HUONG DINH
THE EFFECTIVENESS OF SCAFFOLDING IN A BLENDED LEARNING COURSE FROM STUDENTS' PERSPECTIVE

Master's Thesis in Education
FACULTY OF EDUCATION
Master's Degree Programme in Learning, Education and Technology
2016
Instructional approach has been shifted from teacher-centered instruction to learner-centered instruction because of the evolution in educational paradigms. Teachers, instead of being merely knowledge transmitters, become facilitators who guide learning processes and provide scaffolding to help learners construct knowledge and achieve learning goals. The considerable development of technology recent decades allows the emergence of blended learning as a combination of traditional face to face and technology-mediated learning delivery methods. This leads to benefits and challenges for teachers in providing effective scaffolding in blended-learning environments. Recent findings from research in the effectiveness of scaffolding suggest that scaffolding can be seen as an effective instructional method in various educational settings such as online and blended learning.

Using a case study, this research aims to explore how scaffolding is considered successful based on students’ perspective. In the case study setting, 20 young students (age ranging from 18 to 27) participated in a blended training course aimed at promoting their understanding about nature conservation. The 6-day training course considered as a non-formal learning activity was given under instruction of the three educators of GreenViet, a local NGO in Danang, Vietnam. The empirical data consists of students’ feedback in a questionnaire form, text-based documents generated by students and instructors during the learning process. Data collected and analyzed focuses on examining different types of scaffolding recognized and interpreted by students that have impacts on their learning. Besides, the scaffolding’s effectiveness is investigated through students’ evaluation.

The results shown the recognition of four types of provided scaffolding in a blended learning environment from students’ perspective. Besides, the students positively evaluated the effectiveness of the scaffolding and such scaffolding confirmed in the actual scaffolding manifested during the training course. That is to say, students are able to be aware of the availability of scaffolding delivered by instructors and scaffolding matters for them. However, the alignment between students’ interpretation of the instructors’ scaffolding and the actual scaffolding was not completely consistent. Furthermore, despite of the high evaluation given for the scaffolding, this is not statistically associated with what students interpreted about such scaffolding in their feedback. These findings contributed to deepen understanding of scaffolding, especially from students’ perspective on its effectiveness. Practical suggestions are provided through implications for educators/instructors to take into consideration when designing and implementing scaffolding in blended learning environments. Possible directions for the future research are also discussed.

Asiasanat/Keywords: scaffolding, blended-learning environment, students’ perspective
# Table of Contents

1 INTRODUCTION .................................................................................................................. 1

2 THEORETICAL FRAMEWORK ............................................................................................. 4

2.1 Scaffolding ......................................................................................................................... 4

2.1.1 Defining scaffolding ....................................................................................................... 4

2.1.2 Characterizing scaffolding .............................................................................................. 6

2.1.3 Classifying scaffolding .................................................................................................... 10

2.1.4 Evaluating scaffolding’s effectiveness ............................................................................ 16

2.2 Scaffolding in Blended Learning Environments ................................................................. 19

2.2.1 Blended learning ............................................................................................................. 19

2.2.2 Problem-based learning ................................................................................................. 24

2.2.3 Scaffolding PBL in blended learning environments ...................................................... 26

2.2.4 Implementing scaffolding into educational settings ....................................................... 28

3 AIM AND RESEARCH QUESTIONS ..................................................................................... 29

4 RESEARCH METHODOLOGY ........................................................................................... 30

4.1 Research Design ................................................................................................................. 30

4.2 Participants ....................................................................................................................... 34

4.3 Data Collection .................................................................................................................. 35

4.3.1 Self-completion questionnaires ..................................................................................... 35

4.3.2 Text-based documents .................................................................................................... 36

4.5 Data Analysis ..................................................................................................................... 36

4.5.1 Research methodology .................................................................................................... 36

4.5.2 Data analysis ................................................................................................................... 37

5 RESULTS .............................................................................................................................. 42

5.1 Students’ Interpretation of Instructors’ Scaffolding in Blended Learning Environment .... 42

5.1.1 Procedural scaffolding (11 learners, 19 statements) ...................................................... 44
1 INTRODUCTION

“I never teach my pupils. I only attempt to provide the conditions in which they can learn.”

- Albert Einstein

Since education is no longer to be dominant by teacher-centered instruction as it was seen in the past, teaching and learning paradigms have evolved to student-centered approach (Gibbs, 1981). This approach much more focuses on students as an essential object to serve the ultimate purpose of education. As a result, teachers no longer act as a knowledge transmitter, their role has been multiplied and shifted to be a facilitator that guides the learning process (Camacho, 2010). To describe the support provided by teachers that facilitates deep learning, educational scientists use the term scaffolding. Being used as the metaphor of scaffolding in building construction, scaffolding has been considered as support given to students which is tailored to their needs in fulfilling learning goals (Sawyer, 2005). With the modified role, teachers employ scaffolding to help students construct their own knowledge and promote effective learning. Scaffolding is initially added, then modified, increased or decreased the intensity based on students’ needs and responses, and eventually removed when no longer needed (Sawyer, 2005; Van de Pol, Volman, & Beishuizen, 2010). Due to its crucial meaning, scaffolding has been drawn and examined on an abundance of studies in learning sciences with multiple aspects such as features, functions, mechanisms, benefits, etc. Reasonably, the benefits and effectiveness of scaffolding are paid much attention by educational researchers with the aim to find out appropriate strategies to provide effective scaffolding for students.

