LEARNING TO SOLVE MATHEMATICS PROBLEMS IN GROUP WORK SETTINGS

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ABSTRACT

The use of group-work settings at schools has recently become more popular compared to the individual settings. It might be due to the assumption that students need to practice working in groups as various workplaces apparently require collaborative skills. Mathematics is studied by most students worldwide. The study reported in this article aimed at testing if students could learn solving mathematics better in group-work compared to in individual settings. Worked-example instructions to learn novel arithmetic problems for seven graders, part-to-part and part-to-whole comparisons, were developed based on Cognitive Load Theory. The investigation included whether the worked-example instruction provided a powerful tool for learning mathematics in group-work settings compare to problem solving instruction. The results showed that students were benefited from learning in group-work as much as those in individual setting. Moreover, students who were provided worked-example instructions performed significantly better that those who learned solving problems without the worked-example.

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Problem Solving

Mathematics is often learned by solving mathematical problems.

A problem solving instruction consists of problems designed for students to learn mathematical concepts, procedures, logic or reasoning. Students need to search or discover how to solve the problem by themselves or in groups.

Worked Examples

A worked example instructions consists of pairs of worked example and similar problems to practice designed for students to learn mathematical concepts, procedures, logic or reasoning.

A Cognitive Load Theory has developed principles to design effective worked examples and proved the effectiveness for learning particularly novel (unfamiliar/new) materials.

Arithmetic Problems for Year 7 Students

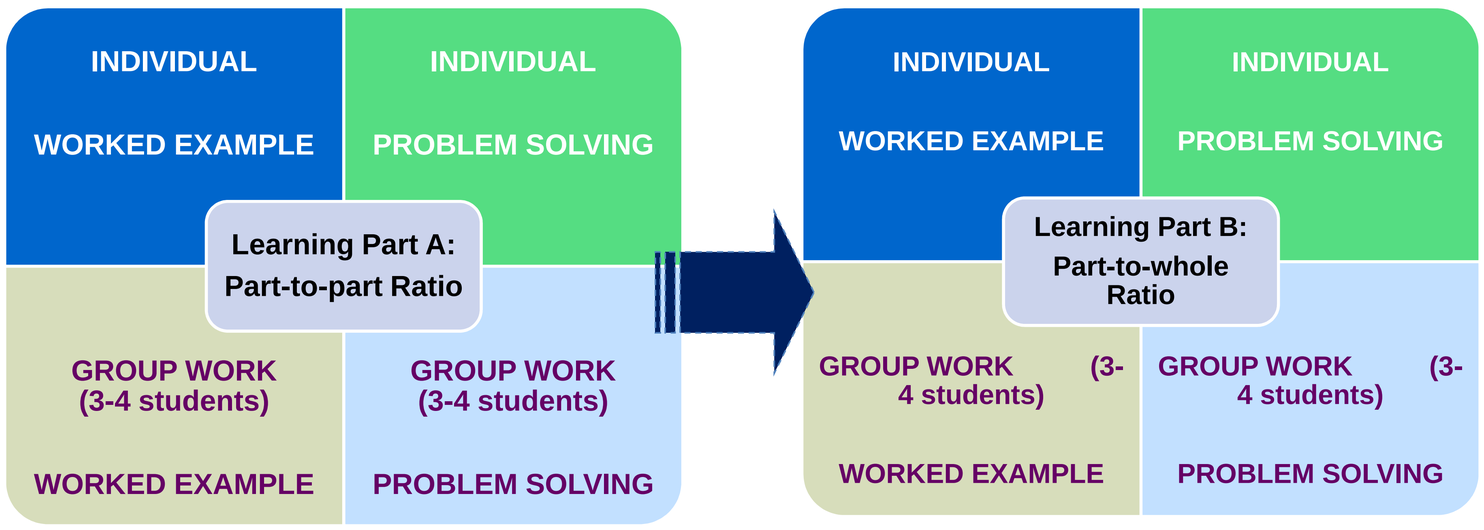
Part-to-part Ratio

We need 2 cups of flour to make 3 muffins. How many cups of flour needed to make 10 muffins?

