Parental engagement as a boundary practice in a classroom community of practice: Implications for Latina/o students' mathematical learning

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INTRODUCTION

The education of Latino students is a growing concern in urban schools in the United States. This group is the largest and fastest growing minority group in the country. Almost fifteen percent of all students are Hispanic or Latino (U.S. Census, 2005). In addition, twenty percent of the children in K-12 schools are immigrant children (Paik & Walberg, 2007) and twelve percent of the total population speak Spanish in their home (U. S. Census, 2005). The Latino population, united by the historical legacy of Spanish, comprises a diverse set of people with dissimilar history, social class, place of birth (US or foreign-born) generation (e.g., first- or second-generation), location (e.g., urban or rural), language preference and fluency, political affiliation, and years of schooling, among other diverse characteristics. Each of these factors influences their experiences and learning in school. Despite this diversity within the Latino population, the educational rhetoric often defines this cohort of students and families as a disadvantaged population.

The particular focus of this research[1] is within the area of mathematics education. Scholars have noted mathematics education has a leading role in perpetuating inequalities among minoritized communities. For instance, Latino children are more likely to receive lower grades and discontinue mathematics courses earlier than other students (Schoenfeld, 2002); they tend to receive a curriculum that emphasizes basic skills and not higher order thinking (Secada, 1992); and they contend with inequitable opportunities related to poverty level, lack of adequate school resources, lower level teaching such as remedial teaching or teaching to the test, or deficit perceptions of them and their families (Hart, 2003; NCTM, 1998; Valencia & Black, 2002). These indicators point to the

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unequal educational opportunities Latina/o students face and that counter the goals of a democratic and just society.

Many Latino students experience mathematics as a restricted privilege, a curricular gatekeeper, and an irrelevant subject (Apple, 1992; Gutstein, 2003; Stinson, 2004). Furthermore, mathematics education is portrayed only as a product to address unemployment and economic goals which supports a market-driven economy (Moses & Cobb, 2001). This perspective, then, ignores the purpose to transform current unequal power structures and the goal of education to endorse human dignity (Olivares Alonso, 2006). These contradictions have critical implications that must be addressed in order to improve the educational opportunities for Latino communities.

The research of Reyes, Scribner, & Paredes Scribner (1999) focuses on the traits of high-achieving schools with a Latino population. This group of researchers underscores four main dimensions of these schools: collaborative governance and leadership, community and family involvement, culturally relevant pedagogy, and advocacy-oriented assessment and quality control. We agree that reform education requires a comprehensive model. In our research we explore one of these dimensions to address its complexity. We focus on parental engagement (Calabrese Barton, Drake, Perez, St. Louis, & George, 2004) in the context of mathematics education.

We argue that an inclusive model of parental engagement is central to a culturally relevant mathematics education (Ladson-Billings, 1995). Our view of parental engagement is of a situated and distributed activity system. We analyze the interaction of parents and the school system using the framework of communities of practice (CoP); in particular we use the concept of boundary practices (Wenger, 1998) to address the particular moments of inclusion or exclusion and their implications.

THEORETICAL FRAMEWORK

Educational researchers have focused their efforts in overcoming the "encapsulation" of school learning (Brown, Collins, & Duguid, 1989; Engestrom, 1991). The school system reproduces knowledge that is static and gets lost within the walls of the classrooms before it can ever become meaningful in the lives of students. In this manner the system has an alienating effect on many students and reproduces unequal

power structures. This knowledge is especially meaningless or irrelevant to students whose communities' funds of knowledge (González, Andrade, Civil, & Moll, 2001; Moll & González, 2004; Moll & Greenberg, 1990) and perspectives are systematically ignored within the curriculum and school system.

In this paper we suggest that using the lens of legitimate peripheral participation and CoP (Lave & Wenger, 1991; Wenger, 1998) allows us to consider central aspects of the learning experiences within the classroom that are commonly overlooked. Learning through participation includes the whole individual in interaction with the world. Therefore these evolving trajectories of participation necessarily entail a transformation in the identity and perspectives of the individual, the negotiation of meanings, forms of membership in a community, and the practice in itself (Wenger, 1998). In our case, the community of practice is the classroom participants and mathematics learning is defined as students' trajectories of participation in the particular mathematical practices.

