

CHAPTER 2 LITERATURE REVIEW

In this chapter, there were several relevant kinds of literature in this study. The relevant literature that discussed firstly is about the knowledge building concept. Then the second literature is about computer-supported collaborative learning (CSCL), and the last is about reflection in the student learning.

2.1 Knowledge Building

2.2.1 Knowledge Building Definition

The knowledge building is defined as a group activity where knowledge is intentionally developed, and students collaboratively work to solve, discuss, and compare common problems and express their ideas. The community accomplishment will be higher than the total of individual contributions and part of broader cultural efforts (Bereiter & Scardamalia, 2003; 2006). Knowledge building pedagogy developed and along with the technology, with teachers' innovations and students' accomplishments instrumental in this evolution (M Scardamalia & Bereiter, 2006).

Knowledge building refers to continuous production and continuous improvement of ideas or values to the community involved. Emphasize the process of enforcing collective cognitive responsibility and collaborative learning for knowledge building discourse. There are three characteristics in knowledge building: (a) knowledge building is not only a process, but creates a product as a result; (b) The products produced are conceptual artifacts, for example, explanations, designs, historical records, and interpretations of literacy works; (c)

conceptual artifacts are not something in the individual mind of students, not something materialistic or visible but still real, found in the comprehensive work of students' collaborative learning communities (Kwok, 2009).

A brief definition of knowledge building, as stated by Resendes & Dobbie (2017) is “*giving students collective responsibility for idea improvement.*” It means that in the knowledge building, the students are allowed to more engage in their learning by having collective responsibility from the community for idea improvement as a result.

Knowledge building philosophical foundation based on the Karl Popper (1978) three-worlds ontological analysis (Bereiter, 2002). In the ontology, we are inside the three interacted world. There is world 1 that consist of physical objects, living things, and energy. World 2 is subjectivity, like consciousness, feelings, and anything that in your mind. The last is world 3 that gained from the process that composed from the physical word and the subjectivity, as we can say the world 3 is the products of human mind that created from the ideas of human community (Marlene Scardamalia, 2002).

These three worlds are related to each other, as we can see in figure 1, The World 1 that is the physical world is entered and enabled world 2 that is the subjective world to exist, and the world 2 try to control the world 1 and take the information in it and produce knowledge. The world 2 that is subjective world interpret the world 1 which is physical world and gained then create some artifacts, as we can say the world 3, like concepts, theories, books, tools, models, and others things that is products of the human minds (Egan, Williams, Ellwood, & Dixon-Hardy, 2013; Popper, 1978).

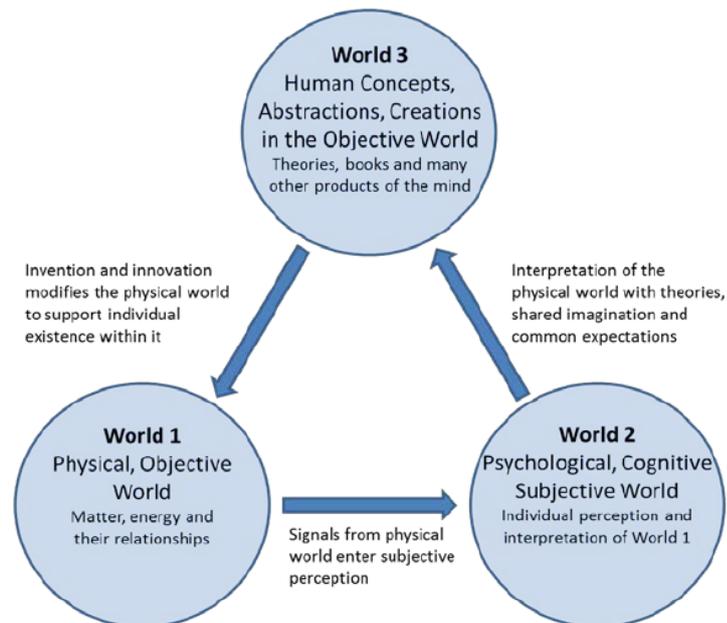


Figure 1. Karl Popper Three World

(Source: Egan, et al., 2013)

