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Engagement with Knowledge and Epistemic Cognition in Children During the COVID-19 Lockdown: An Interpretative Phenomenological Study Using the AIR Model

Participación en el conocimiento y cognición epistémica en niños durante el confinamiento por COVID-19: un estudio fenomenológico interpretativo basado en el modelo AIR

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ABSTRACT

This study examines children's engagement with knowledge during the COVID-19 lockdown through the lens of epistemic cognition and the AIR model. Using a qualitative design grounded in Interpretative Phenomenological Analysis (IPA), semi-structured interviews were conducted with a purposive sample of five students, five teachers, and five mothers. Findings indicate a predominance of maladaptive epistemic strategies, including prioritization of non-epistemic goals such as grades, convenience, and task completion over conceptual understanding, alongside reliance on unreliable processes such as copying during online assessments and passive class participation. Although limited, instances of adaptive epistemic engagement emerged when teachers demonstrated sustained pedagogical commitment and emotional support, and when students engaged in skill-based or exploratory learning activities. However, digital distractions, reduced interaction, and negative emotional states such as boredom and fatigue significantly hindered epistemic engagement and learning outcomes. Participants consistently perceived online learning as less effective than traditional classroom instruction. The study concludes that pandemic-induced educational

disruptions were not only technological but fundamentally epistemic, underscoring the need for targeted online pedagogies and support systems that foster adaptive epistemic cognition, ethical learning practices, and sustained student engagement.

Keywords: Epistemic Cognition; AIR Model; Interpretative Phenomenological Analysis; Online Learning; Student Engagement; Educational Psychology; COVID-19

RESUMEN

Este estudio examina la participación de los niños en el conocimiento durante el confinamiento por COVID-19 desde la perspectiva de la cognición epistémica y el modelo AIR. Mediante un diseño cualitativo basado en el Análisis Fenomenológico Interpretativo (AFI), se realizaron entrevistas semiestructuradas a una muestra intencional de cinco estudiantes, cinco docentes y cinco madres. Los resultados evidencian un predominio de estrategias epistémicas desadaptativas, caracterizadas por la priorización de objetivos no epistémicos —como las calificaciones, la conveniencia y la finalización de tareas— por sobre la comprensión conceptual, así como el uso de procesos poco fiables, como la copia en evaluaciones en línea y la participación pasiva en clases. Aunque limitadas, se identificaron formas de participación epistémica adaptativa cuando los docentes mostraron compromiso pedagógico sostenido y apoyo emocional, y cuando los estudiantes se involucraron en actividades de desarrollo de habilidades o exploración autónoma. Sin embargo, las distracciones digitales, la baja interacción y los estados emocionales negativos —como el aburrimiento y la fatiga— afectaron significativamente la participación y los resultados de aprendizaje. Los participantes coincidieron en que la educación en línea fue menos efectiva que la presencial. El estudio concluye que las disrupciones educativas derivadas de la pandemia fueron no solo tecnológicas, sino también fundamentalmente epistémicas, lo que destaca la necesidad de pedagogías digitales que promuevan la cognición epistémica adaptativa, prácticas de aprendizaje éticas y una mayor implicación del alumnado.

Palabras Clave: Cognición Epistémica; Modelo AIR; Análisis Fenomenológico Interpretativo; Aprendizaje en Línea; Participación Estudiantil; Psicología Educativa; COVID-19

INTRODUCTION

In December 2019, the rapid spread of the coronavirus prompted the World Health Organization to declare it a pandemic (Cucinotta & Vanelli, 2020). To contain the spread of the virus, schools were closed and switched to online or hybrid learning. This change, combined with mask-wearing and fear of the virus, likely impacted children's mental health (Tiwari et al., 2024; Tiwari, Singh, et al., 2023). Being confined to home and unable to

socialize in person could have long-term effects (Bates et al., 2020). The lack of outdoor activities exacerbated these effects, and parents faced increased stress from balancing their responsibilities and helping their children with schooling (Tiwari et al., 2024). This increased stress among parents could impact children's well-being (Chen et al., 2022).

A UNESCO report shows that over 888 million children worldwide faced educational disruptions due to school closures (UNESCO, 2023). Educational institutions experimented with online courses to ensure continuity, using synchronous and asynchronous methods accessible via smartphones and laptops (Dhawan, 2020; Singh & Thurman, 2019). However, access to digital technologies and learning resources varies, potentially exacerbating stress among less privileged students (Di Pietro et al., 2020).

The sudden shift to online learning amid the pandemic increased students' stress and anxiety (Abu Talib et al., 2021). While traditional teaching encourages innovative questioning, online learning offers flexible content delivery and instant feedback, but limits inbound inquiries and teacher responses, reducing its effectiveness (Salcedo, 2010). Personal attention is challenging online, as students crave interactive engagement that is difficult to achieve virtually. Consistent practice and revision, crucial for effective learning, can be hindered by online challenges, leading to a lack of engagement and boredom (Dhawan, 2020). The biggest obstacles include limitations in personalized instruction and scalability (Liguori & Winkler, 2020). Online learning issues such as download errors, audio/video quality problems, and login failures also burden students (Dhawan, 2020). Traditional classroom teaching often results in better persistence and feedback (Atchley et al., 2013).

