

TEACHING MATHEMATICS TO YOUNG AND ADULTS: ETHNOMATHEMATICS AND TEACHERS' CONTINUOUS EDUCATION IN RIO DE JANEIRO

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INTRODUCTION

The development of youngster and adult teachers' continuous education in the city of Rio de Janeiro was significantly consolidated with the elaboration of a document that will not only become a theoretical and methodological reference for Mathematics field, but also will be incorporated in Rio de Janeiro municipal district's *Multieducação* core subject, as proposed by the Board of Education. *Multieducação* is a curricular proposal that guides pedagogical work of all levels of Rio de Janeiro municipal district fundamental schooling. However, adult education segment had not been included in its written directories. The target of this work was to integrate to *Multieducação* a document that would show discussions and propositions prepared to attend specific needs of youngster and adults' education concerning all area of knowledges, done for the first time in the municipality.

Aiming at the legitimacy of this work, twelve teachers were invited to co-participate in the preparation of this Mathematics text, considering that the goal was to incorporate these teachers' personal ideas, so as to build a visible democratization in process.

For such, we were invited to coordinate a teachers' group in order to collect ideas, conceptions and practices present in their talks, so as to bring together theoretical references that could base Mathematics Education' conception for adult education in Rio de Janeiro.

The main focus of this project was to produce, with this group of teachers, a paper that could be used both as theoretical and practical reference to all Mathematics' teachers of the municipality. After several theoretical discussions, ethnomathematics was elected by the group as the closest theoretical referential to their daily teaching practice, because it grounds the validation of students previous knowledges, searching for their (re)inclusion and permanence in school.

In order to comply with this kind of demand, a document built by so many hands, we employed the production methodology of collaborative groups that consider:

(...) the participation of all people involved in an investigative practice, when everybody cooperate or co-laborate in the investigative process considering the group's achievement conceiving its conception, planning and accomplishment until final report analysis and writing phase (Fiorentini, 2004:51)

Teachers were divided in small groups to write about previously chosen topics, as a result different language forms and textual structures appeared, as expected. Therefore, by the end of each phase, collective discussions were carried out in order to bring balance to the text. This was reached by means of interventions in an *Assembly* model, where suggestions, criticisms, critical analysis from external evaluators and self-criticism were proposed.

After this text was prepared, we proposed the teachers to handle an evaluation of all the building process, by means of a questionnaire that would show their opinion on the work dynamics, possible repercussions of the material among their peers, themes focused and stages of the developed work.

In this experience report we will present a short historical description of Rio de Janeiro adult education municipal project (*PEJA*¹) and its teachers' continuous education process. We will also describe the stages of the document's collective construction. Finally, it will be presented issues on Ethnomathematics theory about teachers' education.

1. TEACHERS' CONTINUOUS EDUCATION IN *PEJA*: A SHORT REPORT

The Youngster Education Project (*PEJ*)² of Rio de Janeiro Municipal Board of Education was created in 1985, privileging literacy and aiming at redeeming part of social debt with people aged from 14 to 20 that had been excluded from school. From 1987 on, answering school students and professionals claim, the projects were improved and started providing the continuity of studies for students that had overcome the initial process of literacy. Later in 1998, it was implemented in *PEJ*, the chance to carry teaching until the end of Fundamental School. Both *PEJ I* (corresponding to 1st - 4th grade) and *PEJ II* (corresponding to 5th - 8th grade) were comprised, following the presupposition of a non serial school, organized in blocks and progression units.

The age attended was also extended, and the idea of a maximum age limit for enrolment in the program was abandoned. Nowadays *PEJA* assists a significant number of students (31473 were registered in 2005), working predominantly during the nightly turn of 118 municipal schools spread all over Rio de Janeiro districts, with the participation of teachers from different educational backgrounds.

PEJA is marked by its heterogeneity, such is the population it backs, thus constitutes truly *cultural mosaics* (De Vargas, 2003) with differences in gender, color, geographic origin, religion, family constitution, parents schooling and different insertions and non-insertions in labor market (Machado, 2005), which challenges the creation of an educational politics that could attend different characteristics and expectations of these students.

Trying to face the challenges imposed by this kind of work with socio-cultural diversity in schools, teachers' continuous education has become an important issue assisted by either public and private institutions that have been working with adult education, looking for permanent improvement of the teaching quality and aiming at offering educational opportunities committed with effective citizenship construction.

