



**Featured Symposium to be presented at the Conference of the Australian Association  
for Research in Education**

**Melbourne, November 2021**

**Title:** Investigating Teachers' Beliefs and Practices about How to Promote Student Cognitive Engagement and Self-Regulation

**Abstract:**

The symposium will present the results of research currently in progress under ARC Discovery Grant (DP190102366) *Teaching How to Learn: Promoting Self-Regulated Learning in STEM Classrooms*. The project is a collaboration between the College of Education, Psychology and Social Work, Flinders University, the Graduate School of Education, University of Melbourne, Goethe University Frankfurt, and Arizona State University. The research employed two theoretical frameworks that investigate student cognitive engagement -- the *Interactive, Constructive, Active and Passive* (ICAP) theory -- and self-regulation (SRL) theory, in order to better understand current teacher practices in Australian schools, and design interventions for pre-service and in-service teachers. The project builds on prior research on teachers' beliefs about learning and teaching and about the self-regulation of learning at Flinders University, and on teachers and students' perceptions regarding SRL at the University of Melbourne.

The first presentation addresses pre-service teachers' beliefs about learning and teaching and about SRL. It presents results showing that many pre-service teachers have conflicting beliefs about SRL, a finding which might explain why there is very little teacher SRL promotion in the classroom. The second presentation presents the results of an observation study of teachers' instructional practices. The results showed that the participating teachers engaged mostly in transmissive teaching that did not promote student cognitive engagement. The third paper presents the results of an intervention study which developed a framework for the application of the ICAP theory in the classroom. The study examined pre-service teachers' understanding of ICAP theory and helped them revise their lesson plans in ways that

promoted student learning. The last presentation describes on-going work on the development of a framework for the application of SRL theory in the classroom.

**Organiser and Chair:** Stella Vosniadou, Flinders University

**Discussant:** Charlotte Dignath, Leibniz Institute for Research and Information in Education, Germany

**First presentation:**

Title: Pre-service Teachers Belief Systems about Learning and Teaching and about the Self-Regulation of Learning

Authzors: Michael J. Lawson,<sup>1</sup> Stella Vosniadou<sup>1</sup>, Igusti Darmawan<sup>2</sup>, Penny Van Deur<sup>1</sup>, Mirella Wyr<sup>1</sup> and David Jeffries<sup>1</sup>

1. College of Education, Psychology and Social Work, Flinders University, Adelaide, South Australia. 2. School of Education, University of Adelaide, Adelaide, South Australia.

**Second presentation:**

Title: The influence of classroom instruction on student cognitive engagement: An observation study

Authors: Stella Vosniadou, Michael J. Lawson, Erin Bodner, and Helen Stephenson

College of Education, Psychology and Social Work, Flinders University, Adelaide, South Australia.

**Third presentation:**

Title: An intervention to help pre-service teachers design instruction that promotes student learning

Authors: Helen Stephenson, Stella Vosniadou and Michael J. Lawson

College of Education, Psychology and Social Work, Flinders University, Adelaide, South Australia.

And

Wendy Scott, Sean Kang, Lorraine Graham

Graduate School of Education, The University of Melbourne

**Fourth presentation:**

Title: Developing a framework for the application of self-regulated learning (SRL) to classroom instruction

Authors: Emily White, Sean Kang, Wendy Scott, Carolyn Murdoch, Lorraine Graham

Graduate School of Education, The University of Melbourne

And

Stella Vosniadou, Michael J. Lawson, Erin Bodner, and Helen Stephenson

College of Education, Psychology and Social Work, Flinders University, Adelaide, South  
Australia.

## **Pre-service Teachers' Beliefs Systems about Learning and Teaching and about the Self-Regulation of Learning**

Michael J. Lawson,<sup>1</sup> Stella Vosniadou<sup>1</sup>, Igusti Darmawan<sup>2</sup>, Penny Van Deur<sup>1</sup>, Mirella Wyras<sup>1</sup> and David Jeffries<sup>1</sup>

1. College of Education, Psychology and Social Work, Flinders University, Adelaide, South Australia.

2. School of Education, University of Adelaide, Adelaide, South Australia.

### **Presenter**

Michael J. Lawson, College of Education, Psychology and Social Work, Flinders University, Adelaide, Australia. Email: mike.lawson@flinders.edu.au. Phone: +61 8 8201 3425.