THEORETICAL FRAMEWORK

The theoretical framework for this research is the AIR model of epistemic cognition, which includes epistemic goals and values, epistemic ideals, and reliable processes (Chinn et al., 2014). This model guides our study of student interaction with knowledge during the COVID-19 pandemic. Based on the constructivist paradigm, we examine the collective interpretations of students, teachers, and parents regarding students' engagement with knowledge during the pandemic. Epistemic cognition includes cognitive processes aimed at truth, knowledge, understanding, and wisdom (Chinn et al., 2014). Adaptive epistemic cognition, which involves higher-order thinking, is positively associated with academic performance (Cartiff et al., 2021).

The first component of the AIR model of epistemic cognition includes epistemic goals and values. Epistemic goals refer to intentional goals aimed at achieving outcomes such as understanding, true belief, knowledge, avoidance of false beliefs, and wisdom. Scholars in epistemology have studied these goals extensively (Chinn et al., 2014). Epistemic goals play a critical role in determining adaptive epistemic cognition (Chinn et al., 2011). Epistemic

value involves prioritizing adaptive epistemic goals over non-epistemic goals. For example, a child who turns off video and audio during online classes to engage in other activities will value those activities more than focusing on lectures. Non-epistemic goals include seeking immediate gratification, completing tasks quickly, protecting one's self-image, and achieving good grades (Chinn et al., 2014). For example, a child who cheats during an online exam by copying answers demonstrates non-epistemic goals. The second element of the AIR model is epistemic ideals, which are features of a strong explanation. These criteria include that there is no contradiction by substantial evidence, that a wide range of evidence is taken into account, that internal consistency is maintained, and that explanations are guided by established scientific reasoning (Chinn et al., 2014).

The third aspect of the AIR model is reliable processes, which include cognitive approaches associated with both reliable and unreliable methods that lead individuals toward different epistemic goals. Schemas that prioritize reliable processes help produce adaptive epistemic outcomes such as accurate beliefs and knowledge. Conversely, unreliable processes increase the likelihood of false results (Chinn et al., 2014). Reliable processes involve creating a supportive learning environment and encouraging curiosity to resolve doubts, while unreliable processes impede epistemic goals.

Current research shows that emotions are crucial for knowledge generation (Thagard, 2012). Uncontrolled anger can hinder adaptive epistemic goals, while curiosity promotes deeper understanding. Persistent frustration with online learning can lead to disinterest and render emotions such as anger, boredom, and irritability unreliable for epistemic perception. In contrast, curiosity and enthusiasm are reliable for exploring complex epistemic goals. The way individuals collect evidence influences their interest in adaptive epistemic goals. For example, a child who explores multiple perspectives during an online lecture gains a more comprehensive understanding (Solomon, 2001). Transitioning to sophisticated epistemic beliefs requires epistemic will, a strong motivation to change one's beliefs (Bendixen & Rule, 2004).

Resolution strategies such as social support, group discussions, and debates can move individuals from weak to adaptive epistemic cognition (Greene et al., 2016). However, implementing these strategies in online learning can be challenging. Synchronous online learning with real-time interactions has advantages but also disadvantages, such as a lack of community, technical problems, and difficulty understanding lesson objectives (McBrien et al., 2009; Song et al., 2004). These obstacles, coupled with negative emotions, can affect motivation and the effectiveness of resolution strategies to promote epistemic change.

This study makes a specific scientific contribution to educational psychology by empirically connecting children's engagement with knowledge during COVID-19 to epistemic cognition, rather than restricting analysis to motivation, achievement, or access. By showing that pandemic-era challenges were not only technological or pedagogical but also epistemic—characterized by shifts toward non-epistemic goals, unreliable processes,

and weakened epistemic ideals—it advances current discussions on online learning (Leino et al., 2024). By using Interpretative Phenomenological Analysis to triangulate the lived perspectives of children, parents, and teachers, the study offers a relational understanding of epistemic engagement that is rarely addressed in pandemic research. Using the AIR model offers a fresh theoretical perspective on maladaptive behaviors such as copying, disengagement, and prioritizing grades over comprehension. Beyond earlier research that mainly concentrated on efficacy or satisfaction, the findings provide new insights into how emotional states, digital distractions, and instructional practices jointly shape adaptive or maladaptive epistemic cognition in online learning contexts (Den Boer et al., 2023).

Teaching students about adaptive epistemic strategies is critical, especially given the increasing use of digital devices. Platforms such as YouTube, Google, and Instagram tailor content to users' preferences, potentially leading to cognitive stagnation and a reduced propensity for elaborate, multi-perspective epistemic understanding (Greene et al., 2016). The pandemic has highlighted different perspectives on knowledge and learning and calls for further research into the advantages and disadvantages of digital engagement. Internet overuse, driven by the need to relieve boredom and stress during COVID-19, has increased reliance on social media designed to captivate users with tailored content, potentially leading to cognitive overload and superficial learning. This study examines children's engagement with knowledge in online education during COVID-19, focusing on the AIR model of epistemic cognition. By analyzing qualitative data, the study aims to explore the complexities and benefits of students' knowledge engagement, particularly in the context of the increasing use of digital devices.

Despite a wealth of COVID-19 research on online learning, especially regarding the concurrent integration of the perspectives of students, parents, and teachers, children's engagement with knowledge through the lens of epistemic cognition has received little attention. Instead of examining how epistemic goals, values, ideals, and processes are shaped in online contexts, most existing research focuses on access, satisfaction, or achievement. By using the AIR model to investigate both adaptive and maladaptive epistemic strategies during lockdown, this study fills this gap. By demonstrating how online learning altered epistemic priorities, encouraged non-epistemic goals, and limited trustworthy processes, it advances current discussions. The study is distinctive because of its theory-driven qualitative methodology, which provides fresh perspectives on epistemic engagement that go beyond evaluations of the relative efficacy of online and offline learning. The major research questions are:

- (1) Is students' involvement with knowledge during COVID-19 significantly more beneficial in enhancing the quality of learning compared to before the pandemic?
- (2) What are the advantages and disadvantages of online learning during COVID-19 with respect to the AIR model of epistemic cognition?

