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ORIGINAL

Relationship between Sociocultural Characterization in Regular Basic Education Students from High Andean Zones and their Interaction in Educational Metaverses

Relación entre la Caracterización Sociocultural en Estudiantes de Educación Básica Regular de Zonas Altoandinas y su Interacción en Metaversos Educativos

Francisco Zúñiga Pastor[1], Yesenia Tania Loayza Apaza[2], Milusca Jacqueline Velarde-Tejada[3], Alvaro Rafael Barrientos-Alfaro[3], Rafael Romero-Carazas[4], David Hugo Bernedo-Moreira[5]

[1]Universidad César Vallejo. Lima, Perú.
[2]Instituto de Altos Estudios en Investigación y Desarrollo Empresarial, La Paz, Bolivia.
[3]Universidad Tecnológica del Perú. Arequipa, Perú.
[4]Universidad Nacional de Moquegua. Moquegua, Perú.
[5]Universidad Peruana Unión. Lima, Perú.

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Correspondence: Francisco Zúñiga Pastor

ABSTRACT

Introduction: the sociocultural characterization of students includes factors such as ethnicity, language, beliefs, social practices, family environment and other elements that affect their perception of knowledge and technology; for environments to be effective, it is essential to consider the sociocultural characterization of students, since the factors profoundly affect the ability to adapt to new teaching methods.
Objective: to determine the relationship between sociocultural characterization in regular basic education students from high Andean areas and their interaction in educational metaverses.
Method: a quantitative and correlational approach was adopted with a non-experimental design, focusing on 376 university students who had taken at least one semester in virtual mode. Data collection was done through structured surveys with Likert-type scales to assess the use of AI tools and the level of adaptation of the students.
Results: the results indicated a significant relationship of (r=0,973) and a value of (p=0,000) between the study variables.
Conclusions: It was concluded that AI is key to personalize educational experiences, improving accessibility and interactivity. In addition, the need to avoid over-reliance on AI tools and the importance of fostering interdisciplinary collaboration and real-time feedback to contribute to the continuous improvement of educational environments were highlighted.

Keywords: Sociocultural Characterization; Regular Basic Education Students; High Andean Zones; Interaction; Educational Metaverses.

RESUMEN

Introducción: la caracterización sociocultural de los estudiantes incluye factores como el origen étnico, el idioma, las creencias, las prácticas sociales, el entorno familiar y otros elementos que afectan su percepción del conocimiento y la tecnología; para que los entornos sean efectivos, es fundamental considerar la

caracterización sociocultural de los estudiantes, ya que los factores afectan profundamente la capacidad para adaptarse a los nuevos métodos de enseñanza.
Objetivo: determinar la relación entre la caracterización sociocultural en estudiantes de educación básica regular de zonas altoandinas y su interacción en metaversos educativos.
Método: se adoptó un enfoque cuantitativo y correlacional con un diseño no experimental, centrándose en 376 estudiantes universitarios que habían cursado al menos un semestre en modalidad virtual. La recolección de datos se realizó a través de encuestas estructuradas con escalas tipo Likert para evaluar el uso de herramientas de IA y el nivel de adaptación de los estudiantes.
Resultados: los resultados indicaron una relación significativa de (r=0,973) y un valor de (p=0,000) entre las variables de estudio.
Conclusiones: se concluyó que la IA es clave para personalizar experiencias educativas, mejorando accesibilidad e interactividad. Además, se subrayó la necesidad de evitar la dependencia excesiva de herramientas de IA y la importancia de fomentar la colaboración interdisciplinaria y la retroalimentación en tiempo real para contribuir a la mejora continua de los entornos educativos.

Palabras clave: Caracterización Sociocultural; Estudiantes de Educación Básica Regular; Zonas Altoandinas; Interacción; Metaversos Educativos.