### **Abstract**

We will present results from a series of studies investigating the beliefs of pre-service teachers about learning and teaching and about the self-regulation of learning (SRL). A Beliefs about Learning and Teaching (BALT) questionnaire was designed and validated. The questionnaire was innovative in that it investigated beliefs consistent with SRL as well as inconsistent with it, thus allowing us to test the cohesion of the pre-service teachers' belief systems. The results showed that although the great majority of the participants agreed with statements indicating beliefs consistent with SRL, they also expressed agreement with certain statements expressing beliefs inconsistent with SRL. For example, they agreed with statements such as 'The most important task of teachers consists of teaching subject knowledge,' 'Students do not need to be able to describe their learning strategies' and 'You do not need to understand the process of learning to be a good student'. Structural equation modeling revealed that such inconsistent with SRL beliefs were negative predictors of the pre-service teachers' use of cognitive and metacognitive strategies and academic achievement. Fifty five percent of the pre-service teachers did not mention one sophisticated cognitive and metacognitive strategy and did not seem to be able to express detailed knowledge about important forms of cognitive processing. It is important to find effective ways to effectively address the challenges arising from the holding of inconsistent beliefs about the promotion of SRL and to improve pre-service teachers' explicit knowledge about and use of key SRL strategies.

# **The influence of classroom instruction on student cognitive engagement: An observation study**

Stella Vosniadou, Michael J. Lawson, Erin Bodner, and Helen Stephenson,  
College of Education, Psychology and Social Work, Flinders University

## Abstract

The ICAP theory (Chi & Wiley, 2014) was used as a framework for developing a coding system to evaluate the influence of classroom instruction on the cognitive engagement of students. The ICAP theory, which stands for *Interactive, Constructive, Active and Passive* student cognitive engagement, argues that each mode of engagement corresponds to different types of behaviours and to different types of knowledge-change processes. Thus, students are engaged in the Passive mode when they receive information from instructional materials without doing anything observable related to learning, such as listening to a lecture. Active engagement is characterised by some form of overt action, as it happens for example when students are listening to a lecture but also take notes. Constructive engagement with instructional materials requires behavior that generates or produces additional externalized outputs or products beyond what was provided in the learning materials, as in explaining, predicting, comparing, etc. Interactive engagement requires the exchange of ideas between two or more students while they engage in constructive tasks. Experimental evidence has been provided to support the argument that the Constructive and Interactive modes of engagement result in better learning outcomes than the Passive and Active modes.

The participants were 20 experienced teachers mostly from science and mathematics backgrounds. Video observations of one lesson from the participants' classroom were transcribed and the first 30 minutes were analysed. The coding system focused on the analysis of lesson tasks -- namely, the instructional activities designed by the teacher to take place during a lesson -- the verbal instructions the teachers used to provide whole class directives for each task, and the activities of the students while engaged in each task. Preliminary results show that the number of tasks ranged from 1 to 7, with 4 being the median number of tasks per lesson. The most frequent tasks used by the teachers were determined to engage students at the Passive and Active engagement modes. The teachers spent about 70% of their instruction time on these two types of tasks. Overall, in half of the lessons observed, the students had less than 6 minutes of Constructive or Interactive engagement, while in 4 of the 20 lessons zero time was spent on Constructive or Interactive Tasks. We argue that the ICAP theory provides useful lenses for evaluating the instruction that takes place in our schools and can generate helpful recommendations for its improvement.

## References

Chi, M. T. H., & Wylie, R. (2014). The ICAP framework: Linking cognitive engagement to active learning outcomes. *Educational Psychologist, 49*(4), 219-243. doi: 10.1080/00461520.2014.965823

# **Can we teach pre-service teachers how to design instruction that promotes student learning? An intervention study**

Helen Stephenson, Stella Vosniadou and Michael J. Lawson

College of Education, Psychology and Social Work, Flinders University,

and

Wendy Scott, Sean Kang, and Lorraine Graham

Graduate School of Education, The University of Melbourne

The research investigated the effectiveness of an online professional development video-based workshop on pre-service teachers' ability to design learning environments that promote student cognitive engagement. The workshop was based on the ICAP (Interactive, Constructive, Active, Passive) theoretical framework (Chi & Wiley, 2014). The participants were 78-Education students, with a median age of 29.6 years, mostly female (60) and undertaking a masters' degree (65).