- (3) This study explores the perspectives of three key contributors to students' engagement with knowledge: teachers, parents, and the students themselves.

The study aims to examine whether the actions of these three groups create obstacles for children in developing adaptive epistemic cognition. The discussion encompasses the experiences of each member of the trio: teachers, students, and parents.

METHODS

Research Approach

In keeping with the constructivist assumptions of the AIR model, Interpretative Phenomenological Analysis (IPA) was used to record the lived experiences and meaning-making processes of children, parents, and educators regarding engagement with knowledge during the COVID-19 lockdown. IPA has been suggested as a suitable choice when examining subjective epistemic experiences in a novel educational disruption (Ismail & Kinchin, 2023).

Participants

The participants were chosen through purposive sampling. We conducted semi-structured interviews with a total of fifteen individuals, consisting of five students, five teachers, and five mothers who were approached as parents. Fathers of the participants expressed a preference for interviewing mothers among the parent group, believing them to be more aware of their children's educational matters and therefore more reliable interviewees. Participants were informed that the interview results would be publicly accessible and used. The participants provided written consent to take part in the study and to allow the use of their data for research purposes.

Procedure

All participants were recruited face-to-face. The researchers provided the participants with an explanation of the study procedures and obtained their informed consent. Students were also given parental consent forms, which they returned after completion. Participants were assured that they were free to withdraw from the study at any time and for any reason; however, none chose to do so. The study was approved by the Ethics Committee of the Department of Psychology, Indira Gandhi National Tribal University, Amarkantak, 484887, Madhya Pradesh, India. We collected informed consent from participants and maintained their confidentiality. We also anonymized the data to ensure their privacy.

Data Collection

The approach utilized in this study involved conducting semi-structured interviews. In a semi-structured interview, the researcher follows a guide or schedule centered on various key issues related to the research question at hand (Al-Saggaf & Williamson, 2004). The use of follow-up questions (probes) to clarify responses can help ensure that participants' epistemic cognition, based on the AIR model, is thoroughly explored. Unlike structured interviews, the sequence of questions in semi-structured interviews is not rigidly predetermined. This flexibility allows researchers to delve deeper into the research questions and gain a comprehensive understanding of participants' perspectives (Miles et al., 2013).

The interviews were scheduled over the course of a week to accommodate the availability of each participant. The duration of each interview varied: student interviews lasted between 15 and 22 minutes, while those with mothers ranged from 18 to 25 minutes, and teachers' interviews lasted from 17 to 25 minutes. Teacher interviews were conducted individually with two researchers and the participant, while the remaining interviews were conducted individually with one researcher and the participant. The researchers ensured that each participant was asked about every aspect of the AIR model of epistemic cognition in the context of children's engagement with knowledge during COVID-19. Using a qualitative interview technique allowed us to thoroughly explore important statements made during the interviews (Patton, 2015).

The interview protocols varied based on the participants' roles (i.e., students, teachers, and mothers). Nevertheless, all protocols aimed to explore the same fundamental epistemic cognition from different viewpoints. The student protocol (see Table 1) included inquiries about their focus during online classes, their engagement in other activities besides attending online classes, their satisfaction with online classes, and their opinions on online versus offline classes. The questions in the student protocol were phrased in a manner intended to be more accessible to them.

Table 1

Semi-structured Interview Protocol for the Students

S. No.	Questions
1.	Do your teachers provide you with satisfying online lectures?
2.	Do your teachers clarify your doubts?
3.	Suppose you want to read after classes or for exams. Do teachers provide you with study materials, or what else do you depend on for reading?
4.	Can you concentrate on online classes for a very long period?
5.	Compared to pre-COVID-19 classes, are you satisfied with the current online classes?

S. No.	Questions
6.	Do you have any complaints about online classes?
7.	What are the major good things about online classes?
8.	Do you feel happy attending online classes regularly and on time?
9.	Have your marks improved during the COVID-19 period compared to pre-COVID-19?
10.	Which activity do you like to do most of the time during the COVID-19 lockdown?
11.	Do you feel like talking, playing, or engaging in other favourite activities rather than attending online classes?
12.	Do you spend time on entertaining things using the internet or devices, or doing other offline activities?
13.	Are you curious to seek further information if you need clarification from the teachers?

The interview protocols for mothers and teachers (see Tables 2 and 3) featured questions regarding their observations of their children's or students' focus levels during online classes, whether they noticed them participating in other activities during class, their children's or students' satisfaction with online classes, and their opinions on online versus offline classes. After each interview with all participants, we inquired whether there were any additional positive or negative aspects related to children's engagement with knowledge during COVID-19 that we had not addressed.

Table 2

Semi-structured Interview Protocol for the Mothers

S. No.	Questions
1.	Do your children's teachers provide them with satisfying online lectures?
2.	Do they clarify the children's doubts?
3.	Suppose your children want to read after classes or for exams. Do teachers or you provide them with study materials, or what else do they depend on for reading?
4.	Can your children concentrate on online classes for a very long period?
5.	Compared to pre-COVID-19 classes, are your children satisfied with the current online classes?
6.	Do they complain about online classes?
7.	What are the major good things they share about online classes?

