Research article

Multi-dimensional challenges in the Indonesian social science information technology-based learning: A systematic literature review

Rasimin [a], Andi Bahtiar Semma [b,*], Zakiyuddin [c], Mukti Ali [d], Muhammad Irfan Helmy [e]

[a] *Magister Pendidikan Guru Madrasah Ibtidaiyah, Pascasarjana, Universitas Islam Negeri Salatiga, Indonesia*
[b] *Teknologi Informasi, Fakultas Dakwah, Universitas Islam Negeri Salatiga, Indonesia*
[c] *Doktoral Pendidikan Agama Islam, Pascasarjana, Universitas Islam Negeri Salatiga, Indonesia*
[d] *Komunikasi dan Penyiaran Islam, Fakultas Dakwah, Universitas Islam Negeri Salatiga, Indonesia*
[e] *Ilmu Hadis, Fakultas Ushuluddin Adab dan Humaniora, Universitas Islam Negeri Salatiga, Indonesia*

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ABSTRACT

The development of information technology (IT) has an essential role in education today. Most teachers in Indonesia utilize the traditional method rather than the advancement of IT. Through digital media, the social science learning process becomes fascinating, improves students' skills, and is more engaging. However, implementing Information Technology-based Learning (ITBL) takes a lot of work. It comes with tremendous challenges that should be addressed carefully. Many previous studies explain the feasibility of the media, its effectiveness, and the advantages of using IT-based learning media. However, they still need to present the challenges in IT-based social science learning, even more so in the Indonesian context. Given the vast landscape of ITBL in Indonesia, a case study approach could entail extensive fieldwork, data collection, and data analysis. Therefore, A literature review can be carried out with less resource investment, making it a pragmatic choice for researchers with limited time and resources. This research aims to discover the challenges of students, teachers, and educational institutions in IT-based social science learning in the Indonesian context. The search protocol is based on the P.R.I.S.M.A. (Preferred Reporting Items for Systematic Reviews and Meta-analysis). This systematic literature review results were obtained from 315 articles discussing the challenges of IT-based social science learning published from 2018 until 2022. This research reveals that most challenges students face are internal/self-challenges. For instance, there needs to be more self-regulation and necessary digital literation. On the other hand, teachers' most significant challenge is their lack of skills and experience in implementing IT-based learning media and their inability to operate complex software, even if they have poor digital literacy. The need for facilities and technological training presents challenges for institutions. The need to procure IT infrastructure is due to the difficulty of reaching certain areas (the terrain) in Indonesia. The challenges encountered by students, teachers, and educational institutions are not exclusive to any particular group and extend beyond their respective domains. Addressing the multi-dimensional challenges would be more efficient. The poor digital literacy challenges occurred in other nations, too. This particular

* Corresponding author.
    E-mail address: andisemma@uinsalatiga.ac.id (A.B. Semma).

challenge can be solved through instructional training. Moreover, the Indonesian government offers numerous free digital training programs for individuals or institutions called "Digitalent."

1. Introduction

The development of information technology (IT) has an essential role in education today [1–3]. Educational activities require systematic preparation and focus on process innovation [4,5]. Teachers need to develop digital skills in facing the challenges of evolving technology information to support the educational process teaching and learning process [6–9]. The problem is that many teachers use the teacher-centered teaching method in social science learning [10–12]. They utilize the traditional way rather than using the advancement of IT.

The teacher asks students to remember facts or concepts rather than discuss or work with others during social science learning [13, 14]. The level of difficulty of students in understanding social science material is relatively high due to no concrete examples provided by the teacher [15], even though teachers are expected to apply students centered learning strategies and integration of IT learning to build independent learners [14,16,17]. Mobile learning is one of the innovations and solutions supporting IT-based learning [18,19]. Learning media, such as stop motion video and e-learning, can improve students' abilities and skills [20–22]. These learning media are expected to support the learning process [23]. Before this study, we surveyed 257 teachers who took the teachers' certification program at our University. The survey showed that 88.3% (n = 227) of respondents believed that social science subjects need more attention on IT involvement than science subjects.