The participants read a Module that described the ICAP theoretical framework and viewed a power-point presentation that further explained its connections to learning theory and student learning. They then read a second Module that presented an ICAP-based coding system for analysing classroom instruction and were shown examples of how the coding system could be used to guide the design of tasks that lead to increased student cognitive engagement. The participants practiced by viewing 2 filmed lessons, coding their transcripts, receiving feedback on their coding, and participating in online discussions.

Preliminary results show that the great majority of the participants were able to answer questions that tested their understanding the ICAP theory adequately and that the workshop significantly increased their ability to design instructional tasks that had the potential to increase student engagement. An analysis of the participants' lesson plans provided before and after the intervention showed that the mean of the total scores of the revised lesson plans for all respondents was 6.59 score points higher than the mean of the total scores of their original lesson plans. In their original lesson plans, 67% of total tasks proposed were passive (29%) or active (38%). In the revised lesson plans the passive and active tasks were reduced to 41% of the total lesson – 12% passive and 29% active. There was an increase in the number of constructive (22%) and interactive (29%) tasks. About 8% of the tasks in the revised lesson were collaborative but not constructive. Every task in the participants' revised lesson plans showed an increase in students' level of cognitive engagement demonstrating increased knowledge of, and ability to apply, the theory of ICAP cognitive engagement.

## References

Chi, M. T. H., & Wylie, R. (2014). The ICAP framework: Linking cognitive engagement to active learning outcomes. *Educational Psychologist*, 49(4), 219-243. doi: 10.1080/00461520.2014.965823

# **Developing a framework for the application of self-regulated learning to classroom instruction**

Emily White, Sean Kang, Wendy Scott, Carolyn Murdoch, Lorraine Graham

Graduate School of Education, The University of Melbourne

And

Stella Vosniadou, Michael J. Lawson, Erin Bodner, Helen Stephenson

College of Education, Psychology and Social Work, Flinders University

## **Abstract**

This paper presents progress to date on the development of a framework for examining teachers' promotion of self-regulated learning (SRL). This work is part of the *Teaching How to Learn* (THtL) project, and has grappled with how to view teacher talk and actions through current theoretical and conceptual frameworks of SRL in order to develop a coding system that can be applied to transcripts of videoed lessons. The coding of lessons in such a way facilitates the systematic evaluation of SRL promotion in teacher practice, and is an important element of the professional learning modules developed within the THtL project, which aim to build teacher capacity to promote SRL.

Our framework is informed by Harding et al.'s (2017) research which used developmental progressions to assess teacher and student SRL practices. Harding and her colleagues found that teachers engaged in fewer SRL promotion activities and that students scored significantly lower on SRL skills, in Years 7 and 8 compared to Years 5 and 6. Similarly, classroom observation studies, the development of the Assessing How Teachers Enhance Self-Regulated Learning Scale by Dignath and colleagues (e.g., Dignath & Büttner, 2018) and our international collaboration have shaped our thinking.

This paper outlines the process behind building the coding framework embedded in the SRL professional development modules. The SRL Teacher Promotion Framework codes teacher talk and actions in terms of the promotion of knowledge/beliefs about learning and learning strategies; whether that promotion is explicit or implicit; domain-general or -specific; and focuses on the type of SRL capability being promoted (i.e., cognition, metacognition, motivation, or resource management). The framework is aimed at raising teachers' awareness of the range of SRL capabilities that may be promoted as well as the importance of explicitly promoting knowledge about how learning works and the strategies that can foster SRL. A more detailed version of this framework has been developed for researchers to code lesson transcripts, and is being used in our ongoing observational studies of classroom teaching.

## **References**

Dignath, C., & Büttner, G. (2018). Teachers' direct and indirect promotion of self-regulated learning in primary and secondary school mathematics classes—insights from video-based classroom observations and teacher interviews. *Metacognition and Learning, 13*(2), 127-157.

Harding, S-M., English, N., Nibali, N., Alom, B., Graham, L., & Griffin, P., (2017, August 31). *Self-regulated learning skill development differences in grade 5-8 Australian students* [Paper presentation]. European Association for Research on Learning and Instruction (EARLI), Tampere, Finland.