A Trivium Curriculum Approach to Connect an Active Learning and Self-Assessment of Students' Mathematical Competencies in an Ethnomodelling Perspective

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Abstract

An important change in mathematics instruction needs to take place in order to accommodate changes in student populations. There is a need for pedagogical action that enhances students' knowledge and develops their mathematical competencies. The main goal of this theoretical article is to determine how self-assessment and active learning encourages the building of mathematical competencies by applying an ethnomodelling perspective. The integration of these pedagogies helps educators to meet specific student needs and to achieve desired learning outcomes that may help them to become active participants in the classroom. This context enables ethnomodelling to develop mathematical competencies by incorporating an active learning and self-assessment in its pedagogical action by integrating the trivium curriculum in the teaching and learning of mathematics.

Keywords: Active Learning, Ethnomodelling, Mathematics Competencies, Self-Assessment, Trivium Mathematics Curriculum.

Uma Abordagem do Currículo Trivium para Conectar a Aprendizagem Ativa e a Autoavaliação das Competências Matemáticas dos Alunos na Perspectiva da Etnomodelagem

Resumo

Uma mudança importante no ensino de matemática precisa ocorrer para acomodar as mudanças nas populações de alunos. É necessária uma ação pedagógica que valorize os conhecimentos dos alunos e desenvolva as suas competências matemáticas. O objetivo principal deste artigo teórico é determinar como a autoavaliação e a aprendizagem ativa estimulam a construção de competências matemáticas por meio da aplicação da perspectiva da Etnomodelagem. A integração dessas pedagogias auxilia os educadores no entendimento das necessidades específicas dos alunos e a alcançarem os resultados de aprendizagem desejados, que podem auxiliá-los a se tornarem participantes ativos em sala de aula. Este contexto possibilita que a etnomodelagem desenvolva as competências matemáticas ao incorporar a aprendizagem ativa e a autoavaliação em sua ação pedagógica, integrando o currículo trivium no ensino e aprendizagem da Matemática.

Palavras-chave: Aprendizagem Ativa, Etnomodelagem, Competências Matemáticas, Autoavaliação, Currículo Matemático Trivium.

Una Abordaje de Currículo Trivium para Conectar la Aprendizaje Activo y la autoevaluación de las Competencias matemáticas de los Estudiantes en una Perspectiva de la Etnomodelación

Resumen

Es necesario que se produzca un cambio importante en la enseñanza de las matemáticas para adaptarse a los cambios en la población estudiantil. Existe la necesidad de una acción pedagógica que mejore el conocimiento de los estudiantes y desarrolle sus competencias matemáticas. El objetivo principal de este artículo teórico es determinar cómo la autoevaluación y el aprendizaje activo fomentan la construcción de competencias matemáticas mediante la aplicación de una perspectiva de la etnomodelación. La integración de estas pedagogías ayuda a los educadores a satisfacer las necesidades específicas de los estudiantes y a lograr los resultados de aprendizaje deseados que pueden ayudarlos a convertirse en participantes activos en el aula. Este contexto permite la etnomodelación desarrollar competencias matemáticas al incorporar el aprendizaje activo y la autoevaluación en su acción pedagógica al integrar el currículo trivium en la enseñanza y aprendizaje de las matemáticas.

Palabras Clave: Aprendizaje Activo, Etnomodelación, Competencias Matemáticas, Autoevaluación, Currículo de Matemáticas Trivium.

Introduction

The term *21st Century* in regard to mathematics education is generally used to refer to a certain core of competencies that can be related to the Trivium Curriculum (D'Ambrosio, 1999), which are connected problem-solving activities. This approach advocates for school needs that can teach and help students to become critical and reflective citizens. The teaching and learning of mathematics can, in this sense, become a product of the interaction among teachers, students, and mathematics.

Embracing a *21st Century* learning model encourages teachers to consider innovative elements such as active learning, self-assessment, and the diversity of students as they create alternative pedagogical approaches. This may create a shift in developing learners who will take intellectual risks, fostering learning dispositions, and nurturing school context and recognizes active learning pedagogies. According to Rosa (2010), it is necessary that teachers be supported to include individual differences of all their learners as they address authentic situations in the learning educational process.