S. No.	Questions
8.	Do you have to force your child to attend online classes?
9.	Do you think your child's marks have improved during the COVID-19 period compared to pre-COVID-19?
10.	Which activity does your child like to do most of the time during the COVID-19 lockdown?
11.	Have you seen your child talking, playing, or engaging in other activities rather than attending online classes?
12.	Does your child habitually spend more time using the internet or devices without bothering about anything else?
13.	Do you inquire what he/she does with social media?
14.	Has your child ever done something online or offline that amazed you? How did you respond?
15.	Does your child show curiosity to seek further information if you or the teachers ask interesting questions in class or random conversation?

Data Analysis

All interviews were recorded using a mobile recorder, with participants providing prior consent for the recording sessions. This allowed researchers to focus entirely on participants' responses without missing any points. While all teachers responded in English, mothers and students responded in Hindi. All the authors listened to the recorded interviews in their entirety and reviewed the transcriptions to ensure data accuracy. The data were then translated into English and transcribed by a team of bilingual experts, covering the entire interview conversation except for insignificant dialogues unrelated to the research question. Bilingual experts used a forward-backward translation process to translate Hindi interviews into English in order to maintain participants' epistemic meaning and guarantee semantic equivalency. The data were analyzed using Interpretative Phenomenological Analysis (IPA; Smith et al., 2009).

The translated passages were uploaded into NVIVO for analysis, with relevant data segments compiled into a separate list during the coding process. To maintain reflexivity and prevent the introduction of researchers' ideas into the data, the researchers thoroughly read and re-read the transcriptions. Keywords were identified and applied to themes based on the AIR model of epistemic cognition. As the interviews progressed, redundancy in the data was observed, indicating that further data collection was unnecessary. The second and third authors conducted peer debriefing of the first author to ensure data authenticity. Thus, multiple techniques—including semi-structured interviews, probes to deepen data, peer

debriefing, and in vivo coding—were employed to ensure data authenticity. Data saturation was reached when no new experiential themes pertaining to epistemic objectives, principles, or procedures surfaced among participant groups.

Table 3

Semi-structured Interview Protocol for the Teachers

S. No.	Questions
1.	Do you feel comfortable conveying knowledge in online classes?
2.	Do students ask questions during online classes, and do you feel comfortable responding to those doubts?
3.	Suppose your students want to read after classes or for exams. Do you provide them with study materials, or what else do they depend on for reading?
4.	Can your students concentrate on online classes for a very long period?
5.	Compared to pre-COVID-19 classes, are your students satisfied with the current online classes?
6.	Do they complain about online classes?
7.	What are the major good things they share about online classes?
8.	Do you have to compel your students to attend online classes?
9.	Do you think your students' marks have improved during the COVID-19 period compared to pre-COVID-19?
10.	Which activity do your students like to do most of the time during the COVID-19 lockdown?
11.	Have you seen your students talking, playing, or engaging in other activities rather than attending online classes?
12.	Do your students habitually spend more time using the internet or devices without focusing on their studies?
13.	Do you inquire about what they do with social media?
14.	Have your students ever done something online or offline that amazed you? How did you respond?
15.	Do your students show curiosity to seek further information if you ask interesting questions in class or in random conversation?

RESULTS

The analysis showed that students' engagement with knowledge during the COVID-19 lockdown was plagued by widespread difficulties, with maladaptive epistemic strategies

predominating over adaptive ones. Participants in student, parent, and teacher interviews consistently reported a shift toward non-epistemic goals, such as prioritizing convenience, grades, and task completion over genuine understanding. There were many reports of reliance on unreliable procedures, such as copying during online assessments, passive attendance, and disengagement through muted audio-video. While there were sporadic examples of adaptive epistemic engagement, especially when educators showed consistent academic dedication, these instances were few. The following themes use representative quotations to illustrate how participants perceive epistemic goals, values, and procedures.

Epistemic Aim Through Participants' Perspectives

One out of every five parents commended the teachers for their dedication to ensuring individual attention to each student and managing disruptive behavior in the classroom. They observed that the teachers patiently attended to each student, resulting in significant improvements in their children's academic performance.

The teachers are exceptional; they sometimes ask questions and address doubts during class. They have paid considerable attention to my children, resulting in an 80% improvement in academic performance compared to their previous school. Although some students in the online class may create disturbances, the teachers effectively manage them by remaining calm and not responding with verbal abuse. As a result, these disruptive students eventually quiet down. (Parent #4)

A teacher mentioned how students often go beyond the school's study materials to explore a topic extensively. Those who actively seek multiple perspectives to truly understand an issue are pursuing adaptive epistemic goals.

Only a small percentage of students—approximately 10–15%—demonstrate curiosity in understanding concepts during class. They use Google to seek additional information and then share their findings with the class the following day. (Teacher #5)

Non-epistemic Aim Through Participants' Perspectives

Most participants, including students, reported instances of students copying answers during online exams. Such behavior clearly demonstrates the prevalence of non-epistemic motives. Copying is used by students to evade the cognitive effort required for genuine understanding, which undermines the development of adaptive epistemic cognition. A belief can be classified as non-epistemic if it does not serve an epistemic purpose.

Four out of five student interviewees mentioned that they tried to copy answers during online exams and assignments because it required minimal effort, and they found it easy to do so.

In online exams, we're required to write our answers on sheets and submit them by scanning them into a Google form. I know that my teachers won't read all of the answers (laughs). Can you explain how they determine if I've copied answers during online exams, since we're allowed to have textbooks and other materials in front of us that the teachers cannot see? (Student #4)

I need to submit assignments by the next day. You know, some teachers don't give us sufficient time to complete our assignments. Sometimes, we're given assignments from multiple teachers simultaneously, so I often feel pressured to copy answers from Google and submit them as quickly as possible. (Student #3)

Another student remarked, "My teachers schedule exams back-to-back without allowing much time in between" (Student #1).