To understand more about knowledge building, Scardamalia (2002), identifies twelve principles of Knowledge Building as the foundation of knowledge building pedagogy. The principles are:

- (1) *Real ideas and authentic problems*: students' needs to understand the world based on their real problem experience.
- (2) *Improvable ideas*: students' ideas are treated as improvable; there are not ideas that right or wrong, so student need to work continuously to improve the ideas together.
- (3) *Idea diversity*: students' needs to accept the diversity of ideas raised by other students. Not all ideas are in line; there are also contradictory ideas, so the students need to accept the difference in the community
- (4) *Rise above*: students will create higher level concepts from continuous improvement of ideas and understanding

- (5) *Epistemic agency*: students' efforts will find their way in learning to advance in their study by determining the learning outcomes, processes, and the accompanying challenges.
- (6) *Knowledge building discourse*: students are engaged in discourse to share, and to improve the knowledge to lead better solutions, better explanations, and better ways forward.
- (7) *Constructive uses of authoritative sources*: community members use authoritative sources critically to improve the ideas and support their understanding.
- (8) *Community knowledge, collective responsibility*: students' purpose in the community is their contribution and shared responsibility for improving their collective knowledge in the classroom
- (9) *Pervasive Knowledge building*: students engage in knowledge building and pervade in their life aspects, not only in the classroom but also in their everyday life.
- (10) *Democratizing knowledge*: The community member allowed to contribute to the knowledge advancement in the classroom
- (11) *Symmetric knowledge advancement*: the community aims to have individuals and organizations actively working to make an advance of their knowledge.
- (12) *Concurrent, embedded, and transformative assessment*: students decide how their assessments from their understanding, so they will create and engage in assessments in a variety of ways.

This 12 principle of knowledge building illustrated by Chen & Hong (2016) as we can see in figure 2. In the figure, the shape that interpreted as a cone divided with three sections, first the bottom section are the three conceptual factors, that is ideas, agency, and community, supports the second part of the section that are 12 Knowledge Building principles, which became a core of the implementation in the knowledge building pedagogy.

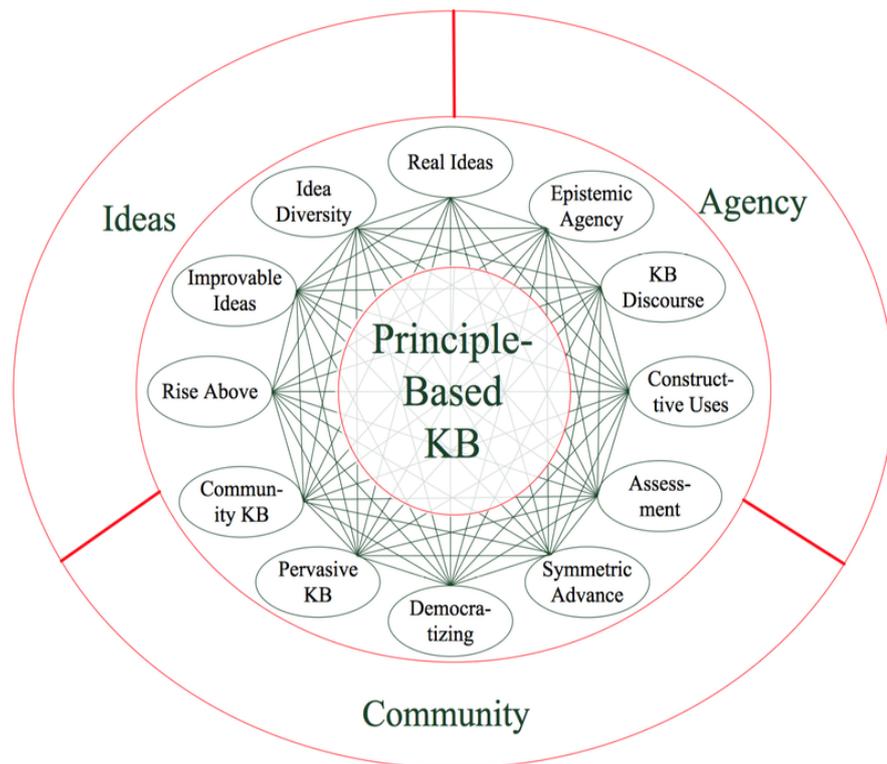


Figure 2. Knowledge-Building (KB) principles with the conceptual framework

(Source: Chen & Hong, 2016)

