

## **BOOK REVIEW**

### *An Invitation to Critical Mathematics Education*\* by Ole Skovsmose (2011)

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#### **Abstract**

Critical mathematics education has developed in many directions and has a broad range of approaches. There will probably be many different ways of expressing critical mathematics education. The book, *An Invitation to Critical Mathematics Education* by Ole Skovsmose (2011) has elucidated critical mathematical education by discussing and reinterpreting its concerns and preoccupations. He reinterprets thoughts and arguments that have been taken for granted and premised in mathematics education, and also discusses unquestioned widespread notions by associating them with his projects or specific practices carried out by him and his colleagues. This review introduced and examined his crucial notions of critical mathematics education, such as “Diversity of situations,” “Students' foreground, Landscapes of investigation,” “Mathemacy,” and “Uncertainty.” These notions will make you to meet his theories with his practices and look back on something overlooked in mathematics education.

**Keywords** Critical mathematics education, Diversity of situations, Foreground, Landscape of investigation, Mathemacy

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## I. OPENING REMARKS

A mathematics classroom is a place in which students engage in and learn mathematics, and at the same time, they live their own lives. In recent years, the access to and equity in mathematics classrooms for all students has become more focused. Equity in school mathematics does not mean that every student has to receive identical instruction but that we have to provide appropriate accommodations to promote access for all from various races, ethnicities, and socioeconomic groups. It is suggested that “all students have access to a high-quality mathematics curriculum, effective teaching and learning, high expectations, and the support and resources needed to maximize their learning potential” (NCTM, 2014, p. 5). However, how much have mathematics education research and practices been interested in mathematics classrooms for all students? And what kinds of classrooms has mathematics education research been interested in so far? According to Skovsmose and Valero (2008) and Skovsmose (2006), “90% of research in mathematics education concentrates on the 10% the most affluent classroom environments in the world, while 10% of the research addresses the remaining 90% of the classrooms” (Skovsmose, 2011, p. 18).

Several years ago, I had the chance to research equity in mathematics classrooms with my colleagues. I encountered the book *An Invitation to Critical Mathematics Education* during that process. Ole Skovsmose, the author of the book *An Invitation to Critical Mathematics Education*, considers and addresses the topics of equity and justice under the name of ‘Critical Mathematics Education.’ He gave us a lot of insights and many questions about the theory and practice of mathematics education. These are also current emerging issues in Korea. We ended up publishing a Korean version of the book. Now, let me share and examine some ideas that attracted me in this book.

Critical mathematics education has developed in many directions and has a broad range of approaches (Skovsmose, 2016, p. 9): mathematics education for social justice (Sriraman, 2008; Wager & Stinson, 2012), pedagogy of dialogue and conflict (Vithal, 2003), radical mathematics (Frankenstein, 1989), responsive mathematics education (Geer et al., 2009), and critical mathematics education (Frankenstein, 1989, 2012; Powell, 2012). There will probably be many different ways of expressing critical mathematics education: a branch of mathematics education, a specific pedagogy, the content of a particular curriculum, or mathematics education for the underprivileged. In the book, *An Invitation to Critical Mathematics Education* by Ole Skovsmose, how is it explained and expressed? The book begins by examining critical mathematics education “as an expression of some preoccupations or concerns with respect to mathematics education” (Skovsmose, 2011, p. 2). Preoccupations can be embedded in discourse and be reconfigured through changes in discourse. This discourse change, at least, says that our life-world changes. In terms of the formulation of these preoccupations in the perspectives of mathematical education, the author, Skovsmose, has elucidated critical mathematical education.

## II. SOME NOTIONS IN CRITICAL MATHEMATICS EDUCATION

The book addresses critical mathematics education by discussing and reinterpreting concerns and preoccupations even though this way, as the author said, might be rudimentary and fragile. In this profound way, he invites critical mathematics education and shows the characteristics of uncertainty throughout the book. He formulates a range of crucial notions of critical mathematics education, such as “diversity of situations,” “students’ foregrounds,” and “landscapes of investigation.” He leads us to the notions of “mathematics in actions,” “reflection,” “mathemacy,” and “uncertainty.”

The title of the first chapter in the book, “Mathematics education is undetermined” (Chapter 1), may seem strange in light of conventional views that mathematics might be treated as a well-defined and solid science and such mathematics has to be taught in mathematics education. The author discusses how empowerment and disempowerment of mathematics education have been acted out and served in various functions and interests socially, politically, and economically. He says that mathematics education is undetermined without essence. The mathematics classrooms imaged in prototypical or stereotypical assumptions have been shown dominantly. However, experienced classroom situations can be completely different from those kinds of classroom situations. He needs to escape from prototypical assumptions about problems in mathematics classrooms. Teaching and learning mathematics situations have a vast diversity in our globalized and ghettoized world. The book talks about the “Diversity of situations” (Chapter 2) for teaching and learning mathematics in the mathematical practice and the process of theorizing. While D’Aambrosio (2006, 2010) associates ‘ethno’ with culture for ethnomathematical research, Skovsmose extends it to teaching and learning in different socio-economic and political contexts.

