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School engagement in students from a Mapuche intercultural high school: a qualitative study

Compromiso escolar en estudiantes de un liceo intercultural mapuche: un estudio cualitativo

Engajamento escolar em alunos de uma escola intercultural mapuche: um estudo qualitativo

Sebastián Aranda López[1], ORCID 0000-0002-0343-159X
Isidora Larrañaga Hetz[1], ORCID 0000-0001-5072-6406
Eduardo López Maldonado[1], ORCID 0000-0002-8235-2151
Constanza Zappettini Sanhueza[1], ORCID 0000-0002-9159-2085
Francisca Hernández Vejar[1], ORCID 0000-0002-4685-8008
Himmbler Olivares[1], ORCID 0000-0001-9223-3351

[1] *Universidad de Concepción, Chile*

Abstract

Several international studies show math learning difficulties for indigenous students. These difficulties have also been seen in the context of Chilean Mapuche intercultural education. This could be related to a lack of school engagement. This study seeks to describe school engagement in Mapuche students. A qualitative study based on phenomenology and ethnography was carried out, which included interviews and class observations of two school subjects: *beyentun* (Mapuche worldview and spirituality), and mathematics. 10 students from a public school located in the Biobío Region, in Chile, took part in the study. They were in the first two years of high school. The resulting data was analyzed using content analysis. The results show high levels of engagement. However, there are differences between the subjects: students have higher levels of emotional engagement in the *beyentun* class and higher levels of cognitive engagement in mathematics. Additionally, the results suggest that *beyentun* classes strongly promote belonging and autonomy needs, while mathematics focuses on competence. These findings are discussed regarding school engagement and intercultural education.
Keywords: school engagement; Mapuche students; intercultural education

Resumen

Diversos estudios internacionales muestran dificultades en el aprendizaje de la matemática en estudiantes indígenas. Dichas dificultades también se han observado en el contexto de la educación intercultural mapuche chilena. Lo anterior podría relacionarse con una falta de compromiso escolar. En esta investigación se busca describir el compromiso escolar en estudiantes mapuche. Se realizó un estudio cualitativo, basado en la fenomenología y etnografía, que incluyó entrevistas y observaciones de clases de dos asignaturas: *Beyentun* (cosmovisión y espiritualidad mapuche) y Matemáticas. Participaron 10 estudiantes de un liceo ubicado en la región del Biobío (Chile), quienes cursaban primer ciclo de enseñanza secundaria. Los datos se analizaron mediante la técnica de análisis de contenido. Los resultados muestran altos niveles de compromiso. Sin embargo, existen diferencias dentro de las asignaturas: los estudiantes presentan mayores niveles de compromiso emocional en *beyentun* y mayores niveles de compromiso cognitivo en clases de matemáticas. Asimismo, los resultados muestran una alta promoción de la necesidad de pertenencia y autonomía en las clases de *beyentun*, mientras

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que en las de matemática se observa una promoción del desarrollo de la necesidad de competencia. Se discuten estos hallazgos en relación con el compromiso escolar y la educación intercultural.
Palabras clave: compromiso escolar; estudiantes mapuche; educación intercultural

Resumo

Vários estudos internacionais mostram dificuldades na aprendizagem de matemática entre alunos indígenas. Essas dificuldades também foram observadas no contexto da educação intercultural do povo Mapuche do Chile. Isso pode estar relacionado à falta de engajamento escolar dos alunos. Este estudo busca descrever o engajamento escolar dos estudantes Mapuche. Realizou-se um estudo qualitativo de base fenomenológica e etnográfica, que incluiu entrevistas e observações de aulas de duas disciplinas escolares: cosmovisão e espiritualidade mapuche (*beyentun*) e matemática. O estudo contou com a participação de 10 alunos de uma escola pública localizada na região de Biobío (Chile), que estavam cursando o primeiro ano do ensino médio. Os dados foram analisados por meio da técnica de análise de conteúdo. Os resultados mostram altos níveis de engajamento escolar. Contudo, esses níveis variam dependendo da disciplina: os estudantes apresentam maiores níveis de engajamento emocional durante *beyentun* e maiores níveis de engajamento cognitivo durante matemática. Além disso, observou-se uma alta promoção da necessidade de pertencimento e autonomia indígenas durante as aulas de *beyentun*, ao passo que, durante as aulas de matemática, enfatizou-se a necessidade de competência. Essas descobertas são discutidas em relação ao engajamento escolar e à educação intercultural.
Palavras-chave: engajamento escolar; estudantes mapuche; educação intercultural

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Correspondence: Himmbler Olivares, Universidad de Concepción, Chile. E-mail: hiolivares@udec.cl

The Bilingual Intercultural Education Program (PEIB, in Spanish) was implemented in Chile in 1996, to improve the quality and relevance of learning through curricular contextualization, community participation, and the teaching of indigenous languages (Lagos, 2015; Ministry of Education [Mineduc], 2018). As of 2016, about 2,000 educational establishments are involved in the PEIB (Mineduc, n. d.). Of these, 75 are located in the Biobío region (Mineduc, 2018). The program implements several strategies such as interculturality workshops, bilingualism, hiring a traditional educator, and an indigenous language subject. In the activities of the program, joint work is carried out by a "pedagogical duo" comprising the mentor teacher or classroom teacher, in charge of teaching the contents of the national curriculum, and a traditional educator, who teaches traditional knowledge of the Mapuche culture (Castillo et al., 2016).