Learning as legitimate peripheral participation is described as trajectories that flow between peripheral and full participation. Trajectories of participation depend on the structuring resources that define a community. The social scientists posit that "the key to legitimate peripherality is access by newcomers to the community of practice and all that membership entails" (Lave & Wenger, 1991, p. 100). This access relies on the transparency of the activity and relationships between members. It is these aspects that determine possibilities of reaching full participation or even to accessing peripheral participation in the community.

Although a 'community of practice' is a unit of analysis, such communities are not isolated from other individuals or communities. In this study we explore the interaction between the classroom CoP and boundary practices (Wenger, 1998) that occur around school mathematics learning involving family members. The term 'boundary practices' refers to the lines of connection and disconnection, inclusion or exclusion, between members of two or more CoP. We use this term to explore those activity systems that relate to the classroom community but that include members of other communities, such as the families of students. This framework addresses how some of these practices afford the inclusion of parents, while others exclude parents from a legitimate peripheral participation (Lave & Wenger, 1991). We contend that a fundamental component for

establishing a culturally relevant education (Ladson-Billings, 1995) are boundary practices that include the funds of knowledge of diverse communities as well as practices that contest the hierarchical and hegemonic practices that often characterize parental involvement in U.S. schools, particularly in minoritized communities.

A concrete way to break the isolation of the knowledge appropriated within the classrooms is to integrate students' everyday experiences and knowledge. There are multiple projects that illustrate how schools, teachers, and researchers may tap into households' funds of knowledge (Barton, 1996; Hammond, 2001; Moll & González, 2004; Patterson & Baldwin, 2001). In these projects, the teachers become learners and therefore encounter opportunities to reconceptualize students, their families and communities, as well as the curriculum. The specific resources in the community become evident as the teachers move away from the enclosed area of the classroom. A focus on the strengths and assets of the families and communities implies changing the focus from needs of the communities to the possibilities present within the communities (Guajardo & Guajardo, 2002). Then the knowledge gained from a community can be used as a tool that further benefits members of that community (Delgado-Gaitan, 2001; Guajardo & Guajardo, 2002; Kincheloe & McLaren, 2002).

The curriculum content must incorporate the community's cultural forms, mathematical practices, and social issues. This inclusion means that participants' identity and communities are part of their learning and they can use it for their own purposes. It is necessary to understand the contexts of families and communities in order to truly understand their realities (Delpit, 1995, p. 175). This approach allows for family-generated, real life uses and applications rather than school-type activities prescribed by program staff.

In this search to solve educational deficits, educational rhetoric proposed parental involvement as the panacea. Research, policies, and pedagogical models mention its benefits; however, these parties often leave involvement or empowerment undefined (Lankshear, Gee, Knobel, & Searle, 1997; Vincent, 1996). This vagueness in the rhetoric of parental involvement tunes into a deficit view of low-income and ethnic- and language-minoritized communities. A deficit-driven model claims educational problems lie in the inadequate socialization within families (Taylor, 1997). This perspective,

however, fails to consider the diversity of the funds of knowledge of students and their communities as well as the institutional role in perpetuating unequal opportunities. Parental involvement must be understood as a product of the historical and socio-political context of schools, influenced by educational policies, research, and teaching practices, among other factors such as race or income level of students' families (Calabrese Barton et al., 2004; Lareau & Horvat, 1999; Lareau & Shumar, 1996; Mapp, 2003; Taylor & Dorsey-Gaines, 1988; Valdes, 1996). Our goal is to contribute to these efforts that propose a distributed and situated notion of parental engagement using the framework of legitimate peripheral participation and CoP. Parental engagement in mathematics education is a practice that can transform current power structures that disenfranchise Latino students and their communities (Civil, 2002). For over ten years we have conducted research on issues of parental engagement and mathematics education in working class, Latino communities (Civil, Bratton, & Quintos, 2005; Civil, Planas, & Quintos, 2005; Civil & Quintos, 2006) Although grounded on involvement in the Funds of Knowledge research projects, we capitalize on the concept of parents as intellectual resources (Civil & Andrade, 2003), as a means to emphasize parents' contributions to their children's mathematics education.