INTRODUCTION

The rapid evolution of educational technologies has led to the implementation of new tools, such as educational metaverses, which allow for creating interactive and immersive learning environments.[1] These technologies offer significant potential to transform education, providing new opportunities for personalization of learning and interaction between students and content.[2] However, for these environments to be effective, it is essential to consider the sociocultural characteristics of students, as social, cultural, and contextual factors profoundly influence their ability to adapt to new teaching methods.[3]

The sociocultural characteristics of students include aspects such as ethnic origin, language, beliefs, social practices, family environment, and other elements that affect their perception of knowledge and technology.[4] In this context, this study seeks to understand the relationship between the sociocultural characterization of students in regular basic education in the high Andean areas of Peru and their interaction in educational metaverses to understand how these variables influence the use of these new technological tools. In this context,[5] to determine the relationship between sociocultural characteristics and interaction in educational metaverses, highlighting that these virtual environments have transformed students' learning experience.

The methodology was mixed, beginning with a qualitative approach that included interviews and observations, followed by a quantitative analysis through surveys to validate the initial findings. The study was conducted on metaverse platforms within educational contexts, which allowed for the observation of immersion and collaboration among participants. The main conclusions revealed that interaction in these metaverses fostered a sense of community and motivation, increasing student engagement and participation. However, challenges were also identified, such as a lack of digital skills and privacy concerns, which could limit the effectiveness of these educational tools. Thus, the need to address these obstacles to maximize learning in these environments has been emphasized[6] and addressed sociocultural characterization and interaction in educational metaverses, highlighting how these virtual environments facilitated participants' knowledge.

They used a systematic review methodology, analyzing various studies to identify patterns in user interaction. The study was conducted in the context of higher education, focusing on disciplines such as social sciences and humanities. The main findings revealed that sociocultural interaction in educational metaverses promoted collaborative learning, improving interpersonal skills and group work. In addition, they noted that, despite the opportunities provided by metaverses, they presented significant challenges related to accessibility and the need for adequate technology.

This analysis led to a reflection on the importance of ensuring inclusion in these virtual environments, highlighting the need to create accessible and equitable educational spaces for all students,[7] characterized by the sociocultural dimension and interaction in educational metaverses, highlighting how these platforms offered new opportunities for immersive learning. They used a methodology based on surveys and data analysis, collecting information from 1,086 Internet users in the United States. This study was conducted in a context where online education needed to adapt to emerging technologies and the demands for personalized learning. The main findings indicated that interaction in educational metaverses improved student engagement and promoted digital adaptation and inclusion. In addition, it was found that trust in these platforms became a positive predictor of adoption intention, suggesting that perceptions of digital equality and attention to privacy risks were crucial for the acceptance of metaverses in education.[8] analyzed interaction in educational

metaverses, highlighting sociocultural factors' influence on students' learning experience.

They researched a group of 596 higher education students in Jordan who were selected intentionally. The methodology included an online survey that assessed various variables related to adopting education in the metaverse. In addition, structural equation modeling techniques were used to analyze the data obtained. Within the research context, the study explored how the COVID-19 pandemic had transformed remote learning, increasing interest in innovative educational technologies. The main findings indicated that attitudes, social influence, and perceived control over adoption were key determinants of students' intention to participate in learning experiences in metaverses, highlighting the importance of fostering an environment that promotes autonomy and innovation in educational practices.[9] studied socioculture and interaction in educational metaverses, highlighting the importance of creating learning environments that foster student immersion and collaboration.

The methodology used consisted of intentional sampling, where data was collected from 253 teachers and students in Vietnam who had experience with metaverse technology. The study was conducted in an educational context, analyzing how these platforms were integrated into the teaching-learning process. The main conclusions indicated that factors such as performance expectations, the effort required to use the technology, and social influence played a crucial role in accepting the metaverse. In addition, they highlighted the need for educational institutions to provide enabling conditions and trust to users to improve the learning experience, suggesting that adopting the metaverse could revolutionize education[10] characterized interaction in educational metaverses, highlighting its influence on the construction of diverse learning communities. It analyzed how sociocultural elements, such as participants' identities and experiences, affected dynamics in these virtual environments. The methodology employed involved case studies, participatory observations, and interviews, allowing for a deep understanding of metaverse interactions.