Since 2002, mainly in Rio de Janeiro, the Youngster and Adult Educational Project of Municipal Board of Education (*PEJA/SME*) has been constructing a teacher education politics destined to young and adult educators achieved by means of several complementary actions that contribute to the empowerment of professionals working with this school modality. Several enterprises could be quoted within this perspective, such as the *1st Extension Course in Youngster and Adult Education*³, carried in 2002 in partnership with PUC-RJ4, aiming to construct a proper identity for the area and for adult education professionals, and in 2003, *Study Center Cycle*⁵, when the study of *National Curricular Directions for Youngster and Adult Education*⁶ was a priority. More recently, in 2004, the *2nd Extension Course for Youngster and Adult Education* was carried in partnership with the Faculty of Education of Fluminense Federal University (*UFF*) , aiming at the continuous education of 500 fundamental school teachers and administrators:

¹ PEJA – from the Portuguese *Programa de Educação de Jovens e Adultos*.

² This was the initial name of the project that was changed in 2004.

³ Translation of Portuguese *1º Curso de Extensão em Educação de Jovens e Adultos*

⁴ Abbreviation for Rio's Catholic University.

⁵ From the Portuguese *Ciclo de Centro de Estudos*.

⁶ Parecer 11/2000 CNE/CEB.

... the proposition of the University Extension Course was constructed together with dynamic teachers, *UFF* professors and *PEJA* representatives, trying to make feasible a deeper theoretical and methodological study, by mean of selected themes and strategies that could reflect the leading uneasiness that adult education goes through nowadays, such as the critical approaches about *cultural diversity*, *juvenile cultures*, *work* and their implications for the preparation of curricular propositions. It was also aimed to contribute to a better understanding of political and pedagogical acting spaces of adult education professionals in the social inclusion process of these young and adults, guaranteeing access to historically accumulated knowledge, making the construction of new knowledges a possible target. (De Vargas, Fantinato & Monteiro, 2005)⁷

The idea of making texts for *Multieducação* is part of this set of continuous education activities implemented by *PEJA/SME-RJ*. Groups of teachers from *PEJA*, from different areas of knowledge and different teaching levels were reunited in 2004 and in 2005 in a collective construction process of papers for *Cadernos da Multieducação*, that could bring to these documents the specificity of pedagogical work with youngster and adult education. The present article refers to the experience of the process held by the group of Mathematics teachers from *PEJA II*.

2. TEXT COLLECTIVE BUILDING PROCESS

The development of collective construction of the written material about mathematics education in adult education happened in five fundamental steps, analyzed and categorized later. That is to say, while starting the process, there was no intention or previous planning to follow these steps, despite the outlining of some fundamental questions, such as:

- What are the outlooks teachers have about working in *PEJA*?
- Which practical and theoretical questions teachers point out or which ones are mandatory for mathematics education with young and adult students?

Based on the answers given, we have elaborated some work phases according to the development of reflections, writings, discussions and analysis proposed by the group.

We will make a descriptive presentation of the five steps of this production as well as points of view and considerations we have stated not only during the process and but also by its end.

2.1. Raising questions to be approached in text

The first step to accomplish the text construction was reached by a *brain storm* dynamics which helped participant teachers to raise questions about mathematics education.

Among other factors, these following statements were present in participants' speeches: (1) the need to approach cultural diversity, related to age, previous school experiences, work and daily life experiences; (2) students' difficulties observed in reading, writing and interpretation, that influence Mathematics learning as well; (3) the fact that it should be an education for life, starting from the contextualization of concepts; (4) the requirement of written or oral communication with students that should be closer to their living experiences; (5) Mathematics Education should raise students' self-esteem, in order to create a better socialization; (6) the consciousness that young and adult students are asking for *help* in school, and are looking for acceptance and inclusion; (7) the necessity of creating a dialog between students' more informal knowledge and teachers' more academic knowledge.

During this stage, teachers could express their concerns, difficulties and anguish about working with youngsters and adults.

⁷ Authors' translation. Original italics.

2.2. Study of conceptions, tendencies and approaches in Mathematic education for youngsters and adults

After the teachers had raised the questions about working in *PEJA*, we proposed an activity that could contemplate analysis and discussion of theories, tendencies and conceptions of Education, mainly of Mathematics Education in search of a theoretical background for written material.

We presented six learning situations where a fictitious teacher focuses the same content – division – in six different ways. Afterwards we asked them to raise positive and negative points of each situation presented and to show in which approach it could be inserted, according to a table brought by Mizukami (1996) that presented characteristics of teaching approaches: traditional, behaviorist, cognitive and socio-cultural.

