Commentary on the Chapter by Wolfgang Schlöglmann, "Mathematics Education for Adults: Can It Reduce Inequality in Society?"

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Education is a social mechanism whereby one generation passes on its knowledge, skills, and values to the next generation. However, for various reasons, access to educational opportunities and successful completion of formal education are not provided to some individuals. As Apple has claimed:

> Education does not exist isolated from the larger society. Its means and ends, the daily events of curriculum, teaching, and evaluation in schools, all of this is connected to patterns of differential economic, political, and cultural power. (Apple 1992, p. 412)

Accordingly, education is deeply rooted in the political domain of a society. In whatever political context, it is seen to be the means, par excellence, for social emancipation, a fact acknowledged by international organizations. In the 2000 World Education Forum in Dakar (see UNESCO 2000), six goals for achieving *Education for All* by the year 2015 were promulgated two of which are as follows:

- Goal 3: Ensuring that the learning needs of all young people and adults are met through equitable access to appropriate learning and life-skills programmes;
- Goal 4: Achieving a 50 per cent improvement in levels of adult literacy by 2015, especially for women, and equitable access to basic and continuing education for all adults.

Although there is no direct reference to mathematics education, these two goals highlight the importance of adult education, which is Schlöglmann's major focus in his chapter.

Mathematics education is situated within the broader notion of education in all societies. In 1989, the National Council of Teachers of Mathematics (NCTM) proposed four new societal goals for mathematics education through the publication of the *Curriculum and Evaluation Standards for School Mathematics*, namely: (1) the development of mathematically literate workers, (2) the pursuit of lifelong learning, (3) the possibility of opportunity for all, and (4) the development of an informed

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electorate. These societal goals underscore the importance of mathematics education in contexts beyond the four walls of the classroom to a wider democratic society.

Schlöglmann to some extent addressed the four goals stated above, although not from the perspective of school mathematics. From his chapter, we draw four implications.

First, we need mathematically literate workers everywhere in the world. In the context of highly industrialized countries, knowledge-based industries are expanding rapidly and labor market demands are also changing very fast. Further, highly automated machinery does not reduce the need for workers; it merely changes the required skills and biases them more in the direction of mathematics education (see Walsh 1990).

Second, adult education is a key element in the general concept of lifelong learning. Schlöglmann uses ideas from a group of authors (Aspin, Chapman, Hatton, and Sawano) to introduce the following four models of lifelong learning: (1) a compensatory model, (2) a continuing vocational model, (3) a social innovation model, and (4) a leisure orientated model. These models of lifelong learning clearly describe an adult learner as somebody who is no longer in school or college but somebody who has had some life experiences after leaving school. On the other hand, the World Bank (2003) describes lifelong learning as something more than just adult continuing education: "Lifelong learning encompasses learning over the entire life cycle (from early childhood to retirement) and all learning systems (formal, non-formal, and informal)" (p. 2).

Let us look at the idea of mathematics education for adults. Any discussion about mathematics education for adults has to grapple with the idea of an adult learner of mathematics. Is an adult learner somebody who is legally an adult, say, age 18 years in most countries? Such an age-bound definition may include all students who are still in high school or who are entering college courses. Or, is an adult learner of mathematics somebody who comes to study mathematics after having been away from school or college either because he or she did not have an opportunity to study the subject earlier of if ever he or she did was moderately successful or even unsuccessful in mathematics? Schlöglmann does not dwell on who is an *adult learner* of mathematics but sees adult education as having close connections with the general concept of lifelong learning. However, the term "adult" in any country is a very generic term. Background factors such as gender, race, ethnicity, socioeconomic status, immigrant or local, prior formal education, even physical fitness and age cannot be taken for granted. These background factors strongly influence an individual's choice to take up or not adult education courses.

Third, the idea of *opportunity for all* is encapsulated in the issue of inequality that Schlöglmann highlights in his chapter. The main point he makes is that there is an uneven acquisition of knowledge of mathematics in society that then gives rise to inequalities. He strongly points out that there exists inequalities in highly industrialized societies that have to be reduced. For Schlöglmann, lifelong learning provides an opportunity that will reduce societal inequalities. He raises a valid claim in that "mathematics education for adults can help reduce inequality in societies, but it is not a silver bullet: a coordinated strategy consisting of several measures is

required". Schlöglmann does not give details about how the inequality is to be reduced or eliminated altogether, however, he attempts to distinguish between people who have passed through the educational system with a low level of achievement and those who have migrated to highly industrialized nations from countries with weak education systems. Although there are no negative comments, perhaps there is a need to clarify why this distinction is important. The distinction also seems to contrast with his interpretation of equality, that it should not only be a principle that is valid at the individual level but that it should also be valid for all social groups.