The utilization of IT in education is believed to be one effective solution [24]. Through digital media, the social science learning process becomes fascinating, improves students' skills, and is more engaging. Social science education in Indonesia is unique. It plots three main subjects (History, Economics, and Geography) as integrative material. However, previous studies [21,23,25–27] only explain the feasibility of the media, the effectiveness, and the advantages of using IT-based learning media and have not explained what are challenges in IT-based social science learning, even more in the Indonesian context. However, implementing Information Technology-based Learning (ITBL) is difficult. It comes with tremendous challenges that should be addressed carefully.

Given the vast landscape of ITBL in Indonesia, a case study approach could entail extensive fieldwork, data collection, and analysis. Therefore, A literature review can be carried out with less resource investment, making it a pragmatic choice for researchers with limited time and resources. This research was conducted to answer three research questions: RQ1 - "What challenges are students facing in implementing IT-based social science learning in Indonesia?"; RQ2 - "What challenges are teachers facing in implementing IT-based social science learning in Indonesia?"; and RQ3 - "What challenges are educational institutions facing in implementing IT-based social science learning in Indonesia?". To answer these study questions, we explored the recent literature as the primary source in answering these research questions.

The study systematically identifies and analyzes the challenges students, teachers, and institutions face in implementing IT-based social science learning. This comprehensive understanding is crucial for developing practical solutions and strategies to overcome these barriers. The findings can inform policymakers and educational institutions in developing data-driven strategies for integrating IT into social science learning, such as allocating resources for infrastructure, providing digital literacy training programs, or designing professional development for teachers. The study also focuses on the Indonesian context, considering unique factors like geographic terrain and government initiatives. The study provides a strong foundation for further research on effective interventions, assessing the impact of implemented solutions, and evaluating the progress of IT-based social science learning in Indonesia.

This study is structured into four main sections. The second section is the methodology, which describes the research questions of this study, the literature search process, and the study selection process. The third section is the results, which present the findings, categorizations, and analysis of results. Finally, the discussion, limitations, and conclusion sections discuss the findings, implications, and research gaps and offer critical recommendations for future research.

2. Method

This study employed a grounded theory for review [28] as a basis of the entire review process and followed an established process [29,30] to analyze quantitative data. The review process consists of five main steps:

1. DEFINE
a. Define inclusion and exclusion criteria
b. Specify the social science IT-based learning field as the focus
c. Determine Web of Science (WoS), Scopus, Emerald, Taylor and Francis, Garuda, OneSearch, and Google Scholar as Main Databases/search engine
d. Decided that "IT enhanced social science learning," "Social Science Learning," "Social Science Learning Media," OR "Interactive Learning Media" as our search terms
2. SEARCH
3. SELECT
a. Filter out of doubles
b. Refine sample based on title and Abstract

Table 1
Inclusion and Exclusion criteria.

