THE IMPACT OF SSR-BASED COLLABORATIVE LEARNING ON COMPUTATIONAL THINKING

Yuanyuan Gong[a], Wenhao Yu[a]

Contact Author: Yuanyuan Gong （1000511353@smail.shnu.edu.cn）

a Department of Educational Technology, School of Education, Shanghai Normal University, 200234, China

THEME:

Innovative STEM pedagogy and curriculum

BACKGROUND AND AIMS

Computational thinking (CT) is a problem-solving method and thinking process. Collaborative learning is usually integrated into programming education to cultivate students' CT. How interactions occur and how they affect performance has always been the focus of collaborative learning research. Socially shared regulation (SSR) is an important part of successful collaboration (Hadwin,2011). The monitoring processes of students in the learning process is particularly essential, which can promote the development of individual cognitive ability, social ability and higher-order thinking. This study is guided by the following two research questions (RQs):

RQ1: Is SSR-based collaborative learning better than the traditional collaborative learning in developing CT of students in programming?

RQ2: How does the CT develop in each stage of SSR-based collaborative learning?

A mixed research will be conducted, and participants (junior high school students) will take the Scratch Programming Course. The research design is shown in Figure 1.

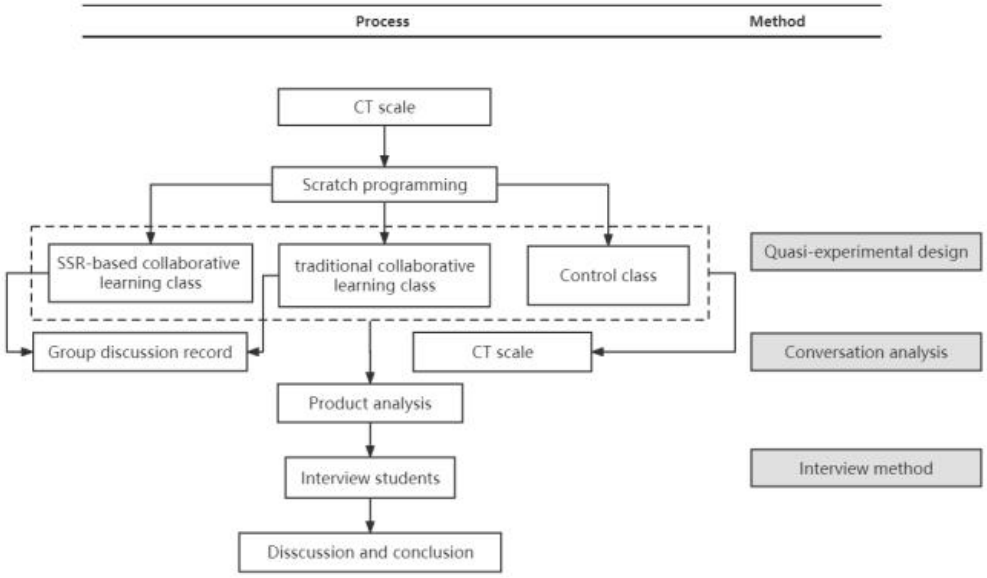


Figure 1 Research Design

Quasi-experimental design. We will set up three classes: SSR-based collaborative learning class, traditional collaborative learning class and the control class. For the first class, SSR interventions will be provided to support students. The control class will take an individual

2022. J. Bobis & C. Preston (Eds.), Proceedings of the 7th International STEM in Education Conference (STEM 2022), University of Sydney, Sydney, Australia, November 23-26. University of Sydney.

pedagogical approach. Comparing the CT of three classes based on the performance in protest and pretest by t-test, whether SSR-based collaborative learning can promote the CT of students will be explored.

Conversation analysis. Group members in SSR-based collaborative learning class will discuss in the online shared documents and their conversations will be coded in various stages of the collaboration. We will explore relationship between the CT and the level of SSR (cognition, task understanding, meta-cognition, affective motivation) in learning process. The assessment will be shown in Table 1 and Table 2.

Interview. Students will be selectively interviewed to understand their learning attitude towards collaborative learning, as the complement for the research.

RESULTS AND CONCLUSIONS

The results will reveal the effect of SSR-based collaborative learning on CT of students. Comparing the different performance of groups to explore the level of SSR (Figure 2), the relationship between SSR and CT will be clarified. And social supervision may have the greatest impact on CT and SSR-based collaborative learning plays a positive role in promoting the development of CT.

