

Book Reviews

Practical and Theoretical Perspectives of the Dutch Learning-Teaching Trajectories

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Van den Heuvel-Panhuizen, M. and Buys, K. (Eds.) (2005).

Young Children Learn Measurement and Geometry. A Learning-Teaching Trajectory with Intermediate Attainment Targets for the Lower Grades in Primary School.

Utrecht, The Netherlands: Freudenthal Institute.

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The text *Young Children Learn Measurement and Geometry*, originally published in Dutch in 2004, is the efforts of the TAL team and a project initiated and funded by the Dutch Ministry of Education. TAL stands for *Tussendoelen Annex Leerlijnen* and is translated in English as *intermediate attainment targets in learning-teaching trajectories*. The goal of the book is to describe longitudinal teaching-learning trajectories for measurement and geometry for the lower grades of Dutch schools.

This text was designed as a guiding tool and framework to support Dutch teachers in the development of measurement and geometry understandings. Thus, this book has been considered for the practical contribution it can make to Australasian early childhood teachers' knowledge and teaching practices. This book can also be examined from another notional point of view. The constructs of learning-teaching trajectories are a recent approach to developing mathematics curricula and conducting research on both the teaching and learning of mathematics. There are varying opinions on the nature of learning-teaching trajectories and the role they have in curriculum development and research, as expressed in a recent special edition of the *Mathematical Thinking and Learning* (Vol. 6 No. 2, 2004). As a consequence, this text has also been reviewed from a theoretical perspective.

A Practical Perspective

Young Children Learn Measurement and Geometry outlines the Dutch learning and teaching trajectories for measurement and geometry in Kindergarten 1 and 2 and Grades 1 and 2 (approximately 4 to 8 years of age). As indicated by the TAL team, the aim of the resource is to “inspire teachers to didactical efforts on a high level” (2005, p. 8). The book contains comprehensive descriptions of both domains –

measurement and geometry – followed by weekly lesson plans and intermediate attainment targets and teaching frameworks. The learning-teaching trajectories demonstrate how children develop an understanding of their surroundings through mathematical tools and insights.

The description of the growth stages of measurement and geometry are clearly articulated within the book and mirror an early childhood approach to development. The intermediate attainment goals resemble those described in other curricula documents (e.g., NCTM, 2000; QSA, 2004). Level 2 of the *Queensland Mathematics Syllabus Years 1 to 10* (QSA, 2004), for example, lists a core learning outcome for the measurement strand as “students use non-standard and standard units to estimate, measure and order the size of objects” (p. 27). This statement corresponds with the Dutch intermediate measurement attainment target 6. In my opinion, from a content outlook Australasian in-service and pre-service teachers can utilise this book as a reliable teaching resource.

The text also provides a comprehensive list of developmentally scheduled lessons. The learning activities are structured to promote connections between mathematics and daily environments. Lessons include spontaneous events, investigations, experience based, and development focussed approaches to learning. The approaches adopted by the TAL project team follow recommendations made by the National Association for the Education of Young Children (NAEYC) and National Council of Teachers of Mathematics (NCTM). Their joint position statement indicated that high-quality mathematics education should, “actively introduce mathematics concepts, methods and language through a range of appropriate experiences and teaching strategies” (2002). Likewise they advocate that children engage in contexts where they explore and manipulate mathematic ideas. Lessons described in the text present a pathway of ‘hands on’ investigative experiences for young children. A CD-ROM (included with the book) provides classroom examples which show the type of didactics intended by the TAL team. The detailed weekly lessons could be regarded by some as very specific and prescriptive. However, Australasian teachers could select salient aspects from the lesson plans to incorporate into their daily activities.

A Theoretical Perspective

The Dutch TAL team (within the text) define learning-teaching trajectories as “a description of an idealised classroom practice ... that is rooted in everyday teaching” (2005, p. 14). It is the TAL team’s aim that the learning-teaching trajectory answers the questions of how skills and insights are constructed over time and how content choices influence that process.

Van den Heuvel-Panhuizen (2000) stated that instead of “unambiguous goal descriptions in behavioural terms, the teaching/learning trajectory provides the teachers with a more or less narrative sketch of how the learning process can proceed provided that a particular educational setting is realised” (p. 15). Simplified the learning-teaching trajectory aims to create for teachers a ‘mental education map’.

The complex nature of learning trajectories has led to a variety of definitions, interpretations, and applications, as discussed in the 2004 special edition of *Mathematical Thinking and Learning*. The traditional Realistic Mathematics Education (RME) approach interprets learning-teaching trajectories as a “set of instructional tasks with guidelines suggesting an order for the tasks and the types of thinking and learning in which the students can engage” (Clements & Sarama, 2004, p. 82). Simon (1995) described a constructive perspective of a hypothetical learning trajectory that similarly included a learning goal, learning activities, and the thinking and learning in which students might engage. Other perspectives emphasise only developmental progressions of learning during the creation of particular curricula or pedagogical contexts (Clements & Sarama, 2004).

From another perspective, Lesh and Yoon (2004) question the fundamental nature of learning-teaching trajectories. They suggest that in many cases ideas do not develop along a defined pathway or trajectory. The perspective of Lesh and Yoon (2004) that “modes of learning trajectories focus on domain specific development, not the development of general cognitive structures” (p. 247) is supported by Baroody, Cibulskis, Lai and Li (2004). Baroody et al. also suggested that the theories of learning-teaching trajectories proposed by Steffe (2004) and Battista (2004) are “so highly technical and complicated that it is unlikely that practitioners would find them helpful” (p. 253). The views of many respected researchers thus vacillate and the debate regarding the nature of learning-teaching trajectories continues.

This book review has considered the contribution the text makes to the scholarly scene from two view points – the practical application as a teacher resource and from a theoretical consideration of the nature of learning-teaching trajectories. As a teacher resource this book provides a comprehensive description of measurement and geometry developments in the early years. Teaching activities provided are extensive and consistent with early childhood learning standards advocated by global curriculum documents such as NCTM & NAEYC (2002). From a theoretical perspective, this book provides another viewpoint that contributes to the diverse range of opinions on the contribution learning-teaching trajectories make to curriculum design and research. However, the nature and potential of teaching-learning trajectories as learning frameworks are still feverishly debated by educators and researchers.

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