

# **The Effects of Types of Decision-Making and Collaborative Information Processing on Collaboration Performance, and Social Support and Collaboration Load among Collaborators in CSCL**

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**Abstract:** This study investigate the process of thinking required by individual learners in collaborative learning and the process of collaborative learning from the perspective of information processing and suggest a specific process of collaborative information processing with information externalization to make effective collaboration performance. In particular, the body of research mainly focused on the optimal process of information processing on the basis of individual learners' types of decision-making.

**Keywords:** *CSCL, Types of Decision-Making, Social Support, Collaboration Load*

## INTRODUCTION

### Need and Objective of This Study

Computer-Supported Collaborative Learning (CSCL) has been established by many studies as an effective type of learning with shared understanding and high-level learning, both of which positively characterize collaborative learning (Jorczak, 2011). However, collaboration load<sup>1</sup>, negative affect, or lack of social support<sup>2</sup>, such as affirmation and aid, among collaborative learners during the process of their opinion coordination can lead to significantly lower task performance (King, 2007). Since collaborators' divergent and convergent thinking and cognitive conflict are necessary elements in the process of collaborative learning, it would not be easy for collaborative learning to be effective if learning is poorly processed or if one single opinion is unanimously adopted or rejected. Effectiveness would also be difficult to obtain if insufficient chance for divergent or convergent thinking exists, or without cognitive conflict among collaborative learners (Jorczak, 2011).

To separate it from cognitive load that occurs in the individual learning situation, it is called group cognitive load (Janssen et al., 2010) or collaboration load (Dillenbourg & Betrancourt, 2006) in the collaborative learning situation. Collaborative learning not only involves load caused by complexity inherent in the task or the situation itself but also load interfering with learning due to mistakes or unnecessary conflict during the learning process and load that facilitates grounding, common knowledge, and confidence building (Kirschner, Paas, & Kirschner, 2009a, 2009b).

There have been attempts to apply design principles of the cognitive load theory that proved to be effective in the individual learning situation to the collaborative one. For example, Brunggen et al., (2004) examined visualization of demonstration to prevent the effect of attention deployment, and Nelson & Erlandson (2007) analyzed effectiveness of such design principles as multimedia principle, duplication principle, modality principle, signaling principle, segmenting principle, and prior practice principle in Multi-User Virtual Environments (MUVES). Most of these principles aim to decrease occurrence of collaborative cognitive load and are derived regardless of collaborative learners' types of decision-making<sup>3</sup>. In this context, this study investigate the process of thinking required by individual learners in collaborative learning and the process of collaborative learning from the perspective of information processing and suggest a specific process of collaborative information processing with information externalization to make effective collaboration performance. In particular, the body of research mainly focused on the optimal process of information processing on the basis of individual learners' types of decision-making.

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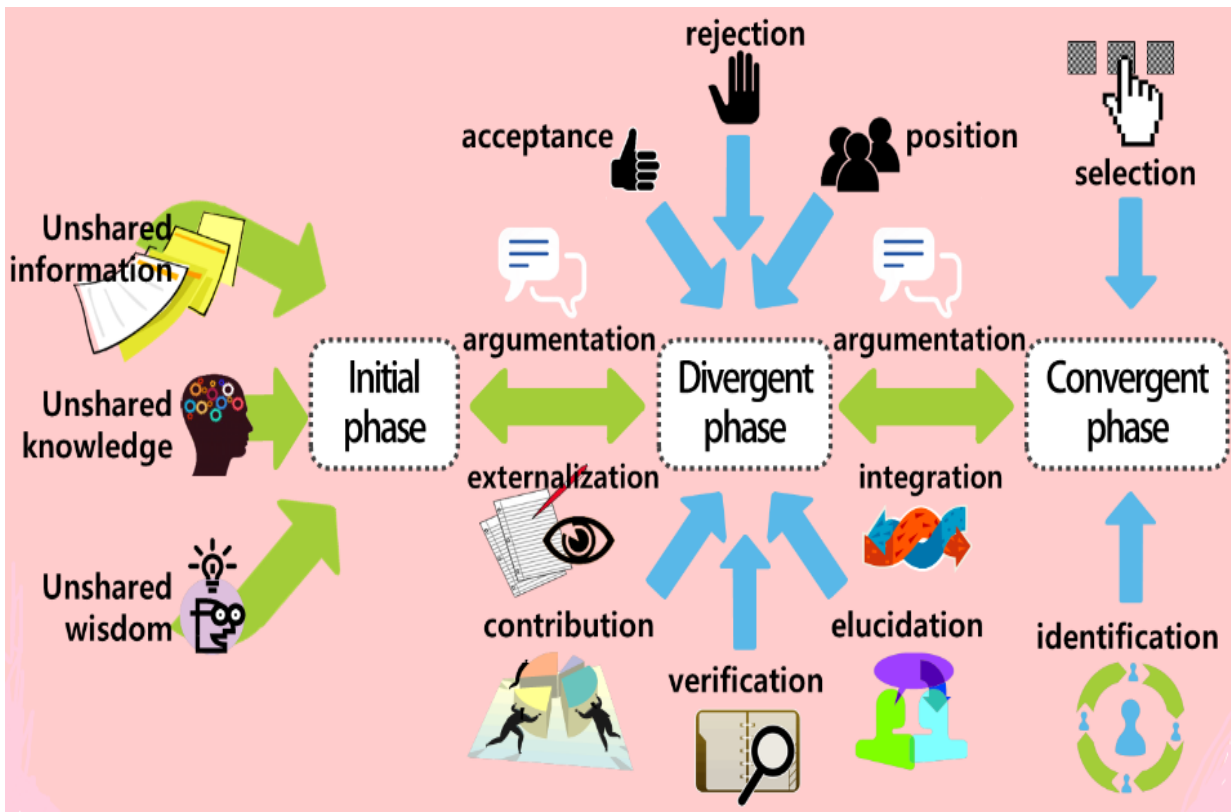
<sup>1</sup> Load at the cognitive level that occurs in the collaborative situation is called group cognitive load (Janssen et al., 2010), or social interaction load or collaboration load (Dillenbourg & Betrancourt, 2006). Since collaborative activities involve a mix of diverse elements, it is necessary to consider collaboration load in designing learning environment. In this study I use a self-administered survey to measure the degree of cognitive load individual learners feel during the process of collaboration.

