## EFFECTS OF USING METACOGNITIVE STRATEGIES ON PROBLEM-SOLVING SKILLS IN HIGH SCHOOL MATH AND SCIENCE CLASSES

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The purpose of this project was to explore the relationship between metacognition and student success, attitude and motivation in grade eleven math and science courses and to help students make connections between and within subjects in school and real life.



I used a writing intensive format in my math, chemistry and biology classes. Students used directed journaling activities, marked some writing activities using a rubric, did cooperative investigations in small groups, and learned to reflectively correct unit tests to 100%.



## **Okanagan Adventist Academy**

I look forward to journaling



What are the effects of directed journaling, which allows students It is clear that my class size was far too small to allow me to make a definite conclusion about the value of my

to allow me to make a definite conclusion about the value of my treatment, but the indications that directed-journaling helps at least some of the students solve problems more successfully means that I will

| <ul> <li>confidence in math skills in math class</li> <li>confidence in math skills in chemistry</li> <li>confidence in math skills in biology</li> </ul>  | about how they solve<br>problems, and other<br>metacognitve<br>strategies, on problem<br>solving?  | <ul> <li>continue to use this strategy in my math and science classes. I am especially encouraged to see the lower-performing students believe that that journaling helps them solidify their learning.</li> <li>Nontreatment, pretreatment and posttreatment responses to concept mapping interview questions covering math content, student journal and other writing assignments about math, my journal</li> </ul>   |
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|  | What are the effects of<br>directed journaling, and<br>other metacognitve<br>strategies, on<br>understanding of<br>mathematical concepts<br>in biology and | Students who found the journaling activities most useful<br>were those whose grades were in the high C and low B range. Students<br>whose grades were in the A range stated that "journaling neither helps<br>nor hurts me". When prompted with a more generic "I think it is helpful to<br>think about how to solve problems", all students were more likely to say<br>they valued this metacognition.   |
|  | chemistry?   | My journal entries with prompts, observations from Shannon Gerber, Larry McCarty and Steven Brock – critical friends, student grades  |
| I focused my project on<br>eight of the students in my<br>grade 11 class. The<br>students were all Canadian<br>citizens from middle class<br>families, and all live in<br>Kelowna, a city of<br>approximately 150,000  | What are the effects<br>of directed journaling<br>on student's attitudes<br>and motivation?  | Student attitudes toward their classes, classmates and teacher did not<br>change over the course of the intervention.<br>They were mostly positive and upbeat. Both Steven Brock and Larry<br>McCarty commented on the camaraderie between students and between<br>students and teacher. Shannon Gerber pointed out that "when the students<br>feel positively about their abilities and about what they are doing, and when<br>they put in some effort, everything else falls into place more easily." |
| people.  |  | Nontreatment, pretreatment and posttreatment responses to interview questions, student journal and other writing assignments about math-rich science content, non treatment, pretreatment and postreatment surveys and interviews with questions about concepts and understanding   |
| A designed and a desi | What are the effects of<br>directed journaling on<br>my attitudes and<br>motivation to teaching?   | My attitude did not change over the course of the intervention. When students understood concepts I was more encouraged, but it was easy to become discouraged when students struggled.   |
|  |  | Nontreatment, pretreatment and post treatment surveys and interviews, student and teacher journals with prompts, feedback from Shannon Gerber, Larry McCarty and Steven Brock   |