

Where and How Can Knowledge Be Acquired? A Qualitative Analysis of Open-Ended Questionnaires

Ismu Sukamto

Pendidikan Guru Sekolah Dasar, Universitas Lampung

E-mail: ismu.sukamto1101@fkip.unila.ac.id

Article Info

Received: 11-03-2026
Revision: 18-03-2026
Published: 01-06-2026

Keywords:

Epistemic beliefs,
elementary school
teacher, open-ended
questionnaire

Abstract

To address the global threat of fake news in the digital era, individuals must understand knowledge and how it is created (epistemic beliefs) to avoid falling for false information. Education is where students spend most of their time daily. Therefore, it is essential to begin investigating teachers' epistemic beliefs as designers of learning. The purpose of this research is to explore teachers' perceptions of knowledge and how it is acquired. Data collection employed an open-ended questionnaire. Inductive thematic analysis was applied to identify concepts and patterns of meaning in the data. The 15-point checklist from Braun and Clarke was used to ensure the quality of qualitative data analysis. Based on the research findings, there are five criteria that teachers believe to be sources of knowledge, namely: subject, environment, object, activity, and process, with subject and object being the most dominant. Furthermore, there are four criteria that teachers believe to be methods of acquiring knowledge: independent learning, learning with others, by providing treatment, and using learning activities. These findings offer potential sources and methods of knowledge acquisition that can be accommodated by teachers to deliver holistic learning experiences.

Abstrak: Untuk mengatasi ancaman global penyebaran berita palsu (fake news) di era digital, individu perlu memiliki pemahaman yang baik mengenai hakikat pengetahuan dan bagaimana pengetahuan tersebut dibentuk (epistemic beliefs), sehingga tidak mudah terpengaruh oleh informasi yang keliru. Pendidikan merupakan lingkungan tempat peserta didik menghabiskan sebagian besar waktu mereka setiap hari. Oleh karena itu, penting untuk mulai mengkaji keyakinan epistemik guru sebagai perancang pembelajaran. Penelitian ini bertujuan untuk mengeksplorasi persepsi guru mengenai hakikat pengetahuan dan cara pengetahuan diperoleh. Pengumpulan data dilakukan menggunakan kuesioner terbuka (open-ended questionnaire). Analisis tematik induktif diterapkan untuk mengidentifikasi konsep serta pola-pola makna yang muncul dari data. Kualitas analisis data kualitatif dijamin dengan menggunakan daftar periksa (15-point checklist) yang dikembangkan oleh Braun dan Clarke. Hasil penelitian menunjukkan bahwa terdapat lima kriteria yang diyakini guru sebagai sumber pengetahuan, yaitu subjek, lingkungan, objek, aktivitas, dan proses, dengan subjek dan objek sebagai sumber yang paling dominan. Selain itu, terdapat empat kriteria yang diyakini guru sebagai cara memperoleh pengetahuan, yaitu belajar secara mandiri, belajar bersama orang lain, melalui pemberian perlakuan, dan melalui aktivitas pembelajaran. Temuan ini memberikan gambaran mengenai berbagai sumber dan cara memperoleh pengetahuan yang dapat diakomodasi oleh guru untuk menghadirkan pengalaman belajar yang lebih holistik.

Kata Kunci: Keyakinan epistemik, guru sekolah dasar, kuesioner terbuka

©2026 Jurusan Ilmu Pendidikan, FKIP Universitas Lampung

INTRODUCTION

Digitalization has facilitated the widespread dissemination of information, including misinformation and disinformation. To address the global threat of fake news, individuals require the ability to critically evaluate and assess information, a crucial skill for advancing progress (Serrano et al., 2023). However, this ability alone is insufficient given the rising prevalence of misinformation as a consequence of rapid developments in ICT. Individuals must understand knowledge and how it is created (epistemic beliefs) to avoid falling victim to fake news (Rudloff & Appel, 2022). This understanding enables them to critically explore and embrace scientific discoveries while others remain focused on addressing global crises.

This is where education plays a crucial role in broadening the scope of abilities—not only the skills to critically evaluate the quality of scientific information but also the psychology of persuasion to effectively communicate scientific truths to the general public (Lima & Nascimento, 2022). It is, therefore, unsurprising that epistemic beliefs are regarded as a normative goal of education in many countries worldwide, even for elementary school-aged children (Schiefer et al., 2020). Numerous studies on students' epistemic beliefs have been conducted, with findings indicating that epistemic beliefs influence academic achievement (Greene et al., 2018; Kivimäki, 2023; Mason et al., 2013), motivation (Winberg et al., 2019), critical thinking (Rott, 2021), reasoning (Krist et al., 2019; Yang et al., 2019), problem-solving (Lindfors et al., 2019), strategy use (Madjar et al., 2017), and epistemic curiosity (Schiefer et al., 2020). They enhance the quality of arguments and learning processes (Rohayati et al., 2023) and, more specifically, Internet-based epistemic beliefs play a significant role in online collaborative learning processes (Liang et al., 2023), impacting self-regulated learning and the community of inquiry (Lan & Huang, 2023).

On the other hand, relatively little research has been directed toward teachers as designers of classroom learning. In fact, teachers, as initiators of the learning process, must facilitate a learning environment where they are transparent about the controversies and uncertainties that arise in the construction of concepts and provide frameworks for students to evaluate the validity of the information presented (Lima & Nascimento, 2022). Teachers need to approach problems comprehensively to integrate alternative perspectives offered by their students (Hadianto et al., 2022; Lee-Hammond & McConney, 2017). By doing so, teachers can facilitate conceptual change and the enhancement of students' epistemic beliefs as part of the discussion outcomes (Cobern et al., 2022), thereby creating opportunities for a broader understanding of theories or concepts and enabling students to engage with other relevant variables more effectively (Lin & Tsai, 2017).

One study on teacher discourse from an epistemic perspective was conducted by Zhai and Yan (2022), whose findings revealed the insufficiency of teachers' epistemic competence in enhancing students' epistemic cognition. This lack of epistemic competence may stem from inadequate epistemic beliefs held by teachers. Therefore, in-depth research focusing specifically on

teachers' epistemic beliefs within the context of learning is necessary. Analyzing teachers' epistemic beliefs will provide insights into the condition of human resources in schools. If weaknesses are identified, appropriate follow-up plans can be implemented promptly to prevent them from negatively impacting student learning.

This study is set in the context of elementary school teachers in Indonesia, who serve as key contributors to the students' first formal educational experience, where their epistemic beliefs form the foundation of the learning process. Epistemic beliefs are specifically defined as individuals' beliefs about how knowing occurs, what is considered knowledge and where it resides, and how knowledge is constructed and evaluated (Liang et al., 2023). Teachers can use these beliefs as scaffolding to encourage students' critical attitudes toward issues or materials, which may lead to conceptual shifts toward more comprehensive understandings (Ford, 2012). However, merely considering the criteria of scientific argumentation might not be sufficient to enhance the quality of learning (McNeill et al., 2018).

This underscores that such beliefs can foster more effective teaching and assessment practices, better aligned with promoting meaningful learning among the next generation of learners (Yough et al., 2023). Given the significance of these epistemic beliefs, the central question is how elementary school teachers perceive knowledge and its acquisition. Therefore, this study specifically focuses on the epistemic beliefs of elementary school teachers in Indonesia, which influence how they prepare for and conduct classroom learning. The aim is to explore teachers' perceptions of knowledge and how it is acquired.

METODE

Research Design

A qualitative exploratory study (Sizoo et al., 2020) was conducted to identify the epistemic beliefs of our research participants who are undergoing teacher professional education training. Our approach to data collection and analysis is based on the definition of epistemic beliefs by Hofer and Pintrich (1997), which posits that the epistemic belief framework comprises a system of four dimensions—two concerning the nature of knowledge (what is believed to constitute knowledge) and two regarding the nature of knowing (how one comes to know).

We employed an open-ended questionnaire as the data collection method because it enables a more complex and contextual understanding of subjective experiences (Bismark et al., 2022). The author designed the open-ended questions to elicit descriptions and insights from the participants (Braun & Clarke, 2006). The coding approach implemented by the author involved organizing data based on transcripts of participants' open-ended responses, identifying common language for coding, and noting significant areas within each transcript. Based on transcript analysis, themes were identified and

served as guidelines for presenting participants' perspectives in a manner that can be translated into practices for other higher education professionals.

Participant Recruitment

To ensure that the research participants understood epistemic beliefs within the context of learning practices in elementary schools, we applied the following inclusion criteria. Participants needed to

- a. Elementary school teachers.
- b. Currently undergoing teacher professional education training.

The author communicated directly via WhatsApp Group with the participants due to their role as administrators and students in the Teacher Professional Education Program offered at a public university in Lampung Province. Participants were not provided with any incentives to take part in this study. Participation in this research was voluntary.

Open-Ended Questionnaire

Considering that epistemic beliefs refer to individuals' beliefs about the concept of knowledge (Rohayati et al., 2023; Rudloff et al., 2023), the author chose to use an open-ended questionnaire to capture the descriptions and understandings of our research participants. The author referred to the open-ended questionnaire used by Sizoo et al. (2020), which explored the dilemmas experienced by elderly care physicians (ECPs) as a result of the COVID-19-driven restrictive visiting policy.