In this regard, Rosa and Orey (2011) affirm that by using ethnomathematics, students have been shown to learn how to find and work with authentic situations and real-life problems. In this context, this program brings the out-of-school mathematics that is practiced in real-life situations into the classroom and, thereby, improving the understanding of mathematical concepts. This approach encourages the connection between mathematics and the real-world through authentic problems and situations that enhance learners' development of their mathematical knowledge.

This approach addresses a *whole child* initiative in which "all students who have access to challenging and engaging academic programs are better prepared for further education, work, and civic life. These components must work together, not in isolation. That is the goal of whole child education" (ASCD, 2015, p. 2). For example, the results of the study conducted by Rosa (2010), shows that this pedagogical action inspires lifelong learning across different spaces and communities.

In this context, routine and/or standardized classroom-based learning do not empower students as creative and engaged citizens who can strengthen the wellbeing of a whole society. This pedagogical action helps students to become a whole person and enables them to develop their critical thinking and draw their own conclusions by performing real-world curricular activities contextualized in the classrooms.

According to Best (2008), the *whole person* pedagogy guides school curricular changes toward exploration of ethics, understanding, comprehension, and knowledge by valuing and respecting the knowledge developed in other contexts. It also directs students' attention beyond the classroom to the needs of the surrounding community, which helps them to become better citizens while accommodating challenges, opportunities, and traditions distinctive to the cultures, societies, and institutions where it takes roots.

It is important to emphasize that different educational systems may place varying degrees of emphasis on aspects of students' academic development and their performing on standardized internal and external assessments and tests, but they also must acknowledge their responsibilities to support their students as multi-faceted, and multi-dimensional beings who are able to transform society in order to look for peace and social justice (Rosa & Orey, 2017a).

In this context, Rosa (2010) argues that in diverse classrooms, an integration of learners with different learning styles, and diverse academic, social, and cultural backgrounds is a positive approach. Frequently, classes may have underachieving students who come from minority groups. This is a result of the integration of learners with different learning styles and academic abilities.

Often, the experiences of individual learners differ from more traditional approaches used in the process of teaching and learning mathematics. Thus, it is important that educators be supported to meet the specific needs of a different student population, which includes minorities and the underrepresented. As well as being supported to develop the desired learning outcomes that support their learning experiences (ROSA, 2010).

With the growth of ethnic and linguistically diverse student populations in schools, D'Ambrosio (1990) states that mathematics curricula should reflect the intrinsic social and cultural learning styles of all students. Hence, teachers should be supported in their preparation to address such differences in classrooms.

When teachers are able to use prior cultural knowledge and experiences, frames of reference, and learning styles of their students they can make learning more relevant and effective with the objective of strengthening their connectedness with schools and as consequence enhancing their learning experiences (Gay, 2000).

This pedagogical action enables Ethnomathematics as a program to draw from the sociocultural experiences and practices of learners, their communities, and society at large by using their *mathematical tacit knowledge*[1] as a vehicle to make mathematics learning more meaningful and useful and, more importantly, to provide students with insights of mathematical knowledge as embedded in diverse environments (D'Ambrosio, 2006).

[1]According to Ernest (1998), tacit mathematical knowledge is related to the ways in which students use mathematical concepts by relating them to their own experiences, beliefs, and cultural values. The main components of tacit knowledge are mental symbolism, mathematical language, methods, symbolic operations, strategies, procedures and techniques locally developed, which are often applicable in solving contextualized problems.

Thus, this context enables the investigation of the effectiveness of self-assessment and active learning pedagogies, as well as the development of mathematical competencies of students by using an ethnomodelling approach.

Ethnomodelling and its Connection to the Trivium Mathematics Curriculum

Ethnomathematics is a program that incorporates mathematical ideas and procedures practiced by the members of distinct cultural groups, which are identified not only as indigenous societies but as groups of workers, professional classes, and groups of children of a certain age group as well. It represents the way that various cultural groups mathematize their own reality because it examines how both mathematical ideas and practices are processed and used in daily activities (D'Ambrosio, 1990).

Ethnomathematics is described as the art and techniques developed by members of distinct cultural groups from diverse cultural and linguistic backgrounds used to explain, understand, and manage social, cultural, environmental, political, and economic environments. This program seeks to study how all learners understand, comprehend, articulate, process, and ultimately use mathematical ideas, concepts, procedures, and practices to solve problems related to their daily activities (Rosa & Shirley, 2016).