CONTEXT AND METHODS

1. Context

A) Socio-Historical Context

In order to understand the practice of education in this particular Latino community we need to zoom into Tucson's political, historical, and economic context. This context is the blueprint of the practice of formal education. The signature of the Gadsden Purchase in 1854 transferred the northern part of Sonora, a Mexican State, to the United States. The 2000 Census found that in Tucson almost thirty-six percent of the population is Hispanic or Latino of any race. Most of the Latino population in this area is of Mexican descent. Since the beginning of the history of Tucson as part of the US territory, discrimination became institutionalized, the Mexican work force was subordinated and the population isolated (Sheridan, 1986). These same power structures

constituted Tucson's school system. This local historian wrote a detailed and critical description of Tucson's public education system.

> No institution revealed the complexity of this subordination better than the public school system. … Mexicans helped pioneer both public and private education in southern Arizona…but times changed. By the end of the nineteenth century, the public schools were firmly in the hands of Anglo administrators and Anglo school boards. Despite a sincere desire to educate Mexican children, these authorities were never able to develop a school system that offered equal educational opportunities to Mexicans, Blacks, and Native Americans, as well as Anglos. Much of the problem was due to the harsh realities of poverty and discrimination outside the classrooms. But the problem was aggravated by the cultural stereotypes of school personnel themselves, stereotypes which made it even more difficult for Mexican students to succeed in the public schools. (Sheridan (1986), p. 217)

Middle class and Anglo-American values, and a bias for them, are at the roots of the public school system. Sheridan describes the subordination of the Mexican population as a "complex, often contradictory historical process involving subtle demographic, economic, political, and psychological variables" (p. 6). A majority of Anglo, well-meaning teachers, administrators, and school board members took on the task to educate the Mexican students ignoring their culture, including their language. From the end of the nineteenth century until the beginning of the twentieth century, the participation of Mexican educators was minimal. In this way, the combination of poverty and discrimination in the changing society of the time and the filtration of values of racism and paternalism within the system perpetuated further the marginalization of Mexican students. At the same time, this subordination faced active resistance from the Mexican community.

B) The classroom community

This study takes place in a fifth grade classroom at an urban elementary school in the southwest United States, in which ninety percent of the students are of Latino background and almost seventy percent of the students receive free or reduced lunch[2]. All the participants had some understanding of English and Spanish, however several of them predominantly use just one of the two languages. Six years ago, Arizona passed an

[2] Free or reduced lunch is used as an indicator of poverty level

initiative that severely curtails access to bilingual education. Proposition 203 is state legislation that was approved by Arizona voters and is now part of the Arizona state statutes. It proposes to replace bilingual education with Structured English Immersion classes for a period of one academic year. It states, "although teachers may use a minimal amount of the child's native language when necessary, no subject matter shall be taught in a language other than English" (A.R.S. Section 15-751 [5]). Bilingual education may only be accessible to students with a written parental waiver if the child: already knows English, is ten years or older, or has special individual needs. The parents of the children in this classroom all signed the waiver requesting bilingual education for their children. However, many of the children were previously in English-only classrooms.

In this classroom community, cooperative learning is a tool and a goal. Based on this structure, all students are expected to participate and help others. The teacher uses both English and Spanish regularly and students have the same choice. Inquiry guides the classroom practice and mathematics is considered a communicative competency. Children engage in inquiries in the three areas of classroom mathematics that support a empowering pedagogy for Latinos: classical mathematics (NCTM, 2000), community mathematics (González et al., 2001) and critical mathematics (Gutstein, 2003). The combination of these mathematical approaches relies on the principles of a democratic education that aims to empower students as mathematical learners and critical citizens.

2. Participants

The participants in the study are: nineteen fifth-grade students, the parents of five of these students, and the classroom teacher. We developed in-depth case studies for five of the nineteen students. These students are Mexican immigrants or Mexican-Americans. These students were selected based on the teacher's knowledge to include diversity in gender, mathematical proficiency, and language fluency in English and in Spanish. This classroom was chosen based on our personal respect for the teacher as well as the teacher's national recognition for her teaching practice. She is a teacher-researcher who talks about and enacts her beliefs and values about teaching and learning, mathematics, and curriculum.