No	Inclusion Criteria	Exclusion Criteria
1	Empirical Study	Non Empirical study (a Review)
2	Published from 2018 to 2022	Published before 2018
3	Social Science subject	Non-Social Science subject
4	Implementation/Development of IT-based learning media	No IT involvement study
5	Implementation/Development of IT-based Online learning	Non-English/Indonesian articles
6	Explicitly mention the challenges/difficulties	Incomplete or unavailable full-text articles
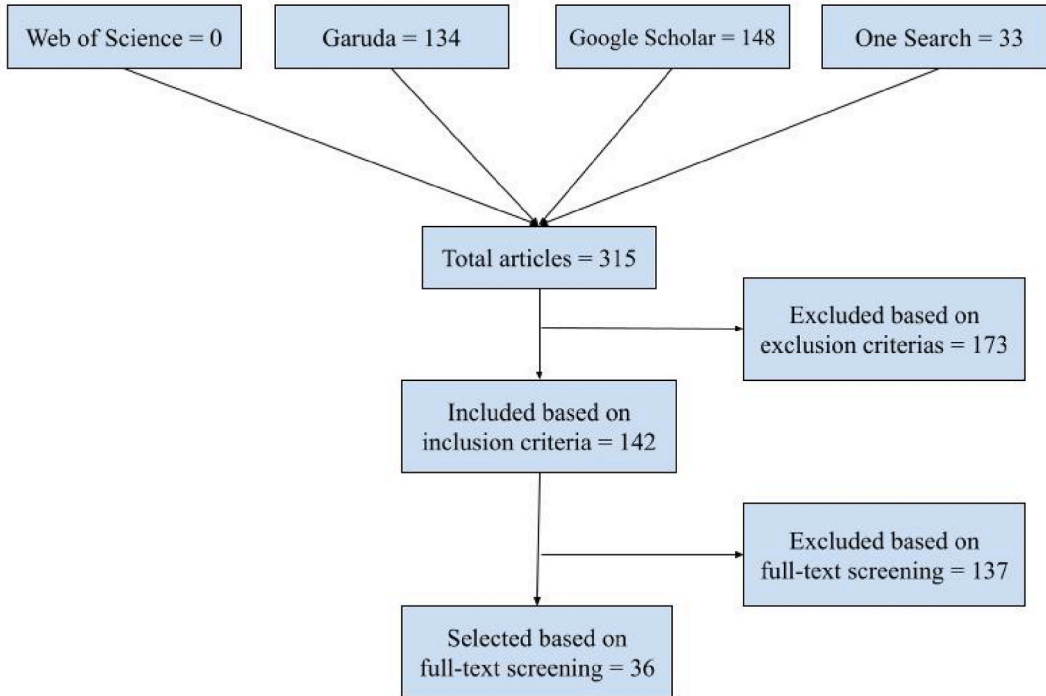
Fig. 1. Literature search process.

c. Refine sample based on Fulltext
d. Discuss the criteria and reasons for the final selection
4. ANALYZE
a. Open Coding
b. Axial Coding
c. Selective Coding
5. PRESENT
a. Represent and structure the content

2.1. Literature search process

The literature search is done through the Web of Science (WoS), Scopus, Emerald, and Taylor and Francis databases. However, we found no empirical studies of IT-based social science learning media implementation within the Indonesian context. Consequently, we chose the Indonesian database (Garuda and One Search) and Google Scholar to get empirical studies on implementing IT-based social science learning without any search restriction. We formulated a search string based on our understanding and knowledge of IT-based social science learning. The keywords were "IT enhanced social science learning," "Social Science Learning," "Social Science Learning Media," OR "Interactive Learning Media". As the social science learning media challenges research area has been very active over the years and has yielded many publications due to its popularity, we mainly focused our research on considering studies from 2018 to 2022.

Nevertheless, we have also referenced and cited numerous other influential studies related to our study to support and provide basis

and evidence in answering our research questions. A total of 134 results from Garuda were finally taken. Furthermore, we added additional literature obtained from other sources (Google Scholar and One Search), and a total of 181 search results were finally retrieved to ensure that all literature studies were relevant to answer the questions in this study. This study only considers the most recent literature to avoid the risk of identifying challenges or technologies that need to be more relevant and updated.

2.2. Eligibility criteria

The inclusion criteria include an empirical study based on real-world data published between 2018 and 2022, focusing on social science subjects, IT-based learning media, and IT-based online learning. The study must explicitly mention challenges faced in IT-based social science learning. Exclusion criteria include non-empirical studies, older studies published before 2018, non-social science subjects, no IT involvement studies, non-English/Indonesian articles, and incomplete or unavailable full-text articles. Detailed inclussion and exclussion criteria is shown in Table 1. The review process involves two researchers per article for a thorough evaluation and manual identification of articles. The study should be relevant to IT use in education and include online learning platforms alongside other IT-based media. The study should also explicitly mention the challenges faced in IT-based social science learning. The review process ensures a reliable evaluation of each study.

After considering the articles based on the inclusion and exclusion criteria, 34 studies were obtained. Those articles contain titles, abstracts, and full text. This study only considers the challenges reported by empirical studies. Fig. 1 provides an overview of our search protocol based on the P.R.I.S.M.A. (Preferred Reporting Items for Systematic Reviews and Meta-Analysis) recommendation statement [31,32].

