STATISTICAL LITERACY: DEVELOPING A YOUTH AND ADULT EDUCATION STATISTICAL PROJECT

KELI CRISTINA CONTI
Faculdade de Educação
Universidade Estadual de Campinas (UNICAMP)
keli.conti@gmail.com

DIONE LUCCHESI DE CARVALHO
Faculdade de Educação
Universidade Estadual de Campinas (UNICAMP)
dione_paulo@uol.com

ABSTRACT

This article focuses on the notion of literacy – general and statistical – in the analysis of data from a fieldwork research project carried out as part of a master's degree that investigated the teaching and learning of statistics in adult education mathematics classes. We describe the statistical context of the project that involved the development of a questionnaire, the organization of the resulting information into tables, and the preparation of posters summarizing the results. The project was carried out with 7th-grade students, ages from 16 to 43, in a public state elementary school as part of the Youth and Adult Education program (Educação de Jovens e Adultos - EJA), located on the outskirts of Campinas, State of São Paulo, Brazil.

Keywords: *Statistics education research; Project-based learning; Literacy events; Pedagogical fieldwork*

1. INTRODUCTION: YOUTH AND ADULT EDUCATION (EJA) IN BRAZIL

The aim of this article is to extend the analysis of fieldwork data collected as part of a master's degree research carried out by Conti (2009). The main objective of the master's research was to understand the teaching and learning of statistics in youth and adult education classes. Here we are focusing on the analysis of literacy events, both general and specifically statistical, that took place during the course of a statistical project – the development of a questionnaire, the organization and analysis of the resulting data, and the presentation of these results in a community context. The participants in the project were seventh-grade students, aged between 16 and 43, enrolled in the Youth and Adult Education program (*Educação de Jovens e Adultos* – EJA) offered by a public state elementary school in Campinas, southeastern Brazil. We now need to give some information on the background of this program, and of 'second chance' adult education in Brazil.

The Brazilian National Law of Guidelines and Bases of National Education (LDBEN, n. 9.394/96, Ministry of Education, 1996) prescribes Youth and Adult Education (EJA) as a teaching method aimed at those who do not have access to or did not continue their studies in primary and secondary school during the ages of 7 to 17 years. It also recommends that EJA be offered as a free educational program, with appropriate opportunities, and considering the characteristics, interests, and conditions of life and work of citizens. Quality basic education for youth and adults is not assured simply by running such programs.

According to the *Course Proposal for Youth and Adult Education* (Ministry of Education, 2002), working with mathematics in EJA should focus on doing, thinking and learning mathematics respecting the socio-cultural identity of the students, taking account of their

actions, stories, fears, exclusion from regular school, and even possible aversion to mathematics. This focus must be from an adult perspective, since the students need to put themselves in whatever context their life imposes. This curriculum proposal also considers the approach of statistics, mentioning it as a vital component of contemporary mathematical literacy.

We consider working with literacy to be an important component of teaching and learning, accessing the robust and flexible meanings of mathematics and statistics from a culturally sensitive perspective (Street, 2004), considering the culture, values and aims of young and adult learners. It was with this background that we sought to develop a statistical project with students of EJA as the fieldwork component of a master's thesis (Conti, 2009). Before describing the actual project, we proceed to discuss our conceptions of literacy in general and statistical literacy in particular.

2. LITERACY

2.1. LITERACY IN GENERAL

We agree with Lankshear (1999) when he states that: "Understanding literacy as a sociocultural practice means that reading and writing can only be understood in the context of the social, cultural, political, economic, historical practices to which they are integral; of which they are a part." (p. 210).

Further, we must consider the two models of literacy presented by Street (2003), the 'autonomous model' and the 'ideological model'. According to Street, in the autonomous model, literacy comprises the technical abilities of reading and writing *per se*; in his words, "[literacy] will have the effect of enhancing their cognitive skills, improving their economic prospects, turning them into better citizens, regardless of the social and economic conditions, which could have caused their 'illiteracy'" (p. 77). He adds that "literacy in itself – in autonomous way – will have effects on other social and cognitive practices" (p. 76).

According to Street, in the ideological model, the practical purposes of literacy are in jeopardy. Specifically, these practical purposes refer to the interactions that take place between the participants, the demands of social contexts and their representations; for example, the values associated with reading and writing, either by *mathematizing* or by representing statistically what a particular cultural group acquires and disseminates.