The open-ended questionnaire consisted of two questions. The first question was: "Where does the knowledge acquired by the students come from?" The second question was: "How do students acquire knowledge?" Both questions pertain to two dimensions of the nature of knowing, namely: the source of knowledge and the justification for knowing (Hofer & Pintrich, 1997). These two questions were open-ended, allowing participants to answer freely according to their understanding.

Data collection took place from March 16 to March 22, 2023. Participants were invited to join the study through a WhatsApp Group. By opening the provided link, they were able to access the questionnaire presented via Google Forms. At the beginning of the form, participants received a message about the purpose of the study. Participants were not required to provide their names but were asked to fill out information regarding the district of their school, the province of their school, the school's status, the area's status, gender, years of teaching experience, the grade they teach, and their employment status before answering the research questions. All participants were assured that the questionnaire was anonymous, their answers would be treated confidentially, used solely for research purposes, and not shared with third parties.

Analysis

Inductive thematic analysis was applied to identify concepts and patterns of meaning in the data, which included the following steps: 1) Familiarizing with the data; 2) Inductive thematic coding; 3) Searching for themes; 4) Reviewing themes; 5) Finalizing themes (Braun & Clarke, 2006). In line with the meaning of epistemic beliefs and the two questions in the open-ended questionnaire, the findings were grouped into two sections: 1) Sources of knowledge; and 2) Ways of acquiring knowledge. The coding of participants' responses to the first question was independently performed by the first and fourth authors, while the coding of responses to the second question was independently carried out by the fifth and sixth authors. The results of these four independent codings were then combined into a single codebook, organized according to the question groups. The codebook was used to code the remaining questionnaire data. Any changes to the codebook (such as renaming or adding new codes) were made through consensus among the four researchers during research meetings (the first, fourth, fifth, and sixth authors). The tenth, seventh, and eighth authors validated the coding by checking for inconsistencies to ensure that no relevant information was overlooked.

Next, we grouped codes with identical content and meaning into categories. During the data analysis process, we categorized the data based on these codes while discussing potential categories. We identified 4 potential categories in the "source of knowledge" subsection and 16 potential categories in the "justification for knowing" subsection, which we compared with the data to ensure their relevance.

For instance, in the "source of knowledge" subsection, we developed categories for "subject," "environment," "object," and "experience." However, after reviewing the quotes, we decided that the "experience" category should be split into two categories: "activity" and "process." Ultimately, we concluded that the 5 categories in the "source of knowledge" subsection and the 4 potential categories in the "justification for knowing" subsection reflected the common ideas shared by participants and were meaningful in relation to our research questions. These nine categories became our themes.

Regular meetings among the researchers involved in the coding process allowed for frequent reflection on the data analysis, including the organization of codes into themes and the evolution of the identified themes. The questionnaire data were analyzed using Microsoft Word and Microsoft Excel. In the concluding phase, the second and third authors critically assessed the draft article to provide final approval for the version intended for submission.

Trustworthiness

In qualitative research, trustworthiness requires us to maintain the validity of the data (Jones et al., 2013). In line with Sizoo et al. (2020), we applied an iterative approach (i.e., a back-and-forth process between the data, codes, and themes) followed at various steps to ensure systematic analysis.

Additionally, we applied Braun and Clarke's 15-point checklist to maintain the quality of the qualitative data analysis (Braun & Clarke, 2006). This checklist refers to five aspects of the thematic analysis process: 1) Transcription (1 point); 2) Coding (5 points); 3) Analysis (4 points); 4) Overall (1 point); and 5) Written Report (4 points).

The author is confident that our study will be meaningful and trustworthy for practitioners and policymakers in elementary education who are involved in the development of learning design. The author has documented our investigation process and the methods we used to collect and analyze data. The author has limited our findings to the data we collected and analyzed.

Limitations

This qualitative study does have some limitations. First, the participants were primarily from Lampung, and the local culture may influence their understanding of epistemic beliefs, so caution should be exercised when generalizing the findings. Second, participants were recruited through convenience sampling, which means the scope of participants was limited to individuals who had an established relationship with us. Therefore, we may not have captured the full range of perspectives from teachers in the research area. Lastly, the identities of the first, ninth, and tenth authors as lecturers and class administrators likely influenced the responses of participants during the questionnaire process.

RESULT AND DISCUSSION

The questionnaire was sent to all active students in the Elementary School Teacher Education Program, and 401 responses were returned anonymously (see Table 1 for participant characteristics). The thematic analysis of the open-ended questions revealed 5 main themes related to the source of knowledge (see Table 2) and 4 themes related to justification for knowing (see Table 3). Next, we identified the source of knowledge and justification for knowing as expressed by the participants.

Table 1. Participant characteristics

Characteristics	Participants	
	N (N _{total} = 401)	%
<i>Province/Country</i>		
Bali	1	0,25
Banten	6	1,50
Special Region of Jakarta	4	1,00
West Java	75	18,70
Central Java	4	1,00
East Java	8	2,00
North Kalimantan	1	0,25
Lampung	259	64,59
Kingdom of Saudi Arabia	1	0,25
Maluku Utara	1	0,25
East Nusa Tenggara	4	1,00

South Sulawesi	6	1,50
Central Sulawesi	2	0,50
North Sulawesi	2	0,50
West Sumatera	7	1,75
South Sumatera	19	4,74
North Sumatera	1	0,25
<i>School Status</i>		
Public	373	93,02
Private	28	6,98
<i>Area Status</i>		
Urban Areas	254	63,34
3T Regions (Remote, Outermost, Underdeveloped Areas)	147	36,66
<i>Gender</i>		
Male	93	23,19
Female	308	76,81
<i>Teaching Experience</i>		
0 – 5 years	30	7,48
6 – 10 years	88	21,95
11 – 15 years	153	38,15
16 – 20 years	104	25,94
21 – 25 years	15	3,74
26 – 30 years	6	1,50
More than 30 years	5	1,25
<i>Teaching for</i>		
Grade 1	55	13,72
Grade 2	33	8,23
Grade 3	36	8,98
Grade 4	67	16,71
Grade 5	96	23,94
Grade 6	114	28,43
<i>Employment Status</i>		
Civil Servant	323	80,55
Non-Civil Servant	78	19,45

Result

Source of Knowledge

Table 2 presents various excerpts from elementary school teachers that illustrate key themes in their epistemic beliefs about sources of knowledge for students. The main themes include subjects, environments, objects, activities, and processes. These findings reflect teachers' beliefs that knowledge can be acquired from diverse sources and processes, involving individuals, the environment, learning objects, activities undertaken, and everyday

experiences. This belief underscores a holistic approach to supporting students' cognitive development.

Table 2. Quotations of elementary school teachers illustrating the emerging themes

I. Subjects
1. "Students acquire knowledge from teachers , the school environment, home, and the community, their parents , and possibly from their smartphones." (Source: P384)
2. "From books, electronic media, and expert informants ." (Source: P287)
II. Environments
3. "From the family environment, school, and community ." (Source: P161)
III. Objects
4. "From various teaching resources, including books , teachers, nature and the surrounding environment , as well as the internet." (Source: P354)
5. "Students acquire knowledge from various sources, namely: first, from within their own family; second, from teachers at school who provide knowledge from various sources, such as textbooks, media and teaching aids, reference books that support learning, as well as the internet and the local environment ." (Source: P401)
IV. Activities
6. "Students acquire knowledge from various sources: they can obtain it from books, the surrounding environment, reading digital texts , and engaging in discussions with the people around them ." (Source: P380)
7. "Storybooks, textbooks, school environment exploration , and exploration of the outside environment ." (Source: P342)
V. Process
8. "From sources of experience and learning that they have gone through, or daily activities that they have recorded, remembered, and either performed or experienced before or after ." (Source: P87)

Subjects

The knowledge acquired by students can originate from teachers, the community, parents, and experts (quotes 1 and 2). Fig. 1 illustrates that teachers are believed to be the most dominant source of knowledge, followed by parents, the community, and peers, with progressively decreasing contributions. The students themselves and experts are seen as having a minimal role, emphasizing the dominant influence of teachers and parents in the formation or development of knowledge.