A third student shared, "I take screenshots of online notes to write down later, but I often feel too lazy to do so after some time" (Student #3).

Three out of five parents reported that their children copied answers during online exams.

I try to prevent them (my children) from copying answers from other tabs or materials during exams, but they cleverly cheat. (Parent #1)

Occasionally, I help my child copy answers (laughs). (Parent #2)

Most of the time, my children copy during exams. Initially, we instructed them not to refer to books, but they only followed this rule for a brief period. When we are occupied with our tasks, they sneakily take out books and copy answers during exams. (Parent #5)

A parent mentioned that their children tend to copy the notes provided by teachers and do not have additional study materials for further reading (Parent #5).

Encouraging students to explore additional reading materials will foster their interest in employing adaptive strategies to attain epistemic goals rather than resorting to maladaptive methods.

My children don't have textbooks for online classes. Instead, they copy the notes provided by teachers and are not motivated to explore or learn beyond those notes. (Parent #5)

Four out of five teachers mentioned that exams and grades in online classes are unreliable compared to pre-COVID-19 times, as they are aware that most students copy answers during exams.

As an educator, I'm confident that many students copy answers during online exams. It surprises me to see some less academically inclined students producing very sophisticated responses; I suspect they are copying from Google. The desire to achieve high marks motivates even capable students to copy during online exams. (Teacher #5)

Epistemic Value (Positive) Through Participants' Perspectives

Participating in skill-building activities requires concentrated cognitive effort. Findings indicated that certain children who acquired valuable skills placed a higher importance on learning those skills compared to other less demanding activities.

Two of them engaged in extracurricular skill-building activities. One student learned to bake various types of cakes. "I enjoy baking cakes, and I've tried learning different cake-making styles from different regions of India, experimenting with them," said Student #5.

Since my online classes are short, I have more free time during the day. I use this time to gather general knowledge from YouTube and take notes. I'm particularly interested in learning about scientific facts through YouTube videos, particularly from channels like (mention specific channels). (Student #4)

Three of the five parents mentioned their children's participation in skill-building activities.

My children use YouTube videos to learn languages and calligraphy, and watch animated stories, even though they have a strong desire to excessively use their mobile devices for other unrelated purposes. (Parent #1)

During the COVID-19 pandemic, my children acquired skills in calligraphy, mehndi (henna design), and cake making. Additionally, we provided them with the necessary materials to engage in these activities. (Parent #4)

My children frequently listen to informative speeches on YouTube, although they occasionally get distracted by other entertaining videos. (Parent #2)

Epistemic Value (Negative) Through Participants' Perspectives

Three of the five interviewees mentioned attempting to participate in other activities during online classes by disabling both audio and video.

I tend to get bored quickly, especially within the first fifteen minutes of starting online classes. That's why I make sure to have my favourite snacks nearby, and I often take breaks to grab some fruits from the refrigerator during class. (Student #1)

I usually read Sudha Murthy stories during classes because my teachers often don't notice when my camera is turned off. Listening to the online class is challenging due to network issues, and I find it difficult to comprehend properly. (Student #5)

Some attempted to engage in outdoor activities with friends from the neighbourhood during classes. "I play ludo with my older sister during class when I feel bored" (Student #3).

All parents mentioned that their children frequently turn off the audio or video during online classes to engage in other activities.

My children opt to watch entertaining videos on YouTube while muting the video or audio of their online classes. (Parent #2)

My children choose to read online stories while muting both the video and audio of their online classes. (Parent #1)

My children engage in play or conversation with us while their online classes are ongoing. (Parent #3)

One parent mentioned a significant gap in knowledge transmission, stating that due to delayed online classes, their children spent time watching TV and playing outside, leading to a decline in previously acquired knowledge. Additionally, two teachers noted the lack of discussions about students' personal situations during online classes due to time constraints.

Teacher #2 stated that there were no organized discussions to gather feedback from students regarding online classes compared to offline ones. Teacher #1 argued that students have not expressed concerns about online classes, likely because these classes focus solely on covering the syllabus within the allocated time.

Four of the five teachers reported that students occasionally disable both video and audio during class without notifying them.

Certain students (sarcastically speaking) disable their video during class, and when questioned about it, they offer false excuses; it is apparent they are engaged in unrelated activities instead of paying attention to the lesson. (Teacher #2)

Four out of five teachers reported that they had not observed notable extracurricular activities, such as creative artwork, among their students.

Teacher #2 stated that they had not observed any creative activities among their students, while Teacher #3 mentioned a lack of creative work and noted that the students often spent their time playing outside or watching TV. Teacher #4 mentioned that only a few students were involved in creating science models.

Reliable Processes (Emotions in Producing Knowledge)

Three participants provided positive feedback about their teachers. One student appreciated their English teacher's thorough explanations and emotional expression during classes, which made them feel more comfortable listening (Student #1). Another student expressed a liking for social and science subjects due to the detailed explanations, experiments, personalized quizzes, and clarification of complex concepts provided by the teachers. The third student mentioned their teacher's patience in addressing doubts, even when students asked repeatedly (Student #2).

Unreliable Processes (Emotions in Producing Knowledge)

The findings indicate a prevalence of factors hindering adaptive epistemic cognition based on the statements provided by students. In the interviews with five students, a unanimous agreement emerged concerning the significant adverse impact of online classes on their ability to concentrate. Each student expressed experiencing boredom and fatigue when attending online classes for prolonged durations.