Teaching mathematics through cultural relevance and personal experiences helps students to know more about reality, culture, society, environmental issues, and self-assess themselves by providing them with mathematics content and approaches that enable them to master academic mathematics successfully through the development of an ethnomodelling pedagogical action (Rosa & Orey, 2013).

This approach considers the use of ethnomathematics assumptions and the application of mathematical modelling techniques and tool that enables educators and teachers to perceive reality by using different lenses, which gives them insight into mathematics performed in a holistic way (Rosa & Orey, 2013).

Such mathematical practices involve numeric relations found in measuring, classification, calculation, games, divination, navigation, astronomy, modelling, and a wide variety of other mathematical procedures used in the production of cultural artifacts (Eglash at al., 2006). Consequently, ethnomodelling allows the development of a definition of ethnomodels as the translation of local mathematical ideas, procedures, and practices in which the prefix *ethno* relates to the specific mathematical knowledge developed by the members of distinct cultural groups (Rosa & Orey, 2017a).

Therefore, it is necessary to start with the social context, reality, and interests of the students and not merely enforce a set of external values and decontextualized curricular activities which have no meaning for them. These approaches are socially rooted constructs that include the cultural aspects of mathematical knowledge in the modelling process through the conduction of pedagogical actions that relate local and school knowledge (Rosa & Orey, 2013).

Teaching mathematics in a way that is sensitive to student experiences with the inclusion of linguistic and cultural aspects in the mathematics curriculum, may create positive and long-term benefits for students' achievement. These aspects contribute to the perception that mathematics is a part of students' daily lives and can enhance their ability to make connections which means (Rosa & Gavarrete, 2016).

The connection between ethnomathematics and mathematical modelling through ethnomodelling approaches are intended to make school mathematics more relevant and meaningful to students in order to increase the overall quality of education and assert more culturally relevant views of mathematics. In this regard, Rosa and Orey (2013) state that this pedagogical approach is best achieved through dialogue (self-assessment) when community members, teachers, and students discuss mathematical themes that help them to work on problems that are directly appropriate to their own communities.

In this context, investigators used mathematical practices to determine the area of the irregular lands with a quadrilateral shape related to the method of *cubação of land*, which is a traditional mathematical practice applied by the *Landless Peoples' Movement* in Brazil (Knijnik, 1993) and the mathematization of a Tipi, which is a conical tent-dwelling that symbolizes the universe of Plains People of North America through the elaboration of ethnomodels (Orey, 2000). These examples show the development of a pedagogical action that helps teachers to elaborate curricular activities that show the importance of the contextualization of problems in the process of teaching and learning of mathematics.

In this context, it is important to describe the trivium curriculum for mathematics developed by D'Ambrosio (1999) and its components: a) literacy (communicative instruments),

b) matheracy (analytical instruments), and c) technoracy (material and technological instruments), which enables the development of school activities based on an ethnomathematics and modelling foundation through ethnomodelling.

a) ***Literacy as the development of communicative instruments***

Literacy is the ability students develop that allows them to process and use information present in their daily lives by applying reading, writing, representing, and calculating techniques as well as using diverse media and the internet. It also includes the competencies of numeracy, which is the ability to understand graphs, tables, the condensed language of codes, and other ways of informing members of distinct cultural groups (D'Ambrosio & D'Ambrosio, 2013).

In accordance with Rosa and Orey (2015), from an ethnomathematical perspective, literacy is the integration of the cultural contexts of the school and the community through cultural dynamism, which allows students to exchange school/academic and local knowledges. In the etnomodelling perspective, teachers guide students to select a topic through dialogue and discussion.

In this regard, Rosa and Orey (2015) stated that themes are general in nature and allow students to engage in mathematical exploration and creativity. The implementation of mathematical modelling precedes an ethnographic investigation of systems found in diverse school communities that can develop ethnomathematical procedures and practices.

b) ***Matheracy as the development of analytical instruments***

Matheracy is the ability students develop to interpret and analyze signs and codes in order to propose the elaboration of models and ethnomodels to determine solutions for daily problems. It provides symbolic and analytical instruments that help students to develop their creativity in order to allow them to understand and solve new problems and situations (D'Ambrosio & D'Ambrosio, 2013).

It is also the development of competencies of drawing conclusions from data, making inferences, proposing hypotheses and drawing conclusions from the results of calculations that are important for students to become active citizens in society. This set of competencies is the first step towards an intellectual, critical, and reflective posture of the students (D'Ambrosio, 1999).

