A Qualitative Exploration of How the Katanzama Indigenous People Experience Self-Regulated Learning and Metacognition*

[English version]

Una exploración cualitativa de cómo el pueblo indígena «Katanzama» experimenta el aprendizaje autorregulado y la metacognición

Uma exploração qualitativa de como o povo indígena «Katanzama» experimenta a aprendizagem autorregulada e a metacognição

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Abstract

Objective: Self-regulated learning (SRL) and metacognition are recognized as critical thinking processes essential for effective achievement, problem-solving, and critical thinking, among other aspects. While there is abundant research on these concepts for typical populations, particularly with white ethnic groups from regions such as the United States and Europe, these constructs have not been extensively investigated in other population groups or ethnic minorities. Therefore, the purpose of this study was to examine how these two phenomena are experienced by the Katanzama indigenous culture in Santa Marta, Colombia. **Methodology**: To achieve this, a structured interview protocol was developed with questions about how this indigenous group experiences SRL, metacognition, and the act of teaching. **Results**: Iterative thematic analyses revealed six themes emerging from the interview data: 1) Knowledge of context and cultural relevance in learning; 2) Regulation and adaptation in learning processes; 3) Diversification of teaching strategies; 4) Learning from mistakes; 5) Planning and organization of study; and 6) Self-criticism and pursuit of continuous improvement. **Conclusions**: The implications for research, theory, and practice are discussed.

Keywords: indigenous population; self-regulated learning; self-learning; metacognition; qualitative research (obtained from Bireme thesaurus).

Resumen

Objetivo: el aprendizaje autorregulado (AA) y la metacognición se reconocen como procesos críticos de pensamiento que son necesarios para el logro efectivo, la resolución de problemas y el pensamiento crítico, entre otros. Si bien abundan investigaciones

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sobre estos conceptos para las poblaciones típicas, que han privilegiado estudios con grupos étnicos blancos de regiones como Estados Unidos y Europa, se considera que no se han investigado estos constructos en otros grupos poblacionales o minorías étnicas. Así, el propósito del presente estudio fue examinar cómo estos dos fenómenos son experimentados por la cultura indígena «Katanzama» de Santa Marta, Colombia. **Metodología**: para ello, se desarrolló un protocolo de entrevista estructurada con preguntas sobre cómo este grupo de indígenas experimenta el AA, la metacognición y el acto de enseñar. **Resultados**: los análisis temáticos iterativos revelaron seis temas que surgieron de los datos de las entrevistas: 1) Conocimiento del contexto y relevancia cultural en el aprendizaje; 2) Regulación y adaptación en los procesos de aprendizaje; 3) Diversificación de estrategias de enseñanza; 4) Aprendizaje a partir de errores; 5) Planificación y organización del estudio; y 6) Autocrítica y búsqueda de mejora continua. **Conclusiones**: se discuten las implicaciones para la investigación, la teoría y la práctica.

Palabras clave: población indígena; aprendizaje autorregulado, autoaprendizaje; metacognición; investigación cualitativa (obtenidos del tesauro Bireme).

Resumo

Objetivo: a aprendizagem autorregulada (AA) e a metacognição são reconhecidas como processos críticos de pensamento necessários para o sucesso efetivo, a resolução de problemas e o pensamento crítico, entre outros. Embora existam muitas pesquisas sobre esses conceitos para populações típicas, predominantemente em grupos étnicos brancos de regiões como Estados Unidos e Europa, acredita-se que esses construtos não foram suficientemente investigados em outros grupos populacionais ou minorias étnicas. Assim, o objetivo deste estudo foi examinar como esses dois fenômenos são vivenciados pela cultura indígena «Katanzama» de Santa Marta, Colômbia. **Metodologia**: para isso, foi desenvolvido um protocolo de entrevista estruturada com perguntas sobre como esse grupo indígena experimenta a AA, a metacognição e o ato de ensinar. **Resultados**: as análises temáticas iterativas revelaram seis temas que surgiram dos dados das entrevistas: 1) Conhecimento do contexto e relevância cultural na aprendizagem; 2) Regulação e adaptação nos processos de aprendizagem; 3) Diversificação de estratégias de ensino; 4) Aprendizagem a partir de erros; 5) Planejamento e organização dos estudos; e 6) Autocrítica e busca de melhoria contínua. **Conclusões**: são discutidas as implicações para a pesquisa, a teoria e a prática.