Intercultural education in Chile has several limitations that have led to educational asymmetries between Mapuche and non-Mapuche students (Arias-Ortega & Riquelme, 2019; Loncon, 2013). Firstly, interculturality is only presented in workshops or in a single curriculum subject (Arias-Ortega & Riquelme, 2019). On the other hand, the lack of social valuation of indigenous languages promotes monolingualism and a lack of interest in reproducing the *chedungun*, forcing Mapuche students to learn Spanish and to grow through that language and the symbolic contents of Chilean society (Lagos, 2015; Loncon, 2013).

One of the main criticisms of the PEIB is that it does not articulate Mapuche knowledge with Western knowledge (Quintriqueo & Cárdenas, 2010). Indeed, many of the tensions there are in the intercultural educational context are based on underlying differences in the way of educating. While Mapuche knowledge is built from social and cultural memory, which in turn is the result of the knowledge of the *kimchi*, and Mapuche sages, Western epistemology is based on monolingualism in Spanish and Eurocentric contents (Quintriqueo et al., 2014). This tension interferes with the participation and learning of Mapuche students since they lose interest in school when they perceive that their knowledge, and the knowledge acquired in the family context, are not legitimized or valued. In practice, these differences lead to feelings of marginalization in Mapuche students, who are victims of prejudices and negative stereotypes by most of society, as they do not comply with the pedagogical profiles or ideals typical of the Western world (Silva-Peña et al., 2013).

It should be noted that the aforementioned tensions, typical of intercultural education, have also been studied in the international context. Evidence shows that indigenous students have greater difficulty in learning mathematics and experimental sciences than non-indigenous students. One of the possible explanations for these difficulties lies in an epistemological conflict between the cultural beliefs of indigenous students, and the educational assumptions established in the school mathematics curriculum (Marginson et al., 2013; Miller & Roehrig, 2018).

According to the United Nations Educational, Scientific and Cultural Organization (2017), there is a significant gap between the learning outcomes obtained by indigenous and non-indigenous children, both in urban and rural areas. In Chile, lower results are seen in indigenous students compared to non-indigenous students in the National Learning Outcome Evaluation System (SIMCE) and in the University Selection Test (PSU). In the SIMCE on mathematics, there is a difference of about 0.2 to 0.3 standard deviations (Webb et al., 2017); and in the PSU, indigenous students average 50 points less than the national average (Abarzua et al., 2011).

In the field of Educational Psychology, evidence shows that the learning outcomes of indigenous students can be explained by emotional aspects, such as motivation and school commitment. The work of Martin et al. (2021) reports lower levels of motivation and school commitment in indigenous Australian students compared to non-indigenous students. The study also shows that high levels of motivation and commitment predict academic achievement. These results are consistent with previous research where, although it is seen that indigenous and non-indigenous students have similar positive aspects associated with motivation and school engagement, such as the valuation of the school, academic optimism, and enjoyment of school, among others, negative aspects, such as the avoidance of failure, insecurity, and disconnection or lack of commitment are higher in indigenous students, compared to non-indigenous Australian students (Martin et al., 2013).

School Engagement

School engagement (SE) refers to the attitude of students towards the educational establishment, their interpersonal relationships within it, and their willingness to learn. It is expressed through the feeling of connection and participation, friendships at school, positive relationships with teachers, the development of a sense of belonging, and identification with the institution and its values (Fredricks et al., 2004; Organisation for Economic Co-operation and Development, 2005). SE results from an interaction between people and an institutional environment that favors opportunities for participation,

edifying interpersonal relationships, and intellectual challenges, so the characteristics of the socio-emotional context are important (Fredricks et al., 2004).

SE is a multidimensional construct, that includes the dimensions of behavior, emotion, and cognition, distinguishing three components: behavioral, emotional, and cognitive commitment. These relate to the way students behave and feel about the formal educational experience and the ability to synthesize new information, critical thinking, and problem-solving (Fredricks et al., 2004; Jimerson et al., 2003). SE components relate to the three fundamental needs of the organism: competence, autonomy, and belonging. The satisfaction of the needs for competence and autonomy has been associated with the development of the three dimensions of SE, while the need for belonging has been associated with emotional and behavioral dimensions (Klem & Connell, 2004; Krauskopf, 2001; Osterman, 2000; Papházy, 2006).