Part-to-whole Ratio

The ratio between the number of boys and girls in the 7th grade is 2 : 3. If the total number of the students is 30, how many boys are in the 7th grade? How many girls are in the 7th grade?

Experimental Design



***Results** were analysed using Repeated Measures Analysis on SPSS*

Research Question

Could the worked example instruction be effective for learning mathematics in group work settings?

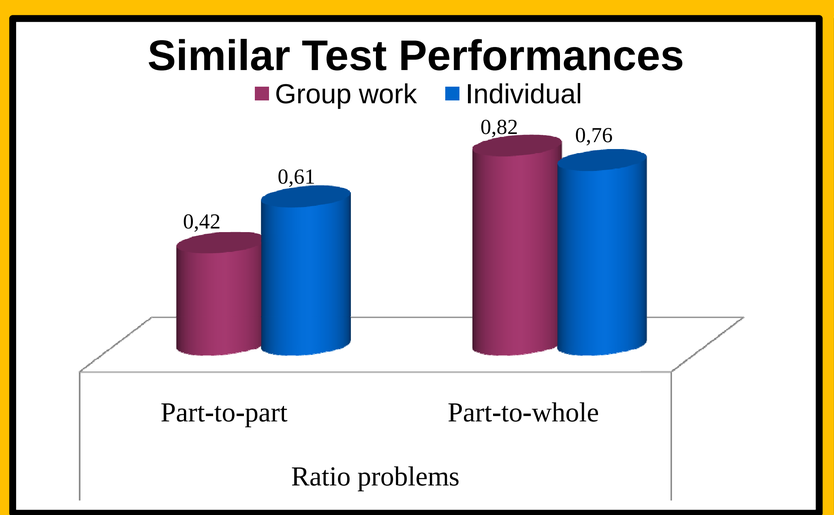
Cognitive Load Theory

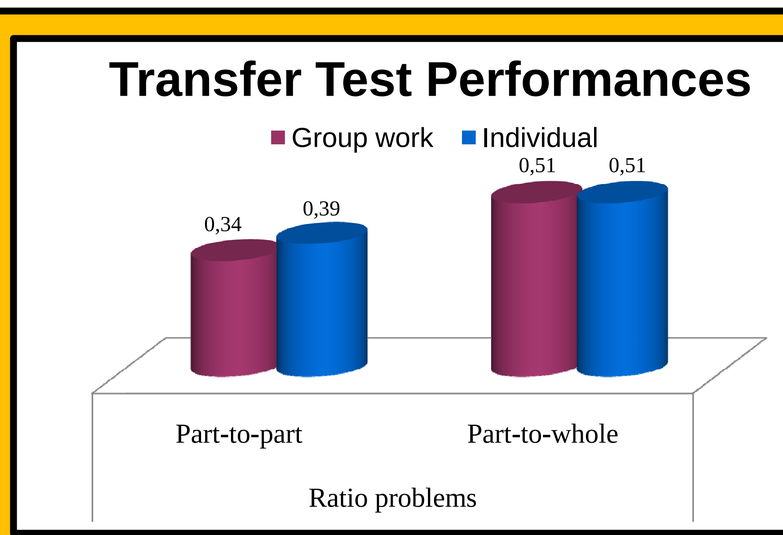
is an instructional design theory based on human cognitive architecture.