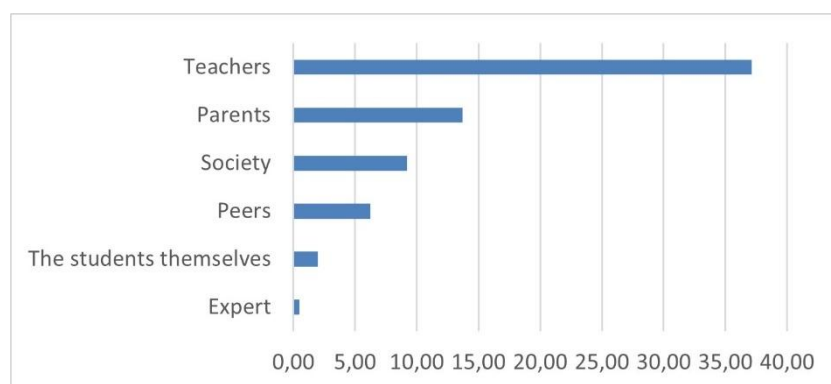


Figure 1. Subjects as sources of knowledge for students

Environments

Knowledge can be obtained from the family, school, and community environments (quote 3). Fig. 2 shows that the school environment is the primary source of knowledge, with the highest response rate. This is followed by the surrounding environment of the students, indicating that peers and influences around them play a significant role in knowledge acquisition. The home environment also serves as an important contributor, emphasizing the role of the family and learning resources at home in students' knowledge development. The social environment, which may include interactions with the wider community and social experiences, is also a relevant source, although its influence is less prominent compared to the previously mentioned environments. Social media, though present, is acknowledged by few respondents, indicating that digital interactions are a relatively small source of knowledge. The "Anywhere" and "Playground" categories received minimal responses, suggesting that these environments are not generally associated with structured knowledge acquisition but may contribute informally.

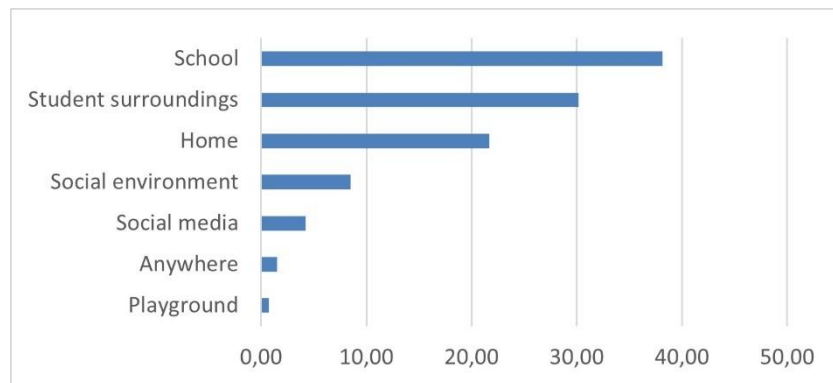


Figure 2. Environments where knowledge can be acquired

Objects

Objects that facilitate the availability of knowledge include books (texts or references), nature (environment), and learning media (teaching aids) (quotes 4 and 5). Based on the analysis of open-ended questionnaire data, there are four categories of objects that contain knowledge: electronic media, real objects, learning media, and printed media (see Fig. 3). In the electronic media category, the internet is the most dominant source of knowledge compared to other electronic sources such as digital media, television, and mobile phones. Other sources, such as YouTube, Google, gadgets, radio, and educational apps, appear less prominent, indicating that internet access is generally regarded as the primary medium for acquiring knowledge.

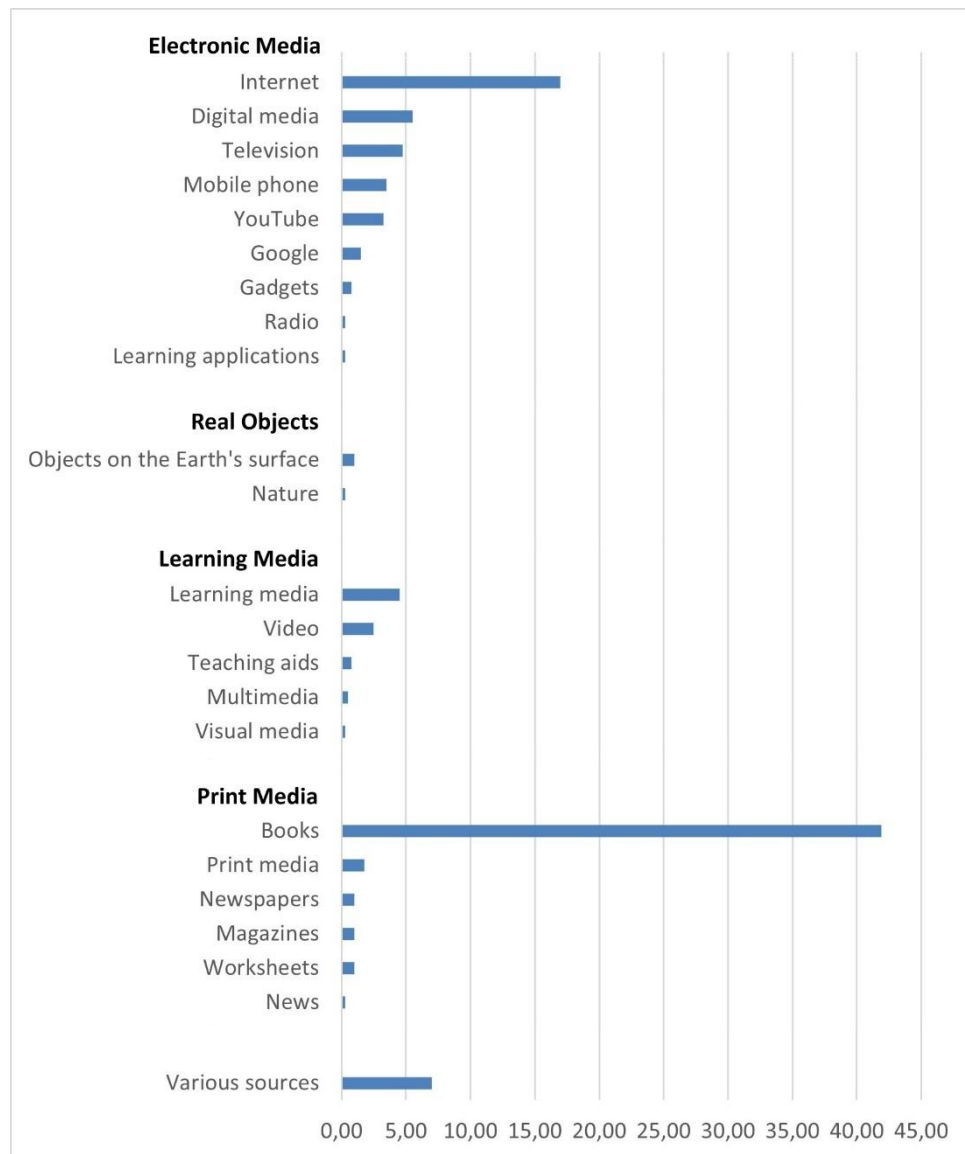


Figure 3. Objects containing knowledge for students

On the other hand, printed media, especially books, are also a very dominant source of knowledge, surpassing other printed media such as newspapers, magazines, worksheets, and news. Meanwhile, real objects, such as those found on the Earth's surface and in nature, have a lower influence compared to other media. Learning media, which includes videos, teaching aids, multimedia, and visual media, also received attention, although not as much as the internet and books. Overall, these results suggest that the internet and books are considered by most teachers as the primary sources of knowledge acquisition.

Activities

Students can also acquire knowledge by directly engaging in learning activities, such as reading digital texts, discussing with people around them, and exploring environments both at school and outside of school (quotes 6 and

7). Based on the analysis of respondents' answers, the formation of student knowledge occurs through both basic and complex activities (see Fig. 4). In the basic activity category, reading occupies the top position as the activity most often regarded as providing knowledge, followed by listening and observing. Other activities such as doing something, asking questions, watching, and writing seem to contribute less to the formation of student knowledge compared to primary activities like reading. For the complex activity category, social interaction and discussion are the most frequently regarded as important in supporting student learning, reflecting the view that communication and idea exchange with others play a role in developing understanding. Other activities, such as exploration, play, investigation, and completing tasks, are also recognized as part of the learning process, although their intensity is lower.

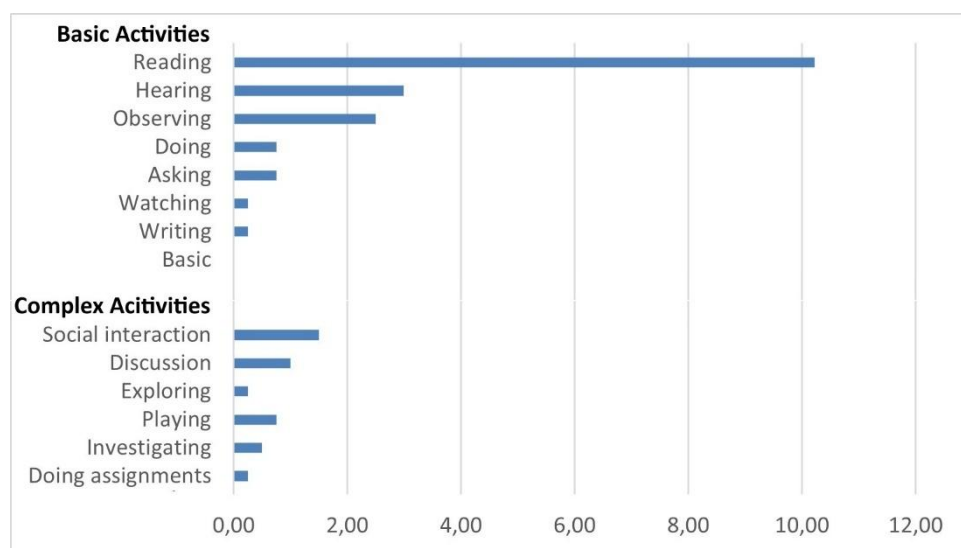


Figure 4. Activities that enable students to acquire knowledge

Process

Figure 5 shows that knowledge can be acquired through a process. This process includes two main sources from which teachers believe students obtain knowledge: "Experience" and "Learning." Fig. 5 indicates that most teachers believe student experience is the primary source in shaping their knowledge, compared to formal learning processes. This interpretation may reflect the perspective of some teachers who prioritize real-life experiences in enriching students' understanding, alongside the role of formal education.