In this paper we present the boundary practices using only one of the case studies, Yessenia and her mother, Lorena[3]. Yessenia is a ten-year-old Mexican immigrant who arrived to the United States as an infant with her mother, Lorena, and her older sister, Carla. Lorena embarked upon this journey to look for a better life for her two daughters. Yessenia is fully bilingual, while her mother has some emergent understanding of conversational English. At home most conversations are in Spanish, while at school most of Yessenia's education has been exclusively in English. The family relies on Lorena's income from her wage cleaning restaurants to cover all expenses.

3. Data collection and analysis

Our year-long qualitative case studies (Dyson & Genishi, 2005) explore in detail the particular engagement of some Latino families in connection to their children's mathematics learning experiences. The use of multiple case studies allows us to bridge local particulars to the abstract social phenomenon of CoP. We used ethnographic tools for our data collection which took place in three sites: the classroom, students' households, and two after-school programs. The analysis of the video transcripts, field notes of classroom observations, and interview transcripts is based on grounded theory (Charmaz, 2001), a process that explores emergent themes. The different sources were used to triangulate the information and build thick descriptions. In the following sections, we present a description of Lorena's emic perspective on her role on her daughter's education. In this context, we analyze two boundary practices in which Lorena participates and discuss the implications.

FINDINGS

Boundary practices: Are parents drawn as legitimate peripheral participants?

Lorena's central means to support the academic and personal development of her daughters is to maintain a close relationship with them. She believes that both of her daughters will be successful because she holds high expectations for them. With

[3] All names are pseudonyms.

encouraging words she motivates them to commit to a goal and to accomplish it. She continuously expresses her love and praises their intelligence. In the following excerpt she explains how she supports them.

Lorena: *yo pienso que platicando mucho con ella, yo pienso así porque yo, yo no tengo mucho conocimiento, para que es más que la verdad, pero yo hablo mucho con ella, y le digo no mija tienes que estudiar, tienes que estudiar, y ser alguien. Ser alguien en la vida, si tú quieres, si tú te propones hacer lo que tú quieres hacer, tú lo vas a lograr, tú lo vas a lograr y tú eres muy inteligente. Siempre le digo que es muy inteligente y eso yo digo que para mi cuenta mucho, estarle diciendo, y diciendo, y diciendo, y diciendo tú eres muy inteligente, y no nomás a ella también a la más grande le digo, ustedes son muy inteligentes y yo sé que ustedes lo pueden lograr, todo lo que ustedes quieran, si tú quieres, si tú te [pones] una meta, tú la vas a cumplir, pero siempre positivo yo le digo a ellas, a Yessenia por eso yo pienso que ella tiene ese apoyo de esa forma de mí. Porque muchas veces si tiene tareas y yo no le entiendo y yo no le puedo ayudar, pero yo de esa forma si la motivo yo. Diciéndole, platicándole, todo eso. Y a la otra más grande también, ésa es mi forma* (parent interview; July 19th, 2006).

Lorena: I think that chatting a lot with her, I think like that because I, I do not have a lot of knowledge to be honest, but I talk a lot with her, and I tell her, "daughter you have to study, you have to study and be someone. Be someone in life, if you want to, if you commit to do what you want to do, you are going to achieve it, you are going to achieve it, you are very intelligent." I always tell her she is very smart and I believe that counts a whole lot, to keep telling her, and telling her, and telling her, and telling her you are very intelligent, and not only to her but also to the oldest one I tell her, "you are very intelligent and I know both of you can achieve anything you want. If you want it, if you commit to a goal, you are going to accomplish it", but always positive words I tell them, to Yessenia that's why I think she has that support from me. Because many times if she has homework and I do not understand it and I can't help, but in that way I motivate her, telling her, chatting with her, and all that. And with my oldest too, and that is my way. –[translation]

In the following concrete experiences we see that Lorena's beliefs and perspectives as a mother are embedded in different moments of participation in her daughters' schooling. At the same time, we see the negotiation of identities, meanings and practices between communities. We present two examples of boundary practices and we analyze the ways these boundary practices mediate moments of inclusion or exclusion to members of different communities.

a. Mathematics homework at the after-school program

Homework is one boundary practice that connects the classroom community with Yessenia's family. At home, Lorena feels limited in her ability help her daughters directly. Nevertheless, she uses her social capital to ensure her daughters receive the support they need. Lorena, therefore, encourages Yessenia and her sister to help each other or to ask their grandfather, who also knows English. At the schools, Lorena pushes her daughters to ask their teachers and accompanies them to tutoring.