SE action patterns occur in the interactional dynamics between the needs of competence, autonomy, and belonging, and the factors of the academic and socio-cultural environment that influence their development since people actively orient their actions, thoughts, and emotions based on the satisfaction of these needs (Connell & Wellborn, 1991). When these needs are met in the school environment, learning self-regulation, academic achievement, and the development of SE in students are facilitated (Raufelder et al., 2014). In this way, SE acts as a mediator between the students, their relevant contexts, and their interests (Reschly & Christenson, 2012).

Another variable that could contribute to satisfying the needs described (and, therefore, influence the SE) is the creation of learning communities, based on dynamic and complementary relationships between the different members of a class, where group work is more relevant than individual work, and where each student serves as a resource for others with variable roles depending on their understanding and management of the activity in question (Rogoff, 2014; Rogoff et al., 2018). These group collaboration commitments would be more common in communities with indigenous heritage (Mejía-Arauz et al., 2007). Similarly, collaborative learning, i.e., mutual involvement in shared tasks, has made it possible to observe, among other phenomena, how students, acting as a group, observe one another, engaging enthusiastically and maintaining the rhythm of interaction (Mejía-Arauz et al., 2007).

It should be noted that SE is associated with low dropout rates and a higher degree of involvement in educational work (Sandoval-Muñoz et al., 2018). Positive relationships have been found between SE and grade point averages, educational aspirations, satisfaction with school, behavior inside the school, and the motivational climate for learning (Gutiérrez et al., 2018; Wang & Eccles, 2011).

Studying SE in Mapuche youth has theoretical and practical relevance. The former is because this research will help understand SE in Mapuche students, allowing exploring the variables related to the construct in the context of Mapuche intercultural education, such as learning, school performance, motivation for learning, and educational aspirations, in addition to helping to understand the phenomenon of lack of schooling (Gutiérrez et al., 2018; Sandoval-Muñoz et al., 2018; Wang & Eccles, 2011). On the other hand, regarding practical relevance, understanding SE in Mapuche students could contribute to making improvements in pedagogical practices and generating curricular proposals that ensure better learning outcomes (Wang & Eccles, 2011).

Aim of the study

The aim of this research is to make a description of the SE of Mapuche students in two subjects: Mapuche language and culture, and mathematics. The aim is to carry out the research from a qualitative, phenomenological, and ethnographic approach.

The distinction between the subjects of Mapuche language and culture and mathematics represents the historical-cultural tensions between Mapuche and Western knowledge. The Mapuche language and culture course, taught by a traditional educator from an indigenous community, addresses contents that usually involve aspects related to the language, with Mapuche cultural practices (work with a loom, for example). These aspects of the subject lead to assuming that these courses are close to training practices typical of the Mapuche culture. On the other hand, mathematics education represents Western education by definition, knowledge-based, that has no relation to the Mapuche culture. These differences in subjects could affect the way students feel and the way they act in class, that is, in their school engagement, and with this, in their learning process. In a similar vein, the school engagement of students can influence their decision to drop out of school.

Method

Design

This is a qualitative descriptive study, based on ethnography as a frame of reference. The purpose of qualitative research is to understand phenomena from the point of view of the participants, focusing on their interpretations and meanings in a natural environment and related to their context (Valles, 1999).

School and Participants

The research was carried out at Trapaqueante School, located in the municipality of Tirúa, in the Biobío region. Approximately 10,000 inhabitants live in the commune, out of which about 45 % belong to the Mapuche culture. The number of people who speak Chedungun in the commune is relatively low and is mainly older people (Henríquez Barahona, 2014). The establishment is the only one that offers high school education in the commune. The education offered by the school covers the areas of social sciences, science, and professional technical training. In the latter, high school-level technical training in aquaculture and nursing is offered. The establishment has an enrollment of 350 students, 44.3 % of which come from the Mapuche community. The school is also ascribed to the PEIB. It should be noted that the students of the establishment have a high dropout rate, more accentuated in the first two years of high school, which is also attributable to other psycho-social problems related to alcohol and drug consumption (Trapaqueante School, 2019).

10 students voluntarily participated in this research, 3 male and 7 female, who were studying the first two years of high school, which in the Chilean system is the ninth and tenth year of schooling. The participants were openly invited through invitations made in each class by members of the research team. The participants signed informed consent, while their representatives consented to their participation orally to the establishment's Head of the Technical-Pedagogical Unit (UTP, in Spanish), an administrative unit in Chilean schools which coordinates and supervises aspects regarded with curriculum and evaluation.