2.2.2 Knowledge Building Environment

Knowledge Building Environment (KBE), based on DiStefano, Rudestam, & Silverman (2004), defined as

“an environment that enhances collaborative efforts to create and continually improve ideas. Among the characteristics of an effective KBE are supports for the formulation of knowledge problems, for preserving ideas and making them accessible as objects of inquiry, for dialogue that is democratic and favorable to idea diversity, for constructive criticism and

analysis, for organizing ideas into larger wholes, and for dealing with recognized gaps and shortcomings of ideas.”

Knowledge, in a knowledge-building environment, is brought into the environment, and something is done collectively to it that enhances its value. The goal is to maximize the value added to knowledge, either the public knowledge represented in the community database or the secret knowledge and skill of its learners (Kwok, 2009). Students need to serve as knowledge workers, thinking and creating collaboratively, continually modifying and improving ideas as a class community and working towards more coherent explanations and ideas (Thagard, 1989). The evolution of knowledge begins with the generation of ideas and continues through the sustained improvement of those ideas; there is no end to this process (H. Y. Hong & Sullivan, 2009).

In a knowledge-building environment, the teachers also need to provide the students with a safe and open atmosphere that allows students to play around and experiment in their environment with new or different ideas and to share, question, discuss and improve these ideas in interactions with their peers. The process of enculturation or cultural transformation that influenced the student knowledge development activities effectively become the indication of a successful knowledge building environment development (H.-Y. Hong & Lin, 2019).

2.2 Computer-Supported Collaborative Learning

2.3.1 Collaborative Learning

Collaborative learning involves individuals as group members but not reducible to it. Collaborative learning involves activity like the sharing and negotiation on some meaningful assignments that are accomplished interactively by individuals in group processes (Stahl et al., 2006).

Collaborative learning is sometimes equated with cooperative learning but has different meanings. In cooperative learning, learning is carried out by individuals, but a collection of results from several individuals will be made into group results. According to Roschelle & Teasley (1995), knowledge construction should occur in learning through social interaction. Collaborative learning is different from cooperative learning because, in a group, individuals must be involved in group activities in social interactions such as sharing and negotiation. In collaborative learning, there are activities to exchange ideas between individuals to construct knowledge and get the results of these activities. Collaborative learning is a collective process from the beginning, where all of them are jointly involved for task performance (Roselli, 2016; Stahl et al., 2006).

The essence of collaborative knowledge construction is how students expand knowledge to bring knowledge from their friends and how the process of overcoming socio-cognitive conflicts. The way students deal with this conflict is meaningful because this process is not just to exchange information but to support the construction in different perspectives. The ideal learning environment also needs to support students in the elaboration process (Ertl, 2009; Fischer, Bruhn, Gräsel, & Mandl, 2002).

2.3.2 Computer-Supported Collaborative Learning

Computer-supported collaborative learning (CSCL) is the part that appears from the learning sciences. This method occurs because there are thoughts on how people can learn together with the help of computers, or as we can say how learning and knowledge building emerged through collaboration and discourse mediated by technology (Stahl et al., 2006). CSCL has the characteristic that users share and

build knowledge with technology as a means of shared communication within the community.

The primary purpose of CSCL environments is to support sharing in the knowledge building process that is realized by the learners in developing knowledge society qualifications (Scardamalia & Bereiter, 2006; Stahl et al., 2006; Yücel & Usluel, 2016). Students in the collaborative learning supported by technology would enhance the effectiveness of knowledge building learning environments, like facilitate sharing and distributing knowledge and expertise among the community members (Lipponen, 2010).

Several studies prove that students could collaboratively construct knowledge in an online learning environment. Knowledge building is a social process in a community, the online learning environment in computer-supported collaborative learning can help to facilitate the social interaction between and within the community in knowledge building learning environment. The computer-supported collaborative learning can be useful for students to express their ideas and the community can see their works in the form of scaffolds, quantity, content, and quality of interaction and participation, and relations between scaffolds and the quantity of interaction and participation. (Coll, et.al., 2014; Comeaux & McKenna-Byington, 2003; M Scardamalia & Bereiter, 2006; Zheng, 2017).