Yessenia and Lorena attend an after-school program at the school site that focuses on mathematics. While the overt purpose of the program is to help children with their mathematics homework, Lorena's personal purpose for attending is to reinforce her close relationship with Yessenia. This is one space Lorena creates to spend time with her daughter.

In this context, the connection with the classroom curriculum was mainly sustained through Yessenia. She brought questions or shared topics the class was discussing. In the following segment, we describe an occasion in which Yessenia asked for help with her mathematics homework. The textbook series used at the school was *Scott Foresman – Addison Wesley Math* (Charles et al., 1999). Yessenia brought the following question from her textbook:

"Can you show 0.02 using only tenths place-value blocks? Explain."

Before we continue, for those not familiar with the place value blocks and their uses with decimals, the equivalencies established were the following: a square unit represents the hundredths, a line of ten square units represents the tenths, and the flat of a hundred square units represents the ones. In her homework, Yessenia wrote the following response, "no, you can't use tenths place value blocks." Yessenia's answer was correct but the teacher revised it and said her solution was not clear since it did not explain the reason why one could not use tenths place value blocks. The tutor explained to Yessenia the decimals using place value, but the tutor was foreign to the use of place-value blocks with decimals and was not using this means to explain the question. Yessenia built on her classroom learning experiences and shared her knowledge of these representations using drawings of the blocks with the tutor. She drew base ten blocks trying to make sense of

the decimals. She explained to the tutor that with two lines or two tenths she could not represent two-hundredths because they were smaller. Yessenia was unsure of her statement so she also represented the decimals drawing money. This time she explained to the tutor "I have two pennies and that [line] is two dimes." During this interaction, Lorena's participation consisted of watching Yessenia's efforts and the non-verbal cues of the tutor to evaluate Yessenia's explanation (field notes after-school setting; February 9th, 2006).

In this practice, we focus on two central resources that set the elements of boundary for Lorena, the language of interaction and the mathematical meanings in negotiation. Lorena becomes an outsider as soon as Yessenia reads the question in English. Although Yessenia is now in a bilingual classroom, her educational history did not support her development of academic Spanish. In this way the history of a practice that included only English situates Lorena as an outsider when she tries to participate in Yessenia's mathematics learning. This is especially contradictory when Lorena's goal for participating in the after-school program is to reinforce her close relationship with Yessenia. In this manner, the language choice for homework and instruction influences the access of parents to their children's mathematical learning.

The second structuring resource in these interactions connects to the negotiation of mathematical meanings. Lorena's schooling experiences taught her that only some children are innately good in mathematics (parent interview, July 19th, 2006) while others are not born to become members of learning communities in school. She was retained in elementary school for several years in Nogales and finally they sent her to a Special Education school. Since then, she has defined herself as an outsider to mathematics because she could not memorize facts and algorithms. In the example discussed above, Lorena is situated as an outsider not only due to language issues but also because she did not remember learning decimals at school and views school mathematics as a subject matter disconnected from her common experience. She evoked her personal history of exclusion in her mathematics education experiences. In contrast, Yessenia's experience with learning mathematics is one that focuses on creating meaning (e.g., from the abstract numbers of two-hundredths and two-tenths to the place value blocks and her experiences with money). In her classroom, mathematics is treated as a language or tool to create

meaning. Yessenia turned to these connections with world experiences (e.g., money) and was able to make sense of the decimal numbers. Yessenia, therefore, did not conceive of mathematics as a series of procedures or rules to be memorized or practiced. This position is radically different in that it empowers her over the mathematics. It is not the mathematics that tells the individual its rules, but it is the individual who fills the numbers with meaning and then manipulates them. Yessenia's approach to mathematics contests the relationship towards mathematics existent in many educational settings.

In order to compare this experience with another form of participation we present another boundary practice that connects Lorena directly to her daughter's mathematical learning in the classroom.

b. A classroom observation

Lorena and other family members were invited to observe and participate in a mathematics lesson. During this visit, one of the activities consisted of revisiting an exploration of the surface area of rectangular prisms. All these interactions were in English and Spanish. The investigation began with a discussion of the importance of the surface area of leaves, with a focus on the vegetation of the desert where they live, and the role of surface area in the packaging industry and therefore the environment. The mothers in collaboration with their children, then drew three-dimensional prisms, traced the faces, and described their observations. When the children left for lunch, the classroom observation concluded with a discussion guided by the observations of the mothers and one grandmother about their children's mathematical learning experiences.