3. Results and discussion

The challenges that students, teachers, and educational institutions encounter in Indonesian social science information technology-based learning are presented in this section, which addresses the study's research questions. The section also examines the connections or relationships between the identified challenges, their potential causes or origins, and the various strategies to resolve them. The results obtained are used to answer research questions. Furthermore, the articles are grouped into two categories. The challenges students face in IT-based social science learning are grouped into two categories (internal and external difficulties).

3.1. Characterization of the result

The study's results were categorized into three main groups, specifically, RQ1 - challenges faced by students, RQ2 - challenges faced by teachers, and RQ3 - challenges faced by educational institutions. The challenges identified in RQ1 were classified into two categories, while those in RQ2 were classified into three. Furthermore, two classes were identified for the difficulties in RQ3. To ensure that the study's findings were accurately represented, the inductive categories of the results were examined, and an inductive code was developed for each category. Despite some studies identifying multiple challenges, particular challenges were found to belong to more than one inductive category.

Consequently, such challenges were incorporated into each corresponding category. The study's findings underwent further refinement to ensure distinct and unambiguous identification of challenges. This process aimed to eliminate confusion or overlap between categories and produce clear and concise findings. The results of RQ1, which investigated students' challenges, revealed two inductive categories: internal and external. The study ensured that each identified challenge was distinct and unambiguous. The first category, internal challenges (IC; n = 6), identified six challenges related to students' behavior that hindered their ability to self-regulate when studying. The challenges included various factors, such as time management issues, procrastination, and lack of motivation, that affected students' ability to engage effectively in their studies.

The second category, external challenges (TLCC; n = 3), identified three challenges related to students' access to technological facilities required for studying. These challenges included limited internet connectivity, access to IT facilities, and insufficient technical support. Overall, the findings from RQ1 provide insight into the challenges that students face while studying, which can help educators and institutions design effective interventions to address these challenges and improve student success.

The results of RQ2, which investigated challenges faced by teachers, revealed three inductive categories: 21st-century challenges, poor training challenges, and technological complexity challenges. The number of challenges in each category is denoted by 'n.' The first category, 21st-century challenges (TCC; n = 7), identified seven challenges related to teachers' technical limitations in effectively using digital tools and resources. These challenges included difficulties adapting to new technologies, limited familiarity with technological advancements, and a lack of technical skills to navigate digital tools.

The second category, poor training challenges (PTC; n = 6), identified six challenges related to inadequate training provided to teachers in digital literacy. These challenges included limited access to professional development opportunities, insufficient guidance on using digital tools effectively, and a lack of training in pedagogical practices that integrate technology. The third category, technological complexity challenges (TCC; n = 6), identified six challenges related to the complexity of educational software and tools. These challenges included integrating different software, dealing with bugs and errors, and managing large volumes of digital data. Overall, the findings from RQ2 provide insights into the challenges teachers face in utilizing digital tools effectively and highlight the need for institutions to provide adequate training and support to overcome these challenges.

The findings of RQ3, which examined challenges faced by educational institutions, identified two inductive categories: provision of technological infrastructure and practical training for teachers challenges. The number of challenges in each category is denoted by 'n.'

Table 2

Students' challenges in social science learning.

Category	Sub Categories	Article
Internal challenges	Students lack confidence.	[33–38],
	Misuse of IT tools.	
	Students prefer online games.	
External challenges	Poor facilities and infrastructure.	[39–41],
	Difficulty with network or signal.	
	Insufficient access to IT-based media.	

Table 3

Teachers' challenges in social science learning.

Category	Sub Categories	Article
21st Century Challenges	Not be able to adapt to the rapid development of educational technologies.	[42–48]
	Difficulty applying IT in the learning process.	
	Lack of digital literation.	
	Do not want to use digital learning media.	
Self-challenge	Difficulty operating educational software.	[34,49–53]
	There is no IT-based learning media development training.	
	Age factor.	
	Additional task overload.	
Technological complexity	Technical difficulties in using IT-based media.	[49,54–58]
	Software complexity.	