Given the above, we can assume that the autonomous and the ideological literacies are not disparate, but two aspects of the same phenomenon. This perspective is especially appropriate when investigating schooling. In this case, literacy is effective in terms of social relations, rather than as an individual property, and it is not the same in all contexts. There are different types of literacies that are consistent configurations as well as literacy practices.

According to Barton and Hamilton (2004), events and literacy practices are basic components of literacy. These authors define literacy practices as "generalized cultural ways of using written language, in which people find inspiration for their life" (p. 112), adding that in the simplest sense, they are "what we do with literacy" (p. 112). They are unnoticed behaviors, and they also involve values, attitudes, feelings and social relationships. Barton and Hamilton (2004) define literacy events as "noticed episodes which arise from practices and are formed by them" (p. 114). The authors point out that many literacy events are activities that we repeat regularly, often structured according to the expectations of the participants, for example, a group of colleagues. Such literacy events can be the starting point for further research. Barton and Hamilton acknowledge that texts are a fundamental part of literacy events, since "the study of literacy is in part a study of texts, as they were produced and how they are used" (p. 114).

In accordance with Rojo (2009), one of the goals of schooling is to enable students to participate in social practices – school-related or not – in which literacy (especially reading and writing) is required in an ethical, critical, and democratic manner. We conducted this research taking into account that multiple demands of today's world include statistical literacy.

2.2. STATISTICAL LITERACY

In the discussion of literacy events from a more 'culturally-sensitive' viewpoint, the use of written language includes a variety of semiotic systems, such as the statistical system, in our case. According to Gal (2002, p. 2), the term *literacy* has been "combined with terms that denote expertise" or that denote diverse domains such as school literacy, social or non-formal literacy, computational literacy, scientific literacy, cultural literacy, visual literacy, statistical literacy, and others. Each of these could deserve a detailed treatment, but here we focus on the case of statistical literacy.

Gal (2002, p. 1) considers statistical literacy as "an expected key ability of citizens who live in information-laden societies. In turn, this ability stands for a predictable outcome of schooling and as a necessary component of adult numeracy and literacy." The author also observes that statistical literacy has two interrelated components:

(a) People's ability to *interpret and critically evaluate* statistical information, data-related arguments, or stochastic phenomena, which they may encounter in diverse contexts, and when relevant (b) their ability to *discuss or communicate* their reactions to such statistical information, such as their understanding of the meaning of the information, their opinions about the implications of this information, or their concerns regarding the acceptability of giving conclusions (Gal, 2002, pp.2–3, his italics).

Gal proposes a knowledge-based model of statistical literacy (summarized in Figure 1), a model that should be available to both adults and students in training to help them understand, analyze, and criticize the statistics that surround them.

Exploring what Gal classifies as 'knowledge elements', it is worth noting that while they are described separately, these elements may occur simultaneously. Concerning Gal's 'dispositional elements', which we could understand as 'positioning', there is an emphasis upon the fact that the concepts of critical stance, beliefs, and attitudes are interconnected. A critical stance is related to an attitude that questions the information that reaches us; beliefs and attitudes are related dispositional elements that allow a person to 'believe in [his/her] power of critical action' (as shown in Figure 1).
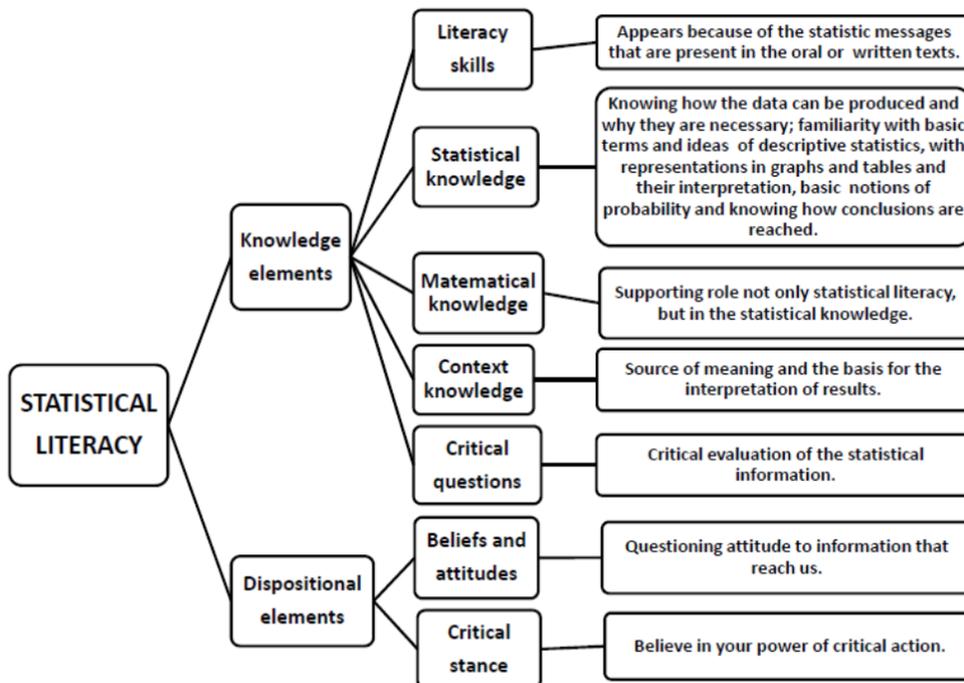