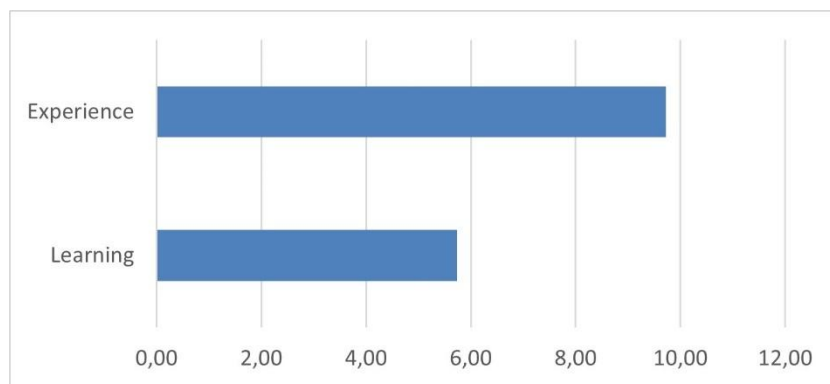


Figure 5. Processes that facilitate students in acquiring knowledge

Justification for Knowing

Table 3 shows that elementary school teachers believe that students' knowledge is formed through approaches such as individually, with others, by providing treatment, and using learning facilities. They emphasize that students can acquire knowledge by studying independently or in groups, reading, conducting practical experiments, and interacting with external sources of information, such as television, the internet, and informants. Teachers also apply scientific methods, simulations, and relevant tasks to connect lessons with students' real-life experiences. In addition, they support the use of printed books, teaching aids, and digital media (such as videos and mobile applications) to strengthen students' understanding. These beliefs suggest that teachers believe students' knowledge is shaped contextually and interactively through various sources and diverse learning methods.

Table 3. Quotations of elementary school teachers illustrating the emerging themes

I. Individually	
1.	"Students can acquire knowledge through information searching, self-learning , or teaching; students can form study groups and learn together; and students can also experience directly." (Source: P363)
2.	"By reading and seeking information in reading texts, because generally, reading is the window to knowledge or reading is the bridge to knowledge, which I always encourage my students to do so that they are motivated to read." (Source: P237)
3.	"By practicing the material that has been learned, such as a science experiment in grade 5 about the changes in the state of matter." (Source: P218)
II. With Others	
4.	"Some knowledge is acquired directly from informants , from television, and from mobile phones." (Source: P241)
5.	"By attending school lessons, listening to the explanation and elaboration of material from the teacher, gathering information from reading books, and engaging with the environment that supports learning ." (Source: P152)
6.	"Learning independently, participating in group discussions at school, engaging in question-and-answer sessions with the teacher , and searching for sources on the internet." (Source: P13)
III. By Providing Treatment	
7.	"Using the scientific method in accordance with the applicable curriculum." (Source: P285)

8.	“Simulation in the use or implementation in real life , solving problems based on what students remember.” (Source: P289)
9.	“Attending lessons attentively, as well as being assigned tasks .” (Source: P266)
10.	“ Analyzing and observing ” (Source: P115)
11.	“From the learning provided by the teacher, starting by connecting the lesson topic with what is around the student , what they frequently see and experience, and gradually making it more complex.” (Source: P204)

IV. Using Learning Facilities	
1.	“From printed books and the environment. To strengthen their knowledge, teaching aids are also included in the learning process.” (Source: P86)
2.	“The knowledge acquired by a child will be maximized if the child's reading ability and willingness are good. However, it is not only through reading; children can also acquire knowledge by listening to the teacher or other media (television, radio , etc.).” (Source: P31)
3.	“Students can acquire knowledge through the teacher's explanation and actively engaging in information-gathering activities using learning media (books, videos, PowerPoint, the internet, YouTube , etc.).” (Source: P125)
4.	“Through the learning process at school; experiences in their living environment; and from mobile applications they use, whether for finding assignments, playing games, or using social media.” (Source: P11)

Fig. 6 illustrates the beliefs of elementary school teachers regarding how students acquire knowledge through various approaches, emphasizing that learning occurs not only in the classroom but also in broader environments. The use of mass media (dominated by books) and the internet, which stands out in the Learning Facility Utilization category, reflects the view that access to digital information and media plays a crucial role in supporting students' independent learning in the technological era. Teachers also believe that the use of instructional media (teaching aids) and other learning facilities can facilitate knowledge acquisition.

Moreover, the treatment provision approach, where teachers create a supportive environment and apply specific teaching methods, highlights the importance of the teacher's role in guiding and directing students' understanding while tailoring learning to relevant contexts. Although rarely mentioned, the connection of materials to environmental phenomena underscores the value of contextual learning, encouraging students to recognize the relevance of lessons to their daily lives.

On the other hand, interactions with others, whether active or passive, demonstrate that collaborative learning can enrich the learning process, although teachers observe that passive interactions are more common. Individual learning with a high level of passive engagement indicates that most students tend to receive information without much initiative to explore further, despite efforts in self-directed learning.

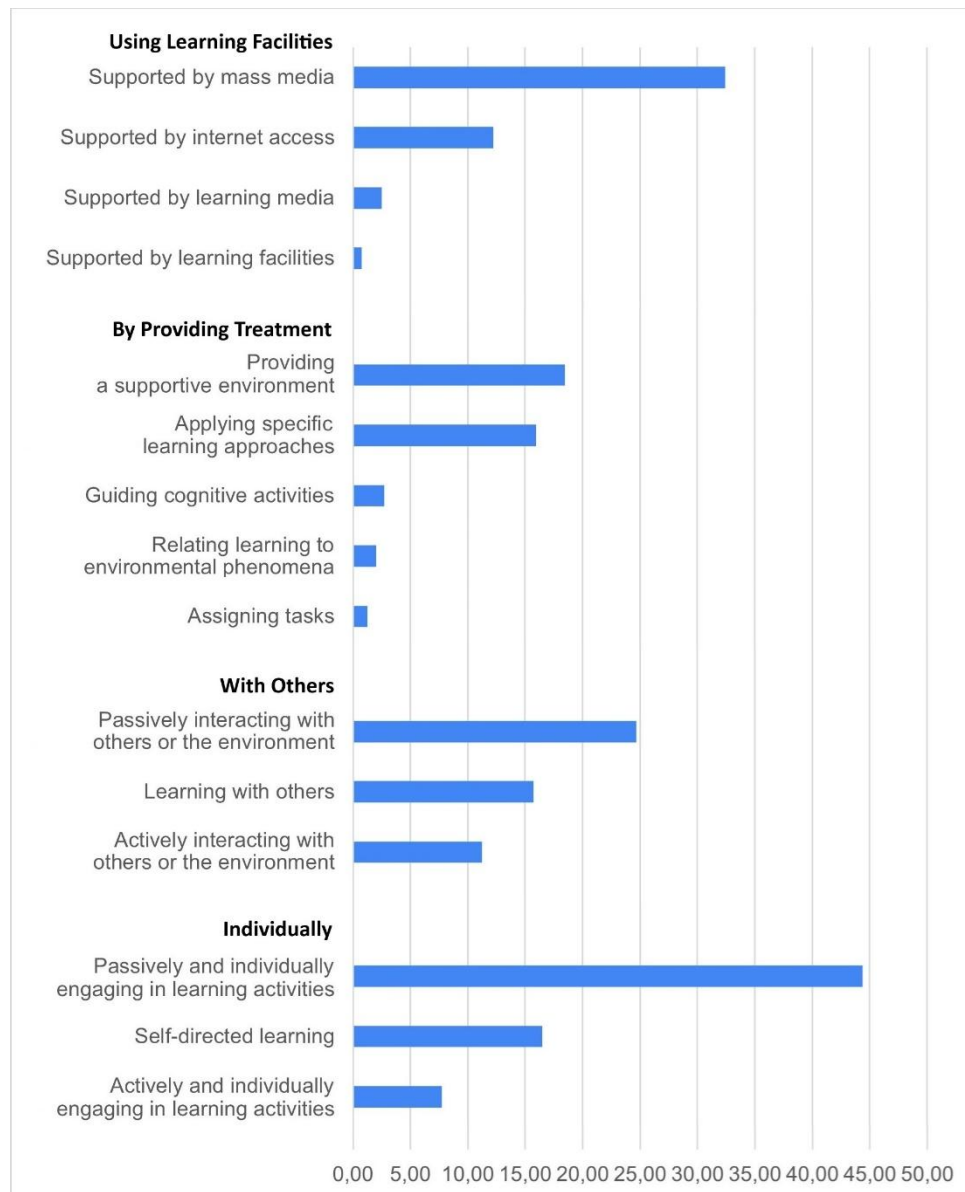


Figure 6. Themes in knowledge acquisition

Discussion

Source of Knowledge

Subjects

Sources of knowledge refer to the belief about whether school knowledge is transmitted to individuals by authoritative figures, such as teachers, scientists, and experts, or whether individuals themselves can actively construct meaning (Urhahne & Kremer, 2023). Teachers are perceived as the dominant subjects in delivering knowledge to students. They act as facilitators of learning, providing information, guidance, and direction to help students understand various concepts (Syarifuddin et al., 2024). Besides teachers, parents also play a crucial role in supporting students' positive development and fostering independence in academic learning, particularly amid the

growing use of digital tools for home-based learning (Williams-Johnson & Gonzalez-DeHass, 2022). This highlights that interpersonal relationships significantly influence students' knowledge construction (Naser et al., 2020).