Staring at the screen for an extended period is exhausting (expressed with a disappointed facial expression). Although I try to appear attentive in class, my mind often wanders to thoughts of playing Ludo with my friends. (Student #1)

I struggle to maintain focus for more than 20 minutes. In traditional offline classes, I could concentrate much better. (Student #3)

Two of the five interviewees mentioned they encountered difficulty in understanding certain concepts during online classes. They attributed this challenge to intermittent network buffering and the teachers' voices being inaudible.

Frequently, I eagerly sit in front of my tablet, determined to follow my favourite classes. However, the online session often gets disrupted by network issues, which frustrates me and diminishes my motivation to focus. (Student #4)

I live in a somewhat isolated area where I usually have a good network connection. However, there are times when the network is lost for extended periods, causing me to miss many of my classes. (Student #2)

Two students described negative behavior exhibited by their teachers.

"One of my teachers uses abusive language in class, which is hurtful to me," said Student #1. Student #4 shared, "My mathematics teacher becomes angry if we ask additional questions during class, claiming that time is limited, and we shouldn't ask unnecessary questions."

All parents reported that their children struggled to maintain focus during online classes for extended periods due to feeling exhausted.

My child suffers from intense headaches after spending extended periods in online classes. As a result, they lose interest in attending these sessions and prefer engaging in other activities they enjoy, such as gardening and cleaning the surroundings. (Parent #2)

My children suffer from eye strain because they spend long periods in online classes. (Parent #5)

Four out of five parents observed that their children displayed excessive cravings for digital devices, often watching entertainment on their mobile phones during classes. All interviewed parents noted that their children tended to engage in irrelevant activities after listening to online classes for a short period. There was unanimous agreement among the

parents that digital devices, particularly mobile phones, were the primary distractions affecting their children's studies.

I'm exhausted from constantly reminding my children not to use YouTube and play games during their classes and study sessions; they're irresistibly drawn to their devices even when they should be studying. (Parent #3)

There was agreement among the parents about the importance of remaining quiet and refraining from active participation during online classes.

My children tend to remain quiet during classes, refraining from asking questions and passively absorbing the lesson. (Parent #4)

The lack of access to high-speed internet facilities hindered the proper delivery of education.

The network problems caused children to have difficulty understanding the concepts taught during online classes. (Parent #5)

Regarding maintaining focus during online classes, all interviewed teachers concurred on the challenge students face in sustaining concentration. They noted that students tend to become distracted after extended periods of online instruction.

Teacher #1 reported that 25 out of 66 students consistently attend online classes. However, their concentration typically lasts for only half an hour before they become distracted.

Teacher #2 noted that 20% of students do not attend classes regularly. According to Teacher #3, only 30–40% of students attend classes consistently. Teacher #5 observed that many students do not attend their classes regularly.

All teachers concurred that digital devices divert students' concentration during classes.

Teacher #2 expressed that students show disinterest in engaging in creative skill-building activities due to distractions from mobile devices. Teacher #1 noted that students in their class are often disrupted during online sessions due to inadequate mobile data.

All teachers unanimously agreed that online classes fell short of offline classes in several aspects. Various reasons supported this assertion, including the constraints of time during online sessions, the inability to individually monitor each student, connectivity issues with the internet, physical discomfort such as headaches and eye strain from prolonged screen use, and the absence of access to digital devices.

Teacher #5 expressed that offline and online classes present distinct challenges, noting that individual monitoring in online classes is not as comprehensive as in offline settings.

All teachers agreed that online classes did not match the quality of offline classes.

Teacher #2 expressed concerns about the limited time available for online lectures, which puts pressure on covering the syllabus swiftly. Teacher #5 noted the challenge of

monitoring and individually focusing on each student during online classes. Teacher #4 highlighted that some students struggle to maintain concentration due to unclear concepts presented in online classes, leading to complaints about headaches and eye strain from prolonged screen exposure. Additionally, Teacher #2 mentioned that a few students lack access to proper mobile phones at home. Teacher #3 added that students often complain about voice clarity issues caused by network problems, which hinder their understanding of concepts even after thorough explanations.

All teachers noted that students generally lack curiosity and refrain from asking further questions to clarify doubts.

Teacher #1: A small percentage—approximately 10%—of students show curiosity by asking questions during classes.

Teacher #2: Few students inquire during classes and demonstrate a curiosity to delve into topics further.

Teacher #3: Only a handful express curiosity by asking questions or seeking clarification.

Teacher #4: I am uncertain about how to foster curiosity among students effectively in online classes.

Teacher #5: A very limited number—ranging from 0 to 5%—of students exhibit curiosity to comprehend concepts during class.

Four teachers noted that most students remained quiet during classes without participating actively.

Teacher #2 expressed frustration over students remaining silent when questions are asked, requiring the teacher to call them out by name for responses. Additionally, many students appear to log into the class but are mentally absent.

Teacher #3 noted that although most students were physically present, their attention was elsewhere, leading to the loss of valuable academic content.

Teacher #1 observed that many students join classes simply to pass the time, lacking faith in the academic value of online instruction.