Palavras-chave: população indígena; aprendizagem autorregulada; autoaprendizagem; metacognição; pesquisa qualitativa (obtidos do tesauro Bireme).

Introduction

Colombia is in the northwestern corner of South America, covering an area of 1,141,748 km2. The country has coastlines along the Pacific and Atlantic Oceans and is traversed from south to north by the Western, Central, and Eastern Andes Mountain ranges. Colombia is characterized by its geographical, biological, ethnic, and cultural diversity, encompassing a variety of landscapes including coastal regions, the Andes, tropical forests in the Pacific and Amazon, plains, vast desert areas, and island territories. These regions are the home of more than 115 Indigenous peoples and communities of African descent (Grupo Internacional de Trabajo sobre Asuntos Indígenas -IWGIA, 2023).

The most recent census, conducted in 2018, identified an ethnically diverse population, accounting for 13.6% of Colombia's total population of 48,258,494 people. This corresponds to 1,905,617 individuals who self-identify as Indigenous peoples of diverse origins, and 4,671,160 individuals who identify as Afro descendant, *Raizal*[1], *Palenquero*[2], and *Rrom*[3] populations. These figures are based on a national population estimate of 51,609,000 people in 2024 (Agencia Nacional de Tierras, 2022).

In 2022, it was estimated that roughly 58.3% of indigenous people in Colombia reside on legally recognized collective property reserves These contexts provide evident access to education that respects the language, beliefs, and cultural idiosyncrasies of each indigenous group. At the same time, the remaining 41.7% of the indigenous population have moved to urban centers due to various social and economic factors, including forced displacement, disappearances, violence, and poverty, resulting in the loss of access to their culturally relevant education. In this respect, it is acknowledged that, as of 2022, there were significant incidents of violence in the ethnic territories of certain regions, particularly murdering indigenous leaders from groups such as the Awá, Nasa, and Embera in Nariño, Cauca, Chocó, and Antioquia (Organización Nacional Indígena de Colombia -ONIC, 2023).

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1 The *Raizal* ethnic group is native to the islands of San Andrés, Providencia and Santa Catalina. They are descendants of the miscegenation between indigenous people, Spaniards, French, English, Dutch, and Africans (Abello & Mow, 2008).

2 *Palenques* are a form of anti-colonial resistance by Maroons (De Friedman & Patiño, 1983).

3 The *Rrom* or Gypsy people are transnational and of Nordic origin. In Colombia, they are found in the departments of Atlántico, Bolívar, Valle del Cauca, and Bogotá (Ministry of Culture of Colombia, 2024).

This displacement of Indigenous children and young people to rural and urban educational centers underscores the loss of access to culturally relevant education, compelling them to enter educational systems that often fail to recognize their diversity, worldviews, traditional laws, authorities, economic models, language, as well as ancestral knowledge. This emphasizes the need to understand how children and youth learn and self-regulate within the context of their ethnic and cultural diversity.

In this respect, several researchers have remarked that students from non-dominant cultures, when included in regular classrooms, are at a high risk of experiencing a lack of engagement and inclusion due to the culturally diverse nature of these educational settings. This challenge arises from classroom activities often disconnected from their backgrounds, interests, and lived experiences (Anyichie et al., 2023; Gay, 2018).

Given these challenges, further research is needed to gain deeper insights into how ethnic minorities, including indigenous students, learn and self-regulate in both rural and urban classrooms. It is imperative to guarantee that these students can effectively self-regulate their learning processes and fully capitalize on the educational opportunities at their disposal while honoring their ethnic diversity and preserving their traditions. To foster an environment that respects and enhances their resources, it is crucial to consider the influence of background, heritage, and cultural practices on individual learning processes (Anyichie et al., 2023; Gay, 2018; Kerfoot, 2005; Villegas & Lucas, 2002). Table 1 depicts the relevant literature review for this study.

