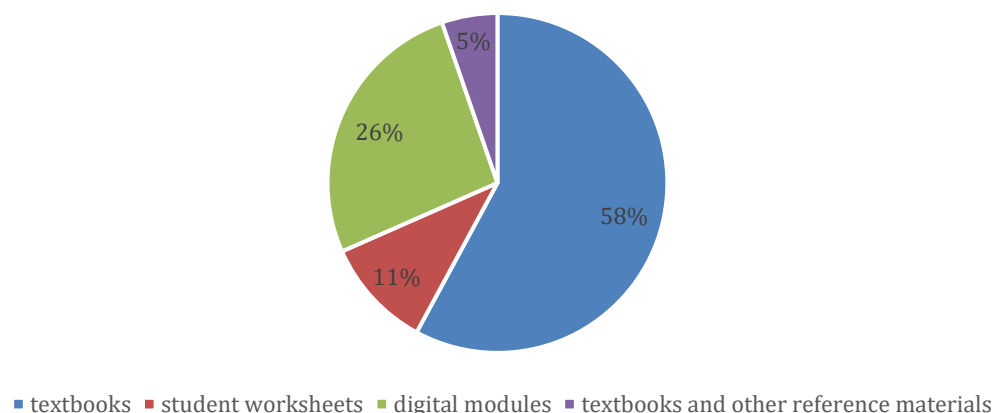

Figure 3. Teaching Materials Used in Learning

The dependence on textbooks seen in the data above cannot be interpreted merely as a practical choice; it reflects the experience of teachers who view textbooks as the most stable, curriculum-compliant, and accessible teaching resource. However, using digital modules and online articles indicates a shift in pedagogical orientation, as teachers realize that student engagement increases when teaching materials are related to the digital world and contemporary issues. This duality between stability (textbooks) and innovation (digital teaching materials) captures the experience of teachers navigating curriculum demands and the need for modernization. This aligns with Aegustinawati et al. (2024), who state that although textbooks are still dominant, teachers are becoming more open to alternative teaching materials that can increase student engagement.

A similar pattern is seen in the explanatory text sources used in learning. A total of 58% of teachers only use textbooks published by the Ministry of Education and Culture, 32% take text examples from the internet, and a small percentage combine various sources. This data shows that although textbooks are still the primary choice, digital sources are beginning to grow and are seen as an alternative that can enrich teaching materials. This can be seen in Figure 4 below.

Where does the source material for explanatory texts come from?
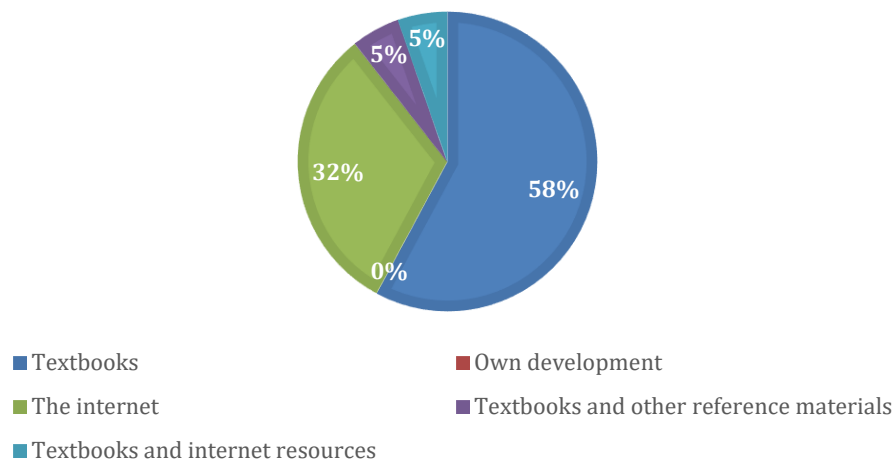19 Responses

Figure 4. Explanatory Text Resources

Upon closer examination, teachers' choice of primary sources for textbooks is not only a matter of availability, but also an internal negotiation between authority and authenticity. Textbooks represent authority and standards, while online sources offer variety, relevance, and proximity to the students' context. The combination of the two shows a shift in perspective that explanatory texts are not only seen as linguistic structures, but also as representations of real knowledge.