In addition to teachers and parents, the community also contributes as a source of knowledge. Interactions with community members enable students to learn through direct experiences, discussions, and observations (Lee & Liu, 2025). Specialist teachers also serve as significant sources of knowledge, particularly for topics requiring specific expertise (Park, 2018). Engagement with the community and specialist teachers facilitates students in gaining deeper and more practical insights. Their involvement also helps students to understand material in a more applied manner.

Environments

The school environment is regarded as a primary source of knowledge for students. Knowledge acquired through active interactions with teachers, peers, and the exploration of various resources within the school setting fosters more constructivist epistemic beliefs (Sengul, 2024). Moreover, the school environment is intentionally designed to facilitate students in acquiring knowledge. Additionally, the school's atmosphere and culture are considered instrumental in cultivating more reflective epistemic beliefs, enabling students to gain knowledge through diverse experiences (Soleimani, 2020).

In addition to schools, the home environment also plays a significant role in shaping students' epistemic beliefs (Perkins et al., 2021). Parents and other family members contribute by creating a conducive learning atmosphere at home. Unlike the school setting, which is typically perceived as a primary source of knowledge, the home environment introduces students to the idea that knowledge is dynamic and can be acquired from various contexts. At home, students often receive more personalized guidance (Wang et al., 2022), not only in academic matters but also in non-academic areas such as character development and life skills. Consequently, the epistemic beliefs that students substantively develop in school become more comprehensive when connected to activities and experiences at home (Muenks et al., 2015).

Although considered less dominant and less effective in providing an educational atmosphere compared to schools and homes, the community environment remains a relevant source of knowledge (Chai et al., 2021). For example, activities such as communal work or visits to cultural sites can facilitate students in observing real-life examples and internalizing social values and practical skills learned in school. These experiences enrich students' understanding of the real world beyond formal environments.

Objects

Learning objects, such as textbooks and references, serve as dominant media in providing knowledge. Books contain structured information that can be accessed at any time, making them a primary source in formal education (Yi-Ming Kao et al., 2025). They also support students in understanding complex concepts through explanations and illustrations. However, it is

important to note that in the current digital era, the books that support learning are electronic books (e-books), which are interactive in nature (Suyatna et al., 2018). Several studies have found that e-books with appropriate interactive features are more effective in enhancing students' critical thinking abilities (CT) (Yi-Ming Kao et al., 2025). This is particularly significant considering that elementary school students are still in the concrete thinking stage.

The development of current technologies, such as the internet and digital devices, allows students to access information from electronic media through platforms like YouTube (Parhi, 2024) and educational applications (Andriaputra et al., 2022; Jasim, 2022). Moreover, digital devices, such as smartphones, have become a basic necessity for everyone. Optimizing the use of smartphones can certainly enhance the learning process. This is an important consideration for educators and education practitioners, as the unlimited access to digital media also enables students to access content that may not be appropriate (Rahmah, 2015).

In addition to print and electronic media, real-world objects such as nature and the surrounding environment also serve as rich sources of learning. Through direct observation and exploration, students can understand natural phenomena in a more concrete manner, such as the water cycle or animal life (Schilhab, 2021). These real-world objects also allow students to engage all of their senses in gathering information. The more senses that are involved, the more complete the knowledge students acquire (Reuter et al., 2022). Thus, these real-world objects are more effective in helping students connect theoretical concepts with their practical experiences.

Activities

Learning activities are one of the ways students acquire knowledge. Through reading, students can independently absorb information. However, reading activities require special attention because elementary school students tend to be more interested in activities that involve physical movement (Watson et al., 2017).

In addition to reading, activities such as listening and observing are also important in the learning process, especially for topics that require visual or auditory comprehension (Bläsing et al., 2018). However, listening alone is often insufficient without discussion or practice to reinforce understanding, particularly because students at this age tend to better grasp information presented interactively (Ostovar-Namaghi et al., 2024). Meanwhile, observation helps students understand phenomena directly, but it may be less effective if students are not guided to take notes or analyze what they observe. Furthermore, elementary school students require more intensive guidance to ensure they understand what they observe, as their analytical skills are still developing (Sarwanto et al., 2021). Therefore, a combination of various learning activities is necessary to accommodate the diversity of students' learning styles, considering approaches that are engaging, interactive, and appropriate for the cognitive development stage of elementary school students.

Discussion and social interaction are complex activities that support the development of students' understanding. Through discussion, students can share ideas, ask questions, and collaboratively solve problems. These activities not only enrich knowledge but also foster critical thinking and communication skills (Cui & Teo, 2023). Additionally, activities such as environmental exploration, play, and investigation significantly contribute to learning. Exploration allows students to learn directly from their surroundings, stimulating curiosity and problem-solving skills essential for lifelong learning (Qablan et al., 2024). Individuals adopt a more nuanced stance when knowledge acquisition is rooted in deliberate activities involving inquiry, exploration, and goal-directed questioning (Weinstock et al., 2020).

Process

The process of knowledge construction involves two primary sources: experience and formal learning. Students' daily experiences serve as a significant source for enriching their understanding (Silseth, 2018). Through these experiences, students can internalize knowledge relevant to their lives (Furberg & Silseth, 2022). Formal learning also plays a crucial role in shaping students' knowledge. This process entails a systematic approach where students learn through structured curricula, teaching methods, and evaluations. The combination of direct experiences and formal learning creates a holistic learning process. Furthermore, reflection on experiences and learning is a vital component of this process. By contemplating what they have learned, students can deepen their understanding and connect new concepts to their existing knowledge (Fries et al., 2021). This indicates that learning is not merely a linear process but also involves a continuous cycle of development.

Justification for Knowing

Individually

Independent learning challenges students to seek, evaluate, and critically understand information without relying entirely on the teacher (Horvat & Bogнар, 2024). This process encourages students to develop confidence in their ability to assess the validity of information. Furthermore, independent learning not only enhances intellectual abilities but also strengthens healthy epistemic beliefs, such as openness to evidence, awareness of biases, and a commitment to the pursuit of truth (Kruse et al., 2024).

Independent learning can be conducted both passively and actively. In this context, passive learning refers to activities that do not involve psychomotor engagement, such as reading, listening, observing, and similar tasks. Among these, reading is perceived by teachers as the most dominant activity in independent learning. Reading serves as a means to broaden students' knowledge and introduce new concepts (Smith et al., 2021). However, given the developmental stage of elementary school students, reading alone is often considered insufficient. For students still in the concrete operational stage of thinking, more hands-on and experiential learning

activities should be prioritized to facilitate independent learning (Cerovac & Keane, 2024).

Active learning activities, such as demonstrating, experimenting, and exploring, should take precedence. In practice, active independent learning often involves direct experiences, such as conducting simple experiments in science lessons (Schiefer et al., 2020). For example, fifth-grade students can better understand the changes in the state of matter by performing experiments themselves. These activities enable students to connect theoretical concepts with practical applications, thereby deepening their understanding.

With Others

Learning with others is an effective approach to building students' understanding. In the context of classroom learning, the "others" typically refer to teachers. Considering that elementary school students are in the concrete operational stage of thinking (Bettencourt et al., 2023) and in alignment with the "Truth is Political" concept proposed by Rudloff et al. (2023), teachers hold the authority to shape the knowledge students need to master. They achieve this by providing explanations and detailing materials to help students grasp complex concepts.

However, while passive interactions, such as listening to the teacher's explanations, are more common, active interactions through group discussions are highly recommended. Such activities not only help students comprehend the material but also develop their collaboration and communication skills (Nematizadeh & Cao, 2024). In group discussions, students tend to achieve a deeper understanding as they share experiences and ideas and support one another in overcoming learning difficulties (Wester, 2021).

Teachers also emphasize the importance of experiences within the local environment where students live (Usman et al., 2024). Interacting with their surroundings enables students to learn from real-world phenomena, such as direct observations of nature or social interactions (De Felice et al., 2022). This approach helps students connect the knowledge acquired in the classroom with everyday life situations.