In this regard, Rosa and Orey (2015) state that in an ethnomathematical perspective, matheracy is the domain of skills, strategies, and competencies that empower students to be aware of the way in which they explain their beliefs, traditions, myths, symbols, and scientific and mathematical knowledge.

In an ethnomodelling perspective, matheracy is the ability to interpret, manipulate, and handle signs, symbols, and codes as well as to propose the elaboration and use of models and ethnomodels in everyday life related to diverse environments in order to use procedures and strategies developed locally and globally in an ethnomathematical perspective.

c) Technoracy **as the development of material and technological instruments**

Technoracy is the ability students develop that allows them to use and combine different material and technological instruments that help them solve problems they encounter in everyday activities in order to assess the reasonableness of the results and their contextualization (D'Ambrosio & D'Ambrosio, 2013).

Hence, the development of technology and related materials and resources that have allowed for the acceleration and dissemination of the acquisition of mathematical concepts, procedures, and techniques that are necessary to solve problems faced in daily life. For example, some students have access to the internet and can obtain a wider variety of information, often without discussing their relevance, necessity, or itsvalue (D'Ambrosio, 2012).

From an ethnomathematical perspective, Rosa and Orey (2015) affirm that technoracy is an important feature of scientific knowledge as well as its reification as technological artifacts. It can manifest itself in technological tools that translate ways of dealing with natural, social, cultural, political, and economic environments.

In an ethnomodelling process, technoracy is the incorporation and use of diverse tools that include calculators, computers, software, computational programs, and simulators (active learning), which enhance the development of mathematical competencies that are also found in the practices developed by the members of the school community**.** The trivium curriculum provides educators with a "critical form, with the communication, analysis, and technical tools needed for learning mathematics in the 21st century" (D'Ambrosio & D'Ambrosio, 2013, p. 22).

In this context, Rosa and Orey (2015) bring the trivium curriculum into the classrooms and encourage the re-conceptualizing the curriculum in which ethnomathematics and mathematical modelling are tools for the development of a pedagogical action that helps students' self-assess their learning as well as to relate mathematical knowledge to activities they perform in real life situations.

Ethnomodelling and its Connection to Self-Assessment and Active Learning

In the trivium mathematics curriculum, teachers can develop self-assessments based on Ethnomathematics in the stage of planning the learning process in order to analyse the final result of students' learning. Thus, this mathematics curriculum becomes more attractive to students if it is developed with the use of everyday life activities through the development of the pedagogical action of ethnomathematics.

The word ethnomathematics comes from three greek roots: *ethno* that means members of distinct cultural grups, *mathema* that is related to the competencies counting, sorting, measuring, weighing, coding, classifying, inferring, and modelling, and *tics* that comes from the word *techne* and means techniques, procedures, and strategies. Hence, ethnomathematics can be understood as a culture of a society that develops or uses mathematical principles in daily life (D'Ambrosio, 2006).

The trivium mathematics curriculum is related to an ethnomodelling learning application adapted from mathematical concepts that are present in daily activities, as well as in the life of the members of diverse cultural contexts. This means that ethnomathematics creates a meaningful learning environment based on the activities developed in the communities while mathematical modelling is correlated to daily activities performed by the students (Rubio, 2016).

The goal of the development of the trivium curriculum can be achieved if there is an evaluation or an assessment procedure that is able to describe the development of the learning process and its evaluative materials and pedagogical content. The most powerful form of assessment addresses formative evaluation of the trivium mathematics curriculum. In this regard, Andrade et al. (2010) states that "Self-assessment is a process of formative assessment during which students reflect on the quality of their work, judge the degree to which it reflects explicitly stated goals or criteria, and revise accordingly" (p. 199).

By agreeing with this assertion, Kartono et al. (2016) affirm that self-assessment is included in the formative evaluation modality because it is related to the reflections students can make about their own learning process that can result in an optimal schooling.

Similarly, self-assessment is a tool used by students to evaluate the quality of their work, measure their performance with the stated goals and learning objectives, identify the area of strengths and weakness in their work and implement revision accordingly. It is an essential stage that gives feedback to the students and the teachers on the progress of learning (ELN, 2019).