The respondents' answers regarding the use of media in classroom learning are shown in Figures 5 and 6 below.

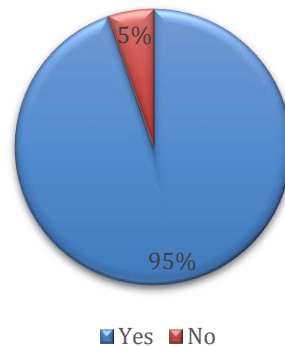Do you use digital or online media when teaching writing?
19 Responses

Figure 5. Use of Digital Media

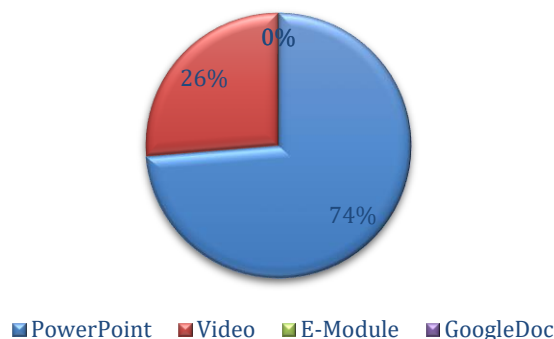If so, what media is used?
19 Responses

Figure 6. Digital Media Used in Learning

From the two figures above, it can be seen that most teachers (95%) stated that they had used digital media in teaching explanatory text writing. Of this number, the majority, or around 74% of teachers, used PowerPoint presentations to deliver material. Meanwhile, 26% of teachers use digital modules as learning media. This finding indicates a high level of readiness to integrate digital media into writing instruction activities. This reflects teachers' awareness of the importance of technology in supporting learning. However, the media used are still presentation-based and have not yet moved towards interactive or inquiry-based media. Learning media development should be directed toward using multimodal elements such as text, images, videos, and graphics that can encourage students to write based on observations or interpretations of scientific data. Findings also reinforce this Handoyo et al. (2024), which emphasizes that the use of various multimedia elements, including text, images, audio, and video, can increase student motivation and understanding, thereby supporting the development of learning media that engages students in interpreting scientific data effectively. Building on this, the study also explored the challenges faced by teachers in implementing explanatory text writing in the classroom, as illustrated in the following diagram.
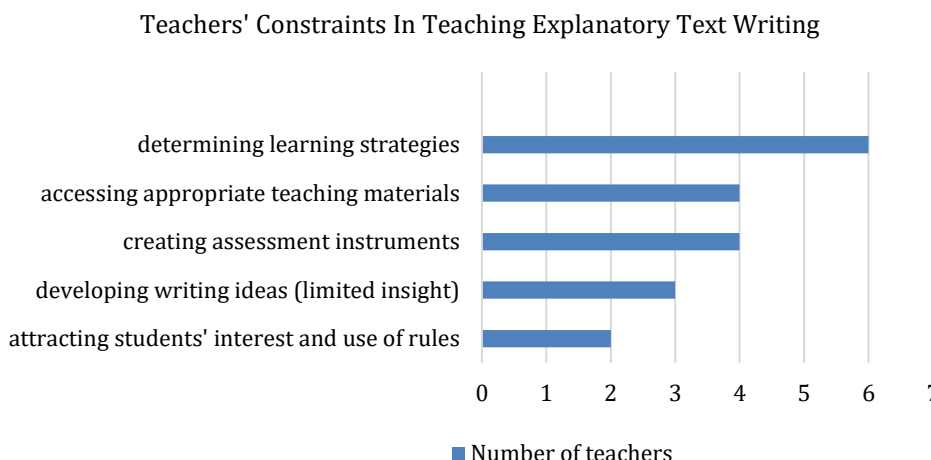
Figure 7. Learning Constraints for Explanatory Texts

The obstacles highlighted the importance of aligning teaching strategies with pedagogical principles supporting interdisciplinary learning. Six teachers admitted having difficulty determining the appropriate learning strategy, indicating a need for a more focused and contextual pedagogical approach. Four other teachers reported challenges in accessing appropriate teaching materials, and four teachers also experienced obstacles in developing assessment instruments relevant to the targeted competencies. Additionally, three teachers stated that students' limited knowledge posed a unique challenge in developing writing ideas. Two other teachers noted that students' lack of interest in learning and limited understanding of language rules hindered writing instruction. These findings highlight the importance of strengthening teachers' pedagogical capacity regarding technical teaching skills and applying approaches that combine language and science literacy. Teacher training should include developing teaching materials based on current scientific issues, integrating project- or problem-based learning strategies, and designing assessments that evaluate critical thinking skills and scientific writing abilities.