Several computer-supported collaborative systems developed to facilitate knowledge building. For example, there is CSILE (Computer Supported Intentional Learning Environments) and the newer version, the Knowledge Forum (KF) that provides a systematic discussion place, or as we can say knowledge building scaffolds, for users in the community so that they can explore more of the ideas expressed by others (Marlene Scardamalia & Bereiter, 2002). There is also another

computer-supported discussion system that developed based on the principle of knowledge building pedagogy.

2.3 Reflection

2.3.1 Definition of Reflection

Based on Dewey (1916), “reflection” is “thought” because no experience having a meaning is possible without some element of thought (reflection is one of the four modes of thinking). Dewey (1933) also said that “*We do not learn from experience... We learn from reflecting on experience.*” From the saying, we could see that the experience alone cannot make someone learning. It needs some reflection from the experience to make someone learn. Reflection is the process for learners to make more meaning from one experience to the next experience with a deeper understanding of their relationship with and connection to other experiences and ideas (Rodgers, 2002).

Boyd & Fales (1983) define reflection as “*The process of creating and clarifying the meaning of experience (past and present) in terms of self (self in relation to self and self in relation to the world). The outcome of the process is changed conceptual perspective*”.

In conclusions, the reflection is a continuous process to evaluate and give more meaning from experience and make it for the self-improvement from the process as learning.

2.3.2 Reflective Learning

Reflective practice is the ability to reflect on one's actions to engage in the process of continuous learning. Schon (1983) said that *reflection-on-action* as reflecting on how practice can be developed, changed or improved after the event

has occurred and *reflection-in-action*, reflection as part of active thought, could help to overcome the problems. The two concepts emphasize the importance of reflection in some process. (Schon & DeSanctis, 1986). Reflective learning is a deliberate process of undertaking what we will call cycles of inquiry. We called the cycle of inquiry is because it used to capture the way a reflective learner moves between action and reflection. From the diagram below, there is a sense in which taking action will result in our doing things differently, and we can then reflect on what happened next. The reflection should lead to action, and so we ‘cycle’ between action and reflection (Ramsey, 2006).

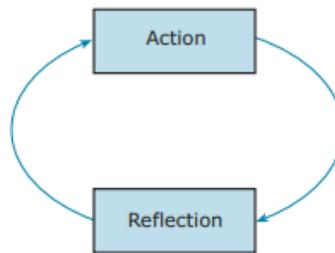


Figure 3. The Action-Reflection System

(Source: Ramsey, 2006)

Costa & Kallick (2008) stated that in the reflective classroom, teachers make students to make meaning from their experiences overtly in written or oral form. Students take the time to reflect on their learnings, to compare intended with actual outcomes, to evaluate their metacognitive strategies, to analyze and draw causal relationships, and to synthesize meanings and apply their learnings to new and novel situations. Students know they will not "fail" or make a "mistake," or similar terms which are interpreted as such. Instead, reflective students know they can produce personal insight and learn from all their experiences.

2.3.3 Reflection in Self-Directed Learning

Self-directed learning defined by Knowles (1975) as a "*process in which individuals take the initiative, with or without the help from others, in diagnosing their learning needs, formulating goals, identifying human and material resources, choosing and implementing appropriate learning strategies, and evaluating learning outcomes*" (Michael Caravello, et.al., 2015).

In self-directed learning, students can work in self-directed ways while engaged in group-learning settings (Brookfield, 2009). The ability for reflection can make students learn how to self-directed learning, so without much direction; they can learn with their previous result and having improvement. A community in a knowledge building environment is given the freedom to construct their knowledge so that reflection skills can help in self-directed learning.

2.3.4 Reflection in Knowledge Building Environment

Reflection in knowledge building learning is a critical element. Resendes & Dobbie (2017), define the group reflection is the same as the term meta-talk. Meta-talk based on the Bereiter & Scardamalia (2014) is defined as a "*discourse about progress and difficulties in the main knowledge-creating effort.*" The advantages of self and groups reflection in the knowledge building environment are that the students can be more involved in community discussions. Also, students can assess progress in the community and also find solutions if there are differences in opinions in the community.