Then, we discussed the relevance of each situation into approaches and we classified them as liberal or progressive, according to political and philosophical aspects of Education (Libâneo, 1995), acknowledging the existent dichotomy between both conceptions related to the power of Education in transforming, either focusing on individualism – the liberal one– or on collectivity – the progressive one.

Directing the discussions towards tendencies of studies and researches in Mathematics Education – (1) *constructivism*, (2) *problem solving*, (3) *modeling*, (4) *ethnomathematics* and (5) *critical mathematics education* – we proposed activities aiming to analyze and to compare tendencies, conceptions and approaches previously discussed.

Then, group acknowledged that ethnomathematics theoretical and methodological referential was close to a progressive conception of education and also close to anxieties they had experienced in their teaching activities in adult education classes. In a way, teachers identified ethnomathematics with their daily work and with some of the presuppositions initially raised in the *brain storm* dynamics.

By the time this production was finished, in the evaluation process with participant teachers, this identification could be clearly perceived in one teacher's words, when we asked about the most important themes focused in the process:

..in my opinion it was the discussion about ethnomathematics. I believe that it is Mathematics path not only in adult education, but also in the so called regular education. All mathematics group from municipal education system should face these discussions and the time has come for us to make a difference in *Multieducação*, we are not mainly to point its existence. The moment of crisis we experienced in municipal schools requires a solution and ethomathematics should be presented as a way out. (T. Luciana)

2.3. Questions' gathering and working groups' distribution

Based on the previous reflections, along with the teachers we raised questions we considered necessary for written material elaboration. We used again *brain storm* resource, thus now grouping according to similar themes: the first one introduced a panoramic approach of work with adult education; the second one attempted to discuss and review teaching Mathematics to youngster and adults; the third one described tendencies in Mathematics Education and explained the identification of adult education with Ethnomathematics; the fourth one discussed the *exchange relationship*, that is the dialogue that should be held in mathematics classes, claiming contextualization as a relevant teaching strategy; the fifth and last topic brought up the technological resources, available for teachers' in their pedagogical action.

The idea was to advance those topics in smaller groups. The teachers would be grouped by areas they felt more sympathetic with.

The initial manuscripts carried a more theoretical tone which pointed teachers' beliefs based on ideas brought from their day-to-day life and from their classroom experiences. However, they lacked in teachers' practical experiences.

After meeting the supervisors of PEJA/SME and listening to them, we realized the text should be written in an accessible, easy language, full of practical examples taken from teachers' and their students' own experiences.

Considering these guidelines, we proposed that the teachers should include reports of their experiences and some speeches that would re-dimension reader's look upon the relationship between theory and practice.

2.4. Articulating partial texts in one single document

Trying to attend SME suggestions, we reunited diverse preliminary texts in a single document, under the same typography and mainly in similar, homogenous and colloquial language⁸.

The unifying process and planning of document was complied by constant reading and re-reading by the whole group, in collective work. Changes, inclusions and exclusions were made according to each participant's observations, and accepted by the majority of the team.

As Fiorentini states about the concept of *community of practice*:

(...) they constitute themselves in groups that assemble voluntarily in order to achieve a common goal. They engage in actions of negotiation of meanings. The group can develop only when members show self involvement and self commitment.⁹ (Fiorentini, 2004:59)

So, we noticed that participants' engagement in this collective work practice was very expressive. Some of the arguments made in order to maintain, change, alter or even exclude each part of the original text, were thoroughly discussed so as to be accepted or rejected by the whole group, by proper negotiation and consolidation contributing to the commitment of producing a document that would contribute significantly to its main proposal: bring to other teachers some ideas about teaching Mathematics to young and adult students, aiming to propose future actions in a continuous educational process.

2.5. Document's evaluation process

When the document reached its end, it was submitted to the evaluation of ten Mathematics teachers from Rio de Janeiro adult education system, named by the participant teachers. It was also evaluated by an academic specialist that works with ethnomathematics in adult education - Professor Alexandrina Monteiro -, and by PEJA's consultant - Professor Sônia De Vargas.

The evaluation reports were very positive about the document's intentions and its possible repercussion among peers, mostly due to the way it had been written. We considered many of evaluators' observations and contributions, and following the *Assembly* style, we made decisions about the suggested changes.

As not many observations pointed toward a higher formalization of the text - following scientific and academic productions' model - we decided to disregard them, considering that it should be a document intended for school teachers, which would provide ideas, suggestions and some reflections, which does not require such a formality.¹⁰

Somehow, the contributions made in the evaluation reports were relevant and contributed significantly to our closer look for the necessary text adjustments.