This is in line with the statement of Ryan et al. (2023) and Sartika (2020) teachers must be able to choose learning strategies and teaching materials aligned with the material to be delivered to achieve learning objectives optimally. In this context, teachers must also be willing to use and continue learning about how to utilize simple technological tools, given the tremendous potential technology has in supporting teaching and learning practices in the classroom (Lokollo & Mali, 2024). The research findings of Ismayani et al. (2025) demonstrate that the appropriate use of technology can enhance student engagement and active participation. Additionally, technology enriches the learning process, particularly in writing activities that require creativity and a deep understanding of the subject matter.

Overall, teachers' practices in teaching explanatory text writing reveal a dialectic between conventional habits and the need for science literacy-based innovation. The collected data does not merely show numbers or percentages, but reveals the real experiences of teachers in navigating learning: a sense of security in using textbooks and PowerPoint, adaptive efforts in utilizing digital modules or online articles, and anxiety when faced with low motivation and limited knowledge among students. When understood through the lens of experience, these practices reflect teachers' struggles to balance curriculum demands with the real conditions of the classroom. Thus, the challenges that arise are not only technical issues, but also part of an evolving pedagogical journey. This is an opportunity to strengthen teachers' capacity to integrate science literacy through contextual strategies, multimodal media, and assessment designs that encourage students' critical thinking and scientific writing skills.

3.2 Teachers' Needs in Teaching Explanatory Text Writing Based on Science Literacy in Vocational Schools

Building upon the instructional challenges identified in the previous section, this part further explores how science literacy integration can address these limitations and what specific needs teachers express to support such integration. The findings revealed that most respondents positively perceived the

importance of integrating science literacy in learning to write, especially explanatory texts. These results are illustrated in Figure 8 below.

In your opinion, is it important to link writing instruction with science literacy content?
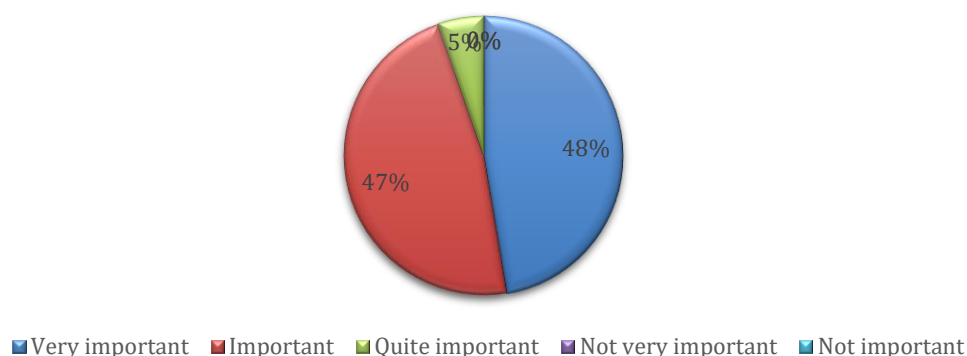19 Responses

■Very important ■Important ■Quite important ■Not very important ■Not important

Figure 8. The Importance of Science Literacy Integration in Writing Learning

In the questionnaire section that asked teachers' opinions on the importance of linking writing instruction to science literacy content, the researchers first provided a brief operational definition so that respondents would have a common understanding. The definition explained science literacy as linking language learning to scientific phenomena through observation, interpretation, and authentic multimodal learning resources, such as texts, images, graphs, and scientific data. With this explanation, respondents were guided to interpret science literacy consistently in the practical context of classroom learning, rather than as an abstract theoretical concept. This step was taken to ensure clarity of meaning and minimize variations in understanding, thereby increasing the validity of the answers provided in the questionnaire.