Figure 1. Statistical literacy model based on Gal (2002).

Summing up, Gal states that statistically literate behavior needs the activation of these five interrelated 'knowledge elements' in the presence of the 'dispositional elements' of a critical stance supported by appropriate beliefs and attitudes. He emphasizes "the key role that *non-statistical* factors and components play in statistical literacy, [reflecting] the broad and often multi-faceted nature of the situations in which statistical literacy may be activated" (Gal, 2002, p.19, his italics).

Gal points out that one does not have to incorporate fully all these elements of knowledge and willingness to be able to deal with statistical data. Statistical literacy can be seen "as a set of capabilities that can exist in different degrees within the same individual, in that it relies on the contexts in which it is invoked or applied" (p. 19).

For the purposes of carrying out a study that would assist the development of adults' statistical literacy under this perspective, we helped students to develop a statistical project that addressed a topic about which they were worried: pregnancy. In this article, we describe part of our fieldwork based on this particular concept of literacy.

We focus on three activities that might provide unique opportunities for students to participate in literacy events, while developing skills related to statistical literacy. The first activity was to prepare a questionnaire from which they could collect data from the other students in the school. The second activity comprised the tabulation of the collected data, carried out manually since technological resources were available. In the third activity, students reported the results of their statistical project in a series of posters prepared by them and evaluated by us. In our view, it was in fact a privileged moment of intellectual production.

3. FIELDWORK

Our research project was inspired by the perspective developed by Lopes (2004), who advocates for students to collect genuine data using different sources, to be able to perform experiments and draw conclusions, to work with real situations, to establish connections between school and their reality, and to produce knowledge that is meaningful for them.

We hoped that this type of project might inspire classroom teachers who wanted to investigate the Youth and Adults Education (EJA) program, so we chose to set up 'field research' (Gajardo, 1986), which has in its origin a link with "the processes of adult education and, as such, it recognizes the influence of the ideas of Paulo Freire" (p. 44). Gajardo adds that it is in the field (in our case, the school) that arise the "themes" for "discussion, reflection and action", and the participant students are ones who "through discussion of units, the central aim of a problem, analyze the situation, placing themselves as active subjects and protagonists, seeking from their experience and reality, a path of effective action to face them" (p. 32).

This perspective seems to be related to what Barton and Hamilton (2004, p. 111) called 'critical ethnography', i.e., an ethnography "committed to discovering and documenting everyday literacies, which are not always recognized in the hegemonic discourse about literacy."

We developed and conducted this research during the first semester of 2007 in a classroom in which one of the researchers was also the teacher, working in partnership with two interns (students who were participating in a program of classroom experience in local public schools, supervised by a more experienced teacher), together with 7th-grade students from EJA.

We obtained initial data such as age and employment status from 29 of the 39 students enrolled in the class; the others either never attended classes, or left the class before the project. Only 17 students participated in all stages of the project; others were forced to leave the school for work or family reasons. Of these students, six were between 16 and 21 years old, and the other 11 ranged from 29 to 43 years. They had returned to study in order to get a job (6) or a better job (9), or one closer to where they lived (2).

Based on Biajone (2006, p. 76), the fieldwork sought to encompass all phases of a statistical project (Table 1). We believe that it was a pivotal moment when the idea of a project was first presented to the students. In addition to offering guidance, we wanted them to experience all the phases, by being aware of them and committing themselves to their development. Note that there is flexibility of the limits for each phase, insofar as they vary from project to project, and

from group to group. We considered that at this time we were setting up some rules with the group, a 'didactic contract' that pointed the expectations that were set for each participant.