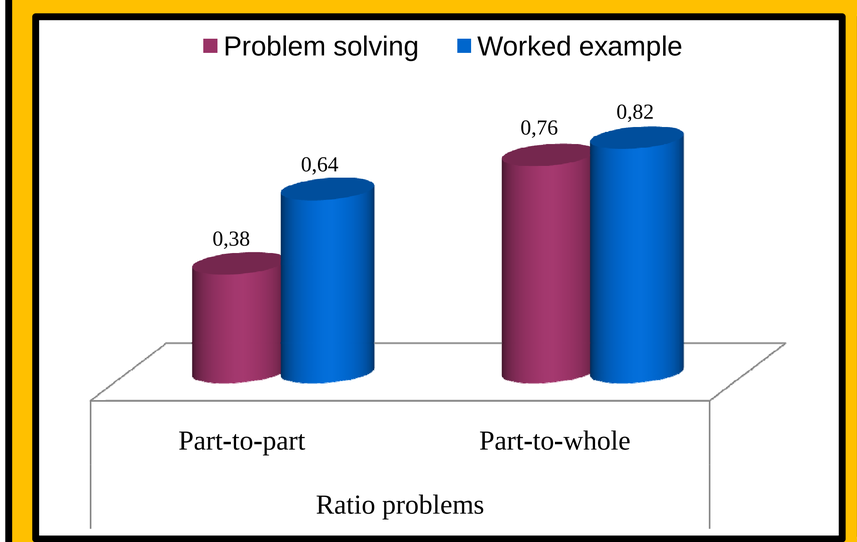
✓Learning is defined as changes of knowledge in **long term memory.** LTM stores unlimited knowledge that can be retrieved to perceive new information.

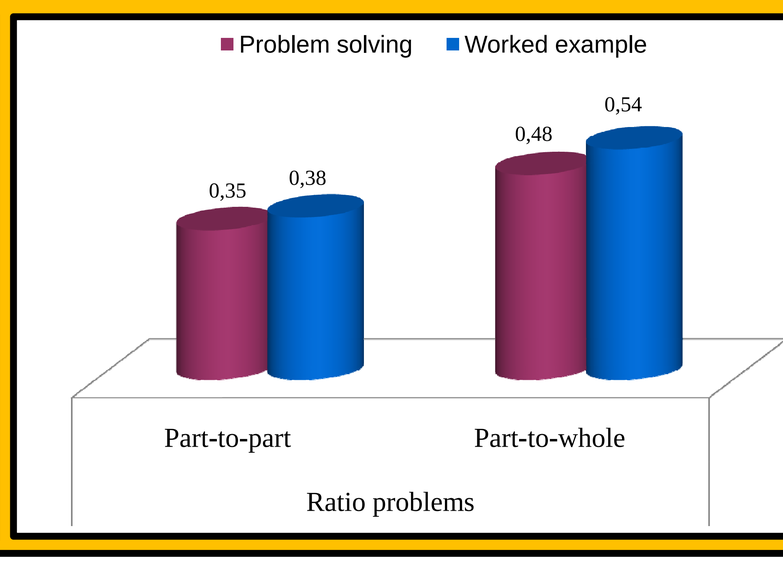
✓Changes of knowledge is facilitated when cognitive load is well-managed in **working memory.** WM has limited capacity when dealing with novel information.

✓Instructors should focus on **intrinsic** cognitive load generated by the learning material and reduce **extraneous** cognitive load from the instructional design in order to facilitate effective learning









Findings

☺Significant difference between the instructions where students who were provided the worked example instruction performed better that those with the problem solving instruction

☺Students in different settings did not show significant different in performances

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Conclusion

The worked example instruction were more advantageous for students either learning individually or in group work, compared to the problem solving instruction

Dear Endah,

Re: Invitation to present a poster

Thank you for your submission to this year's Australian Conference on Science and Mathematics Education.

This year we have been delighted at the number and breadth of submissions that have been received. Over 70 Submissions were received! To accommodate the theme of the conference, distribution of submissions from different disciplines and institutions, your submission had been accepted as a **POSTER PRESENTATION.**

We will send you a proof of your abstract that will be published in the conference proceedings for you to check in the next week or so.

Early Bird registrations close on **18 August 2011** so we encourage you to register before then.

You will be contacted closer to the date of the conference regarding your needs for the actual presentation.

Looking forward to seeing you at the conference!

Best wishes,
Alex

Dr Alexandra Yeung |
Associate Director, Advancing Science by Enhancing Learning in the Laboratory (ASELL) Project
Manager, Institute for Innovation in Science and Mathematics Education (IISME)

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