The survey results showed that 48% of respondents stated it was essential to link writing learning with science literacy content, 47% stated that it was important, and only 5% stated it was pretty important. When understood more deeply, this data reveals teachers' collective awareness that science literacy is relevant to improving the quality of writing instruction. This awareness does not stem from mere curriculum fulfilment, but from daily experiences dealing with students' limited motivation, difficulties in writing meaningful topics, and the need to provide real-world contexts in learning.

However, recognition of the importance of science literacy does not automatically correlate with classroom practice. Eighty-three percent of teachers admitted that they have never integrated science literacy content into learning to write explanatory texts. Figure 9 below shows this.

Have you ever integrated science literacy content into teaching explanatory writing?
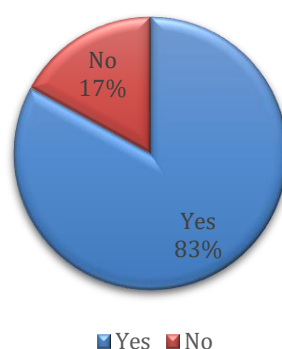19 Responses

■Yes ■No

Figure 9. Integrating Science Literacy in Learning

This contradiction can be interpreted as a form of experiential gap. Teachers have a conceptual awareness of the urgency of science literacy, but their practical understanding of how to implement it is

still limited. In other words, teachers' experiences reveal an inner tension: they recognize its relevance, but a lack of training, limited access to popular science reading materials suitable for students, and a lack of concrete examples make integration difficult to achieve. This is in line with the findings of Hutami & Pratiwi (2024) and Alwi et al. (2020), which emphasize the need to strengthen teachers' capacities and provide contextual teaching materials.

The questionnaire results found that all respondents (100%) expressed interest in using science literacy-based e-modules to improve students' writing skills, especially in learning explanatory texts. Questionnaire data from this study are shown in Figure 10 below.

Are you interested in using science literacy-based e-modules to improve students' writing skills?
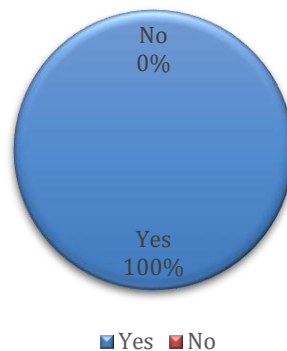19 Responses

Figure 10. Teachers' Interest in Using E-modules

This enthusiasm not only demonstrates teachers' openness to digital innovation, but also reflects the need for learning media that is in line with the times. From the teachers' experience, e-modules are seen as a means of connecting language and real-world phenomena, making learning more contextual and meaningful. Furthermore, teachers emphasized that science literacy-based e-modules should draw from various popular media that present up-to-date and scientific information in language that is easy for students to understand. In addition, they also want teaching materials that have a clear text structure, complete with exercises, writing guides, and systematic assessment rubrics. This desire of the respondents is illustrated in Figure 11 below.

What features do you think are important for science-based writing e-modules to have? (You may select more than one answer.)
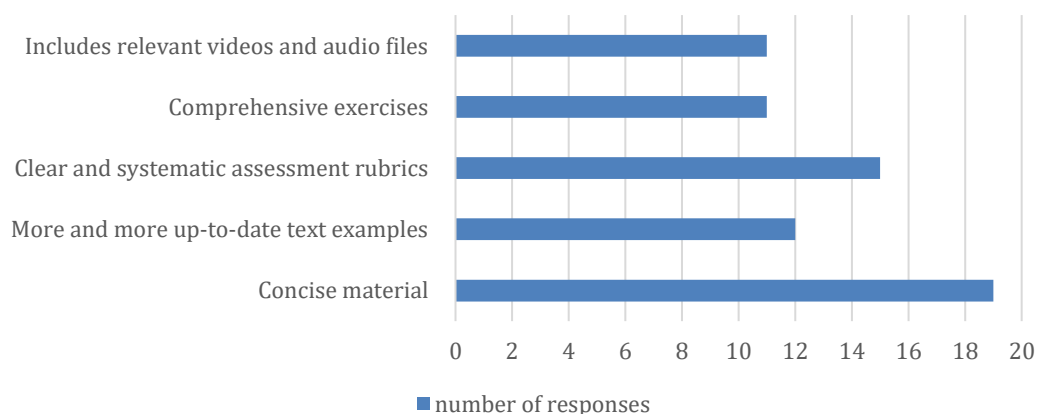19 Responses