Table 1. *Studies on the Process of Metacognition and Self-regulated Learning in Indigenous Populations.*

Researchers	Country	Objective/Method	Findings
Resing, W., Tunteler, E., de Jong, F., & Bosma, T. (2009)	Netherlands	To examine whether ethnic minority children exhibit different change patterns to Indigenous children when presented with a learning strategy, a serialization task, within a dynamic testing context based on graduated prompt techniques. Study Design: Quasi-experimental pretest-posttest control-group design.	The tested children demonstrated a strategic behavior change in the more advanced strategy-use. This change was the largest for ethnic-minority children with initially weaker scores. These children also required more guidance but progressively needed fewer cognitive hints than Dutch-indigenous children during training. The graduated prompts approach offers valuable insights for detecting and describing strong and weaker points in each child's task-solving processes before, during, and after training.

Researchers	Country	Objective/Method	Findings
		Sample: one hundred and nine children, aged seven-to-nine, enrolled in five schools in the western part of the Netherlands.	With a brief intervention, it was possible to describe the number, timing, and type of prompts a child needed during training, illustrating the "learning
Ridwan, A., Rahmawati., Y., & Hadinugrahaningsih, T. (2017)	Indonesia	To explore the implementation of an ethnochemistry-based Culturally Responsive Teaching (CRT) approach in high school chemistry classrooms by incorporating cultural practices relevant to students' backgrounds alongside the formal Indonesian chemistry curriculum. Study Design: Qualitative research employing multiple methods for data collection, including observation, interview, reflective journal, and content analysis. Sample: Students from four high schools, including three public schools and one private Islamic school.	In chemistry education, Western knowledge predominates at all levels of the curriculum, resulting in a disconnect between students' learning experiences and their cultural environments. However, the challenge for teachers lies in designing a learning process that acknowledges students' cultural backgrounds and characteristics, leveraging these as metacognitive resources for both teaching and learning. The model for integrating ethnochemistry into the CRT approach developed in this study encompassed five main steps: self-identification, cultural understanding, collaboration, critical-reflective thinking, and transformative construction. This model was readily applicable in Indonesian chemistry classrooms. Students were empowered to explore their cultural identity and develop cultural awareness, allowing them to appreciate the distinctions between indigenous knowledge and formal knowledge. Additionally, while actively participating in chemistry education, the learning model provided students with opportunities to develop collaboration skills, empathetic communication, critical self-awareness of their cultural identity, and higher-order thinking skills.

Researchers	Country	Objective/Method	Findings
			Pre-service science teachers revealed Indigenous chemistry knowledge in diverse fields, including agriculture, health care, environmental conservation, food processing, and food preservation. In conclusion, chemistry metacognition can be effectively taught or enhanced in students by incorporating indigenous knowledge of chemistry into formal Western education.
Mudau, A., & Tawanda., T. (2022). Mudau, A., & Tawanda., T. (2024).	Zimbabwe (Africa)	To explore the use of Indigenous knowledge in chemistry, as culturally contextualized by science education trainees and its metacognitive use in chemistry teaching. Study Design: Mixed methods case study utilizing interviews and focus groups. Sample: Twenty-nine pre-service science teachers	Pre-service science teachers from local schools possess vast indigenous chemistry knowledge in areas such as zoology, botany, agriculture, medicine, and craft skills. In this context, recognizing the value of this extensive and systematic indigenous chemistry knowledge (prior knowledge) can favor the accurate assessment of the demands of chemistry learning. This also helps address questions about the understanding and skills needed to integrate indigenous and formal knowledge effectively, ensuring that indigenous knowledge is applied reliably within the framework of the Western curriculum. Such integration enhanced students' learning by increasing motivation, cultural identity, engagement, and collaboration, as well as higher-order thinking skills.

Studies focusing on metacognition and ethno-education are scarce. Generally, research in this area examines the contributions of respecting the "self-education" of indigenous cultures and ethnic minorities. Although this is undoubtedly an important issue, such a perspective can be regarded as macro-level, overlooking the micro-level challenges related to personal knowledge and self-regulation in learning processes. These challenges comprise how learners experience and self-regulate their educational dynamics, and how teachers navigate their worldview and cultural identity to facilitate or enhance in-depth learning.