For example, the results of the study conducted by Ambrose at al. (2010) and Siegesmund (2016) showed that self-assessment increased students' metacognition and developed their self- learning. Previously, the results of the investigation carried out by Black and William (2009) showed that self-assessment increased the students' motivation and responsibility for their learning process in the school environment.

Self-assessment in the context of a trivium curriculum is developed with the objective of stimulating students' interest and motivation. As well it seeks to support active engagement for better mathematical understanding through the elaboration of pedagogical action and educational situations that engage students as active participants in their learning process (Rosa, 2010).

In this classroom environment students actively participate in proposed activities as well they share ideas and are prepared to live in a more participatory political system where their voices and opinions are taken seriously. Thus, it is necessary to reconfigure teachers' conception of mathematics classrooms because learning includes participatory performance both as a model and a means to stimulate democratic participation (Gerofsky, 2010).

In this regard, it is important to state that through self-assessment, students investigate conceptions, traditions and mathematical practices developed by members of distinct cultural groups in order to incorporate them into the mathematics curriculum. This occurs when students are encouraged to examine mathematical activities in their own sociocultural contexts, they realize that mathematics techniques and practices are not trivial as they see them connected to their daily lives (Rosa & Orey, 2017a).

In the trivium mathematics curriculum, active learning can be defined as activities that students develop to construct their own knowledge and understandings. For Carr et al. (2015), students actively construct their own knowledge and develop their higher order thinking. In this direction, Hendelsman et al. (2007) state that active learning helps students to engage in their own learning because they participate in activities that help them to construct their knowledge and build their scientific skills

Similarly, Freeman et al. (2014) highlight that active learning engages students in their learning process through the development of activities and/or discussion in class as opposed to passively listening and only receiving information from the teachers. It emphasizes higher-order thinking and often involves group work.

Thus, active learning is an approach to instruction that involves actively engaging students with the course material through discussions, problem solving, case studies, role plays, and other methods. In this context, according to the *National Academies of Sciences, Engineering, and Medicine - NASEM* (2018), it is paramount in combining active learning with a self-assessment component in supporting the development of students' cognition skills.

According to NASEM (2018), self-assessment intervention needs to be implemented to ensure that mathematics mastery is at the achieved level. This approach also provides teachers with rich resources of evidence to draw upon that gives an insight into the abilities, opinions, feelings, understandings, and misconceptions of their learners.When assessments and active learning are fully embedded in classrooms, then students are able to be *self-efficacious*[2], steer their own learning, their self-esteem and motivation is high therefore mathematics competencies related to the mastery of mathematical contents may be achieved.

Hence, educational reform encourage teachers to shift their pedagogical practices from traditional teacher-centered instruction, such as textbook-based lectures with an emphasis on scientific facts, to student-centered, inquiry-oriented approaches that provide opportunities for problem solving and active participation by students (NASEM, 2018).

Regarding to the trivium mathematics curriculum, Niss and Højgaard (2011) affirm that mathematical competencies are the ability to develop and apply thinking in order to solve a

[2]Self-efficacious refers to an individual's belief in their capacity to execute behaviors necessary to produce specific performance attainments, which helps them to be able to produce the intended result. Thus, it refers to an individual's confidence in their ability to complete a task or achieve a goal (Bandura, 1997).

range of problems in everyday situations. It is important to point out that the emphasis is on the process and activities, as well as knowledge. Mathematical competencies involve, to different degrees, the ability and willingness to use mathematical modes of thought (logical and spatial thinking) and presentation (formulas, models, constructs, graphs, and charts). In this perspective, Rosa and Orey (2021) argue that:

> (...) different contexts require different numeracy skills, abilities, and competencies that can be developed and activated by the students because it promotes the discovery and analysis of processes related to the origin, transmission, diffusion, and institutionalization of mathematical knowledge acquired in a diversity of cultural environments and in an interdisciplinary fashion (p. 871).

In this regard, mathematical competence is the ability to understand, judge, do, and use mathematics in a variety of intra-and extra mathematical contexts and situations in which mathematics plays or could play a role (Niss & Højgaard, 2012). This author identifies eight competencies that were divided into two groups.

The first group refers to *the ability to ask and answer questions in, with, and about mathematics* that is composed by mathematical thinking, problem tacking, modelling, and reasoning competencies, and the second group refers to *the ability to deal with mathematical language and tools* that is composed by representing, symbolism and formalism, communicating, and aids and tools competencies (Niss & Højgaard, 2012).