By Providing Treatment

However, the learning process is not merely about receiving knowledge from sources such as teachers or experts; it also involves active exploration. According to Rapaport's categorization of epistemic belief development (Rapaport, 2018), teachers, perceived by students as authorities providing knowledge (dualism), play a crucial role in guiding students toward understanding themselves as imperfect authorities (multiplicity). In this context, knowledge is viewed as a construct of human thought. With a long-term orientation toward future goals, students must be able to develop their own knowledge, which may initially appear more like opinions than facts. Students with multiplistic beliefs often attribute similar validity to various types of arguments (e.g., scientific evidence vs. anecdotal evidence),

emphasizing that “knowledge is subjective, uncertain, and justified by personal preferences and judgments” (Barzilai & Eshet-Alkalai, 2015). At the next stage, students need to be guided to learn how to identify accurate solutions and accept knowledge (relativism). Finally, they should be encouraged to develop the ability to understand when evidence is incomplete and to practice the research skills necessary to bridge knowledge gaps (Barker, 2011).

Thus, teachers need to provide special support to help students experience all stages of epistemic belief development. The scientific method is often employed to guide students through a systematic learning process (Bennett, 2014). Through this approach, students can gain a deeper understanding of the concepts being taught, thereby enhancing their epistemic beliefs. Furthermore, teachers should relate learning materials to phenomena in students' surroundings, such as using examples from the home or community environment (Yani et al., 2021). This approach makes it easier for students to see the relevance of lessons to their everyday experiences, reducing subjectivity in knowledge acquisition. Additionally, assigning tasks is considered effective in reinforcing students' understanding. These tasks are designed to sharpen students' analytical and observational skills, enabling them to apply the knowledge they have gained to different situations. In doing so, teachers create a learning environment that supports students' intellectual development in a contextual manner (Ugalde et al., 2021).

The teacher acts as a navigator, breaking down complex concepts in ways that spark curiosity, while students take on the role of explorers charting their own course of knowledge. In this journey, the justification of what is known serves as the compass—not merely following authority or trusting intuition, but evaluating every claim based on evidence and critical inquiry. This approach fosters a robust scientific mindset, where experimentation and mathematical evidence form the foundation in natural sciences and mathematics (Urhahne & Kremer, 2023). Conversely, in the humanities and social sciences, the map of knowledge is more dynamic, shaped by diverse perspectives connected through the expertise of relevant authorities (Marra & Palmer, 2008). Thus, learning becomes an intellectual adventure, empowering each student to explore, validate, and deeply understand the world around them.

Using Learning Facilities

Learning facilities, such as textbooks and teaching aids, serve as primary resources in supporting students' learning processes. Textbooks provide structured and easily accessible information. Teachers often prioritize textbooks in the process of delivering knowledge, partly because a relatively large number of early-grade elementary school students are still struggling with basic literacy skills, including reading, writing, and arithmetic (Anwas et al., 2022). Although less commonly utilized, some teachers consider teaching aids helpful in assisting students to understand abstract concepts through visual representations, catering to elementary school students who are still in the concrete operational stage of thinking. The combination of these two resources creates a more interactive learning experience. Additionally, digital

media, such as videos and the internet, also play a significant role in education (Dwidarti & Prabowo, 2025). The internet enables students to independently explore information (Varlamova & Aleksandrova, 2022), while educational videos provide more engaging and comprehensible explanations (Sablić et al., 2021).

SIMPULAN

This study reports two main findings regarding elementary school teachers' epistemic beliefs. Concerning teachers' beliefs about sources of knowledge for students, five categories were identified: (1) Subjects; (2) Environments; (3) Objects; (4) Activities; and (5) Process. Among these categories, teachers as subjects and books as objects were perceived by teachers as the most dominant sources of knowledge. Furthermore, regarding teachers' beliefs about how knowledge is acquired, four categories were identified: (1) Individually; (2) With others; (3) By providing treatment; and (4) Using learning facilities. Among these categories, passive independent learning and the use of books as learning facilities emerged as the most dominant methods for acquiring knowledge.

Despite the dominance of certain categories in these two themes, students' knowledge justification reflects teachers' beliefs that learning is a holistic process. Independent learning, collaboration with others, teacher-led interventions, and the utilization of learning facilities all contribute to students' knowledge development. These approaches not only enhance students' understanding of academic content but also develop their lifelong learning skills. The integration of technology (Jang, 2024) and the contextualization of content in real-world scenarios have become essential components of modern education. Teachers play a dual role as both information providers and facilitators, creating supportive and relevant learning conditions tailored to students' needs (Grant & Pittaway, 2024). Consequently, students acquire knowledge that is not only theoretical but also applicable to their lives.

DAFTAR PUSTAKA

- Andriaputra, A. R., Resmana, D. B. P., Marzuki, N., & Rangkuti, A. H. (2022). Development of E-Learning Applications to Support Student Learning. *Proceedings - 4th International Conference on Informatics, Multimedia, Cyber and Information System, ICIMCIS 2022*, 49–54. <https://doi.org/10.1109/ICIMCIS56303.2022.10017697>
- Anwas, E. O. M., Afriansyah, A., Iftitah, K. N., Firdaus, W., Sugiarti, Y., Sopandi, E., & Hedianana, D. (2022). Students' Literacy Skills and Quality of Textbooks in Indonesian Elementary Schools. *International Journal of Language Education*, 6(3), 233–244. <https://doi.org/10.26858/ijole.v6i3.32756>
- Barker, D. (2011). *Perry's Model of Cognitive Development during the College Years*.
- Barzilai, S., & Eshet-Alkalai, Y. (2015). The role of epistemic perspectives in comprehension of multiple author viewpoints. *Learning and Instruction*, 36, 86–103. <https://doi.org/10.1016/j.learninstruc.2014.12.003>

- Bennett, D. G. (2014). Scientific method and human dignity in the balance. *Pertanika Journal of Social Sciences and Humanities*, 22(March), 139–147.
- Bettencourt, B., Manzi Muneza, A. R., Green, M., Anguiano, S., Fails, J. A., Kennington, C., Wright, K. L., & Pera, M. S. (2023). “Who are you?”: Identifying Young Users from a Single Search Query. *UMAP 2023 - Adjunct Proceedings of the 31st ACM Conference on User Modeling, Adaptation and Personalization*, 305–310. <https://doi.org/10.1145/3563359.3596992>
- Bismark, M., Smallwood, N., Jain, R., & Willis, K. (2022). Thoughts of suicide or self-harm among healthcare workers during the COVID-19 pandemic: qualitative analysis of open-ended survey responses. *BJPsych Open*, 8(4), e113. <https://doi.org/DOI: 10.1192/bjo.2022.509>
- Bläsing, B. E., Coogan, J., Biondi, J., & Schack, T. (2018). Watching or Listening: How Visual and Verbal Information Contribute to Learning a Complex Dance Phrase. *Frontiers in Psychology*, 9. <https://doi.org/10.3389/fpsyg.2018.02371>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp063oa>
- Cerovac, M., & Keane, T. (2024). Early insights into Piaget’s cognitive development model through the lens of the Technologies curriculum. *International Journal of Technology and Design Education*. <https://doi.org/10.1007/s10798-024-09906-5>
- Chai, C. S., Lin, P.-Y., King, R. B., & Jong, M. S.-Y. (2021). Intrinsic Motivation and Sophisticated Epistemic Beliefs Are Promising Pathways to Science Achievement: Evidence From High Achieving Regions in the East and the West. *Frontiers in Psychology*, 12. <https://doi.org/10.3389/fpsyg.2021.581193>
- Cobern, W. W., Adams, B. A. J., Pleasants, B. A.-S., Bentley, A., & Kagumba, R. (2022). Do We Have a Trust Problem? Exploring Undergraduate Student Views on the Tentativeness and Trustworthiness of Science. *Science & Education*, 31(5), 1209–1238. <https://doi.org/10.1007/s11191-021-00292-1>
- Cui, R., & Teo, P. (2023). Thinking through talk: Using dialogue to develop students’ critical thinking. *Teaching and Teacher Education*, 125, 104068. <https://doi.org/https://doi.org/10.1016/j.tate.2023.104068>
- De Felice, S., Hamilton, A. F. de C., Ponari, M., & Vigliocco, G. (2022). Learning from others is good, with others is better: the role of social interaction in human acquisition of new knowledge. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 378(1870), 20210357. <https://doi.org/10.1098/rstb.2021.0357>
- Dwidarti, F., & Prabowo, M. (2025). Multimedia-based dance learning in elementary school. *Journal of Education and Learning*, 19(1), 515–521. <https://doi.org/10.11591/edulearn.v19i1.21795>
- Ford, M. J. (2012). A Dialogic Account of Sense-Making in Scientific Argumentation and Reasoning. *Cognition and Instruction*, 30(3), 207–245. <https://doi.org/10.1080/07370008.2012.689383>
- Fries, L., Son, J. Y., Givvin, K. B., & Stigler, J. W. (2021). Practicing Connections: A Framework to Guide Instructional Design for Developing