Further studies are needed to link the identity of indigenous populations with metacognitive and self-regulated learning perspectives. Several researchers acknowledge that both Indigenous teaching approaches and self-regulated learning theories emphasize the importance of making learning relevant and practical for students (Battiste, 2013; Brayboy & Maughan, 2009; Brayboy et al., 2012; Deloria, 2003; Perry, 2017). Similarly, students engage in in-depth learning when they are assisted in pursuing their personal goals that are consistent with their cultural values and the social priorities of their communities (Perry, 2017).

Most self-regulated and metacognitive learning models involve typical and cyclical phases, including planning, execution, and evaluation (Winne & Hadwin, 1998; Winne et al., 2013; Zimmerman & Campillo, 2003). These models describe the processes students use to guide their thoughts and actions before, during, and after engaging in a learning task or pursuing a goal. Similarly, Indigenous epistemologies often view knowledge as a holistic process that encompasses careful planning, deliberate and strategic action, as well as continuous evaluation (Brayboy & Maughan 2009). Both perspectives converge and are valuable resources to help Indigenous students understand and regulate their learning more effectively. This approach respects their idiosyncrasies and identity while navigating a school context that may be unfamiliar and disconnected from their culture and traditions.

Sociodemographic, cultural, and religious variables specific to various Indigenous populations may impact the learning opportunities and development of scientific thinking in Indigenous students who enter traditional classrooms. Their diverse worldviews are not acknowledged as valid prior knowledge that could contribute to the development of scientific concepts in learning. Various studies have extensively highlighted this perspective, emphasizing the influence of students' socio-cultural backgrounds on science teaching and learning. These studies justify incorporating these backgrounds

into the curriculum, based on how indigenous students construct their knowledge. This is grounded in observations and experiences shaped by the customs, beliefs, and religious practices of their society (Akpanglo-Nartey et al., 2012; Msimanga & Shizha, 2014; Tyler et al., 2006), which often do not seem to be integrated into formal classroom instruction. This problem underscores the need to incorporate metacognitive reflection processes, enabling students to critically evaluate which aspects of their indigenous knowledge contribute to and enhance their learning process.

This study

This study was based on this research question: How does this Colombian Indigenous population undergo self-regulated learning, metacognition, and teaching?

Position of researchers

This study aims to gain a deeper understanding of participants' awareness of their metacognition process, with a focus on their experiences with metacognition and self-regulated learning. The research team was also interested in determining whether the 'Katanzama' people of Colombia underwent metacognition like typical populations. Therefore, this study was conducted from the professional and respectful work of a team of researchers, who were aware of their understanding of metacognition, self-regulated learning, and teaching, as well as the desire to enhance the participants' metacognitive awareness. They were made partial to certain findings and blind to others.

The researchers' previous experience with metacognition and self-regulated learning favored the incorporation of the following assumptions: (1) Participants can be supported in enhancing their comprehension monitoring skills; (2) Self-regulated learning may vary across domains, topics, and content areas; and (3) Metacognition and self-regulated learning can be influenced by sociocultural factors such as race, gender, ethnicity, and level of education.

Methodology

Participants, Sampling and Research Design

This study used an intentional sampling approach to examine how metacognitive phenomena operate within Indigenous populations. Stake (1994) conducted a case study to substantiate the generality of the metacognitive phenomenon. The selection criteria were like those used in this study. Participants included individuals from a community with diverse educational roles, and the same set of questions was posed during the structured interview (Merriam, 1998; 2009). A qualitative analysis technique was applied to examine the structured interviews, facilitating a deeper understanding of how this Indigenous population undergoes self-regulated learning and metacognition.

The participants were five individuals, all members of the Katanzama community. The sample comprised a community leader, a school principal, two teachers from the local educational institution, and a university student.

Following the guidelines and authorizations provided by the leaders of the Katanzama community, who granted permission for two researchers to enter the community, conduct field data collection, and select participants for the study, the following procedure was implemented:

The Mamo[4] (senior member) of the community delegated the task of selecting interview participants to one of the community leaders. This selection was based on specific criteria that the selected individuals needed to meet to be included in the study sample:

- Proficiency, comprehension, and fluency in both the native language, "Iku[5]," and Spanish as a second language.
- Be an active member of the community.
- Possess an adequate level of education to ensure that the interviewee could fully comprehend the questions posed by the researchers.