Consequently, the trivium mathematics curriculum can support pedagogical actions that enable students to both meet school/academic goals and improve their mathematical competencies (D'Ambrosio, 1999).

For example, this curriculum develops an important and innovative approach regarding the possibilities of implementing a mathematical teaching and learning process in schools by helping students to reason, solve problems, communicate their ideas, and choose appropriate mathematical representations that allow them to synthesize procedures and practices developed in their own sociocultural contexts (Rosa & Orey, 2015).

These forms of pedagogical action provide flexible learning environments that enable students to reconfigure the relation between cultures, mathematics, and technology, which deals with active learning and the trivium curriculum. Therefore, ethnomodelling practices offer a concrete method towards involving and practicing numeric relations found in measuring, classification, calculation, games, divination, navigation, astronomy, modelling, and with a wide variety of other mathematical procedures used in the production of cultural artifacts (Eglash et al., 2006).

A connection between ethnomodelling, active learning, and self-assessment can be observed in research conducted by Eglash et al. (2006) that is based partially on West African content by developing a computer software called *Culturally Situated Design Tool*, which allows students to create and modify patterns from traditional culture on their own. Consequently, it is important to focus on the use of GeoGebra software as an active learning pedagogy (technoracy), self-assessment (literacy) to ascertain the development of mathematical competencies (matheracy) of students.

Final Considerations

Learning, according to the theoretical basis of ethnomodelling, is the process of making sense of the world by integrating a pedagogical action that is closer to an ethnomathematics program in solving real-life problems in order to mathematize existing phenomena through mathematical modelling. This approach applies ethnomodelling as a pedagogical action to an ethnomathematics program because it is powerful, both as a way of deepening understanding of mathematics, and a way of translating mathematical ideas and practices as cultural conduits of the mathematical practices found in the students' communities (Rosa & Orey, 2017b).

By using ethnomodelling as one form of pedagogical action of an ethnomathematics program, students have been shown to learn how to find and work with authentic situations and real-life problems contextualized in the elaboration of ethnomodels (Cortes, 2017). Ethnomodeling is a process of elaboration of problems and questions growing from real situations or systems taken from reality that forms an image or sense of an idealized version of the *mathema*.

The focus of this perspective essentially forms a critical analysis of the generation and production of knowledge (creativity), and forms an intellectual process for its production, the social mechanisms of institutionalization of knowledge (academics), and its transmission (education), which is related to the assumptions of the trivium mathematics curriculum (Rosa & Orey, 2017b).

The use of modelling as pedagogical action for an ethnomathematics program values students' tacit knowledge and traditions by developing their mathematical competencies to assess and translate mathematical processes by elaborating ethnomodels in diverse contexts. Thus, ethnomodelling applies a pedagogical action developed with a cognitive focus that has strong sociocultural foundations.

In this Dambrosian pedagogical action, it is necessary for school curriculum to translate mathematical ideas, procedures, and practices between distinct mathematical systems that help students to analyze the connection between both traditional and non-traditional learning settings in an active learning environment.

Therefore, this context enables ethnomodelling to develop mathematical competencies by incorporating active learning and self-assessment in its pedagogical action through the integration of the trivium curriculum in the teaching and learning process of mathematics. For example, to determine the volume of the trunk of a cone can be motivated by the application of techniques learned by the Italian ancestors of Seu Joaquim, a wine producer in Ijuí, in the state of Rio Grande do Sul, in Brazil. For D'Ambrosio (2001), this is a relevant example of an ethnomathematical practice and its natural encounter with mathematical modelling, which demonstrate an application of ethnomodelling.

In this context, any study of self-assessment and active learning represents a powerful means of validating how well students have attained mathematical competencies. Thus, the integration of these pedagogies by using an ethnomodelling approach to meet specific needs of the diverse students' population, as well as the desired learning outcomes that may help them to become active participants in the classroom instructions and activities.

In the mathematics classroom, there exists a need to create a new role to mathematics instruction that empowers students to build competencies by considering the effect of selfassessment and active learning pedagogy on students' mathematical knowledge. In this regard, Rosa and Orey (2013) affirms that ethnomodelling can be considered as a pedagogical action that translates mathematical ideas and procedures as cultural conduits of mathematical practices found in the students' communities.

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