Figure 11. Desired E-Module Features

Based on the diagram of the questionnaire results displayed above, it can be seen that all respondents (100% or 19 teachers) agreed that concise material is the most crucial feature for science-based writing e-modules to have. Furthermore, 78.9% of respondents (15 teachers) stated the importance of having a clear and systematic assessment rubric in the e-module. As many as 63.2% of respondents (12 teachers) also wanted the text examples presented in the e-modules to be more numerous and authentic to provide contextual and relevant student references. Meanwhile, 57.9% of respondents (11 teachers) considered that complete practice questions and supporting media, such as appropriate video and audio, are also critical features that should be included. These results show that teachers have high expectations for the quality of content and completeness of features in e-modules, especially those that support science literacy-based writing skills. Features considered necessary are generally related to the ease of understanding the material, clarity of assessment, and completeness of learning resources, both text and multimedia.

The questionnaire results show that most teachers have high expectations for developing science literacy-based writing e-modules as effective assistive media in the learning process. This expectation reflects the need for writing learning innovations that can overcome academic obstacles, such as low motivation and student involvement in writing activities. In line with that, findings from previous research indicate that e-modules have advantages in facilitating the learning process of students, thanks to their interactive, flexible, and adaptive nature to individual learning characteristics and needs (Sari et al., 2020; Sriwahyuni & Eliza, 2024; Sutama et al., 2021). Therefore, developing writing e-modules integrated with science literacy principles is seen as having great potential in improving learning effectiveness, especially in gradually, contextually, and meaningfully building writing skills. The respondents also emphasized the importance of the suitability of the e-module content with learning objectives, students' learning styles, and the relevance of real-world contexts, such as information from actual news or the results of scientific studies, to increase students' engagement and understanding. The respondents' expectations and wishes are summarized in Table 1 below.

Table 1. Thematic Analysis of Suggestions and Expectations for Science Literacy-Based E-Module Development

Theme Category	Theme Description	Respondent Statements
Linkage to Learning Objectives	Modules must be tailored to learning objectives and student learning styles.	Pay attention to learning objectives and student learning styles.
Interesting and Visual Content	Modules are expected to be concise, interesting, use visual/audio media, and easy to understand	Make e-modules as enjoyable as possible so that students are interested in learning.
		Be complete, concise, and engaging.
Real World Integration	The module should relate the material to real life, news, or current scientific phenomena.	Integrate real-world examples such as news or scientific studies.
		Use real-world examples.
Development of Science Process Skills	Focus on thinking critically, solving problems, making observations, making hypotheses, and drawing conclusions.	Focus on science process skills such as observing, asking questions, making hypotheses, and drawing conclusions.
Clear Assessment System	Modules must be equipped with assessment rubrics and evaluations aligned with learning outcomes.	Assessment rubrics that are in line with learning outcomes.
		Evaluation that represents student understanding.

Technology Accessibility	Expectations for the module to be easily accessible, including when offline and for the long term.	Accessible when offline.
		More accessible in the long term.
Support for Teachers and Students	The module should help teachers and students understand the material in an actual and relevant manner.	Helps teachers provide complete and accurate material.
		Facilitate learning.
Socialization and Continuous Development	The module needs to be socialised more widely and continuously developed.	To be further disseminated.
		More interesting e-modules should be developed.
Utilization of Technology in Learning	Integrate digital media such as video, audio, and other learning technologies.	Utilize technology in learning.
		By using relevant images.

More broadly, the e-modules developed are expected to transfer information, develop critical thinking skills and problem-solving abilities, and encourage students to ask questions and engage in scientific discussion. Some teachers have suggested that the modules facilitate observation and simple experiments to reinforce science literacy-based learning experiences.

In addition, teachers participating in the survey want e-modules that are visually appealing, concise but comprehensive, and easy to understand. These expectations reflect not only the needs of teachers, but also the real experiences of students in the learning process. For example, teachers' desire for e-modules to be equipped with visual illustrations and interactive media stems from the fact that students often have difficulty understanding abstract concepts in explanatory texts when they are only presented in the form of long texts. Similarly, the demand for offline accessibility reflects the conditions of vocational school students who often have limited internet quotas and networks.