The inclusion criteria were: being at high school, being in the first two years of high school, being considered as belonging to the Mapuche culture, and taking the subject of Mapuche language and culture, called *beyentun* (taught by the school through the PEIB, which teaches the Mapuche cosmovision and spirituality). On the other hand, within the exclusion criteria, it was considered to have an Individualized Curricular Adaptation Program (PACI, in Spanish) in mathematics, since students who follow this program are not taught the same contents because they have special educational needs.

The students who decided to volunteer in the research and who met the inclusion criteria were interviewed individually. The interviews were conducted in the library and classrooms at the school, set up for that purpose. The interviews lasted between 20 to 30 minutes.

Three open, spontaneous interviews, without guidelines, were also conducted with four teachers, including the *beyentun* pedagogical duo, who were interviewed together. The interviews conducted were useful to give context to the researchers about the establishment and the students being observed.

Data Collection Techniques

Two techniques were used for information collection: (1) semi-structured interviews with students, which consisted of 12 questions to inquire information about motivations to learn and attend high school, their grades, learning in *beyentun* and mathematics classes, and class participation (see Appendix 1); (2) participant observation, which was done in the math and *beyentun* classes. In each class, one, two, or three researchers –depending on how many participants were present in that class– each recorded the actions performed by one or two students, at most. Both the mathematics and the *beyentun* classes lasted between 45 and 90 minutes (1 or 2 pedagogical hours, respectively). The information was collected through field notes with an observation format shared by the research team, where a written record of the observed context was made (Rodríguez et al., 1996).

The shared observation format recorded actions carried out by the teachers and students during the class, which were later analyzed from the point of view of school engagement. An example of an action is when a student looks at her phone at some point in the class. Other observations relate to typical interactional aspects of a class, such as a question asked by the teacher. In some cases, depending on the situation, both aspects are inextricably linked. For example, observing that a student checks her phone while the teacher explains an important aspect of the class content.

Procedure

The research consisted of six stages: 1. Contact with the school's direction team through the Municipal Education Administration Department of the commune where the school is located; 2. Presentation visit, planning of the information collection techniques to be implemented together with the school team, and approach to the participants; 3. Participant observation in 5 classes of mathematics and 6 of *beyentun*, in addition to semi-structured interviews with students in 3 visits; 4. Transcription and analysis of the collected data, through content analysis; 5. Preparation of conclusions using the results obtained.

Data Analysis

The method used to analyze the information was content analysis (Bardin, 1996). An open categorization was carried out, where the collected data were compared and a common name was given to a group of fragments of the observations and interviews made. In this way, conceptualizations and relationships between the contents were obtained, with which the conclusions of the study were formulated (Valles, 1999). To ensure the authenticity of the interpretations of the data associated with the study (Gall et al., 2003), double codifications and peer review were performed. Also, quotes from the interviews with participants and extracts from the notes taken in the class observations of the participants are included.

Ethical Considerations

An informed consent form was given to the guardians of each participant, with the information about the study. However, considering what was mentioned by Frisancho et al. (2015), the informed consent was adapted from a cross-cultural perspective, due to the cultural background of those living in indigenous communities and their lack of familiarity with the research protocol, where parents had the option to orally consent to their participation through the Head of the UTP.

Results

By reviewing the data collected in the interviews with students (S) and the observations of classes (M, B), 7 categories emerged. organized according to the research objective, from which some more specific subcategories appeared:

1. Behavioral Engagement

Behavioral engagement is based on the idea of participation in academic and social or extracurricular activities (Fredricks et al., 2004). It includes actions such as active participation in classes, paying attention, and copying the texts given in the class. For its analysis, it was conceptualized into high behavioral engagement and low behavioral engagement. The following quote exemplifies the high behavioral engagement in math class: “Ca organizes her pencils and notebook for today's class. She looks carefully at the whiteboard and writes down what the teacher writes on it” (M1B, P4). A quote that exemplifies low behavioral engagement in *beyentun's* class is as follows: “Yo saw she talks to a classmate who, apparently, is chatting on her cell phone” (B3B, P31).

2. Cognitive Engagement

Cognitive engagement incorporates thoughtfulness and a willingness to exert the effort needed to understand complex ideas and master difficult skills (Fredricks et al., 2004), including actions such as: showing effort, remembering, expressing formulated doubts about the subject, and persevering academically. For its analysis, it was conceptualized into high and low. The following quote exemplifies high cognitive engagement in *beyentun* classes: “The teacher asks questions about the parts of the loom. She asks who wants to spin a ball of wool. Yo answers the parts he remembers, the ones he was taught in English” (B1A, P14, and P15). A quote taken from one of the interviews, which exemplifies the low cognitive engagement is as follows: “I never study at home, no subject” (S4, P12).