4 He is the spiritual leader of the indigenous people, and has the responsibility to maintain order through songs, meditation, and offerings.

5 The language of the *Katanzama* group is the *Ika* language. The 'Arhuaco' or 'Iku' language is the Amerindian language of the Chibchana family used by the *Ika* people of Colombia. This language is also known as *aruaco, bintuk, bíntukua, bintucua, ica, ijca, ijka, ika* and *ike*. In its grammar structure it uses the linguistic form of subject, object, and verb. Many of the community's inhabitants are monolingual in their aboriginal language, others speak Spanish as an auxiliary language (Jackson, 1995; Landaburu, 2000).

- Engage in various roles within the community (such as parent, student, teacher, community leader, or principal of an educational institution) to provide diverse perspectives during the interview.

The term "Katanzama" translates as "root of knowledge" and refers to an Arawak indigenous community located in the Magdalena Alto region of the Sierra Nevada de Santa Marta, Colombia. This community regained its land roughly 12 years ago through a national land restitution program. It is considered the only indigenous population residing at sea, a location of sacred significance for the community's inhabitants. From their worldview, interactions with the sea and its stewardship have a spiritual scope. Similarly, the community venerates a second sacred site: a tree that serves as a focal point for gathering to discuss collective matters and perform daily sacred rituals, as illustrated in Figure 1: *Conversation Around the Sacred Tree.*

Figure 1. *Conversation Around the Sacred Tree.*

Source: Henao & Hurtado (2024).

Each day begins at this ritual site, where "the elders" (community leaders), "the *mamo*" (spiritual leader), and all community members convene. "The *mamo*" is the leader of this community which has one educational institution dedicated

to "self-education." At this site, the community collectively discusses all issues, decisions, and opportunities related to school matters to reach a consensus. The school employs teachers from within the community and external educators appointed by the Ministry of National Education. The community retains the autonomy to accept or request the removal of these teachers, typically preferring individuals who have had prior contact with the community. The educational institution operates two campuses: one in the upper part and one in the lower part of the territory. Teachers must stay at each campus for nearly 15 days. The institution is led by a principal, who, although an external individual, is regarded as a member of the community. Decisions regarding school matters are made within the community and communicated to the principal, who acts as a liaison to convey the community's sentiments to territorial and national entities.

Regarding the curriculum, the education provided is tailored to the community. The community determines the content that is important to learn, and the methods used for this. This approach aims to foster the development of skills and the acquisition of cultural knowledge and customs, as evidenced in the photographic record: Gathering within the Community.

Figure 2. *Gathering within the Community.*

Source: Henao & Hurtado (2024).

Data Collection

The process for conducting the interviews was as follows:

First, it is important to note that the interviews were conducted during a pedagogical outing organized for an ethnography class, which was attended by two of the study's researchers in the city of Santa Marta, Magdalena. Second, to conduct the interviews, the researchers obtained the necessary permissions from the teacher, who facilitated approval from the institution's principal and the community's leader, the mamo. The community leader agreed on the condition that one of their leaders would oversee the interviews, advise on the process, and appoint individuals to whom each interview question would be directed. The questions were submitted for approval in advance.

Finally, five structured interviews were conducted, each with an average duration of 35 minutes. Interviews were conducted on-site (i.e., on the Indigenous group's land) by two of the study's authors, at mutually convenient times for each participant. Participants reviewed the informed consent form and asked questions prior to the interview. Participants were informed that the interview would be digitally recorded for the purposes of data analysis. A structured interview protocol was selected due to the lack of research on how indigenous cultures globally experience metacognitive phenomena. Consequently, the questions were designed on key concepts derived from the literature review and the lead author's understanding of self-regulated learning theory. *Appendix* contains the list of questions used in this study. See figure 3: *Field interview process.*

Figure 3. *Field Interview Process.*

Source: Henao & Hurtado (2024).

Data Analysis

All five interviews were transcribed, and any identifying information about participants was removed. The analysis process commenced with an initial reading of the transcripts to familiarize the researchers with the dataset, annotate it, and identify the sections of data deemed most relevant. During the open reading process, the data were individually coded descriptively (Saldaña, 2013), and both analytical and theoretical memos were prepared. The individual codes were subsequently merged, and the next phase involved reviewing each other's codes and notes in conjunction with the overall dataset.