Teachers' expectations for clear assessment rubrics also indicate that students often feel confused about the standards for successful explanatory writing. Thus, the needs of teachers and students are interrelated: teachers articulate pedagogical needs, while students are the ones who directly feel the urgency of having e-modules that are systematic, accessible, and relevant to their context. These findings align with Sari et al. (2020) and Sriwahyuni & Eliza (2024) research, which confirms that interactive digital teaching materials can increase student engagement while facilitating a deeper understanding of writing skills.

In integrating science literacy, teachers emphasize the importance of teaching materials that connect language themes with real scientific or social issues. For example, when assigned to write an explanatory text, students may be asked to write about acid rain formation, waste recycling processes, or phenomena related to climate change, which not only practices their writing skills but also enhances their understanding of scientific principles. This learning strategy encourages student engagement with scientific concepts, promotes critical evaluation of information, and facilitates restructuring that information into coherent and logically structured texts. These findings are in line with previous studies conducted by Yusnaeni et al. (2024) and Heryani et al. (2024), which shows that integrating scientific literacy into language learning can increase students' active engagement, critical thinking, and ability to organize ideas systematically in writing. Thus, language learning does not stand alone but serves as a means of strengthening cross-disciplinary literacy.

This expectation is in line with the findings of Nurhaq et al. (2025) who concluded that teachers' primary needs in the learning process include the development of various learning resources, such as textbooks, enrichment books, and exercise books; the preparation of structured lesson plans; the development of accurate assessments in measure student abilities; and improving teacher competence through training to teach skills more effectively. Respondents also wanted recommendations for varied media and visual support, such as relevant images and videos, to stimulate students' critical thinking skills.

Overall, the teachers' expectations of the e-module development were positive and constructive. They considered that e-modules made by considering the development of science, the needs of teachers and students, and science-based learning approaches can be an innovative learning solution. The accuracy of the selection of teaching materials will help achieve learning objectives (Asnawi et al., 2023). The teachers hope that this kind of module can be developed and disseminated so that there are more quality references for learning Indonesian writing. They also hope that the development of e-modules continues by trying new things so that the benefits can be widely felt in the world of education.

4. Conclusion

This preliminary research shows that the practice of learning to write explanatory texts in vocational schools still faces various challenges. One of the main problems teachers faces is the limited teaching materials relevant to the context of students' lives and the needs of the times. Most teachers still rely on textbooks and have not optimally utilized other sources that are more current and contextual. In addition, the learning strategies teachers use tend to be conventional, so the integration of science literacy content and the use of interactive digital media have not been implemented systematically. These findings reflect the need for a more innovative and contextualized approach to learning writing, primarily through strengthening content and teaching strategies.

Furthermore, the questionnaire results also show the urgent need for teachers to teach materials integrated with science literacy. As many as 83% of teachers stated that they had never integrated science literacy into writing learning, but all respondents expressed interest in using e-modules based on science literacy. Teachers expect the presence of e-modules that contain concise materials, actual text examples, systematic assessment rubrics, and interesting supporting media such as audio and video. This expectation confirms the urgency of developing science literacy-based writing e-modules to solve classroom learning challenges and foster students' critical thinking, information literacy, and writing skills that are more contextual and meaningful.

However, this study has limitations. First, the data obtained is still limited to questionnaire responses, so it does not fully reflect classroom learning practices. Second, the relatively small number of respondents and the fact that they only come from a few vocational schools limit the generalization of the findings to a broader context. Thus, the results of this study are best understood as an initial overview that needs to be explored further through follow-up studies.

For this reason, it is recommended that subsequent research empirically develop and test science literacy-based e-modules in the context of writing instruction through experimental approaches to assess their effectiveness and qualitative studies to explore the experiences of teachers and students in greater depth. The pedagogical implications of this study emphasize the need for policy support and teacher training programs to enable the integration of science literacy into language teaching. The development of science literacy-based modules is not only seen as an innovation in materials but also as a pedagogical shift that enables writing instruction to go beyond language conventions and empowers students to engage with real-world issues, thereby supporting more holistic, contextual, and relevant learning in line with 21st-century competency requirements.

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