3. Emotional Engagement

Emotional engagement encompasses positive and negative expressions towards teachers, and academic and school classmates, and is supposed to create bonds with an institution and influence the willingness to do work (Fredricks et al., 2004). It was conceptualized as high and low for its analysis and includes actions such as positive actions and attitudes between peers or student-teacher, and emotional interest in the subject. The following quote, taken from one of the interviews, exemplifies high emotional engagement: “My friends, coming to see them. Come to play football. I have my best friends, my friends from class, and all that. I like coming to study, that's what motivates me the most” (S5, P2). A quote is taken from an interview that shows low emotional engagement is the following: “The teachers raise my spirits and then lower them, they don't understand my situation of traveling every day, that I have to get up early. I have to be ready at 5 and I miss an hour of class” (S8, P3).

4. The need for competence

This is defined as the need to see oneself as being capable of producing the desired results and avoiding the negative ones (Connell & Wellborn, 1991).

Carrying out a structured class and delivering encouragement and feedback was considered a promoting intervention by teachers: "The teacher [...] congratulates those who remember the contents" (M1B, P4). In contrast, a hindering intervention by teachers would be not paying attention to the student when they request it: "Vi: 'Miss, I'm done, but it doesn't matter.' The teacher doesn't check their work" (B3B, P78).

The student may have a feeling of competence when they feel able to do some activity and express it: "The teacher [...] asks Ro if he knows how to use the loom and he nods his head while drinking tea" (B2, P2). On the contrary, the feeling of incompetence consists in feeling incapable of performing an activity.

5. The need for autonomy

The need for autonomy is given by the choice of maintaining, starting, and regulating the activities carried out by a person in a learning situation (Connell & Wellborn, 1991). An example of an intervention that promotes autonomy is the following: "The teaching assistant approaches the desk and points at the notebook of Yu. The teacher asks if he is doing well with his worksheet. Yu nods, pointing out that he is doing well with his work, that he has no doubts" (M2B, P95). A hindering intervention by teachers would be forcing them to work and/or participate in activities, or intervening in students' interactions related to classwork: "The teacher asks the students to work with the spindle. None of them wants to, so she comments that she knows that Pa can do it well. In the beginning, Pa doesn't want to, but then gives in" (B1C, P14). A peer-to-peer promoting intervention would consist of lending materials or encouraging peers to work, and a hindering peer condition would be to deny the material, deny an explanation, or affect the development of the class.

6. The need for belonging

The need for belonging encompasses the need of the person to connect confidently with the social environment and their experience as a person who is worthy and capable of loving and respecting in reciprocity (Connell & Wellborn, 1991). This need implies that the student body is flexible and is confident to build and express meanings with those they work with, to understand their interpretations of what they are taught (Anderson, 2018).

This need is satisfied, for example, when there is a driving intervention related to cultural identity such as speaking in chedungun and performing actions linked to the customs of the culture: "The traditional educator advises on how to use the loom and on which wool is the best. She talks about Mapuche objects and personal experiences" (B1B, P12). The need for belonging would also be related to participation in community activities, whether linked to the school or the culture.

On the other hand, it was found that the satisfaction of the need for belonging can be diminished by hindering conditions regarding the infrastructure: "We used to play every recess, but I can't play in the yard here, because I don't like to get dirty, it's just dirt" (S1, P71).

There is also the driving intervention of teachers, with a positive effect on the student: "The teachers […] help me, more or less, in what is more complicated for me and whenever they can" (S2, P65). Instead, a hindering intervention would be to stigmatize students. In addition, there are peer-driving interventions and peer-hindering interventions, when there is a negative effect.

7. Collaborative Learning

Collaborative learning is a mutual involvement when participating in shared tasks, where one learns cooperatively, and works with a high engagement (Freire et al., 2016) where the students, acting as a group, observe each other, engage enthusiastically, and maintain the rhythm of the interaction (Mejía-Arauz et al., 2007).

This was conceptualized into four divisions for its analysis: peer-to-peer/horizontal, for collaborative actions between students with equal knowledge; peer-to-peer/vertical, for collaborative actions between students with unequal knowledge: "Ro notices the difficulties that one of his classmates has with the work on the loom, so takes the lead and goes to help him, [...] working alternately on their loom" (B2, P7); teacher-student/horizontal, when there is a collaborative interaction between the teacher and the student, with a balanced knowledge; and teacher-student/vertical, for collaborative interaction between teacher and student with unbalanced knowledge: "Yo focuses and does the exercises with the teacher" (M4B, P6).

Behavioral engagement, cognitive engagement, and emotional engagement

In *beyentun*, the subcategories of high levels of engagement (High Behavioral Engagement, High Cognitive Engagement, and High Emotional Engagement) are repeated considerably more than those with low levels of engagement (Low Behavioral Engagement, Low Cognitive Engagement, and Low Emotional Engagement).