<sup>2</sup> Social support among collaborators quantifies how individual learners evaluate and perceive the quality of their interpersonal relationships in collaborative learning. To put the prior studies together, social support was categorized into material (provision of time and resources to help solve problems), belonging and informative (information or advice to help solve problems), emotional (provision of comfort through a sense of belonging and stability, affective empathy, and love), and self-esteem support (improvement of self-confidence and evaluation of the self reflected in others) (Jin, 2007). In this study I use a self-administered survey to measure the degree of affect, affirmation, and aid that individual learners feel they receive from their collaborators during the process of collaboration.

<sup>3</sup> Janis & Mann (1977) define a type of decision-making as "a strategy that individuals use to approach and resolve important decision-making in their own life." Arroba (1978) defines it as "a way of approaching and determining certain decision-making," and Hoy and Miskel (1978), Baek (1981), and Nah (1985) note that decision-making not only means decision but also its process is highly valued. In this study individuals' approaches to decision-making were divided into rational, intuitive, and dependent types.

Research suggests how individual learners' types of decision-making and collaborative information processing affect collaboration performance and social support among collaborators in CSCL. Here, types of decision-making are categorized into rational, intuitive, and dependent ones according to how individuals approach decision-making (Harren, 1984); learning performance is presented in a concept map based on collaborative learning among members; and social support among collaborators is a social index of how individual learners evaluate and perceive the quality of their interpersonal relationships, which can not only include such emotional and evaluative items as concerns, affection, understanding, evaluation, and recognition but also information and material ones, by which means the degree of affect, affirmation, and aid individual learners receive from their collaborators during the process of collaboration in this study.

The specific goals of this study are as follows: first, to determine how types of decision-making and collaborative information processing affect collaboration performance in CSCL; second, to determine how types of decision-making and collaborative information processing affect social support among collaborators in CSCL; and third, to determine how types of decision-making and collaborative information processing affect collaboration load in CSCL. The ultimate goal is to suggest an instructional design plan for CSCL. The results of this study will be suggestive for the process of collaborative information processing in CSCL.



**Fig.1** social support among collaborators

## **Research Question**

This study address the following research questions:

### **1 How do types of decision-making and collaborative information processing affect collaboration performance in CSCL?**

1-a. Collaboration performance would vary significantly, depending on types of decision-making (rational, intuitive, and dependent).

1-b. Collaboration performance would vary significantly, depending on types of collaborative information processing (serial and parallel).

1-c. Types of decision-making (rational, intuitive, and dependent) and those of collaborative information processing (serial and parallel) would interact with each other in collaboration performance.

### **2. How do types of decision-making and collaborative information processing affect social support among collaborators in CSCL?**

2-a. Social support among collaborators would vary significantly, depending on types of decision-making (rational, intuitive, and dependent).

2-b. Social support among collaborators would vary significantly, depending on types of collaborative information processing (serial and parallel).

2-c. Types of decision-making (rational, intuitive, and dependent) and those of collaborative information processing (serial and parallel) would interact with each other in social support among collaborators.

### **3. How do types of decision-making and collaborative information processing affect collaboration load among collaborators in CSCL?**

3-a. Collaboration load among collaborators would vary significantly, depending on types of decision-making (rational, intuitive, and dependent).

3-b. Collaboration load among collaborators would vary significantly, depending on types of collaborative information processing (serial and parallel).

3-c. Types of decision-making (rational, intuitive, and dependent) and those of collaborative information processing (serial and parallel) would interact with each other in collaboration load among collaborators.

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