Table 1. Phases of a project

Project Phases	Statistical Project Phases
1) Definition of the topic	1) Definition of the topic for the project
	2) Definition of an aspect of the topic to be investigated by each group
2) Planning actions	3) Deepening of information regarding each of the approaches.
	4) Preparation of questions from these approaches for the construction of a questionnaire
	5) Definition of the sample (depending on the topic).
	6) Questionnaire review
3) Taking actions	7) Delivery and collection of questionnaires
	8) Tabulation of data for each approach
4) Preparation of the analyses and conclusions	9) Analyses of data from each approach
	10) Interpretation of data from each approach
5) Dissemination and communication of the results	11) Dissemination and oral and written communication of the results

It took 18 meetings (lessons of 90 minutes) to complete all the phases in Table 1. From the beginning, the activities were positioned as components of a "school literacy project". The goal was to build a thick network of literacy events in order to include students in contemporary literacy practices, thereby enabling the development of reading and writing skills required for usual social needs (Rojo, 2010). We tried to use Kleiman's (2010) proposal that the pedagogical movement go from social practice to the 'content' rather than from the content to social practice.

'Pregnancy' was the topic chosen by students during the first phase of the statistics project. This topic is not a usual part of mathematics syllabuses, but it was in agreement with Lopes' (2003) view that such a study can emerge from a more general problem, from an issue that was not part of the initial school planning, or even from a set of interrelated issues.

The students were divided into six groups. Each group chose an aspect of pregnancy for investigation: Group 1: Contraceptive methods; Group 2: Teenage pregnancy; Group 3: Modes of delivery; Group 4: HIV and pregnancy; Group 5: Infertility; and Group 6: Abortion.

3.1. PRODUCING THE QUESTIONNAIRE

The questionnaire was produced during the second phase, which began with the study of printed material on the subject of pregnancy; public institutions, such as health centers and hospitals, and in the internet provided this material.

To guide our students during the preparation of the questionnaires, we presented them with an excerpt from a book by Fiorentini and Lorenzato (2006, pp. 116–118), who gave details of question types and uses: "A closed-form question is one for which a researcher provides a suitable list of responses; an open-ended question is one where the researcher does not provide the respondent with a set of answers from which to choose. Rather, the respondent is asked to answer in their own words", and the mixed-form question, which combines both types. In Brazil, this book is used in subjects relating to mathematics education in undergraduate and graduate courses. The practice of taking academic texts into an elementary school classroom is highly unusual, particularly for EJA. It was motivated by a belief that using such a text during classroom work would involve these students in authentic literacy activities during their research (Soares, 2003).

It was decided that a closed-form questionnaire would be more appropriate due to the large number of respondents who might participate in the project. Each group was charged with developing a question related to their chosen aspect. The questions were read collectively, and

each student could give his/her opinion regarding the presentation, language, and options for the answer in terms of clarity, objectivity, accessibility of vocabulary, etc.

The 'closed-form question' concept in a statistical questionnaire was not clear to some of the groups, and even those who seemed to grasp the meaning needed some help, especially from their peers, to include all possible views of potential respondents. As an example of this process, we selected the initial and final proposals from a highly-engaged group that brought their own 'reworking' into the discussion (Table 2). The transition from the initial proposal to the final form was a slow process requiring much discussion among the group members, and later with the teacher, who assessed each alternative answer and suggested other possible alternatives, depending on the respondent's situation.

Table 2. Initial and final proposals by Group 1

Initial proposal:
Do you always seek medical advice before using a contraceptive method?
(   ) Yes.
(   ) I went to the pharmacy and bought it.
(   ) My friend recommended it.
(   ) My mother bought it.
(   ) My boyfriend buys it.

