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The Effect of Metacognitive Guidance and Collaborative Learning on a Motivational Dialog between Teacher and Student during Environmental Inquiry-based Learning Process Through On- line Asynchronous Forums

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Abstract

Inquiry provides opportunities to engage students in authentic science. Although inquiry's underlying principles can motivate students to learn, the challenges that students encounter may hamper their motivation. Thus, the teacher's role in providing motivational support is crucial. This research examines how the interplay among the inquiry's characteristics, the challenges encountered by students, and the motivational support provided by the teacher affects students' expression of motivation throughout an online inquiry process. The messages of both the teacher and the students were examined using self-determination theory (SDT). The results indicate that the students did not automatically embrace the autonomous characteristic of open inquiry. Their expressions of motivation were dynamic, affected by the challenges that they encountered. In contrast, the teacher maintained high levels of autonomy and competence and intertwined these components in a strategy that we term *guided autonomy*. The teacher and students expressed high order expressions of affect. In addition, we found a positive correlation between the teacher's motivational support and the students' expressions of motivation. The results indicate that SDT can provide a powerful framework for understanding students' unfolding motivation throughout a challenging educational process and for guiding teachers' efforts in supporting the motivation of their students in an online environment. These results have led us to examine another crucial support – metacognitive support- on student autonomy.

The study aimed to explore the effect of metacognitive support on student autonomy through an open inquiry learning process. The metacognitive support consisted of both individual and social metacognitive scaffolds. We hypothesized that these scaffolds would promote student strategies to engage in the inquiry process and consequently, lead to student autonomy. Two classes of 37 and 36 junior high-school students served respectively as the experimental and control groups in the timeframe of an academic year, inquiry-based environmental program. Small groups of 2-3 students worked on scientific inquiry projects. The experimental group received metacognitive support throughout the entire year; whereas, the control group did not receive any support. The students reflected on their experiences throughout the project. Online communication messages among the students were analyzed for each group separately for expression of autonomy, on the basis of the conceptual framework of the Self-Determination Theory (SDT). Results of this analysis reveal that in contrast to our hypothesis, the control group exhibited higher levels of expressions of *positive autonomy* than the experimental group. However, our analysis of students'

reflections reveals that the students in the experimental group demonstrated *positive consequences* of *positive autonomy*. These consequences included time management and learning strategies; whereas, the students in the control group did not show such consequences. The study implies that while metacognitive support made students express less autonomy in the short-term, this support promoted better coping strategies that enabled students to overcome inquiry challenges in the longterm. To conclude, student motivation and especially student autonomy is vital for the students' learning performances. Thus, we highly recommend science educators scholars to further explore this issue.