- Understanding in Complex Domains. *Educational Psychology Review*, 33(2), 739–762. <https://doi.org/10.1007/s10648-020-09561-x>
- Furberg, A., & Silseth, K. (2022). Invoking student resources in whole-class conversations in science education: A sociocultural perspective. *Journal of the Learning Sciences*, 31(2), 278–316. <https://doi.org/10.1080/10508406.2021.1954521>
- Grant, A., & Pittaway, S. (2024). An introduction to a Pedagogy of Kindness. In *Enacting a Pedagogy of Kindness: A Guide for Practitioners in Higher Education* (pp. 1–7). <https://doi.org/10.4324/9781003364887-1>
- Greene, J. A., Cartiff, B. M., & Duke, R. F. (2018). A meta-analytic review of the relationship between epistemic cognition and academic achievement. *Journal of Educational Psychology*, 110(8), 1084–1111. <https://doi.org/10.1037/edu0000263>
- Hadianto, D., S. Damaianti, V., Mulyati, Y., & Sastromiharjo, A. (2022). Effectiveness of Literacy Teaching Design Integrating Local Culture Discourse and Activities to Enhance Reading Skills. *Cogent Education*, 9(1). <https://doi.org/10.1080/2331186X.2021.2016040>
- Hofer, B. K., & Pintrich, P. R. (1997). The development of epistemological theories: Beliefs about knowledge and knowing and their relation to learning. *Review of Educational Research*, 67(1), 88–140. <https://doi.org/10.3102/00346543067001088>
- Horvat, S. M., & Bognar, B. (2024). Achieving Essential Changes in the Elementary Teaching of Mathematics. *Mathematics Teaching-Research Journal*, 16(5), 40–65.
- Jang, M. (2024). AI Literacy and Intention to Use Text-Based GenAI for Learning: The Case of Business Students in Korea. *Informatics*, 11(3). <https://doi.org/10.3390/informatics11030054>
- Jasim, W. M. (2022). Knowledge assessment of medical students' college regarding the suitability of e-learning application in medical education. *Medical Journal of Babylon*, 19(3), 422–426. https://doi.org/10.4103/MJBL.MJBL_56_22
- Jones, S. R., Torres, V., & Arminio, J. (2013). *Negotiating the complexities of qualitative research in higher education: Fundamental elements and issues* (2nd ed.). New York, NY: Routledge. <https://doi.org/10.4324/9780203123836>
- Kivimäki, V. (2023). Structured learning diary and epistemic beliefs predict academic achievement in higher education. *Frontiers in Education*, 8. <https://doi.org/10.3389/feduc.2023.1153618>
- Krist, C., Schwarz, C. V., & Reiser, B. J. (2019). Identifying Essential Epistemic Heuristics for Guiding Mechanistic Reasoning in Science Learning. *Journal of the Learning Sciences*, 28(2), 160–205. <https://doi.org/10.1080/10508406.2018.1510404>
- Kruse, J., Voss, S., Easter, J., Kent-Schneider, I., Menke, L., Owens, D., Roberts, K., & Woodward, L. (2024). Preparing students for the modern information landscape and navigating science–technology–society issues. *Journal of Research in Science Teaching*. <https://doi.org/10.1002/tea.21972>
- Lan, M., & Huang, Q. (2023). Clustering digital learning pathway preferences from the perspectives of epistemic justification on self-regulated learning, social presence, and resources. *Heliyon*, 9(9).

<https://doi.org/10.1016/j.heliyon.2023.e20038>

- Lee-Hammond, L., & McConney, A. (2017). The impact of village-based kindergarten on early literacy, numeracy, and school attendance in Solomon Islands. *European Early Childhood Education Research Journal*, 25(4), 541–560. <https://doi.org/10.1080/1350293X.2016.1155256>
- Lee, H.-C., & Liu, W.-H. (2025). Implementing the Slow Fish curriculum for SDGs: Strategies, challenges, and policy suggestions through a case study. *Marine Policy*, 173. <https://doi.org/10.1016/j.marpol.2024.106538>
- Liang, Y., Ren, L., Wei, C., & Shi, Y. (2023). The Influence of Internet-Specific Epistemic Beliefs on Academic Achievement in an Online Collaborative Learning Context for College Students. *Sustainability (Switzerland)*, 15(11). <https://doi.org/10.3390/su15118938>
- Lima, N. W., & Nascimento, M. M. (2022). Not Only Why but Also How to Trust Science: Reshaping Science Education Based on Science Studies for a Better Post-pandemic World. *Science and Education*, 31(5), 1363–1382. <https://doi.org/10.1007/s11191-021-00303-1>
- Lin, T.-J., & Tsai, C.-C. (2017). Developing instruments concerning scientific epistemic beliefs and goal orientations in learning science: a validation study. *International Journal of Science Education*, 39(17), 2382–2401. <https://doi.org/10.1080/09500693.2017.1384593>
- Lindfors, M., Winberg, M., & Bodin, M. (2019). The Role of Students' Scientific Epistemic Beliefs in Computer-Simulated Problem Solving. *Scandinavian Journal of Educational Research*, 63(1), 124–144. <https://doi.org/10.1080/00313831.2017.1324907>
- Madjar, N., Weinstock, M., & Kaplan, A. (2017). Epistemic beliefs and achievement goal orientations: Relations between constructs versus personal profiles. *The Journal of Educational Research*, 110(1), 32–49. <https://doi.org/10.1080/00220671.2015.1034353>
- Marra, R. M., & Palmer, B. (2008). Epistemologies of the Sciences, Humanities, and Social Sciences: Liberal Arts Students' Perceptions. *The Journal of General Education*, 57(2), 100–118. <https://doi.org/10.1353/jge.0.0017>
- Mason, L., Boscolo, P., Tornatora, M. C., & Ronconi, L. (2013). Besides knowledge: A cross-sectional study on the relations between epistemic beliefs, achievement goals, self-beliefs, and achievement in science. *Instructional Science*, 41(1), 49–79. <https://doi.org/10.1007/s11251-012-9210-0>
- McNeill, K. L., Marco-Bujosa, L. M., González-Howard, M., & Loper, S. (2018). Teachers' enactments of curriculum: Fidelity to Procedure versus Fidelity to Goal for scientific argumentation. *International Journal of Science Education*, 40(12), 1455–1475. <https://doi.org/10.1080/09500693.2018.1482508>
- Muenks, K., Miele, D. B., Ramani, G. B., Stapleton, L. M., & Rowe, M. L. (2015). Parental beliefs about the fixedness of ability. *Journal of Applied Developmental Psychology*, 41, 78–89. <https://doi.org/https://doi.org/10.1016/j.appdev.2015.08.002>
- Naser, S. C., Verlenden, J., Arora, P. G., Nastasi, B., Braun, L., & Smith, R. (2020). Using child rights education to infuse a social justice framework into universal programming. *School Psychology International*, 41(1), 13–36. <https://doi.org/10.1177/0143034319894363>

- Nematizadeh, S., & Cao, Y. K. (2024). Investigating willingness to communicate in synchronous group discussion tasks: one step closer towards authentic communication. *IRAL - International Review of Applied Linguistics in Language Teaching*, 62(4), 1587–1617. <https://doi.org/10.1515/iral-2022-0092>
- Ostovar-Namaghi, S. A., Morady Moghaddam, M., & Rad, E. (2024). The effect of interactive games on English language learners' reading comprehension and attitudes. *Asia Pacific Education Review*, 25(2), 399–409. <https://doi.org/10.1007/s12564-023-09883-9>
- Parhi, S. (2024). Understanding Electronic Media, Mediation, and Behavioural Biases: A Revisit of Human Behaviour and Meditation. In *Rethinking Media Studies: Media, Meditation and Communication* (pp. 367–380). <https://doi.org/10.4324/9781032632667-28>
- Park, Y. (2018). How do specialist teachers practice safety lessons? Exploring the aspects of physical education safety lessons in elementary schools. *International Electronic Journal of Elementary Education*, 10(4), 457–461. <https://doi.org/10.26822/iejee.2018438136>
- Perkins, H., Benedict, B., Rohde, J., Godwin, A., Washington, M., & Castillo, A. L. (2021). Understanding How Family Influences and Support Students' Certainty of Engineering Major. *Proceedings - Frontiers in Education Conference, FIE, 2021-Octob.* <https://doi.org/10.1109/FIE49875.2021.9637191>
- Qablan, A., Alkaabi, A., Aljanahi, M., & Almaamari, S. (2024). Inquiry-Based Learning: Encouraging Exploration and Curiosity in the Classroom. In *Cutting-Edge Innovations in Teaching, Leadership, Technology, and Assessment* (pp. 1–12). <https://doi.org/10.4018/979-8-3693-0880-6.ch001>
- Rahmah, A. (2015). Digital Literacy Learning System for Indonesian Citizen. *Procedia Computer Science*, 72, 94–101. <https://doi.org/10.1016/j.procs.2015.12.109>
- Rapaport, W. J. (2018). *William Perry's Scheme of Intellectual and Ethical Development*.
- Reuter, J., Mello, G., Dias, M. F., & Amorim, M. (2022). Developing environmental awareness competencies through a sensorial escape room. *ICERI2022 Proceedings*, 6357–6365. <https://doi.org/10.21125/iceri.2022.1586>
- Rohayati, R., Syihabuddin, S., Anshori, D., & Sastromiharjo, A. (2023). Effectiveness of Epistemic Beliefs and Scientific Argument to Improve Learning Process Quality. *International Journal of Instruction*, 16(2), 493–510. <https://doi.org/10.29333/iji.2023.16227a>
- Rott, B. (2021). Inductive and deductive justification of knowledge: epistemological beliefs and critical thinking at the beginning of studying mathematics. *Educational Studies in Mathematics*, 106(1), 117–132. <https://doi.org/10.1007/s10649-020-10004-1>
- Rudloff, J. P., & Appel, M. (2022). When Truthiness Trumps Truth: Epistemic Beliefs Predict the Accurate Discernment of Fake News. *Journal of Applied Research in Memory and Cognition*. <https://doi.org/10.1037/mac0000070>
- Rudloff, J. P., Hutmacher, F., & Appel, M. (2023). Post-truth epistemic beliefs rooted in the Dark Factor of Personality are associated with higher COVID-19 vaccination refusal. *Scientific Reports*, 13(1).