Final form:
Currently, do you seek medical advice before choosing, and using a contraceptive method with your partner?
(   ) Yes.
(   ) No. I go to the pharmacy, ask the pharmacist, and buy it.
(   ) No. I buy what my friend recommended.
(   ) No. My mother/father buys it.
(   ) No. My boyfriend/girlfriend buys it.
(   ) I do not use any contraceptive method.
(   ) I have yet to start my sex life (I'm a virgin).
(   ) Other

Only after the complete questionnaire had been approved by the project participants, with necessary grammatical corrections, did we conduct a test run using a school employee. Following that, the students gave us the final approval to print copies, to be administered in randomly-selected classrooms; this step involved a large number of students who contributed to the project by answering the questionnaire. During the designing of the questionnaire and inspired by Terzi (2005), we noticed a 'movement' that we tried to summarize in a diagram, later reinterpreted in a master's degree dissertation (Conti, 2009), noting the important mediation role of a more experienced person in the school culture – the teacher (Figure 2).

To a certain extent, it can be said that the activities developed along with the students were focused on the "literacy skills" discussed by Gal (2002). During the process of preparation of the questionnaire, what we call a 'zero writing', the reading of an excerpt from Fiorentini and Lorenzato (2006) was used as a 'mediation text'. Students interacted with the academic text through appropriation and (re)signification of the meaning ascribed to the questionnaire. They realized that the 'right' answers were not decided *a priori,* nor were they unique. Further, the 'interaction' with an absent respondent was essential to the study of the project theme that the students were developing with the aid of statistical tools. The writing of the 'other' which led to 'dialogue 1' during the reading generated 'writing 1', the first proposal for the questionnaire by the group. In turn, 'dialogue 2', the collective reading with the participation of all groups, generated 'writing 2' as well as the (re)signification that this process produced. Students were producing statistics, moving in the universe of likelihood, rather than moving in the world of falseness *versus* the world of truth (Besson, 1995).
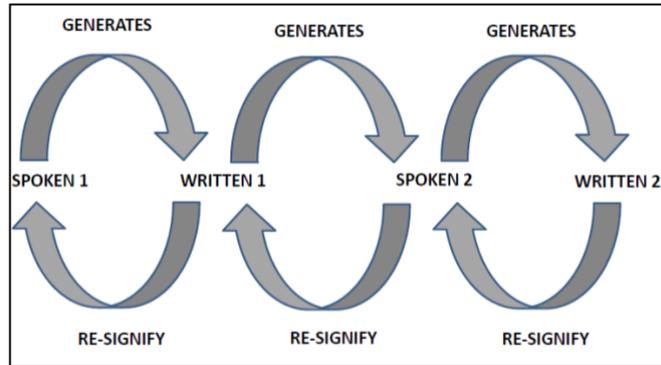
Figure 2. Initial literacy 'movement'.

3.2. INITIAL SUMMARIES OF THE INFORMATION

Responses were collected from 115 students in randomly-selected classrooms at the school. The questionnaire was formatted so that it was separated by aspects of pregnancy, so that each project group received responses to the questions they formulated and all of them could work simultaneously. We offered students the opportunity to organize and clean their own data, as recommended by Lopes (2004), so that they could apply their own diverse experiences to the data-checking activities. As the work progressed, the importance of learning how to build tables to organize data became very clear to us. According to Gal (2002), this capability is an essential part of statistical literacy, though such a view does not seem common in the Brazilian educational system.

Since it was done manually, tabulating the data took a long time. Students developed recording methods and strategies for tallying and verifying the data. At first, these strategies seemed purely mathematical, but they were also part of the statistical literacy classified by Gal (2002) as "mathematical knowledge". Tables 3, 4, and 5 show excerpts from the students' portfolios to indicate how the initial tallies were recorded, showing the similarities and differences between these records and conventional statistical ones.

Four of the six groups had to count and record the numbers of male and female respondents. Table 3 shows Group 1's notation, which demonstrates basics of statistical literacy with regard to "mathematical knowledge" (Gal, 2002). Their equation (69+46=115) demonstrated a concern for the accuracy of the data, and revealed some familiarity with the notions of absolute and total frequencies obtained from counting and tabulating values of the variable 'gender'.

Table 3. Group 1 – initial representation of the variable 'gender'

	06/06/2007
Female: 69	
Male: + 46	
115	

In terms of organization for the variable 'age', three groups produced conventional statistical tables in their initial recording. However, only one group thought that it was important to sort the ages in ascending order (Table 4). It seems they were experiencing what Barton and Hamilton (2004) call a 'literacy event' regarding the organization of their table of data in the school context.