The study was conducted in varied educational contexts, encompassing institutions of different levels and pedagogical approaches, facilitating a broad perspective on using metaverses. The main conclusions indicated that interaction in metaverses favored collaboration and active learning but highlighted challenges, such as the exclusion of certain groups and the need for mediation to ensure equitable participation. Thus, the article emphasized the importance of considering sociocultural variables in designing and implementing educational experiences in metaverses.[11]

They analyzed the sociocultural aspects and interaction in educational metaverses, highlighting that these platforms must adapt to the diversity of users and foster effective interaction between educators and students. Creating virtual environments that reflect real educational spaces to facilitate immersion and collaborative learning was emphasized. The methodology comprised a comprehensive literature review on educational metaverses and semi-structured interviews with educators and students. This approach allowed us to validate and refine the requirements for an effective virtual educational environment. The study was conducted in the post-COVID-19 pandemic context, where the need for digital education solutions increased significantly. The main conclusions indicated that an educational metaverse should incorporate features that promote active learning and student autonomy, thus contributing to improved educational effectiveness and user satisfaction.[12] The objective was to understand the sociocultural characteristics and interaction in educational metaverses, analyzing how these virtual spaces influenced student learning and socialization. A structured descriptive study was carried out, observing various interactions in the metaverse, focusing on using technological tools and student participation in collaborative activities.

The methodology combined qualitative and quantitative techniques, providing a clear overview of the educational experience in these environments. The study was conducted in an educational context where metaverses were implemented in teaching, encouraging immersion and active student interaction. The main conclusions indicated that metaverses enhanced meaningful learning by facilitating the connection between students and educational content and promoting a sense of community. This suggested that integrating these platforms could be beneficial for developing social and academic skills in students.[13] studied sociocultural characterization and interaction in educational metaverses, highlighting the relevance of sociocultural factors in the learning experience.

It focused on how diverse cultures and social contexts affected students' engagement in these virtual environments. The methodology comprised surveys and interviews that collected user perceptions and attitudes on metaverse platforms. This study was conducted in various educational institutions, allowing for a comparative analysis of the experiences of different demographic groups. The main conclusions showed that sociocultural characteristics significantly influenced the type of interaction and collaboration between students. It was identified that students from diverse backgrounds showed different levels of engagement and motivation, highlighting the need to design inclusive educational metaverses that reflect cultural diversity and promote an enriching experience for all learners.[14] Characterized the sociocultural context and interaction in educational metaverses, noting that these virtual environments fostered collaborative learning and user immersion. The methodology used was qualitative, through interviews and focus group analysis, which provided an in-depth understanding of the social dynamics in these spaces. The study was conducted in

educational institutions that implemented metaverses as part of their curriculum, allowing them to observe student behavior and interactions in these environments. Among the main conclusions, it was highlighted that using metaverses promoted a sense of community and facilitated active student participation. In addition, it was concluded that the cultural diversity of the participants enriched interactions, although it also presented challenges in communication.

The research demonstrated the potential of metaverses to transform educational processes by improving engagement and collaboration among students.[15] analyzed the sociocultural characterization and interaction in educational metaverses, focusing on how these virtual environments could influence student learning and collaboration. The methodology used included case studies that included observations and interviews with users of different metaverses, seeking to understand their experiences and social dynamics. This study was conducted in the context of educational institutions that integrated these digital environments as part of their curriculum, with the aim of innovating teaching.