⁸ This care was essential due to the objective of making the reading pleasurable, without disregarding the necessary theoretical base.

⁹ Authors' translation.

¹⁰ Form and language were a great concern of the group, in order to produce a document that would catch teacher's attention. We also made an effort not to use evasive and childish speech, that would undermine the teacher throughout the reading and the understanding process.

3. ETHNOMATHEMATICS IN YOUNG AND ADULT TEACHERS' EDUCATION

This work has been based on ethnomathematics, as we believe this study and research field has a lot to contribute to adult education. A continuous educational process, grounded on an *ethnomathematical look* among teachers, can give these professionals enough support to perform their mediator roles in the diverse mathematical knowledges classroom. Alexandrina Monteiro points out the importance of teachers in the process of building dialogical spaces:

From my point of view, such wide transformation should emerge from teachers' reflections and experiences as they will necessarily have to broaden their awareness to the different voices which make up the school setting. For different reasons, some teachers have been showing the capacity to create a pedagogical process focused on the dialogic construction founded on relations established in confrontations, challenges and conquests of a culturally diverse space.¹¹ (Monteiro, 2004:446)

The socially privileged representation of mathematics interferes in the ways youngsters and adults represent mathematical knowledge in their relations with supposed *representatives* of official mathematics present in the classroom (teachers, school books, etc.). In school milieu, young and adult students tend to adopt practices they consider *appropriate* for that context, which results either from past or present schooling experiences. The Mathematics teacher who decides to work in adult education must be aware of his/her position of owner of a kind of knowledge so far considered *superior* to students' daily knowledges, as well as he/she should try to revert this perspective, by means of a dialogic attitude. This ethnomathematical attitude implies in analyzing social and political determinants that make knowledges of underprivileged groups *invisible* in our society, such as it happens in youngsters and adults when they hold their manifestation in school context. This posture opens opportunities to establish real knowledge exchange in the classroom, mainly if one considers the implicit power relations in the situation that places interlocutors in unbalanced positions beforehand.

Reflecting upon teacher's education from an ethnomathematical perspective, Maria do Carmo Domite talks about both the complexity of the task and a certain predisposition for the dialogue with the *other*. This researcher states:

the teacher's openness to such attitudes – negotiation with students' universe of knowledges and therefore less authoritative and more dialogic – is intimately connected to the teacher's personal behavior in his/her daily life, as much as the teacher's self consciousness and of the school context he/she is inserted.¹² (Domite, 2004:429)

One of the contributions of ethnomathematics' researches to pedagogical practices with youngster and adults is thus referred as the *recovery of one's cultural dignity* (D'Ambrosio, 2001). The recognition of one's roots provides the individual with such a reference, that it supports him emotionally and culturally. The student is identified as someone who holds a mathematical knowledge, which becomes a powerful tool to retrieve the learner's self-esteem.

The construction of dialogic spaces in the classroom, mediated by the teacher, has been signalized in the text of National Curricular Orientations for Young and Adult Education¹³, that says:

...it can be said that the preparation of a teacher for adult education should include, besides formative needs for any teacher, those related to the differential complexity of this modality of

¹¹ Authors' translation.

¹² Authors' translation.

¹³ Parecer CEB 11/2000, reported by Counselor Carlos Roberto Jamil Cury, apud Soares (2002)

education. So, to master this professional skill, one should be prepared to interact with this group of students and to establish the exercise of dialogue.¹⁴ (Cury, apud Soares, 2002:114)

Teacher's education following an ethnomathematical perspective can be a way to include students and therefore could build a proper identity for mathematics educator of adult education, by bringing students' previous knowledges to discussions. It demands an "attempt to increase mathematics teachers' availability to get to know students more intimately in their specificity, such as social and economical conditions, preferences, family situation, previous knowledges (intellectual, artistic, among others) that are part of his class-group." (Domite, 2004, p. 428).

Fonseca's words are used to conclude (2002:63):

The sensibility required to understand the adult-life specificity of adult education students is based not only on the educator's generous open attitude towards the other to welcome him, but also on the discipline of observation, registration and reflection over the practice and about a pedagogical practice that would allow the teacher to see the other from the students' point of view. It implies considering other hierarchy of values, to be adapted to other rhythms, to manage other demands and mainly to be open to other's experience. The process of teacher education in adult education (pre-service and in-service) should provide reflection, and the exercise of this attitude and discipline would shape this educator's professional identity, more than mere eventual procedures.¹⁵

Ethnomathematics area has a lot to contribute to the development of this sensibility referred by the author. The experience reported in this paper has attempted to contribute to dialogic teachers' education that could grant the indispensable approximation within diverse mathematical knowledges in adult education classroom context.