Although the initial plan was to analyze the data thematically, a more holistic approach was adopted emphasizing the participants' responses to the initial questions. The analytical process of the present study comprised: (a) repeated readings of the data; (b) combining similar codes into categories; (c) identifying broad patterns, which led to the development of themes; and (d) selecting representative excerpts to document the findings.

Throughout this process, the research team maintained transparency and thoughtfulness, consistently returning to the primary objective: "to gain a deeper understanding of the participant's awareness of their metacognition process". During discussion sessions, the research team reflected on how the assumptions and inferences drawn from the interview process were shaped through the interpretative process. Finally, an acceptable level of data saturation was achieved. Although interviewees expressed it in slightly different terms, there was a convergence in the fundamental meaning of their experiences with metacognition.

Results

The qualitative analysis of the interview process with the five participants reveals several thematic confluences concerning the teaching and learning processes, as well as the participants' perceptions and strategies. The following six topics provide a detailed description of how this Indigenous population learns, teaches, and self-regulates their teaching and learning processes: 1) Knowledge of context and cultural relevance in learning; 2) Regulation and adaptation in learning processes; 3) Diversification of teaching strategies; 4) Learning from mistakes; 5) Planning and organization of study; and 6)

Self-criticism and pursuit of continuous improvement. These findings include a detailed description and excerpts from the dataset.

Context Awareness and Cultural Relevance in Learning

Participants emphasized the significance of understanding the context in which learning occurs. Emphasizing the incorporation of local cultural and contextual aspects into teaching methods is crucial to ensuring that learning remains meaningful for students.

> Regulation, for me, also involves that... interaction with the context. The knowledge one acquires as a professional in university must first be contrasted with the knowledge encountered in the territory. In practice, when applying this knowledge, various methods exist depending on the population you are working with. The skills developed must be adapted because they vary across different regions in Colombia. (Participant 1, Lines 10-17. Personal communication, May 5, 2023).

> How do I plan them? How do you plan them? For me, it all ultimately comes down to context. First, I need to ensure that this knowledge relates to the reality experienced in the context so that it can be meaningful. To effectively reach the student. I must prepare the topics including cultural factors. If the subject involves any cultural aspect, my responsibility is to investigate and incorporate that knowledge by using the strategy of asking the elder leaders, the MAMO. For them to contribute their knowledge, and to make comparisons with Western cultural knowledge. It is of utmost importance to draw parallels between the two perspectives. What does Hema mean to us? What is its meaning? What does it mean to us? For instance, teaching about the parts of a plant differs significantly depending on the context, what is the root? They told me about "cate", it is root. And for the root of a tree, is it cate? That is an essence, it is a force, right? So, for the Arawak, cate is root and it is knowledge, it is ancestral knowledge. Comparing these differences adds another level of understanding. (Participant 4, Lines 32-47. Personal communication, May 5, 2023).

Regulation and Adaptation of the Learning Processes

The need to adapt teaching and learning strategies based on students' ages and needs is emphasized. The ability to self-regulate and adapt throughout the learning process is crucial for enhancing results.

> Well, that depends on the age of the children. According to the student's age, we instilled the topics we covered. Some children progress more quickly, while others do not. So, like everyone else, we are always there to support them. (Participant 2, Lines 54-57. Personal communication, May 5, 2023).

> Teaching is similar to parenting—just as when raising a child, you don't have all the knowledge yourself; you're always close to the grandparents for guidance. Grandparents always pass down customs and ancestral teachings, and just as our grandfather teaches us, the father continues learning throughout the process. This is how teaching has traditionally taken place at home. (Participant 5, Lines 65-70. Personal communication, May 5, 2023).

Diversification of Teaching Strategies

Various teaching strategies are highlighted, including playing, singing, and pedagogical outings, which are employed to make learning more interactive and effective. The significance of integrating theory and practice within the educational process is also emphasized.

> It's through play, through singing, and through pedagogical outings that teaching occurs by combining both theory and practice, as people say. (Participant 3, Lines 6-9. Personal communication, May 5, 2023).