- <https://doi.org/10.1038/s41598-023-31079-9>
- Sablić, M., Miroslavljević, A., & Škugor, A. (2021). Video-Based Learning (VBL)—Past, Present and Future: an Overview of the Research Published from 2008 to 2019. *Technology, Knowledge and Learning*, 26(4), 1061–1077. <https://doi.org/10.1007/s10758-020-09455-5>
- Sarwanto, S., Fajari, L. E. W., & Chumdari, C. (2021). Critical thinking skills and their impacts on elementary school students. *Malaysian Journal of Learning and Instruction*, 18(2), 161–187. <https://doi.org/10.32890/mjli2021.18.2.6>
- Schiefer, J., Golle, J., Tibus, M., Herbein, E., Gindele, V., Trautwein, U., & Oschatz, K. (2020). Effects of an extracurricular science intervention on elementary school children's epistemic beliefs: A randomized controlled trial. *British Journal of Educational Psychology*, 90(2), 382–402. <https://doi.org/10.1111/bjep.12301>
- Schilhab, T. (2021). Nature Experiences in Science Education in School: Review Featuring Learning Gains, Investments, and Costs in View of Embodied Cognition. *Frontiers in Education*, 6. <https://doi.org/10.3389/feduc.2021.739408>
- Sengul, O. (2024). Epistemological beliefs and classroom practices of experienced physics teachers: are they related? *Frontiers in Education*, 9. <https://doi.org/10.3389/feduc.2024.1362426>
- Serrano, D. M., Crone, T., & Williams, P. S. (2023). Exploring the Role of Multiplist Epistemic Beliefs on COVID-19 Conspiracies and Prevention Among Undergraduates. *Science and Education*. <https://doi.org/10.1007/s11191-023-00447-2>
- Silseth, K. (2018). Students' everyday knowledge and experiences as resources in educational dialogues. *Instructional Science*, 46(2), 291–313. <https://doi.org/10.1007/s11251-017-9429-x>
- Sizoo, E. M., Monnier, A. A., Bloemen, M., Hertogh, C. M. P. M., & Smalbrugge, M. (2020). Dilemmas With Restrictive Visiting Policies in Dutch Nursing Homes During the COVID-19 Pandemic: A Qualitative Analysis of an Open-Ended Questionnaire With Elderly Care Physicians. *Journal of the American Medical Directors Association*, 21(12), 1774–1781.e2. <https://doi.org/https://doi.org/10.1016/j.jamda.2020.10.024>
- Smith, R., Snow, P., Serry, T., & Hammond, L. (2021). The Role of Background Knowledge in Reading Comprehension: A Critical Review. *Reading Psychology*, 42(3), 214–240. <https://doi.org/10.1080/02702711.2021.1888348>
- Soleimani, N. (2020). ELT teachers' epistemological beliefs and dominant teaching style: a mixed method research. *Asian-Pacific Journal of Second and Foreign Language Education*, 5(1), 12. <https://doi.org/10.1186/s40862-020-00094-y>
- Suyatna, A., Distrik, I. W., Herlina, K., Suyanto, E., & Haryaningtias, D. (2018). Developing interactive e-book of relativity theory to optimize self-directed learning and critical thinking skills. *AIP Conference Proceedings*, 2014(1), 20065. <https://doi.org/10.1063/1.5054469>
- Syarifuddin, S., Tahir, A., Abidin, K., & Syarifuddin, F. (2024). School and Family Partnerships: Contribution of Transformational Teachers in Implementing the Autonomous Learning Curriculum Educational Institutions in Bone, Indonesia. *Samarah*, 8(3), 1476–1502.

- <https://doi.org/10.22373/sjhg.v8i3.22584>
- Ugalde, L., Santiago-Garabietta, M., Villarejo-Carballido, B., & Puigvert, L. (2021). Impact of Interactive Learning Environments on Learning and Cognitive Development of Children With Special Educational Needs: A Literature Review. *Frontiers in Psychology*, 12. <https://doi.org/10.3389/fpsyg.2021.674033>
- Urhahne, D., & Kremer, K. (2023). Specificity of epistemic beliefs across school subject domains. *Educational Psychology*, 43(2–3), 99–118. <https://doi.org/10.1080/01443410.2023.2179605>
- Usman, M., Hermansyah, S., Said, S., Febrianti, D., & Rizal, A. (2024). Holistic Learning Models in Remote Areas: Enhancing Student Motivation through Local Wisdom, Parental Collaboration, Teacher Capacity, and Government Support. *Journal of Ecohumanism*, 3(7), 4548–4561. <https://doi.org/10.62754/joe.v3i7.4565>
- Varlamova, V. N., & Aleksandrova, D. S. (2022). Developing Cognitive Competence in Students of Non-linguistic Specialties in the Course of Working with Social Media Neologisms. In A. Z. (Ed.), *Lecture Notes in Networks and Systems: Vol. 499 LNNS* (pp. 253–261). Springer Science and Business Media Deutschland GmbH. https://doi.org/10.1007/978-3-031-11435-9_27
- Wang, Y.-C., Lin, C.-H., Liu, Y.-H., & Chang, T.-J. (2022). The Influence Experience of Family Strengths on Adolescent's Career Purpose Development. *Bulletin of Educational Psychology*, 54(1), 1–26. [https://doi.org/10.6251/BEP.202209_54\(1\).0001](https://doi.org/10.6251/BEP.202209_54(1).0001)
- Watson, A., Timperio, A., Brown, H., Best, K., & Hesketh, K. D. (2017). Effect of classroom-based physical activity interventions on academic and physical activity outcomes: a systematic review and meta-analysis. *International Journal of Behavioral Nutrition and Physical Activity*, 14(1), 114. <https://doi.org/10.1186/s12966-017-0569-9>
- Weinstock, M., Israel, V., Cohen, H. F., Tabak, I., & Harari, Y. (2020). Young Schoolchildren's Epistemic Development: A Longitudinal Qualitative Study. In *Frontiers in Psychology* (Vol. 11).
- Wester, J. S. (2021). Students' Possibilities to Learn From Group Discussions Integrated in Whole-class Teaching in Mathematics. *Scandinavian Journal of Educational Research*, 65(6), 1020–1036. <https://doi.org/10.1080/00313831.2020.1788148>
- Williams-Johnson, M., & Gonzalez-DeHass, A. R. (2022). Parental role construction leading to parental involvement in culturally distinct communities. *Educational Psychologist*, 57(4), 231–237. <https://doi.org/10.1080/00461520.2022.2131554>
- Winberg, T. M., Hofverberg, A., & Lindfors, M. (2019). Relationships between epistemic beliefs and achievement goals: developmental trends over grades 5–11. *European Journal of Psychology of Education*, 34(2), 295–315. <https://doi.org/10.1007/s10212-018-0391-z>
- Yang, F.-Y., Bhagat, K. K., & Cheng, C.-H. (2019). Associations of epistemic beliefs in science and scientific reasoning in university students from Taiwan and India. *International Journal of Science Education*, 41(10), 1347–1365. <https://doi.org/10.1080/09500693.2019.1606960>
- Yani, A., Amin, M., Rohman, F., Suarsini, E., & Rijal, M. (2021). Pre-service biology teacher's perception on local environment problems as contextual

- learning resources. *International Journal of Evaluation and Research in Education*, 10(3), 768–780. <https://doi.org/10.11591/ijere.v10i3.21091>
- Yi-Ming Kao, G., Yeh, H.-C., Su, S.-W., Chiang, X.-Z., & Sun, C.-T. (2025). Advancing a Practical Inquiry Model with multi-perspective role-playing to foster critical thinking behavior in e-book reading. *Computers & Education*, 225, 105185. <https://doi.org/https://doi.org/10.1016/j.compedu.2024.105185>
- Yough, M., Tan, D., Fedesco, H. N., & Cho, H. J. (2023). Learning of assessment in teacher education: the role of epistemic beliefs. *Educational and Developmental Psychologist*, 40(2), 151–160. <https://doi.org/10.1080/20590776.2022.2121160>
- Zhai, J., & Yan, X. (2022). Epistemic analysis of high school science teachers' class talks. *Journal of Education for Teaching*, 48(2), 259–262. <https://doi.org/10.1080/02607476.2021.2004075>