The other groups organized their data in less conventional ways. The students believed that they were communicating the information clearly, but they did not fully achieve their aim. They showed difficulties moving from a concept of literacy centered on individuals to one centered on groups, as in conventional tables (Barton and Hamilton, 2004). Table 5 shows Group 2's

summary as an example. The students grouped the responses by age and then recorded them under individual ages. This demonstrates that summarizing the raw data from original questionnaires is not a trivial job.

Table 4. Group 6 – part of the initial summary for 'age'

Question 6
What are the types of abortion that you know? (You can indicate more than one)
14 years old = 16 answered
15 years old = 7 answered
16 years old = 30 answered
17 years old = 30 answered
18 years old = 7 answered
19 years old = 4 answered
20 years old = 1 answered
22 years old = 2 answered

Table 5. Group 2 – part of the initial summary for 'age'

06/06/2007						
Age 46	Age 51	Age 25	Age 41	Age 60	Age 47	Age 36
1 person	1 person	1 person	1 person	1 person	1 people	1 person
Age 35	Age 32	Age 28	Age 23	Age 22	Age 20	Age 39
1 person	1 person	1 person	1 person	2 people	1 person	3 people
Age 14	Age 15	Age 19	Age 16	Age18	Age 17	
15 people	7 people	4 people	29 people	7 people	32 people	

The organization of data and the preparation of the initial tables were discussed at a meeting. These first summaries allowed us to mediate the construction of the final tables. At the following meeting, we helped the students to produce records closer to the conventional ones, mobilizing their mathematical knowledge to address the problem of creating appropriate statistical records.

3.3. RECORDING INFORMATION IN TABLES

For the group meeting about tables, we took some tables to the classroom and demonstrated their organization. We obtained them from situations encountered by our students in other assignments unrelated to their statistics project. We hoped that these assignments could serve as models for the construction of the tables for their statistics project. After this approach, only one group still showed difficulties in organizing data in a table: Table 6 attempts to show the responses to a question about problems facing women who are HIV-positive, but seems only to be tabulating the ages of the respondents. Nevertheless, even this group improved its counting strategies and made records closer to the conventional ones.

Table 6. Group 4 – second attempt at tabulating data

Question 4	(06/13/2007)
In your opinion, what are the biggest problems facing HIV positive (AIDS) pregnant women?	
15p 14	
6p 15	
31p 16	
32p 17	
7p 18	
...	

We can consider that in the process of working with "statistical knowledge" (Gal, 2002) to produce tables, we have unleashed a "literacy movement," i.e., new representations were being generated through the written record, showing signs that they were being re-signified to be presented again (Barton & Hamilton, 2004).

Likewise, the other groups presented their new summaries, organizing data relating to the variable 'age' in numerical order, with reference to the examples we presented. Following this, the data were also represented in graphical form, to make it easier for people to understand the results when they were presented as posters. This process represents another level of 'literacy events', and we show an example of the results in Figure 3. According to Barton and Hamilton (2004), certain literacy events are structured according to the expectations of the participants; the viewers of the posters might expect that information is given graphically, and for this reason, the students prepared posters including graphical elements.

3.4. MAKING POSTERS

The posters were created in the week after the preparation of the tables and the inclusion of graphs by some of the groups. Our students worked with their calculators, notes, and sketches of the charts. Their only difficulties appeared during the planning of what to put on the poster, and how to select only a part of the whole 'content'. Furthermore, they were unsure about the lettering, and about who would write on the poster boards as they did not consider their handwriting 'pretty' enough. They also were afraid of making mistakes when writing with pens. We noticed in this concern with aesthetics an insecurity about being accepted in the public presentation for which they were preparing. Some groups needed extra time beyond the three previously planned meetings to complete their posters, and fellow teachers at the school kindly provided these lessons and time.

After each meeting, the students' ideas were loaded into a software program for the drafting of slides from pre-prepared poster templates. These drafts allowed students to get an idea of the final poster, and to participate actively in its construction, giving hints and suggestions, approving or disapproving, even though they were unfamiliar with the software (and indeed some had never worked on a computer before). In this literacy event, we used the computer screen as a space for reading and writing. This kind of access to information brings new cognitive processes, new forms of knowledge and new ways to exercise practices of reading and writing.

We tried to stay true to the students' hand-drawn version when putting their information into the program, respecting as far as possible the chosen font, colors, and placement of text and graphics. A proposal from Group 1 to add illustrations to the posters was well received by the group of students, who seemed to agree with the suggestion. Students were involved in the job of searching for appropriate pictures in the study material that we had given them and also in other material such as magazines. The inclusion of pictures in the computer versions improved the resulting posters. Students gave their approval after seeing their posters on the computer, and the final posters were printed on 60×90 cm photographic paper.