The main conclusions indicated that educational metaverses fostered greater social interaction and a sense of community among students. However, they also revealed challenges related to accessibility and user adaptability to new technologies. In addition, it was highlighted that the sociocultural richness of the participants influenced how they related and learned in these virtual spaces, highlighting the importance of considering diversity in their design.[16] addressed sociocultural characterization and interaction in educational metaverses, highlighting how these virtual environments could influence student learning and socialization. The methodology used was a mixed approach that combined interviews and surveys with content analysis, providing a comprehensive view of metaverse user experiences. The study was conducted in the context of educational institutions that had implemented metaverse platforms to facilitate learning. The main conclusions highlighted that, despite the interactive richness of these spaces, challenges related to inclusion and accessibility emerged. In addition, it was observed that interaction in metaverses could foster a sense of community among students, but the lack of training in using these technologies limited their educational effectiveness. The article suggested that properly integrating metaverses could enrich the learning experience. [17] addressed the sociocultural characterization and interaction in educational metaverses, highlighting that these digital environments promote interactive and collaborative learning, which is essential for forming learning communities. The study methodology was qualitative, using interviews and content analysis to explore user experiences in various educational metaverses. The study was conducted in virtual communities of students and educators, where immersion in virtual environments facilitated reflection on educational practices and the construction of collective identities. The main findings indicated that interaction in metaverses fostered knowledge acquisition and strengthened social bonds among participants. Through collaboration and meaningful learning, educational metaverses became valuable spaces for students' socio-emotional and academic development, promoting a more inclusive and equitable education.[18] examined the sociocultural characterization and interaction in educational metaverses, highlighting the importance of understanding how cultural and social aspects influence learning within these virtual environments. The methodology used was qualitative, using interviews and focus groups to collect data from students and educators, which allowed for a deep understanding of their experiences and perceptions in these spaces. The study was conducted in the context of educational institutions that implemented metaverses to facilitate teaching and learning. The most important conclusions indicated that metaverse interaction was strongly mediated by sociocultural factors, such as the participants' background and technological skills. In addition, it was identified that the design of these platforms should consider social dynamics to promote effective learning. The findings underscored the need to integrate inclusive approaches that reflect the students' diversity.[19] addressed sociocultural characterization and interaction in educational metaverses, highlighting how these virtual spaces can enrich the learning experience. The research was conducted in educational institutions where metaverse environments were implemented to assess their impact on social and educational dynamics. The methodology consisted of a qualitative approach, using interviews and focus groups to collect data from students and teachers about their experiences in these environments. In addition, direct observations were made in virtual classrooms. The most significant findings indicated that educational metaverses fostered greater student collaboration and participation, facilitating more interactive and personalized learning. The importance of adapting technological tools to users' cultural and social needs was also highlighted, as this allowed for more effective integration into educational processes.

In the Peruvian context, education in the high Andean regions faces significant challenges related to limited access to technology, language barriers, and cultural differences that can hinder the integration of technologies in classrooms. In particular, rural and high Andean areas, such as Chincheros in the Apurímac region, are characterized by a strong cultural identity, where indigenous languages and traditions play an essential role in students' daily lives. However, lack of access to technological resources and differences in cultural perceptions of technology create obstacles to adapting and using educational metaverses. Despite these challenges, innovative technologies could offer new opportunities for educational inclusion and equitable access to learning tools. As a result, this study was conducted to understand the relationship between the

sociocultural characteristics of students in regular basic education in the high Andean areas of Peru and their interaction with educational metaverses. This study seeks to fill this knowledge gap by providing an empirical basis for improving the integration of educational metaverses in these cultural and geographical contexts. Therefore, the objective was to determine the relationship between the sociocultural characteristics of students in regular basic education in high Andean areas and their interaction in educational metaverses. The correlational analysis will provide key information for designing more inclusive teaching strategies that respect students' cultural differences and encourage their active participation in virtual environments. The direct beneficiaries of this study will be students in the high Andean areas, who can experience learning more adapted to their cultural context, and teachers, who can implement more personalized and practical approaches to using educational technologies. In addition, education policymakers can use the results to create strategies that promote equitable access to technologies, favoring inclusion and educational metaverses in all regions of the country.

METHOD

This correlational study analyzed the relationships between the sociocultural characteristics of students in regular basic education in the high Andean regions of Peru and their interaction in educational metaverses, as well as the respective dimensions of these relationships. A correlational study does not involve the manipulation of variables. Instead, it seeks to identify the nature and strength of the relationship between two or more variables observed naturally in their usual context.[20] In this case, the students' conditions will not be altered or changed; instead, their sociocultural characteristics, such as language, cultural traditions, socioeconomic status, and access to technology, will be observed and analyzed to determine how they correlate with their ability to interact with and take advantage of educational metaverses.