DISCUSSION

The current study reveals that during the COVID-19-induced transition to online learning, students significantly favoured maladaptive over adaptive epistemic strategies. According to the AIR model, students frequently gave non-epistemic objectives—such as task completion, grades, convenience, and effort avoidance—precedence over comprehension and knowledge construction. Unreliable epistemic processes and weakened epistemic values are reflected in behaviors such as copying answers during online exams, passive attendance, and disengagement through muted audio-video. These results support concerns

that online assessment settings may unintentionally encourage strategic compliance and surface learning rather than epistemic development. However, there were clear instances of adaptive epistemic engagement. A small percentage of students showed curiosity, looked for information from a variety of sources, and participated in skill-building activities such as calligraphy, baking, and independent study using instructional videos. Crucially, teachers who demonstrated patience, emotional intelligence, and a dedication to their students' academic development frequently facilitated this kind of engagement. This confirms earlier findings that, even in limited online settings, teachers' pedagogical dispositions and epistemic cognition are crucial for promoting adaptive epistemic goals.

Boredom, exhaustion, frustration, and anxiety are examples of negative emotions that have been shown to function as unreliable processes that undermine epistemic engagement. Students' curiosity and willingness to participate were further reduced by extended screen time, network disruptions, limited interaction, and occasionally emotionally unsupportive behavior from teachers. Parents' testimonies, which emphasized excessive device use, cognitive fatigue, and short attention spans, confirmed these concerns. The findings indicate that many students' online learning during the pandemic was epistemically impoverished—not only because of technological obstacles but also because the learning environment did not support adaptive epistemic goals. In order to foster deeper engagement with knowledge, the study emphasizes the necessity of online pedagogies that specifically cultivate epistemic curiosity, ethical learning practices, emotional safety, and meaningful interaction.

This qualitative study unveiled key aspects related to students' involvement with knowledge during the COVID-19 pandemic. It became evident that students lacked adaptive epistemic strategies during this period. Maladaptive epistemic strategies—including prioritizing non-epistemic goals, placing undue importance on non-epistemic values, and relying on unreliable processes—were prevalent among the students in our study. Our findings revealed a higher prevalence of maladaptive epistemic strategies compared to adaptive ones among students.

The positive feedback from certain students and teachers regarding the effectiveness of teachers in maintaining students' academic interest indicates that when teachers adopt a consistent focus on students' academic growth, it can have a positive impact on students. A few participants, including three students and a mother, expressed satisfaction with their teachers' effectiveness. Multiple pieces of evidence indicate that teachers' epistemic cognition is linked to their teaching practices; thus, teachers must embrace adaptive epistemic cognition (Lunn Brownlee et al., 2017). The epistemic cognition of practicing teachers can influence their teaching methods, approach, and expectations of their students (Buehl & Fives, 2009). Teachers' epistemic cognition can be enhanced by cultivating epistemic virtues such as reflexivity (Fives et al., 2017).

School authorities were initially reluctant to introduce alternatives to offline classes, a stance that was disrupted by the pandemic. Many participants, including students, admitted that students often muted video and audio during online classes, indicating a lack of concentration. This behavior suggests that students who mute themselves to engage in unrelated tasks may not prioritize class participation, hindering the development of adaptive epistemic cognition. Most participants—including four teachers, two parents, and three students—noted that students did not make any effort to develop skills or engage in creative activities. This lack of interest suggests a preference for less demanding activities, which may impact the prioritization of epistemic values to achieve knowledge-related goals.

The pandemic highlights the importance of maintaining educational standards. The lack of response by education authorities to the importance of knowledge is a cause for concern. When institutions do not prioritize the value of knowledge, it can lead to a lack of motivation among students to engage in adaptive learning strategies and achieve cognitive growth (Dhawan, 2020). Students who regularly interact with their teachers, maintain positive relationships, and receive constructive feedback are more likely to engage in learning and achieve academic success (Rimm-Kaufman & Sandilos, 2015). Positive emotions such as curiosity can encourage greater effort to achieve knowledge-related goals. Patience and appropriate emotional responses in challenging classroom situations can elicit positive emotions in students and support cognitive goals.

A lack of mutual positive interaction between teachers and students can lead to negative emotions and reduce students' motivation to learn. Negative emotions are unreliable for promoting adaptive cognitive processes. Without positive emotions such as genuine curiosity, attempts to learn can be ineffective. The lack of positive emotions in educational interactions significantly hinders cognitive development. An abusive teacher-student relationship can also lead to negative emotions and hinder epistemic goals. Studies show that negative teacher-student relationships hinder academic and social-emotional development (McCormick & O'Connor, 2015; O'Connor et al., 2012). Participants noted that students have difficulty maintaining concentration, become distracted, or become tired during online classes. Teachers and parents agreed that digital devices are a major source of distraction in online classes. While moderate internet usage can benefit students, excessive internet addiction negatively impacts academic performance (Singh & Barmola, 2015). Research in North India found that a significant percentage of students reported reduced academic performance due to excessive use of digital devices. In rural India, high mobile phone consumption contributes to technology addiction, poor academic performance, and mental health problems (Jamir et al., 2019). Excessive technology use among adolescents is associated with low emotional stability, anxiety, and depression (Chou et al., 2017; Kim et al., 2018; Wu et al., 2013). Furthermore, the COVID-19 lockdown increased stress among

adolescents, leaving many feeling unable to use their time effectively (Allen et al., 2019; Chaturvedi et al., 2021; Kuss & Lopez-Fernandez, 2016; Pandya & Lodha, 2021).

Research suggests that students tend to spend excessive amounts of time on digital devices, which is linked to poorer academic performance. Lockdown-related stress and emotional challenges may further hinder students' engagement in adaptive epistemic cognition. Epistemic vices such as bigotry and dishonesty can hinder epistemic goals (Chinn et al., 2014). Many teachers and parents reported student passivity during online classes and noted that limited instructional time often results in a rushed curriculum, undermining deeper understanding (Rimm-Kaufman & Sandilos, 2015).