3.5. PROJECT CONCLUSION AND PRESENTATION OF POSTERS

By agreement with the school principal, the presentation was scheduled for a Friday during the break between semesters, so as not to interfere with other classes. The choice of this time allowed the whole school community to attend, not only those who participated directly in the project. This included teachers, the principal, the schooling coordinator, students from regular as well as EJA classes, and also the families of the project students. We prepared a small presentation using a multimedia projector to present the project that we had developed with the students, and to explain to the community the process involved in the production of these posters.

 After the presentation, our students were asked to start the display of their work; groups stood next to posters, which were attached to the inner courtyard walls. The school community was encouraged to participate by observing and asking questions. Our students felt that the

school community found their work interesting, and they felt valued by participating in a meaningful experience beyond the ordinary classroom.

We chose to describe only one of the posters (Figure 3), by featuring it in the audio recordings and in the researcher's field diary. The choice was made due to an episode that
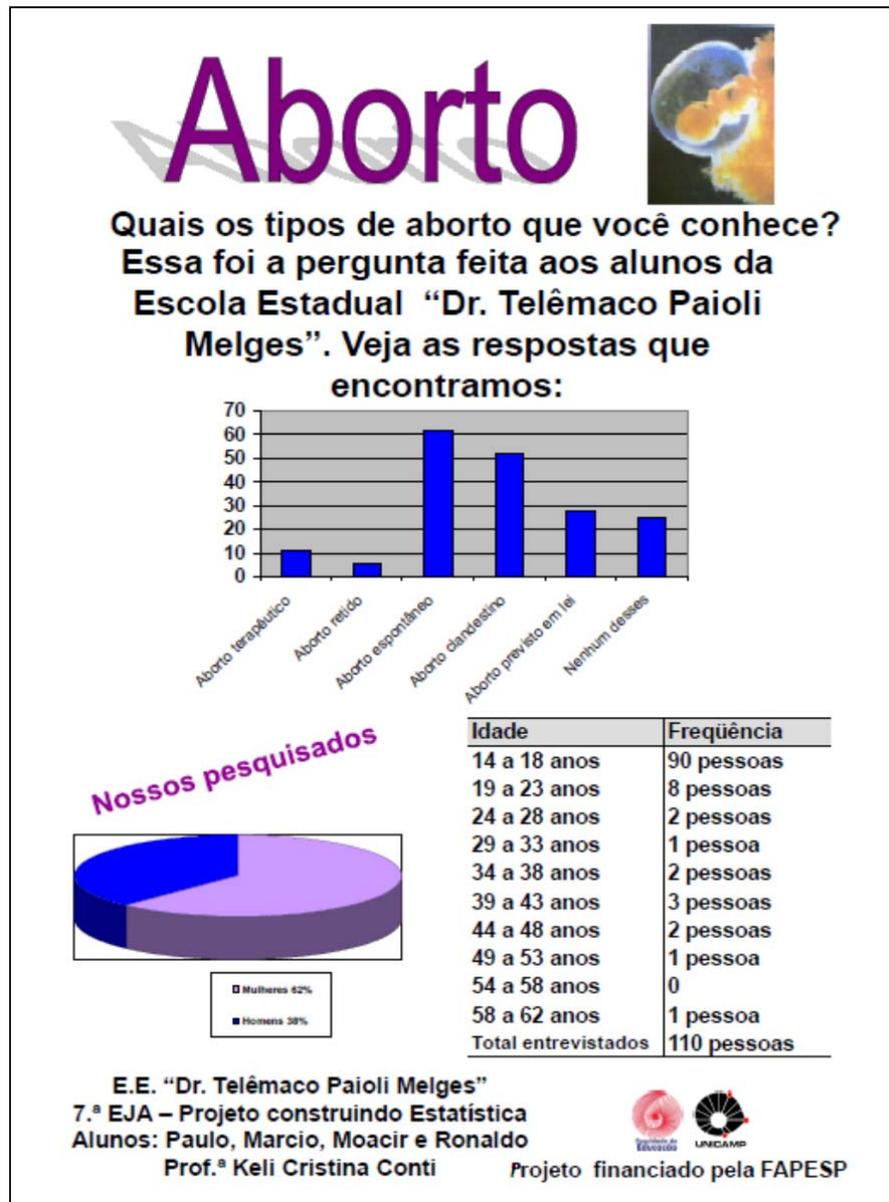

Figure 3. Group 6's Poster for Question 6.