Below are some examples of high behavioral, cognitive. and emotional engagement in the subject, respectively: "Yo takes the loom and its parts by looking at it and handling it very carefully and very attentively" (B1A, P11); "Yo tries spinning for a while by hand, without the spindle. Then takes it and watches it. He does not give up" (B1A, P20); "I would like to be a *beyentun* teacher, like Rosa" (E8, P21).

It is also seen that High Behavioral Engagement is almost always accompanied by High Cognitive Engagement: *"*Pa manages to fix it and continues working, visibly focused and interested" (B1C, P14). Likewise, high emotional engagement frequently appears next to low behavioral engagement: "She hugs her classmate, not paying attention to the teacher" (B4A, P10); demonstrating tension between the emotional and behavioral engagement in this subject.

In mathematics, the subcategories of High Levels of Engagement are repeated noticeably more than those of Low Levels of Engagement, especially high cognitive engagement compared to low cognitive engagement.

Below are some examples of high behavioral, cognitive, and emotional engagement in math, respectively: "Pa draws the sphere projected on the board in their notebook" (M1C, P7); "Ju stays quiet and [...] confines himself to saying only what's needed. He answers the teacher the result of a quick multiplication" (M1C, P16); "The special needs teacher arrives at the desk of Pa and their classmates. The four of them talk and laugh cheerfully" (M1C, P17).

On the other hand, High Emotional Engagement and the Need for Competence: With a teacher's hindering intervention, both occur together on considerable occasions. For example, "Teacher again talks about the topic of the trip and the choice of the students, commenting, jokingly, who she will 'leave off the bus'. Pa smiles shyly and whispers to her classmates" (M1C, P16).

Likewise, High Behavioral Engagement appears next to High Cognitive Engagement, a relationship that is exemplified in the following quote: "The teacher explains how to get the lateral area, Ju looks carefully and stops writing" (M1A, P12).

When comparing the results obtained in terms of SE, High Emotional Engagement appears much more in *beyentun* than in mathematics. In contrast, High Cognitive Engagement appears more in mathematics than in *beyentun* and Low Cognitive Engagement is twice as high in *beyentun* than in mathematics. Meanwhile, in both subjects, high-engagement subcategories are repeated much more than low-engagement subcategories, and low-engagement levels appear more frequently in *beyentun* classes.

Need for belonging, need for competence and need for autonomy

Regarding the subject of *beyentun*, the subcategory of High Behavioral Engagement is linked to each of the needs, through autonomous work, and coexistence with peers related to academic work in activities related to Mapuche culture: "The teacher gives worksheets and gives specific instructions regarding the work that students must do (Code: driver of the need for competence). The title of the worksheet is Artisan wool production process. Ro receives it and continues to work on their loom. Later, they stop to flip through the worksheet and comment on it with two of their classmates" (B2, P13).

It is also possible to see that there is a high promotion of the Need for Belonging, especially for cultural identity and in teacher interventions. In addition, both subcategories appear together frequently. For example, in the following situation: "The traditional teacher tells us about the loom that she has in her hands. She tells how her mother weaved and how the tradition has been lost. She names all the parts of the loom" (B1A, P3). In the same way, the driver of the need for belonging carried out by the teacher is related to High Emotional Engagement and the students' school engagement in general. The driver of the need for belonging is expressed in the following quotes:

> Two students do not have their tolohue (main wooden rod for weaving on the loom). Faced with this situation, the traditional teacher breaks hers (not without first analyzing how else she could solve the problem since it is considered a very valuable instrument for her) into two pieces, one for each student (B6, P1).

> The traditional teacher guides a conversation about the etymological origin of the "Trapaquena" sector: it is divided into "Trapa" and "Quena", and refers to the closure of a place by a landowner. Ro listens attentively and is surprised (B6, P3).

Less often, the need for belonging also appears to be connected -driving intervention, both of the cultural identity and the teacher-, with the need for competence –driving intervention of the teacher–. An example would be "After choosing the colors, Ro starts working. While the teacher guides the weaving, they comment on the names of some parts of the process in chedungun and their etymological origin" (B2, P6).

In mathematics, there are more situations of driving needs than those that hinder them. There is a greater driver of the Need for Competence, especially those that involve teacher-driving interventions, in contrast with the driver of the Need for Belonging and the Need for Autonomy. When comparing both subjects, there is a considerable difference in the driving of the Need for Belonging, since the number of cases in *beyentun* is noticeably higher than in mathematics. On the other hand, the driver of autonomy is greater in *beyentun*. The need for competence is driven to a greater extent in mathematics. However, interventions that hinder the Need for Competence are recorded almost twice as often in mathematics. On the other hand, in mathematics, hindering interventions linked to the students' need for belonging occur more frequently.

