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Research Article



Active learning strategies for an effective mathematics teaching and learning

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ABSTRACT

Learning is an active enterprise, where three dimensions stand out, cognitive, social, and physical, and, in addition, not all students learn in the same way. Grounded on these ideas, this article reports a study that aims to understand and characterize the performance of pre-service teachers when experiencing active learning strategies during their mathematics classes. The participants were 48 future teachers of primary education (3-12 years old) that experienced paper folding, a gallery walk, and a math trail as active learning strategies. We followed a qualitative methodology, collecting data though observations, written productions, and photographic records. The analysis involved a qualitative and inductive approach resorting to content analysis. The results of the study show that the participants valued these experiences, due to their potential in the development of a diversity of mathematical concepts and abilities, and throughout them showed traits of cognitive, social, and physical engagement. Active learning provided collaborative work and mathematical communication enabling the emergence of different strategies to solve the proposed tasks. The participants were able to reflect and be aware of their ideas, mistakes, and difficulties, as well as of others, in a non-threatening environment, where movement was highlighted for not being a popular dimension in mathematics classes. Although more research is needed, the results encourage the use of active learning strategies as a valuable approach to teaching and learning.

Keywords: active learning strategies, visualization, problem solving, challenging tasks, teacher education

INTRODUCTION

Mathematics learning is largely shaped by the teacher and the tasks proposed, as well as the strategies used to convey them. Thus, the teacher must contribute to the development of students' mathematical understanding, creating opportunities for them to be challenged and engaged in high-level thinking, through thus choice of the strategies and tasks to use. This implies working inside and outside the classroom, in an active learning environment (Prince, 2004; Vale & Barbosa, 2020a), that addresses different types of thinking displayed by the students, engaging them in challenging tasks, desirably with multiple solutions, privileging hands-on activities, that motivate them to learn mathematics and work collaboratively. This paper presents a study carried out with pre-service teachers of primary education (3-12 years) that aims to understand and characterize their performance when experiencing active learning strategies in the teaching and learning of mathematics. Based on this problem, the following two research questions were posed:

RQ1. Which aspects of the three dimensions of active learning (intellectual, social and physical) can we identify in the participants?

Freedom To Learn An Active Learning Approach To Mathematics

Titu Andreescu, Kathy Cordeiro, Alina Andreescu

Freedom To Learn An Active Learning Approach To Mathematics:

Freedom to Learn Edith Ethel Biggs, James R. MacLean, 1969 For student teachers and teachers Freedom to Learn Edith Ethel Biggs, 1969 Handbook of International Research in Mathematics Education Lyn D. English, David Kirshner, 2010-04-02 This book brings together mathematics education research that makes a difference in both theory and practice research that anticipates problems and needed knowledge before they become impediments to progress

Selected writings from the Journal of the Mathematics Council of the Alberta Teachers' Association Egan J Chernoff, Gladys Sterenberg, 2014-06-01 The teaching and learning of mathematics in Alberta one of three Canadian provinces sharing a border with Montana has a long and storied history An integral part of the past 50 years 1962 2012 of this history has been delta K Journal of the Mathematics Council of the Alberta Teachers Association This volume which presents ten memorable articles from each of the past five decades that is 50 articles from the past 50 years of the journal provides an opportunity to share this rich history with a wide range of individuals interested in the teaching and learning of mathematics and mathematics education Each decade begins with an introduction providing a historical context and concludes with a commentary from a prominent member of the Alberta mathematics education community As a result this monograph provides a historical account as well as a contemporary view of many of the trends and issues in the teaching and learning of mathematics This volume is meant to serve as a resource for a variety of individuals including teachers of mathematics mathematics teacher educators mathematics education researchers historians and undergraduate and graduate students Most importantly this volume is a celebratory retrospective on the work of the Mathematics Council of the Alberta User-Friendly Math for Parents Catheryne Draper, 2017-06-08 User Friendly Numbers in Math Teachers Association for Parents shares stories of students reasoning thinking and sometimes misunderstandings about numbers stories that provide the opportunity to see math differently Most of the students are visual spatial creative daydreamers who may miss the details in math a characteristic of visual spatial learners Through these stories parents will see mathematics through their child's eyes both the clarity and the confusion Armed with this new sight and therefore insight parents will be able to talk differently with their child about the number language of math By seeing numbers through new eyes children and parents can take control of the math language and therefore the mathematics This book focuses more on the why reasons behind math number relationships explained in plain English and with images that show number relationships By including more images and fewer formulas readers especially the visual spatial learners have a better chance of understanding how number organizers apply to different number types Recognizing connections among number formats significantly reduces the impatience frustration and heartache around homework Selected Writings from the Journal of the Saskatchewan Mathematics Teachers' Society Egan J Chernoff, Bharath Sriraman, Gale L. Russell, 2019-07-01 The teaching and learning of mathematics in Saskatchewan one of three Canadian provinces sharing a border with Montana has a long and storied history

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