The translation of the poster in Figure 3 is:

Abortion: What are the types of abortion that you know?

This was the question asked by the students of the State school 'Dr.Telêmaco Paioli Melges'

This is what we found out: Medical abortion, Missed abortion, Miscarriage, Clandestine abortion, Legal abortion, Others

Our respondents: Age – Frequency, 14 to 18 years old – 90 people, …

Females 62%, Males 38%, Total interviewed

Statistics building project; Students – teacher; Project financed by FAPESP/São Paulo Research Foundation

showed us the interaction between the authors and the public (Table 7). We consider that the presentation of posters constitutes a literacy practice which, although not observable, it implies values, attitudes, feelings and social relations and represents what we do with literacy (Barton & Hamilton, 2004). Many of these conversations involved discussion of statistical content, showing the use of statistical literacy in practice.

Table 7. Extract from discussion with Group 6

English teacher:	What is a missed abortion?
Ronaldo:	When the child dies for some reason, but remains in the uterus.
English teacher:	Then a type of D&C (dilation and curettage) procedure has to be performed
Male student:	The clandestine is the most common, according to statistics!
Ronaldo:	No, it is the one they know about!
….	
Female student:	What's in here, the questions?
Ronaldo:	No, the age of the people who participated in the survey!
	…So, between 14 and 18 years old, there were 90 people who answered the questionnaire.
Keli:	This also shows that those who are looking for evening classes are in that age group, younger, maximum up to 23 years.

This poster shows a bar chart, because this question allowed multiple answers, making it impractical to use a pie chart (as was used in the other posters). It also contains a frequency table, which was selected in preference to a histogram, which seemed less informative due to the variability in the data. Even though Ronaldo, the group representative, was a shy student, he coped well with the questions asked at the exhibition, answering the ones related to the statistics, as well as questions regarding types of abortion.

4. CONCLUDING REMARKS

Returning to the general idea of literacy, Gal (2002) points out that each of the proposed components of statistical literacy could be modified or redesigned, depending on the context, the interest, and the expected level of the students or citizens in the school, community, or country. Lankshear's (1999) conceptualization presents it as a sociocultural practice; hence, there is no consensus on how to evaluate it and measure it, as it makes sense only in context. Hence, we consider an evaluation of the statistics project in context, highlighting the real progress of the seventh- and eighth-grade EJA students during their participation. There were signs that they began to identify mathematical knowledge as a means of understanding the world around them. They showed an ability to relate statistics to their other courses of study and to their lives in general, and they demonstrated the capacity to select, organize, and produce relevant information and analyze such information critically. They solved problem situations, they communicated and utilized quantified information, and they were more confident in their own ability to construct knowledge, and to deal with the social exposure required in presenting the results of their investigation.

As predicted by Rojo (2010), we saw evidence of statistical approaches in a variety of literacy events; maybe it is more realistic to focus on multiple 'literacies' instead of a unique 'literacy' (e.g., Kalantzis & Cope, 2012; Rojo, 2009), or specifically 'statistical literacies' rather than 'statistical literacy' (Tait-McCutcheon, 2010). According to Rojo, work at school from this perspective consists of developing 'educating languages', i.e., creating literacy events. These events may involve dealing with previously-written texts, such as TV news, seminars, and poster presentations, or it may involve students developing their own texts. Therefore, it is possible to integrate students into (multi-)literacy practices which they have yet to master.

In conclusion, the inclusion and participation of students in literacy events permeated the whole study. The advances were not always explicit, although they had a significant cumulative effect in terms of literacy for the students, at their particular level of education and in their real-life context. Their achievement was to establish an initial level of statistical literacy. This

process did not end when the fieldwork research was completed, because the students could continue working with the statistical literacy through the internship activities that were developed in the classroom by the trainee partners in this research. We also had the opportunity to return to the school at later times to give feedback to the students and the principal about the future development of the research.

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KELI CRISTINA CONTI
Faculdade de Educação – Universidade Estadual de Campinas (UNICAMP)
Av. Ary Rodrigues, 315 - Parque das Camélias, Campinas – SP – Brasil
CEP 13 052-550