> School teaching is crucial for the younger generations, but spiritual and ancestral teaching, customs, and practices are imparted within the community, specifically in the calducu, where the Mamos guide, explain, and engage in spiritual practices. Aburu, a practice involving cotton, is used to create small figures, such as worms, which can come from our body, a tree, tree seeds, or seashells, depending on the task. This is how the spiritual practice is performed, and the child learns the spiritual and ancestral knowledge, customs, and how to behave as an indigenous individual. It's something learned throughout life, always guided by

> the mother, the mamos, and the parents. (Participant 4, Lines 102-112. Personal communication, May 5, 2023).

Learning from Mistakes

Mistakes are recognized as opportunities for learning and growth. Participants emphasized the significance of reflecting on mistakes and using them as a guide for future improvement.

> In my case, it's when I fail to provide what I'm supposed to, meaning the topics that need to be covered when I'm not prepared. I don't realize I'm making a mistake. That's what becomes evident with children. For example, when one is given book tests and later finds that one doesn't understand the material. It means one is making a mistake. (Participant 4, Lines 91-96. Personal communication, May 5, 2023).

> Sometimes, when I'm at home, I realize that my mistake is feeling reluctant to go to the university. For example, taking the bus and dealing with crowds. However, I remind myself that studying is a crucial part of my life and preparation for a better future. (Participant 5, Lines 51-56. Personal communication, May 5, 2023).

Study Planning and Organization

Planning is discussed as a crucial strategy for achieving success in one's studies. The organization and prioritization of tasks are highlighted as key aspects of effectively managing study time.

> At university, a lot of work is assigned to us. I write down the activities I need to complete in my notebooks, tackling the most urgent tasks first and addressing the less urgent ones later. (Participant 1, Lines 40-44. Personal communication, May 5, 2023).

> That's what you plan, one day before I plan everything, what I'm going to say the next day, that's what you have to plan, we always have to be prepared. (Participant 2, Lines 88-91. Personal communication, May 5, 2023).

Self-criticism and Search for Continuous Improvement

Participants demonstrate the will to reflect on their learning methods and consistently seek how to improve. The need to experiment with different approaches and strategies to identify what works best for everyone was underscored.

> "Well, I sometimes feel that the methods I use for learning don't work for me. I've tried various approaches to learn better. For instance, watching videos sometimes gives me a headache, but I'm always looking for better ways to improve my learning". (Participant 3, Lines 30-34. Personal communication, May 5, 2023).

> Well, life teaches us through different stages. As one becomes a father and then a grandfather, each stage offers more lessons from life. Being surrounded by mamos, authorities, and leaders, one realizes that learning is ongoing. A mamo, for example, isn't fully wise unless he applies his knowledge in practice. When a mamo becomes a grandfather, its teaching and learning cycle is complete. If a mamo is not a grandfather, he is a young mamo with wisdom but lacking experience. Thus, community members learn throughout life. (Participant 1, Lines 89-98. Personal communication, May 5, 2023).

In summary, these topics reflect the complexity and diversity of teaching and learning approaches, underlining the significance of adapting to students' specific needs and contexts. The assessment of the cultural context, adaptation, reflection on mistakes, and planning were identified as key elements in the educational process, as articulated by the participants during the interviews.

Discussion

One of the most controversial issues concerning intercultural metacognition studies today is the findings derived from traditional quantitative research and factor analysis. These studies present the frameworks accepted by the scientific community comprising the two major components of metacognition: knowledge and regulation. These were proposed and demonstrated by scholars in the area (Brown, 1987; Flavell, 1979, 1987; Nelson & Narens, 1990; Schraw & Sperling, 1994; Schraw & Moshman, 1995) and their frameworks remain valid today

(Tarricone, 2011; Padmanabha, 2020; Tuononen et al., 2023). Current studies examine how context, culture, and self-education influence the development of these two major components and their associated sub-skills, particularly in individuals experiencing metacognition across diverse settings, idiosyncrasies, and cultures.