Personally, “Students’ foregrounds”(Chapter 3) were interesting and impressive as I was always attracted by students’ backgrounds for teaching and learning. Although their foregrounds may be related to their backgrounds and even framed by them, foregrounds and backgrounds are very different kinds of matter. The author reinterprets the notions of ‘intentionality’ and ‘life-world’ developed by Brentano and Husserl and explains how facts and situations are experienced. The two children introduced in the book, Nthabiseng and Pieter, were born on the same day in South Africa and had very different family circumstances: their race, their parents’ income and education, and their–locations (Skovsmose, 2011, p. 21). Nthabiseng’s and Pieter’s opportunities from the perspective of their backgrounds may seem fixed and conclusive. What could be thought of as meaningfulness for these students? It tells us that meaningful mathematics education for students depends on their foregrounds and intentions in some cases. The foreground is not a ‘social fact,’ while it is not only composed of tendencies but also formed by interpretations of future possibilities. According to the cases in this book (Skovsmose, 2011, p. 29), the project ‘Surfing’ for the students who have never seen the beach and the ocean in a school located in a poor neighborhood; the project ‘Pilots Mathematics’ for children living in a village (Vithal, 2010); the project ‘Learning from Diversity’ (Skovsmose, Alrø, & Valero, 2008; Skovsmose, Scandiuzzi, Valero, & Alrø, 2008). The notion of students’ foregrounds has been suggested to consider students’ interests, expectations, hopes, aspirations, and also students’ experiences of possibilities and obstructions.

The notion of “Landscapes of investigation” (Chapter 4) allows us to expand an outlook for educational possibilities beyond the sequence of exercises in the school mathematics traditions. Six types of learning milieus are composed in two ways and proposed. One way of distinguishing between references can be the references to pure mathematics, the references to a semi-reality, and real-life references. The other way the paradigms of classroom activities can be the sequences of exercise and the landscapes of investigation. The exercise paradigm can be closely associated with a comfort zone, but the landscapes of the investigation will lead to a risk zone. The author says that this risk zone can also be a zone of educational possibilities and will open up new opportunities. At this point, the book shows the characteristics and specific examples of critical mathematical education in the notion of the landscapes of investigation.

“The modern conception of mathematics” (Chapter Intermezzo) - known as the New Math Movement, this education emerged in a distinguishing wave during the late 1950s - has been discussed. As a different interpretation from the modern conception of mathematics, “A critical conception of mathematics” (Chapter 5) is presented by relating mathematics to discourse and power. This aspect associates with and illustrates mathematics-based performances, in which “Mathematics in action” is explored. Mathematics in action requires action and “Reflection” (Chapter 6). Reflection tends to be related to a judgment of actions and an ethical demand. While in numerous previous studies of mathematics education, reflections are thought to be limited mainly from ethical considerations or philosophical and psychological perspectives, e.g., Piaget (Skovsmose, 2011, p. 72), the author considers reflections as a kind of everyday notion giving thought to actions. Daily life is filled with reflections, including many decisions and actions to be carried out.

The notion of “Mathemacy” (Chapter 7) is deeply related to the idea of literacy as described by Freire, which is competence in reading as the actions to grasp the social, political, cultural, and economic features of one’s life-world and in writing as the active way of changing this world. In this way, mathemacy can be seen as reading the world in terms of numbers and figures and writing it as being open to change (Skovsmose, 2011, p. 83) (Gutstein, 2006, 2008, 2009). The author discusses mathemacy concerning different types of practices: the practices of the marginalised, the practices of consumption, the practices of operation, and the practices of construction. Also, he proposes the notion of critique as “Uncertainty” (Chapter 8); critique is an uncertain activity. Uncertainty does not assume solid foundations for critical activities. He says that this uncertainty should apply to the assumptions in previous formulations to formulate a critical mathematical education for the future and also has to apply to all the features he has suggested in this book.

### III. CLOSING REMARKS

Critical mathematics education reinterprets thoughts and arguments that have been taken for granted, assumed, and premised in mathematics education and brings them to the

place of discussion. And it talks about aspects overlooked in mathematics and mathematics education, which should have been moved into the center of one's considerations and prioritized above all else.

Unlike the general way in which other academic books on mathematics education present theories, methods, and conclusions, this book does not stay at explaining and presenting issues or results. Instead, the author reinterprets and discusses unquestioned widespread notions by associating them with his projects or specific practices carried out by him and his colleagues. He actively explored and practiced critical mathematics education (e.g., problem-based education, project organization), and at this point, this book could be read more deeply the critical mathematics education as his life and his practices. I hope that teachers, mathematics education researchers, educational administrators, and also parents have an opportunity to meet his theories with his practices and look back on something overlooked in mathematics education. I look forward to this book review's readers responding to my invitation and enjoying Skovsmose's profound and challenging book, 『An Invitation to Critical Mathematics Education』.

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