The first category, provision of technological infrastructure (PTIC; n = 5), identified five challenges related to educational institutions' difficulty providing the technical support and services required for IT-based social science learning. These challenges included issues with limited financial resources, inadequate technical expertise, and problems managing and maintaining digital infrastructure.

The second category, practical training for teachers challenges (ETTC; n = 3), identified three challenges related to providing practical training and technical support to teaching staff. These challenges included difficulties in delivering practical training, limited resources for training and development, and challenges in managing technical support staff. Overall, the findings from RQ3 highlight the challenges that educational institutions face in providing the necessary technological infrastructure and training to support IT-based social science learning. These findings can inform the development of strategies to overcome these challenges and improve the quality of education in these institutions.

3.2. Challenges for students while learning IT-based social science

3.2.1. Internal challenges

The development of IT brings a series of new challenges, especially in social science learning. Most of the challenges faced by students are challenges caused by internal factors. These findings are shown in Table 2. In social science learning, students prefer to play online games rather than learn what the teacher has given through e-modules or other applications. Many students still are not confident in expressing their opinions during social science learning and abuse/misuse of their learning tools.

3.2.2. External challenges

Students also face external challenges, such as poor IT facilities, technological literacy, competencies regarding educational technology utilization, and the complexity of educational technologies. Digital technology supports the student's learning, and many researchers suggest that it is essential to place the students as the center of learning but not the technology. This study result showed that students' challenges come from internal factors. They prefer to play online games rather than learn what the teacher has given them. Many students are still not confident expressing their thoughts during social science learning and abuse/misuse their learning tools. The internet access was misused. Internet access was used to access the site that students desired rather than to access the educational material given by the teacher. The external factors are the poor IT facilities, the study material, which is relatively hard to access, and the poor students' digital literacy and competencies.

3.3. Challenges for teachers while teaching IT-based social science

3.3.1. 21st-century challenges

The challenges of the 21st century are critical in the learning process for teaching success. Some teachers have difficulty making IT-based learning media and operating software. They were not quickly adapted to the advancements in educational technology and poor digital literacy. Consequently, they tend not to use digital learning media. These detailed findings can be seen in Table 3.

Table 4
Educational institutions challenges.

Category	Sub Categories	Article
Challenges of providing IT facilities and training	High cost of IT facilities.	[54,59–62]
	Technological complexity.	
	The application of e-learning according to the needs of students.	
Other Challenges	Lack of teachers' digital literation training.	[63–65]
	Poor technical support staff.	

3.3.2. Self-challenges

The results of this study show that teachers have many difficulties regarding educational technology operations. IT-based social science teaching is a rapidly evolving field, and teachers need to make an effort to stay up-to-date on the latest technologies and tools to provide their students with the best learning experience. This can be difficult, as it requires time and resources that teachers may not always have. Once teachers have learned about new technologies, they must learn how to use them effectively in the classroom. This can be challenging, as it requires technical skills and pedagogical knowledge. It is caused by poor technical training regarding IT-based social science learning media development/implementation. Not all students have equal access to technology, and teachers must be aware of this when designing and implementing IT-based activities. They need to find ways to ensure that all students have the opportunity to learn and succeed, regardless of their access to technology. On the other hand, the age factor and additional task overload cause teachers to prefer traditional teaching (standard lecturing) rather than IT-based social science teaching.

3.3.3. Technological complexity

Educational technologies and tools present a significant challenge for teachers as they often find them complex and difficult to operate and implement. This challenge arises due to poor technical training and digital literacy among teachers. However, the advancement of educational technology can be viewed as an opportunity for enhancing the teaching and learning process. To take advantage of this opportunity, teachers must possess adequate technological and pedagogical skills to integrate technology effectively with traditional face-to-face teaching.

The findings of this study reveal that teachers face numerous challenges in operating complex software and lack essential skills and mastery of information technology. Educational institutions often provide inadequate or no training to teachers, making it necessary for them to learn and master information technology through self-learning. Nevertheless, social science learning requires the integration of technological innovations to enable students to easily understand facts, events, concepts, and generalizations through immersive learning experiences. Training or workshops and supporting facilities are necessary to support the social science learning process [47].