Collaborative Learning

A finding that emerged from this research, which arises from classroom observations, relates to aspects connected to collaborative learning. This is because the phenomenon was frequently observed during class interactions. For this purpose, the distinction between vertical collaborative learning and horizontal collaborative learning was used, since it could contribute to distinguishing differences in school engagement in the two subjects considered for the study. Additionally, the interactions in collaborative learning were analyzed, distinguishing whether they were between teacher and student or between peers. The results show that, in mathematics, horizontal collaborative learning is present more often than vertical collaborative learning. Also, almost all collaborative learning occurs between peers, as can be seen in the following excerpt: "It is seen that they plan to stay for a long time, as they set up a chair next to the table of the observed student's classmate. They join the conversation, reflection, and work dynamic" (M5, P3).

For its part, in *beyentun*, Horizontal Collaborative Learning occurs relatively more often than Vertical Collaborative Learning, with peer-to-peer collaborative learning predominating over teacher-student collaborative learning, and horizontal peer-to-peer over vertical peer-to-peer: "CA chats with her classmate and then starts spinning. They help her so that she can learn to do it well" (B1B, P7). These are also often linked to High Emotional Engagement: "RO notices the difficulties that one of his classmates has with the work on the loom, so he takes the initiative and goes to help him, guiding his classmate's work and working alternately on his loom" (B2, P7); with High Behavioral Engagement: "Together, the classmates provide feedback to solve the problem. PA manages to fix it and continues to work, visibly focused and interested. Then, she passes the loom to a classmate and observes her, giving her feedback from time to time" (B1C, P14).

When comparing the results obtained, a greater number of Collaborative Learning situations were found in *beyentun* compared to mathematics, although in both subjects there are more situations of horizontal collaborative learning between peers than vertical collaborative learning between peers-. As for student-teacher collaborative learning, more cases are seen in *beyentun* than in mathematics.

A high number of Vertical Collaborative Learning situations are present in *beyentun*, compared to mathematics. This difference is shown both in teacher-student interactions and those between peers. Collaborative Learning occurs at length throughout the entire class and often appears alongside high levels of all three dimensions of SE, especially High Emotional Engagement. In contrast, in mathematics, collaborative learning situations occur in specific cases, are shorter, and lack emotional engagement.

Discussion

This research describes the case of Mapuche high school students attending an establishment located in the commune of Tirúa, in the Biobío Region (Chile). For this purpose, observations were made in *beyentun* and mathematics classes, in addition to semi-structured interviews, with 10 participants. The main results of this work show that the levels of engagement, in general, are high in the subjects of mathematics and *beyentun*. There is a high emotional engagement in *beyentun* compared to mathematics, and a high cognitive engagement in mathematics compared to *beyentun*. However, low levels of engagement appear more frequently in *beyentun* classes than in math classes, especially in cognitive engagement. From the needs approach, a high driver of the need for competence is observed in mathematics classes, while in *beyentun*, a high driver of the needs of belonging and autonomy is seen. The results also show a high amount of

collaborative learning interactions, between teachers and students, vertical and horizontal, with greater presence and duration of this type of exchange in *beyentun* classes.

The overall results of this research show good levels of engagement in the students who were part of the study. This means that students show personal involvement with the learning activities proposed by their teachers in the observed classes, along with an effort to try to achieve the learning proposed in those classes. These results coincide with previous research that shows high levels of motivation and school engagement in indigenous students (Martin et al., 2013; Martin et al., 2021). In a similar vein, aspects related to negative emotional engagement or disconnection are observed in students, which also coincides, to some extent, with previous research that shows higher levels of disconnection or lack of school engagement in indigenous students (Martin et al., 2013; Martin et al., 2021)

More specific results on higher levels of cognitive engagement and drivers of the need for competence in mathematics classes could be attributed to a greater valuation of the subsector and its relationship with possible aspirations related to the life projects of the Western world on the part of teachers, students, and their families. However, no valuation was observed in the discourse in favor of learning mathematics in the classes, nor were higher evaluations observed in the student interviews. Instead, the results indicate that the mathematics classes evidence patterns of interaction where the promotion of the teacher's competence predominates, accompanied by the cognitive engagement of the students. The observation of this interaction format is positive since it allows students to progress in the process of learning mathematics. Future research may contribute, first of all, to determining the relationship between this type of interaction in greater detail, considering the pedagogical practice related to content presentation by teachers and student learning outcomes in mathematics. In this sense, the competency driving actions observed in our study (for example, reviewing exercise worksheets on the board, reviewing tasks next to each student's desk, and asking students questions), could be studied in future research, in addition to the feedback provided by the teacher to the students (Martin et al., 2013; Wisniewski et al., 2020). In this way, it will be possible to specify supports that contribute to improving the math learning results of Mapuche students.