Fourth, the notion of an informed electorate is couched on fundamental principles that govern any democratic society. Schlöglmann points to the Universal Declaration of Human Rights in which one of the rights asserts education for everyone. The word *education* is used in a broad sense but is an essential element for all democratic societies. He states that: "We must extend the concept of lifelong learning to encompass the needs of people in a democratic society". To be educated is to be literate. Does general literacy subsume basic knowledge and skills in mathematics? Some questions are pertinent here: What kind of mathematical literacy is appropriate for adult learners? What would be the correct term to use: numeracy, quantitative literacy, financial literacy, mathematical literacy, democratic numeracy or functional mathematics (see Galligan and Taylor 2008, p. 100)? An interesting point to note regarding this matter is from Apple (1992) who claims that mathematical knowledge is often produced, accumulated, and used in ways that may not be totally democratic, which necessitate thinking carefully about the definitions of mathematical literacy with which we now work. Apple also notes that "literacy" is a slippery term and that mathematical literacy is a sliding signifier that can be used to cover a multitude of social goals. How do we, then, reconcile Apple's comments with the notion that mathematics education can reduce inequalities in society?

Mathematics educators relish having more students learn mathematics in schools. Folk knowledge, if nothing else, tells us that mathematics is an important component of the school curriculum. What about mathematics in the context of lifelong learning? Better still, the question should be: Why should mathematics education be considered as a key element of lifelong learning? Schlöglmann claims that democracy "demands a means for communicating and discussing principles in a rational way. Mathematics with its close relationship to rationality, is our concept to do so". Mathematical reasoning is a very powerful tool, and perhaps this is the connection that he wishes to make with mathematics, the harbinger of rationalism. Schlöglmann aptly states that, "The status of mathematics in our society is rather paradoxical. On the one hand, many people see mathematics as abstract, remote from the life, incomprehensible. On the other hand, the same people have full confidence in mathematical methods—they pay invoices, accept calculation of election results, accept use of complex mathematics in technology and the economy". He also describes a responsible citizen as someone who is able to participate in societal processes in a rational way.

Schlöglmann clearly directs attention to the issue of adult education and more so in the area of adult mathematics education. Adult education may not be on the priority list in many countries, which makes *Education for All* a very ambitious goal. This goal cannot be achieved if there is no clear policy about adult education in any given

country. Education for all, or more specifically *Mathematics Education for All*, cannot remain at the level of rhetoric. It would be too simplistic to believe that teaching mathematics to all adults will reduce inequality in society. Mathematics education for adults has to be looked at from the same vantage point as school mathematics education. The guiding questions should be along the following Tylerian lines: Why must we teach mathematics to adults? What mathematics should we teach to adults? How should we teach mathematics to adults? And, how do we know that we have been successful in teaching mathematics to adults? Additional questions include the following: Who should teach mathematics to adults? Where should the teaching of mathematics to adults take place? Who should pay for the costs? Accordingly, I raise the five points below for consideration to further the discussion in this area.

1. There should be a clear commitment from policy makers to support mathematics education for all adults. Some kinds of incentives will encourage adults to participate more in adult education courses.
2. A strong mathematics curriculum specific to the perceived needs of adult learners in a democratic society should be developed. There must be a strong emphasis on developing decision making and problem solving skills, which is a necessity for knowledge-based economies (World Bank 2003). The curriculum needs a strong content base. The teaching and assessment has to be adapted to the level of the individual learners. However, the needs should not only be utilitarian or vocational.
3. Countries need to recruit a well-trained teaching force for the specific purpose of teaching adult learners and with specific knowledge of andragogy. More specifically these teachers need to have some type of Mathematical Andragogical Content Knowledge (MACK) similar to Mathematical Pedagogical Content Knowledge (MPCK) that takes adult learners' approach to learning and interests into account.
4. A venue suitable for running adult education courses and at times more suitable for adult learners should be carefully chosen. There is a need to avoid mass adult education practices using technology that do not necessarily respond to the individual needs of adult learners (see FitzSimons 2007).
5. A cost-sharing approach with the state would be more suitable than an individually financed scheme for adult education courses.

Mathematics education is an essential component of any adult education course. Certainly, enhancing the mathematics education of adults will reduce some inequalities. Schlöglmann, who writes from the perspective of highly industrialized countries, highlights this matter in his chapter. What is needed at this time is how mathematics education for adults can be developed and effectively implemented in order to reduce social inequalities.

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