3.4. Challenges for institutions while implementing IT-based social science

3.4.1. Challenges in providing facilities

The development of information technology provides challenges for educational institutions. The result of this study shows that challenges faced by educational institutions mostly come from the provision of facilities. This can be seen in Table 4. The lack of procurement of IT infrastructure is due to the difficulty of reaching certain areas (the terrain) in Indonesia.

3.4.2. Other challenges

The high cost of procuring information technology facilities is challenging for educational institutions. The government allocates only a few funds to procure information technology facilities supporting education. Apart from that, the lack of technicians and teacher training had a significant impact. The learning process eventually returns to the traditional lecturing method. Consequently, teachers prefer not to utilize the facilities provided by educational institutions at all.

The development of information technology impacts not only teachers and students but also educational institutions as education providers. Most of the challenges educational institutions face come from providing facilities that support social science learning in the classroom. Several factors, including 1) the lack of provision of infrastructure) the difficulty of reaching the provision of facilities for specific areas, 2) the high cost of providing facilities that support learning, and 3) the lack of allocation of funds from the government for the procurement of IT-based facilities. In addition, the limited operational and technical staff and the lack of teacher training have resulted in teachers choosing not to utilize the facilities provided by educational institutions.

3.5. Discussion

The integration of information technology (IT) into social science learning offers numerous benefits, including interactive and engaging learning, enhanced information access [66], collaborative learning opportunities [67–69], learn about current events and social issues [70,71], participate in online discussions and simulations [72–74] and the development of digital literacy skills [75]. However, achieving successful integration requires careful consideration of various factors. The digital divide, which affects access to technology and reliable internet connectivity, necessitates infrastructure development and bridging the digital gap. Teachers may require training and support to utilize IT tools effectively and technological challenges can disrupt the learning process. Robust support
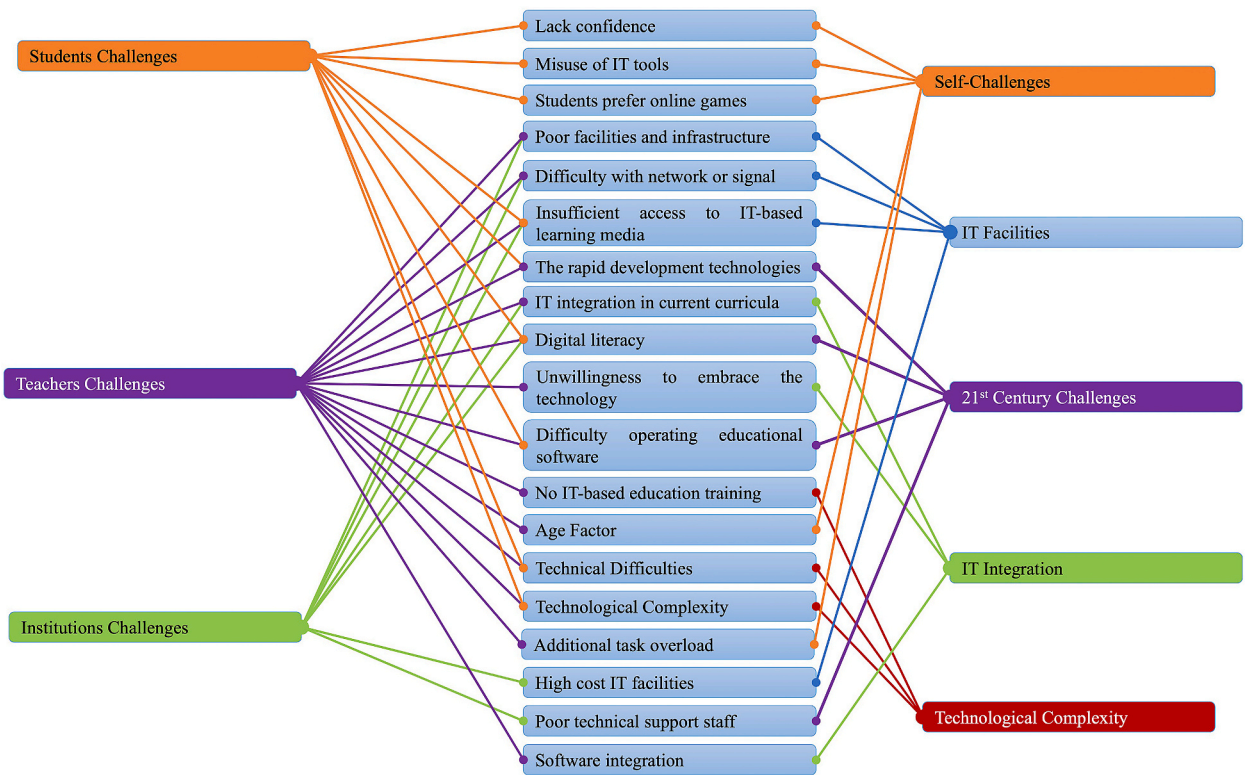
Fig. 2. Taxonomy of challenges in IT-Based social science learning.