As this is a non-experimental study, students will not be subjected to specific conditions or treatments; instead, their behavior will be observed in their natural environment, providing a more representative and realistic view of how these interactions unfold in their sociocultural context.[21]

The target population for this study is students from the high Andean regions of Peru, specifically the district of Chincheros in the Apurímac region. This population consisted of 7,936 secondary school students in public educational institutions in rural and semi-rural areas, with sociocultural characteristics typical of high Andean communities.

The sample consisted of 366 secondary school students from different educational institutions in Chincheros. The sample selection was representative of the target population, considering various sociodemographic variables, such as gender, level of access to technology, and predominant language (Quechua or Spanish).

A simple random sampling method was used, allowing students to be randomly selected from among those who were part of the population in the study area. This type of sampling was appropriate and ensured that each student had the same probability of being selected, guaranteeing the sample's representativeness and avoiding bias in data collection. This sampling was ideal since it was not necessary to manipulate the variables or intervene in the characteristics of the students but instead to observe how they behave naturally within the educational and technological environment.[22]

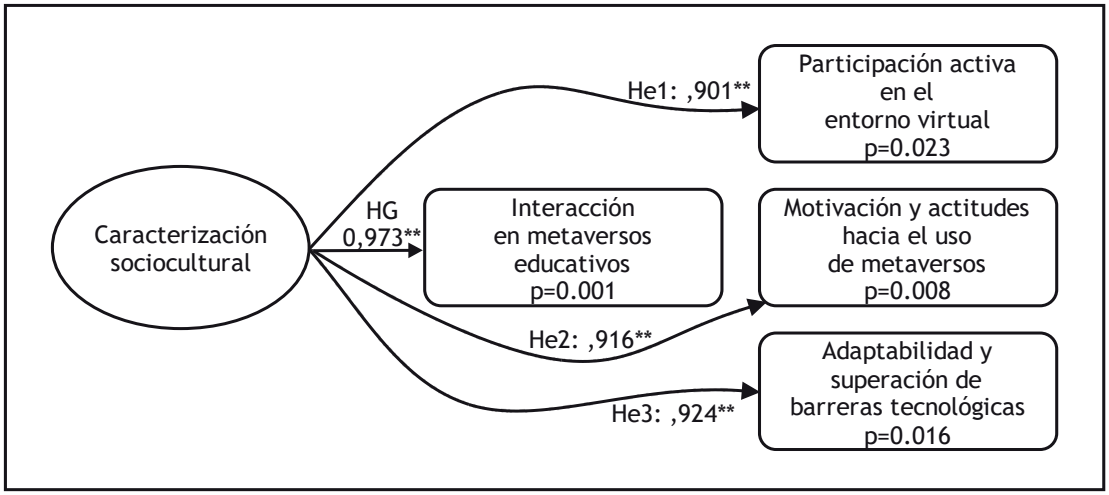
The correlational level was adopted in this study because the main objective was to determine the relationships between the proposed variables. Using a correlational methodology allows for identifying patterns and significant associations between sociocultural variables (such as mother tongue, cultural beliefs, and socioeconomic context) and how these influence the adaptation and use of educational technologies such as metaverses.[23] In this way, the study will provide valuable information for designing more inclusive teaching strategies that are better adapted to students' cultural needs.

The data collection technique was a survey, using a structured questionnaire based on the variables' dimensions. The questionnaire included 10 items for each variable, using a Likert scale from 1 to 5. The instrument was validated by expert judgment and a pilot test to ensure its reliability and validity. The data obtained were processed with SPSS v.26 statistical software, using normality tests and inferential statistics for analysis.

RESULTS

Figure 1 shows the relationships between the sociocultural characterization of regular basic education students in high Andean areas and their interaction in educational metaverses.

Regarding the General Hypothesis (GH): There is a significant relationship between the sociocultural characterization of students in high Andean areas and their interaction in educational metaverses. The correlation coefficient is 0,973, with a p-value less than 0,001, indicating a strong and statistically significant relationship between the two variables. This result confirms that the socioculture of students significantly influences their interaction with educational metaverses.



