Chapter 31
Defining Effective Learning Tasks for All

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ABSTRACT

An effective mathematics program may be defined as one in which classroom teachers implement tasks and activities that allow all students opportunities to engage in high levels of mathematical thinking and reasoning (NCTM, 2014). In the chapter, we describe background information regarding the preparation of practicing and prospective teachers when implementing research-based practices in the inclusive classroom. Specifically, we provide explicit background information from the extant literature regarding: 1. Equity, 2. Universal Design for Learning, and 3. How to use games as classroom activities to promote the development of mathematical concepts, skills, and conceptual reasoning.

INTRODUCTION

An effective mathematics program may be defined as one in which classroom teachers implement tasks and activities that allow all students opportunities to engage in high levels of mathematical thinking and reasoning (NCTM, 2014). However, many teachers claim they are ill prepared when asked to meet the needs of students in inclusive classrooms (Rose & Meyer, 2000; Spencer, 2011). A key factor that negatively impacts students’ mathematical development is the contrast that often exists between the needs of individual students and the type of instruction received (Buchheister, Jackson, & Taylor, 2014; Kroesbergen & Van Luit, 2003). While each and every child that enters a classroom should be provided the “opportunity to reach his or her potential, the current education system does not adequately address these needs. [In fact], the traditional methods used by teachers often focus on exposing and remedying...
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deficits; setting up some students for a pattern of failure” (Subban, 2006, p. 938). Classrooms today reflect widespread diversity including students with disabilities, students exceeding grade level expectations, students from various cultural backgrounds, and students whose home language is not English (Subban, 2006), and unfortunately, many general education classroom teachers have a dearth of knowledge regarding specialized practices that provide students access to high quality mathematics instruction (Macinni & Gagnon, 2006). Consequently, it is integral that professional development and teacher education programs help teachers acquire knowledge and skills necessary to provide all students—regardless of mathematical understanding, language proficiency, or cultural experience—with the greatest opportunity to learn.

Universal Design for Learning (UDL) defines a framework to aid practicing and prospective teachers in providing access and opportunity to high quality mathematics. In addition, with many variations and various mediums, mathematical games naturally provide multiple modes of presentation and expression while simultaneously engaging and motivating students to participate in discussions of key mathematical ideas. Thus, games, as viewed through a UDL lens, are tasks that provide learning for all. In this chapter, the authors describe how the theory of UDL may be incorporated into the general education classroom through the use of mathematical games as lesson activities. Game play not only provides a context for students to use critical thinking skills that reflect mathematical proficiencies (e.g., communication, modeling, quantitative reasoning), but the strategic implementation of games allows for multiple entry points so students with a wide range of mathematical experience are empowered to participate in the problem solving process (Jackson, Taylor, & Buchheister, 2013). With knowledge of effective planning strategies through the integration of UDL (Courey, Tappe, Skiker, & LePage, 2012), teaching and learning of mathematics would embody the elements of equitable instruction. The authors conclude the chapter with practical implications for teacher education, professional development, and subsequent research to further support the teaching and learning of equitable mathematics using UDL as a framework to define learning tasks through game play.

Equity in Mathematics Education: What Is It?

Equity has ranged in meaning from issues of access to making content culturally relevant to disrupting structural norms (DiME, 2007; Gates & Jorgensen, 2009). Equity may also be viewed as a process or as a product (Crenshaw, 1988; Gutiérrez, 2002; Martin, 2003; Rousseau & Tate, 2003). Essentially, seeing equity as a process means treating all students equally, without regard to race, ethnicity, or economic background. On the other hand, seeing equity as a product means differentiating instruction based upon students’ needs in order to promote equal learning outcomes. Differentiated instruction is a teaching strategy designed to recognize and address students’ learning preferences, strengths, and weaknesses (Subban, 2006), which should be a standard “component for teachers’ professional development in order to maximize effectiveness” (Chen & Herron, 2014, p. 24). Thus, implementing this level of instruction requires the dedication and knowledgebase of a well prepared teacher (van Garderen, Scheuermann, Jackson, & Hampton, 2009; Morgan, 2014).

The authors adopt the view of equity as a product, and define teaching mathematics for equitable outcomes as approaches to teaching mathematics that are respectful of students’ ethnic, racial, and economic backgrounds that promotes equal learning outcomes. More specifically, the authors draw on Gutiérrez’s (2007; 2009; 2012) definition of equity, which include access (i.e., resources that provide students an opportunity to learn and participate in the learning of mathematics), achievement (i.e., student outcomes), identity (i.e., drawing on students’ cultural frame to see themselves and the broader society