Educational systems should develop strategies to improve every child's learning experience in digital education while addressing existing challenges. Many children struggle with conceptual understanding in online classes, which hinders effective knowledge transfer. Persistent problems with online learning can reduce children's motivation and affect their cognitive development. Therefore, educators must assess the impact of the pandemic-related shift to online learning on children's educational experiences and outcomes.

Previous research highlights the significant challenges of online learning. Epistemic researchers emphasize the importance of knowledge and understanding as key cognitive goals. In parts of India, inconsistent high-speed internet results in frequent interruptions of synchronous video and audio lectures, which are critical for live participation, immediate feedback, and real-time interaction. Epistemicists distinguish between knowledge—which involves isolated facts—and understanding, which requires connecting these facts into a coherent framework (Chinn et al., 2011).

Technical challenges such as audio and video issues, download errors, and login errors can reduce engagement and cause boredom in online learning (Dhawan, 2020). Such difficulties can impact students' ability to understand lesson objectives and potentially lead to disengagement. This boredom and detachment can hinder adaptive epistemic cognition because they involve negative emotional states. When students turn off video feeds or switch focus during online lectures, this may not indicate a lack of interest in sophisticated epistemic cognition but rather reflects the obstacles that online learning presents compared to traditional methods. Additionally, it can be difficult to achieve effective two-way interaction in online learning. Our study found that some teachers had difficulty giving detailed explanations due to the shortened class duration. Research highlights that inadequate course content and a lack of personal attention are major problems with online learning (Dhawan, 2020).

When compared to traditional classroom settings, online learning in India during the COVID-19 pandemic revealed significant socioeconomic and infrastructure disparities. Many students reported worse learning experiences, technical difficulties, and stress; urban learners and those with better devices were more receptive, underscoring the digital divide

in access and pedagogical readiness (Bast, 2021; Saraf et al., 2021; Tiwari et al., 2025; Tiwari, Rai, et al., 2023). Research from South America, on the other hand, demonstrates comparable forced shifts to remote learning, with region-specific emphasis on student engagement dimensions (behavioral, cognitive, and affective) and persistent connectivity issues that hindered high-quality online instruction (Salas-Pilco et al., 2022). While both regions struggled with emergency remote teaching and inequitable access, Latin American research emphasized professional training and engagement constructs as essential components of successful online learning, indicating that pedagogical and emotional support strategies—rather than infrastructure—had a greater comparative influence on learning outcomes.

Limitations, Educational Implications, and Directions for Future Research

The current study is not without limitations, and they should be considered when interpreting the results. First, the results' generalizability is limited by the small and purposive sample, which included just five parents, five teachers, and five students. The experiences described may not accurately represent the variety of students and learning environments found in various geographical areas, school types, or socioeconomic backgrounds. Second, the fact that all the parent participants were mothers limits our understanding of how fathers and other caregivers can support their children's learning during online schooling. Third, social desirability or recall biases may have been introduced through the use of self-reported data, especially when it comes to sensitive behaviors such as copying during online exams. Furthermore, the cross-sectional design was unable to account for changes in adaptation over time, as it only recorded experiences at one point during the pandemic. Lastly, the study's focus was on participants' perceptions rather than direct observations of learning behaviors.

The findings, especially with regard to online and blended learning, have significant implications for educational practice and policy. Instead of focusing solely on grades and task completion, educators should specifically emphasize developing adaptive epistemic strategies such as curiosity, critical inquiry, and ethical learning practices. Online classroom engagement, emotional sensitivity, and epistemic cognition should all be included in professional development programs and teacher training. To lessen the possibility of academic dishonesty and encourage deeper learning, online assessment procedures need to be reconsidered at the policy level. It is crucial to guarantee stable internet connectivity, learner support systems, and equitable access to digital devices. Policies should also place a high priority on controlled screen time, interactive pedagogies, and planned opportunities for student-teacher interaction in order to maintain meaningful engagement with knowledge.

Future research should expand on this study by using larger and more diverse samples from various educational levels, geographical locations, and socioeconomic contexts to improve transferability. Examining how students' epistemic cognition and engagement with knowledge change over time in online or hybrid learning environments would benefit greatly from longitudinal designs. A more thorough understanding could be obtained through mixed-methods approaches that combine qualitative insights with quantitative measurements of academic outcomes, engagement, and epistemic beliefs. In addition to examining disciplinary variations in epistemic engagement, future research should investigate the viewpoints of fathers, caregivers, and school administrators. Lastly, intervention-based research is required to test pedagogical approaches and assessment models that specifically support adaptive epistemic cognition in digital learning contexts.

CONCLUSION

The qualitative investigation employing the AIR model of epistemic cognition uncovered significant insights into children's engagement with knowledge during the COVID-19 lockdown. Students demonstrated a deficiency in adaptive epistemic strategies, often resorting to non-epistemic goals such as copying answers during online exams. Positive feedback emphasized the crucial role of dedicated teachers in fostering academic growth. Skill-building activities were valued, while distractions during online classes impeded learning. Teachers acknowledged the challenges of online learning, including decreased student participation. Overall, online classes were perceived as less effective compared to offline classes. The findings underscore the complex interplay of factors influencing educational experiences during the pandemic, highlighting the need for further research and intervention.

Compliance with Ethical Guidelines

The study was approved by the Ethics Committee of the Department of Psychology, Indira Gandhi National Tribal University, Amarkantak, 484887, Madhya Pradesh, India.

Competing Interest

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