In this context, in contrast with the first sample, the bilingual community welcomes Lorena as a legitimate peripheral participant. While the teacher uses both languages, Yessenia collaborates with her mother and talks to her only in Spanish. Throughout the school-year children had the choice of either language, but Yessenia oftentimes chose to do the classroom tasks in both languages. Lorena values English highly and wants to preempt her daughters from the limitations she experiences as an emergent English speaker. Her desire for her daughters to know English, however, does not counter her value of Spanish. Most of their family still lives in Mexico, and even the ones in the United States mostly speak Spanish. Lorena is also proud of their Mexican

identity and tells her daughters that they should also take pride in their nationality. In this way, she connects Spanish with their identities and this community of practice supports her goal.

The use of Spanish is not sufficient to include Lorena. The negotiation of mathematical meanings departs from concrete experiences that underscore participants' previous knowledge of surface area and supports it through a collaborative community and concrete tools. Lorena and others are invited to connect the concrete prism, geometrical representations in two-dimensions, and the formula of surface area. In this way, Lorena visualizes the surface area and then connects it to the formula. Mathematics as a human practice that supports sense-making allows her to be a legitimate peripheral participant. The connections between the different representations add to the transparency of the mathematical meanings. In an interview after this experience, Lorena redefines her view of mathematics connecting to her conversations with the teacher about mathematics as a communicative competence to create meanings. Furthermore, she also reconsiders her ability as a learner. She shifts from a deficit view of herself to a critical analysis of her learning experiences. She describes herself using a new lens that included the analysis of the educational system in which she participated.

Lorena: Yo sé que soy inteligente porque ahora me doy cuenta, pero antes, no sé que me pasaba a lo mejor decía, 'no voy a aprender, no voy aprender' entonces eso a lo mejor también por eso no aprendía, a lo mejor podía haber llegado más lejos, más lejos de la primaria.

...Si, se las enseñan diferente también. Se las enseñan diferentes porque yo pues no más estudié las tablas... yo estudiaba, no, y ya con eso, pero no te explicaban y ahorita ya te explican, si no entiendes de una forma, te explican de otra

Lorena: I know that I am intelligent because now I can see it, but before, I don't know what happened to me, maybe I said to myself, 'I'm not going to learn, I'm not going to learn' and maybe because of that I didn't learn, maybe I could have gone further, further than elementary school.

…Yes, they teach [mathematics] differently too. They teach them differently because I only studied the times tables… I studied them and that was all, but they didn't explain and now they do explain, if you don't understand in one way they

hasta que ya le entiendes.
(parent interview; May 10th, 2006).

explain you in a different way until you understand. [translation]

CONCLUSION

The data presented in this case study suggest that the nature of the community of practice plays a critical role in the types of relationships established with parents. These examples of boundary practices decenter the notion of parental involvement and focus on the organization and history of the community, as well as the identities of the participants. Language practices and mathematics education practices play a defining role in these interactions. Language use in this community is not only a tool to negotiate meanings, identity, and the community, but it becomes an element of boundary. At the same time, the nature of school mathematics practices goes beyond the realm of negotiation of meanings. Mathematics practices are elements of membership as well as elements of identity. Finally, our data indicate that a culturally relevant pedagogy includes an egalitarian dialogue with parents and between parents and children.

This detailed analysis of boundary practices underscores the distributed nature of parental engagement. The structuring resources determine the access to the negotiation of identities, meanings, communities, and practices; they set the boundaries of inclusion or exclusion. We argue that a distributed and situated notion of parental engagement may open spaces in education for diverse social communities. At the same time, this perspective brings to the forefront the need to problematize current power structures. Unless we are serious about addressing the inequities of opportunity that surround and permeate mathematics education we might reinforce those means that disenfranchise the communities we claim to work for. The systematic exclusion of the funds of knowledge of Latino families, including bilingual mathematical communicative competencies, and mathematics as a knowledge base, will continue to exclude Latino students and their families.

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