On the other hand, the fact that High Emotional Engagement is present more often in *beyentun* than in math could be related to previous findings that indicate that, when teachers share the same cultural background, they provide a strong role model to the students, which becomes particularly relevant in contexts of academic vulnerability (Bingham & Okagaki, 2012). In another vein, the results in emotional engagement can also be related to the greater presence of horizontal collaborative learning interactions. In this case, the predominant interaction formats are based on horizontal collaboration, affective support, or promotion of students' emotional engagement. In this sense, the findings coincide with the research of Bárbara Rogoff (2014) and her collaborators (Mejía-Arauz et al., 2007; Rogoff et al., 2018), that account for a completely different way of understanding training, own and verifiable in American indigenous peoples, where collaboration is appreciated as a cultural aspect present in daily life, which acts as a basis for coexistence and, by extension, for teaching and learning.

It is noteworthy that, in these collaborative scenarios, a sense of mutual understanding guided affectively also predominates as the basis of social interactions. Indeed, it is common to observe patterns in the results related to the promotion of the need for belonging with aspects related to the affective commitment of students.

Future research requires expanding the results of the research because it can contribute to the generation of a new curricular framework or new educational projects based on collaboration and community participation, whose scope in the learning of language and culture and knowledge of Western disciplines is still unknown. In this sense, different authors point out the importance of involving communities in decision-making processes related to pedagogical and curricular aspects (Martin et al., 2021).

Finally, in light of the results, which show high levels of SE in the observed students, and since SE is associated with low dropout rates and a higher degree of involvement in educational work (Sandoval-Muñoz et al., 2018), in this study no evidence was found that would connect low levels of SE in the observed students with intention or attempts to drop out. In fact, it is observed that the high SE is greater than the low SE in all its dimensions in this set of students. These results are valuable, since they imply lower risks of dropout in the observed students, in a school context with high dropout levels. Future research may address this aspect by looking in detail at SE in students at risk of dropping out or who have previously dropped out.

Conclusion

The results of this study describe the SE and how it is related to the satisfaction of the needs of belonging, autonomy, and competence in Mapuche students in the context of intercultural education in Chile. Such findings are relevant for making curricular reforms that adapt to the needs of these students, considering how the conditions that have defined the institutionalization of the proposal of intercultural bilingual education by the State have limited the capacity for action and transformation of educational processes by incorporating indigenous and local knowledge into educational establishments with the logic of a monocultural school curriculum (Forno et al., 2009).

Within the limitations of the study, there is a limited number of students in the sample. Future research should expand the sample size, taking as a reference the categories observed in this study. Other practical limitations were given by the conditions of the country in 2019, which is the year when the observations of the study were made. On one hand, a teachers' strike caused the class schedules to be different from the usual ones. In fact, some subjects had excessive-class hours. The Chilean popular uprising that occurred in October 2019 is also relevant, since one of the activities planned in the study, which consisted of holding a focus group with the participants, could not be done.

It is hoped that the results presented in this research will contribute to a better understanding of the situation of Mapuche students and the context of intercultural education in Chile, and that future research carried out in this context will extend upon the results presented in this study.

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Apéndice 1. Pauta de entrevista realizada a los estudiantes

1) ¿Cuáles son tus razones para venir a clases? ¿Qué te motiva? ¿Qué te desmotiva?
2) ¿Qué es lo que más te gusta de tu liceo? ¿Qué es lo que menos te gusta de tu liceo?
3) ¿Cómo te va en las evaluaciones? ¿Qué notas te sacas?
4) ¿Qué aprendes en *beyentun*? ¿Qué cosas les enseñan? ¿Las cosas que aprendes en *beyentun* son importantes para ti? ¿Por qué?
5) ¿Qué aprendes en las clases de matemática? ¿Qué cosas les enseñan? ¿Las cosas que aprendes en matemática son importantes para ti? ¿Por qué?

6) ¿Estudias matemática cuando no estás en clases? ¿Cómo estudias? ¿Qué estrategias utilizas? Descríbenos tu rutina de estudio.
7) ¿Estudias *beyentun* cuando no estás en clase?
8) ¿Haces otras cosas que no ves en el taller de *beyentun* y que son parte de la cultura mapuche?
9) ¿Participas en clases de *beyentun*/matemática? ¿En cuáles te consideras más participativo/a?
10) ¿De qué manera influyen tus profesores/as, educador/a tradicional y compañeros/as en tu motivación por aprender?
11) ¿Participas en otras actividades del liceo? ¿En cuáles te interesas más? ¿Por qué?
12) ¿Cómo sería para ti el liceo soñado? (¿Te gustaría tener más clases de *beyentun*? ¿Más clases de matemática?)

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