There are various perspectives on this topic, exemplified by a classic study that analyzed the relationship between metacognition and self-concept across samples of Asian, Black, Hispanic, and White students. Despite variability due to ethnic origin and gender, the study revealed a moderately positive relationship between students' self-reports of metacognitive activities and their self-concept across different ethnic groups. This suggests the presence of universal and general components of metacognition. However, Asians exhibited stronger intercorrelations (Hartman et al., 1991), and several researchers attribute this finding to the relationship between language, thought formation, and cultural variability. Chinese philosophy relies on the "Yin/Yang" concept to train students at a perceptual level of thought. At the academic level, this trend fosters cultural values such as reflection, self-criticism, and practices like perspective shifting which are believed to mediate students' metacognition, self-perceptions, and opportunities for improving academic performance (Hartman et al., 1991; Treisman, 1985).

A more recent study on the diversity of development in mental reading and metacognition demonstrates the universal nature of the construct as evidenced by phenomena such as the "tip of the tongue" (Fossa et al., 2022; Schwartz, 2006; Schwartz & Metcalfe, 2011) and the feeling of knowing, which has been documented in speakers of 45 languages (Kim et al., 2018). This process is related to the predictions people make about their memory performance after searching for items that are not currently remembered. This phenomenon is among the most studied aspects of conscious monitoring of one's performance (Koriat, 2000; Nelson et al., 1984; Spehn & Reder, 2000). The study of the "tip of the tongue" phenomenon suggests that metacognitive performance relies on the use of metamemory strategies, which are effective in aiding retrieval and extending the duration of the search. The feeling of knowing influences how individuals choose to answer a question and the duration of their search for an answer (Nhouyvanisvong & Reder, 1998).

The study also notes that despite the extreme diversity of human beliefs about nature and the origins of individual competence (Lillard, 1998), and the limited research on variations in metacognition, ethnic and gender biases persist across cultures and need further research (Kim et al., 2018).

For example, a study involving American, European, and Mayan infants unveiled significant differences in their metacognitive performance which were influenced by parenting guidelines and their cultural context, particularly in the imitation learning process. In such a study on imitative learning, children from different cultures were compared based on their modes of learning and metacognitive behaviors. European and American children were more likely to mimic the use of a toy when the experimenter engaged in ostensive communication, compared to when they only observed the experimenter using the toy (Csibra & Gergely, 2011; Kim et al., 2018).

In this respect, communicative behavior is considered ostensive when the speaker explicitly conveys their intention through a statement, and the listener interprets the statement in the manner intended by the speaker. This suggests that signals directed at the baby, such as eye contact or a directed greeting, capture attention and signal that the forthcoming information is relevant. In this experiment, the same pattern was not observed in Mayan children. Instead, findings showed that while Mayan infants imitated more during their second visit to the testing room, their imitation rate was not influenced by signaling (Csibra & Gergely, 2011).

Thus, it was concluded that sensitivity to relevance does not rely on an innate signaling device in infants of all cultures. Instead, it represents a process shaped either autonomously —where learning is driven by the child's own attentional and perceptual processes regarding task demands— or heteronomously —where learning appears to depend more on the level of trust the infant places in the external signals provided by caregivers—.

The findings of this study align more closely with the hypothesis that culture and ethnic differences contribute to shaping certain cognitive and metacognitive behaviors. This supports the idea of enhancing Western pedagogical approaches by incorporating insights from the pedagogies of various ethnic groups. In the case of individuals from the Katanzama indigenous community who shared their knowledge about learning and self-regulation, significant strategies were identified, including: 1) prioritizing knowledge of the context and cultural relevance in learning; 2) regulation and adaptation in learning processes; 3) diversification of teaching strategies; 4) learning from mistakes; 5) planning and organization of study; and 6) self-criticism and the pursuit of continuous improvement.

These types of learning strategies have been recognized as highly valuable by various researchers, who emphasize understanding context and culture in adapting the curriculum to address problems relevant to the individual and their social and historical environment. In this regard, the most successful curricula for Indigenous students share an explicit

emphasis on outdoor education, a place- and problem-based structure, and the incorporation of traditional Indigenous knowledge into formal instruction (Riggs, 2005).

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Appendix

Structured Interview Question Guide that was used in this research

1) How do I know or approach the topics I am going to learn?
2) How do I regulate myself in terms of my learning processes?
3) What kind of learning strategies did you use to learn better?
4) How do I think the error influences my learning?
5) How do I plan my study and learning moments?
6) What do I think about how I learn?

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