systems and troubleshooting skills are crucial. Overreliance on technology should not replace traditional teaching methods. Successful integration strategies include clearly defining learning objectives, selecting appropriate tools, designing active learning experiences, and regularly assessing the effectiveness of IT integration and student learning outcomes. These strategies should encourage active engagement with technology, promote critical thinking, analysis, and collaboration, and adapt and refine strategies based on feedback and data. By addressing these challenges, IT integration can provide students with more profound engagement, increased knowledge retention, and valuable 21st-century skills.

The findings indicate that most challenges students face stem from internal factors, such as a preference for playing online games instead of engaging with e-modules or m-learning. Students' lack of self-regulation hinders their ability to utilize social science learning in the classroom. External factors such as inadequate facilities and infrastructure, challenging access to teacher-provided materials, and insufficient skills in operating information technology-based learning media also present significant student challenges.

In addition, teachers face significant challenges in adapting to new technologies. The study results indicate that most teachers struggle with operating complex software, insufficient technical skills, and a lack of digital literacy. These findings are aligned with previous reviews [76–78] that technology complexity and insufficient technical skill persist. There are a few reasons why technology complexity and teachers' inadequate technical skills problems continue in implementing IT-based learning. Technology is constantly evolving and becoming more complex. This can make it difficult for teachers to keep up with the latest trends and developments.

Some IT-based learning tools can also be complex, even for teachers with some technical skills. This is due to a lack of training or experience [79]. Additionally, some teachers may hesitate to use technology in the classroom because they are uncomfortable with it [79,80]. Educational institutions are responsible for providing teachers with appropriate training, but this study shows that activity in this area is lacking or non-existent. Consequently, teachers must take it upon themselves to become self-taught and gain the necessary technological and pedagogical skills to integrate technology into traditional teaching methods effectively.

The development of information technology impacts not only teachers and students but also educational institutions as education providers. Most of the challenges educational institutions face come from providing facilities that support social science learning in the classroom. Several factors, including 1) the lack of provision of infrastructure, 2) the difficulty of reaching the provision of facilities for specific areas, 3) the high cost of providing facilities that support learning, and 4) the lack of allocation of funds from the government for the procurement of information technology-based facilities. In addition, the limited operational and technical staff and the lack of trained teacher training resulted in teachers choosing not to utilize the facilities provided by educational institutions.

Numerous intervention approaches are utilized to tackle the challenges identified in technology-based learning. As the behavior of teachers and educational institutions varies across different domains, resolving these challenges requires consideration of their multi-dimensional nature. This article serves as a reference for further research, with the expectation that the government will conduct socialization and provide all necessary support before implementing policies in technology-based learning.
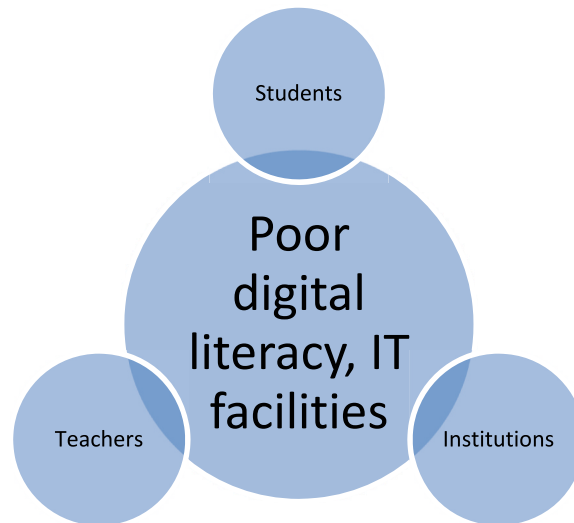
Fig. 3. Multi-dimensional challenges.