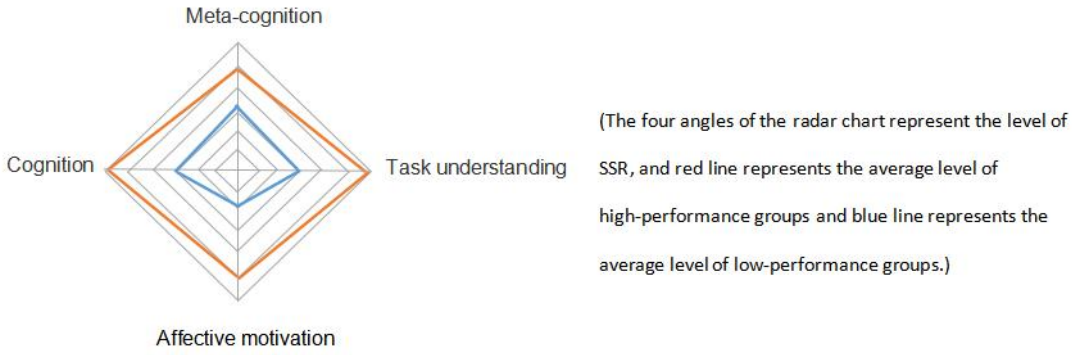
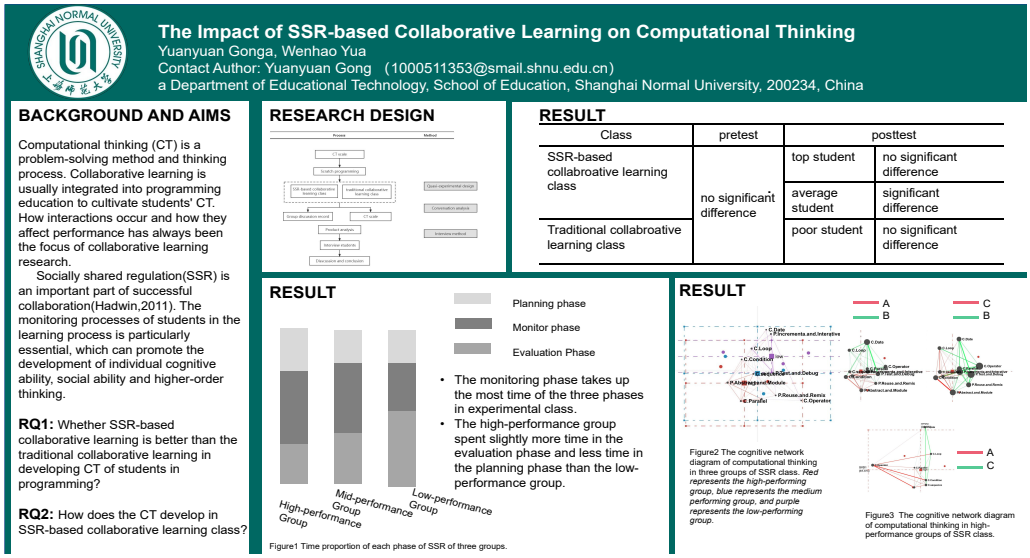


Figure 2 The level of SSR in high-performance groups and low-performance groups

REFERENCES

Hadwin, A.F., Jrvel,S.,& Miller,M.(2011). Self-regulation, co-regulation, and socially shared regulation of learning. *Handbook of Self-regulation of Learning and Performance*, 30:65-84.



2022. J. Bobis & C. Preston (Eds.), Proceedings of the 7th International STEM in Education Conference (STEM 2022), University of Sydney, Sydney, Australia, November 23-26. University of Sydney.

Table 1 SSR Assessment(Adapted from Tsai and Zheng)

Dimension	Category	Category Description	Example Quote	Standard for evaluation
A.Cognition	A1.suggest style	Offer suggestions to project	"Did we create too many characters?Let's remove several characters."	Each additional nuit generate one score.
	A2.rectify style	Point out the errors of project	"The direction of our characters is wrong."	Each additional unit generate one score.
B.Meta-cognition	B1.Evaluation	Evaluate the quality of project	"The procedure of our project is purpose logical."	Each additional unit generate two scores.
	B2.Reflection	Reflect the project	"Did our project fit the theme?"	Each additional unit generate two scores.
C.Affection	C1.Approval	Express approval	"The layout is beautiful."	Each additional unit generate one score.
	C2.Criticism	Express disapprove	"The character is ugly."	Each additional unit generate one score.
	C3.Affective responses	Express self-perception	"I like this color."	Each additional unit generate one score.

Table 2 CT Assessment(Adapted from Grover)

Code	Category Description	Examples	Example Quote	Standard for evaluation
C1: CTC	CT Broad Concept(may or may not use CT language)	Programming, storage of data	"It can control...." "does what it is programmed to do "	C1<=20,5 / Each additional unit generate one score.
C2: CTV	CT Vocabulary(CT language)	Input,output,software,download,program,debugging	"collecting inputs first..there are certain input devices like sound sensor"	C2<=10,5 / Each additional unit generate two scores.
C3: CTPro	CT procedural/operative details	Start the application,provide an initialization	"compose these modules...,click .."	Each additional unit generate one score.
C4: CTTT	CT Technical Terms	The function of codes.	"We can set conditions by blue code."	Each additional unit generate two scores.
C5: CTPri	CT Principle (Dimension)	If-then conditional;task decomposition;error checking	"This action can be divided into three steps."	Each additional unit generate three scores.