Note: HG=General hypothesis: There is a relationship between the sociocultural characterization of students in regular basic education in high Andean areas and their interaction in educational metaverses. He1=Specific hypothesis 1: There is a relationship between the sociocultural characterization of students in regular basic education in high Andean regions and active participation in the virtual environment. He2=Specific hypothesis 2: There is a relationship between the sociocultural characterization of students in regular basic education in high Andean areas and their motivation and attitudes toward using metaverses. He3=Specific hypothesis 3: There is a relationship between the sociocultural characterization of students in regular basic education in high Andean areas and their motivation, adaptability, and ability to overcome technological barriers.

Figure 1. Relationship between study variables

Regarding Specific Hypothesis 1 (He1): There is a significant relationship between the sociocultural characterization of students and their active participation in the virtual environment. The correlation coefficient is 0,901, with a p-value of 0,023, indicating a significant positive relationship, although somewhat weaker than the general hypothesis. This result suggests that socioculture also influences students' participation in the virtual environment.

Regarding Specific Hypothesis 2 (He2): A significant relationship exists between sociocultural characterization and motivation and attitudes toward using metaverses. The correlation coefficient is 0,916, with a p-value of 0,008, reflecting a strong and significant relationship. This indicates that sociocultural factors also affect students' motivation and attitudes toward using educational metaverses.

For Specific Hypothesis 3 (He3): A significant relationship exists between sociocultural characterization and adaptability and overcoming technological barriers. The correlation coefficient is 0,924, with a p-value of 0,016, showing a strong and vital relationship. This result indicates that socioculture positively impacts students' ability to adapt to technologies and overcome barriers associated with using metaverses.

All the results presented are statistically significant, with p-values below 0,05, which supports the acceptance of the hypotheses proposed. The strongest correlation between sociocultural characterization and interaction in educational metaverses is observed, followed by the relationship with motivation and adaptability to technological barriers. These results suggest that the sociocultural characterization of students in high Andean areas significantly influences their interaction with educational metaverses, their active participation in virtual environments, their motivation and attitudes toward using metaverses, and their ability to overcome technological barriers. This underscores the importance of considering sociocultural factors in designing and implementing educational technologies in specific contexts such as the high Andean regions.

DISCUSSION

The results of the present study are consistent with those of,[5] which highlight how virtual environments, such as educational metaverses, have transformed the learning experience, promoting immersion and collaboration among students. Similarly, in our research, students from high Andean areas demonstrated strong interaction in these environments, suggesting that socioculture significantly influences student participation in virtual environments. However, obstacles were also identified, such as a lack of digital skills and concerns about privacy, which could limit the effectiveness of these educational tools, which should also be considered when working with students from rural areas.

Likewise, the results of this study are similar to those obtained by,[6] who conducted a systematic review of sociocultural interaction in educational metaverses, concluding that they promoted collaborative learning and improved interpersonal skills and group work. In our study, we observed that sociocultural characterization also positively impacts students' active participation in the virtual environment, reinforcing the idea that metaverses are a powerful platform for fostering collaboration among students.

On the other hand, the results of the present study are consistent with those of,[7] who found that interaction in educational metaverses promotes digital adaptation and inclusion. In the context of students in high Andean areas, sociocultural factors significantly influence students' ability to overcome technological barriers, suggesting that these virtual environments can be useful for improving inclusion in more remote communities, as long as they are designed with an awareness of local technological limitations.

The results of this study are also similar to the findings of,[8] which indicate that sociocultural attitudes and social influence are determinants in the adoption of innovative educational technologies. In our research, we observed that students' sociocultural characterization significantly impacts their motivation and attitudes toward the use of metaverses, which underscores the importance of understanding students' perceptions and attitudes to promote the adoption of new educational technologies.

Similarly, the results of the present study are similar to those found in,[9] which indicate that educational metaverses promote immersion and collaboration among students. In our research, students also showed significant engagement with metaverses, and interaction in these environments resulted in greater collaborative learning. However, challenges related to accessibility and the need to provide conditions that facilitate equitable participation were also identified, an aspect that should be considered when implementing these environments in regular basic education contexts.