The challenges encountered by students (RQ1), teachers (RQ2), and educational institutions (RQ3) are not exclusive to any particular group and extend beyond their respective domains, as illustrated in Fig. 2. For instance, a teacher's inadequate technological literacy and proficiency in using technology for social science instruction is linked to insufficient institutional training support. Similarly, students' ability to self-regulate their conduct and motivation during IT-based learning relies on their institutions' instructional training. When educational institutions fail to provide professional development opportunities for teachers, it affects their ability to promote students' IT-based learning activities and may result in poor self-regulatory behavior. As shown in previous research (Rasheed et al., 2020), these multi-dimensional challenges are not unique to Indonesia. Fig. 3 depicts these challenges.

Parwati et al. [81] has investigated the solution to these challenges, particularly in the subject of Indonesia's history. Their study suggests that addressing multi-dimensional challenges would be more efficient in solving the problem for students, teachers, and educational institutions. Two key obstacles, namely poor digital literacy and inadequate IT facilities, can be solved through instructional training. The Indonesian government offers numerous free digital training programs for individuals or institutions called "Digitalent." In summary, the challenges in technology-based learning require multi-dimensional solutions that involve addressing the needs of students, teachers, and educational institutions.

The government must provide adequate support and conduct socialization before implementing policies in technology-based learning. Resolving the challenges requires addressing poor digital literacy and inadequate IT facilities through instructional training programs like "Digitalent." Besides that, big IT companies like Microsoft and Google also offer instructional training and premium accounts for their particular service, such as Microsoft 365, for free. When teachers get proper training, they will teach their skills to their students, and when students' digital literacy is improved, students' self-regulation will also be improved. We believe that this solution may have a tremendous positive impact on Indonesian social science IT-based learning.

4. Conclusion

This paper provides a comprehensive literature review to recognize the difficulties associated with IT-based social science education as perceived by students, educators, and academic institutions. The study results indicate that students' internal factors, such as self-regulation, pose the most significant challenges, while teachers struggle with operating complex software and lack digital literacy. Educational institutions face challenges in providing facilities supporting social science learning, limited operational and technical staff, and inadequate teacher training. Multi-dimensional challenges, namely poor digital literation and IT facilities, should be addressed as a priority, especially the poor digital literacy challenge, because it is the easiest to solve.

Technological training is a straightforward and cost-effective solution to solve the challenge of poor digital literacy among teachers and students. The Indonesian government provides many free digital training programs for individuals or institutions, and big IT companies like Microsoft and Google offer instructional training and premium accounts for their services for free. Proper training can improve teachers' skills and enable them to teach their students, ultimately improving students' digital literacy and self-regulation.

This study is a starting point for future research on Indonesia's IT-based social science learning challenges. The study's limitations include its focus on challenges related to IT-based learning media and its empirical study conducted mainly in a state school. Future research should focus on specific challenges and identify the most effective and efficient solutions. Even though this study is based on a social science study, we have a hypothesis that the obstacles found in this study are not only applicable to social science subjects.

Data availability

Data is available in public repository here.

CRediT authorship contribution statement

Rasimin: Validation, Supervision, Funding acquisition, Formal analysis, Data curation, Conceptualization, Validation, Supervision, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Andi Bahtiar Semma:** Writing – original draft, Software, Project administration, Methodology, Investigation, Data curation, Conceptualization. **Zakiyuddin:** Writing – review & editing, Supervision, Methodology, Writing – review & editing, Supervision, Methodology. **Mukti Ali:** Writing – review & editing, Supervision. **Muhammad Irfan Helmy:** Writing – review & editing, Supervision, Methodology.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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