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Abstract

Scientific Concepts within Reach of Young Learners: Support from the Educational Research Literature †

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Abstract: For four or five decades, science educators, including physics educators, have benefited from the work of Piaget and neo-Piagetians. Piaget's theory of cognitive development argues that children move through four different stages of mental development, how they acquire knowledge and the role of active learning. Among other issues, neo-Piagetians considered that working memory capacity is affected by biological maturation, restricting young children's ability to acquire complex thinking and reasoning skills. I want to emphasise that these educational developments largely benefitted science teachers and young science learners with many new and improved science curricula and teaching methods. However, challenges to these views arose when educational researchers observed children's learning that did not neatly fit these cognitive stages or restrictions. Since the mid 1990's, there has been a growing body of research demonstrating that, with appropriate scaffolding by teachers and opportunities for student collaboration, young learners can engage with and understand abstract scientific concepts that might otherwise be seen to be out of reach for this age group. Based on this premise from recent research in educational psychology, the work of the Einstein-First group has embarked on studies that demonstrate how young learners from primary school onwards can engage and learn abstract Einsteinian physics concepts that were previously considered best taught only in upper high school.

Keywords: modern science; conceptual change; abstract physics concepts

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