4. FINAL CONSIDERATIONS

Considering the democratic process applied on the development of the document, written by the teachers, in the collaborative group adopted methodology, we perceived the achievement of pre-set goals, legitimating the adoption of ethnomathematics as the main theoretical referential, as well as its contributions as a study and research area for young and adult education.

The outcomes offered by this document can provide, besides its prime effects on the reformulation of didactical material used by students (inspired on *Multieducação* document and constructed by the same group of teachers), its exposure and its usage as a referential for a program of continuous teachers' education, by means courses, workshops, etc.

We noticed a real political and philosophical consolidation carried by the group during this work, in the interest of educating teachers on the specificity young and adult students require, mainly due to the need of a critical education look, which aims at encouraging both mathematical and life knowledges students bring to the classroom, and not at silencing them.

5. BIBLIOGRAPHY REFERENCES

D'AMBROSIO, U. *Etnomatemática: elo entre as tradições e a modernidade*. Belo Horizonte: Autêntica, 2001.

DE VARGAS, S. Migração, diversidade cultural e educação de jovens e adultos no Brasil. *Educação e realidade*. Porto Alegre. V. 28, n. 1 (113-131), 2003.

¹⁴ Authors' translation.

¹⁵ Authors' translation.

- DE VARGAS, S., FANTINATO, M. C. C. B., & MONTEIRO, E. Curso de extensão universitária em Educação de Jovens e Adultos: discutindo a formação continuada de professores. *Movimento*, N. 12, setembro de 2005. Niterói: EdUFF, 2005 (no prelo).
- DOMITE, M. C. C. B. *Da compreensão sobre formação de professores e professoras numa perspectiva etnomatemática*. In: KNIJNIK, G., WANDERER, F. & OLIVEIRA, C. J. (orgs.) *Etnomatemática: currículo e formação de professores*. Santa Cruz do Sul: EDUNISC, 2004.
- FANTINATO, M. C. C. B. *Identidade e sobrevivência no morro de São Carlos: representações quantitativas e espaciais entre jovens e adultos*. São Paulo: Faculdade de Educação da USP, Tese de Doutorado, 2003.
- _____. *Contribuições da etnomatemática na educação de jovens e adultos: algumas reflexões iniciais*. In: RIBEIRO, J. P. M., DOMITE, M.C.S. & FERREIRA, R. (orgs.) *Etnomatemática: papel, valor e significado*. São Paulo: Zouk, 2004.
- FIORENTINI, D. *Pesquisar práticas colaborativas ou pesquisar colaborativamente?*. In: BORBA, M. & ARAÚJO, J. *Pesquisa qualitativa em educação matemática*. Belo Horizonte: Autêntica, 2004, p.47-76.
- FONSECA, M. C. F. R. *Educação matemática de jovens e adultos: especificidades, desafios e contribuições*. Belo Horizonte: Autêntica, 2002.
- LIBÂNEO, José Carlos. *Democratização da Escola Pública - A Pedagogia Crítico Social dos Conteúdos*. São Paulo, Edições Loyola, 1995.
- MACHADO, F. P. Aluno do PEJ: quem é você, por onde você andou? Perfil de pessoas matriculadas no PEJ e análise de suas trajetórias escolares anteriores. *Anais do 15º Congresso de Leitura do Brasil*. Campinas: ALB/ Faculdade de Educação da UNICAMP, 2005.
- MIZUKAMI, Maria da Graça Nicoletti. *ENSINO: As Abordagens do Processo*. Editora E.P.U, São Paulo, 1996.
- MONTEIRO, A. A Etnomatemática em cenários de escolarização: alguns elementos de reflexão. . In KNIJNIK, G., WANDERER, F. & OLIVEIRA, C. J. (orgs.) *Etnomatemática: currículo e formação de professores*. Santa Cruz do Sul: EDUNISC, 2004.
- RIO DE JANEIRO, Secretaria Municipal de Educação . *MULTIEDUCAÇÃO: Núcleo Curricular Básico*. Rio de Janeiro, 1996.
- SOARES, L. *Educação de jovens e adultos*. Rio de Janeiro: DP&A Editora, 2002.