The studies in[10] and[11] both highlight the importance of considering sociocultural identities and diversity in educational metaverses. The results of the present study are consistent with these, as sociocultural factors, such as students' identities and backgrounds, significantly influence interactions and collaborations within metaverses. This suggests that the design of metaverses should be inclusive and reflect the sociocultural realities of students to maximize their effectiveness as educational tools.

Finally, the results of the present study are consistent with those of,[12] which point out how educational metaverses can enhance meaningful learning and promote a sense of community among students. Our research also observed that metaverses encourage active student interaction, resulting in more collaborative and enriching education. This reinforces the idea that metaverses can be a valuable tool for fostering students' academic and socio-emotional development, especially when designed with an inclusive approach.

In summary, the results obtained in this study are consistent with various previous studies, which highlight the positive impact of sociocultural interaction in educational metaverses. These findings suggest that, when integrating these platforms into the academic environment, especially in high Andean areas, it is crucial to consider students' sociocultural and technological characteristics to ensure that these environments are accessible, inclusive, and effective in learning.

CONCLUSIONS

About the general objective, which seeks to determine the relationship between the sociocultural characterization of students in regular basic education in high Andean areas and their interaction in educational metaverses, the results obtained show that there is a powerful and statistically significant relationship between both variables, with a correlation coefficient of 0,973 and a p-value of less than 0,001. This confirms that the socioculture of students has a decisive influence on their interaction with educational metaverses. In other words, sociocultural factors are crucial in how students in high Andean areas engage and interact with innovative educational technologies, such as metaverses.

The first specific objective, which aimed to determine the relationship between the sociocultural characterization of students in regular basic education in high Andean areas and their active participation in the virtual environment, shows a significant positive relationship with a correlation coefficient of 0,901 and a p-value of 0,023. Although the relationship is somewhat weaker than the general objective, it is still statistically significant. This finding suggests that students' sociocultural background significantly influences their level of active participation in virtual environments, highlighting the need to consider their sociocultural contexts when designing educational experiences in metaverses.

Regarding the second specific objective, related to the relationship between sociocultural characterization and motivation and attitudes toward using metaverses, the results are highly significant, with a correlation coefficient of 0,916 and a p-value of 0,008. This finding indicates a strong relationship between sociocultural factors, student motivation, and their attitudes toward using educational metaverses. Therefore, it can be concluded that sociocultural influences not only participation but also the degree of interest and willingness of students to adopt new technologies in their learning process.

The third specific objective, which seeks to determine the relationship between sociocultural characterization and adaptability and overcoming technological barriers, shows a significant relationship with a correlation coefficient of 0,924 and a p-value of 0,016. These data confirm that sociocultural factors considerably impact students' ability to adapt to technologies and overcome technological barriers associated with using metaverses. This reinforces the importance of providing adequate support and technological training to students, considering their sociocultural context to ensure the successful integration of educational technologies.

The results of this study highlight the relevance of the sociocultural characterization of students in the

design and implementation of educational technologies, especially in contexts such as the high Andean regions. It is confirmed that sociocultural factors significantly impact students' interaction with educational metaverses, their active participation in virtual environments, their motivation and attitudes toward using these technologies, and their ability to overcome technological barriers. This study highlights the need to consider sociocultural contexts in creating virtual educational environments to facilitate a more inclusive and practical learning experience.

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AUTHOR CONTRIBUTION

Conceptualization: David Hugo Bernedo-Moreira.
Data curation: Yesenia Tania Loayza Apaza.
Formal analysis: Milusca Jacqueline Velarde-Tejada.
Research: Alvaro Rafael Barrientos-Alfaro.
Methodology: Rafael Romero-Carazas.
Project management: David Hugo Bernedo-Moreira.
Resources: Yesenia Tania Loayza Apaza.
Software: Alvaro Rafael Barrientos-Alfaro.
Supervision: Francisco Zúñiga Pastor.
Validation: Milusca Jacqueline Velarde-Tejada.
Visualization: Rafael Romero-Carazas.
Writing – original draft: Francisco Zúñiga Pastor.
Writing – review and editing: David Hugo Bernedo-Moreira.