Meanwhile, thanks to the significant development of technology recently, teaching and learning approaches have been evolved and improved to serve multiple purposes of educational processes. Remarkably, this allows the emergence of blended-learning as being a learning delivery method that combines traditional instruction with technology-mediated instruction (Graham, 2006; Phipps & Merisotis, 1999). Research evidence shown various benefits of blended learning such as improving learning effectiveness, increasing cost effectiveness, and extending the reach of learning (Singh & Reed, 2001; Osguthorpe &
Graham, 2003). Blended-learning environments, therefore, are preferably employed by educators to make good of strengths and advantages from both traditional and technology-mediated approaches in delivering the learning instruction.

In this sense, the challenge for teachers is to effectively provide scaffolding in blended-learning environments, especially within problem-based learning contexts. There are numerous empirical studies analyzing the effectiveness of scaffolding from various aspects that affects to learners such as: learners’ engagement, perception, interactions, behavior, performance, outcomes, etc. (e.g., Huang, Wu, & Chen, 2012; Reingold, Rimor, & Kalay, 2008; Sharma & Hannafin, 2007). A conclusion can be drawn from such studies is that scaffolding can be seen as an effective instructional method in various educational settings such as blended learning. However, implementing scaffolding into blended-learning environments is considered challenging because its high dependence on teachers and students. Especially, it is important to notice that students may not be aware of the availability of provided scaffolding that is intentionally designed and delivered by teachers. Therefore, they may not be inclined to take advantage of this support (Simons & Ertmer, 2005). This raises a need on taking students’ perspective into consideration to deepen understanding of scaffolding’s effectiveness as well as suggest possible guidance that helps students in making good of provided scaffolding. Up till now, there is a lack of studies that would examine scaffolding’s success based on students’ viewpoint and recognition of the scaffolding provided. Fulfilling this gap, therefore, is an ambitious goal of this study.

Based on earlier studies, the present study continues to explore how scaffolding is considered successful, focusing on students’ perspective. The empirical research aims to examine how 20 young students interpret and evaluate the scaffolding provided in a blended training course about nature conservation. The course was considered as a non-formal educational activity held by GreenViet, a local NGO in Danang, Vietnam. Through understanding student’s viewpoint in recognizing and interpreting the scaffolding that they receive from their instructors, this study may contribute to the more holistic view of scaffolding research. Especially, findings may help educators to gain more understanding about scaffolding’s interpretation in blended learning environments. Furthermore, these will provide suggestions for them to take into consideration when designing and
implementing a blended course that maximize students’ learning. As being a researcher, as well as an educator of GreenViet organization, I was motivated to conduct this research because of the need to thoroughly understand how scaffolding works and supports students in an effective way. Besides the contribution to the learning science research about scaffolding, this also helps me to apply relevant knowledge and skills into my position as a non-formal educator.

This present study is structured in seven chapters. The first chapter provides introduction about the main topic and the need for the current research as well as presents the study context. The second chapter conceptualized relevant theory and review existing studies related to study’s topic. Particularly, scaffolding is defined and discussed in many aspects to lay a soundly theoretical backbone for this research. The main focus is on scaffolding problem-based learning in blended-learning environments. The third chapter indicates ultimate aims of the work and research questions that are formulated to guide the research process. In the fourth chapter, research methodology is described in detailed with information and explanation of research design, participants, data collection and used methods, and analysis procedure. The fifth chapter serves to present the results generated from the data analysis that are detailed answers to research questions. What students interpreted and evaluated the scaffolding are revealed. Concrete examples are included to illustrate the findings. The sixth chapter is a conclusions and discussion section that reflects the results from theoretical framework, gives meanings and implications of the research. Also, directions for future research are recommended. The final chapter is an evaluation section that evaluates the quality of the research and consists of evaluation of reliability, validity, ethical issues and limitations.
2 THEORETICAL FRAMEWORK

This section will make an overview of relevant theories with the focus is on critical issues of scaffolding in blended-learning contexts.

2.1 Scaffolding

2.1.1 Defining scaffolding

Scaffolding, according to a definition of Oxford dictionary (2004), is a term used in building construction which means poles and boards that are joined together to make a contemporary structure for supporting the building or modifying of another structure. However, this term has been also used commonly in learning sciences for ages. This section will historically track the development of the scaffolding’s definition in the field of learning sciences.

The term scaffolding was first appeared in educational contexts in 1976. In their study about “The role of tutoring in problem solving” (Wood, Bruner, & Ross, 1976), Wood et al. used the metaphor of scaffolding in building construction to first introduce the concept of scaffolding in supporting children’s learning. According to them, children - who receive scaffolding, which is just in-time help and assistance in problem solving from an adult or expert – can better perform in dealing with more complex tasks than they would without helps. Since then, the notion of scaffolding rooted and has been drawn on an abundance of studies in learning sciences.

Reasonably, “scaffolding” is linked to the Social Constructivism Theory pioneered by the Soviet psychologist Lev Vygotsky and his well-known concept about the Zone of Proximal Development (ZPD). Concerning to the field of assisting children by parents or adults, ZPD is originally defined by Vygotsky (1980) as “distance between the child’s actual developmental level as determined by independent problem solving and the higher level of potential development as determined through problem solving under adult guidance and in collaboration with more capable peers” (p. 86). In other words, the ZPD refers to a range of learning tasks that is only achievable by children with adequate help and guidance from
teaches or peers, otherwise it is beyond children’ current ability (Stone, 1998; Wood et al., 1976) (see Figure 1). Thereafter, Cazden (1979) related ZPD to scaffolding and suggested to expand the use of this metaphor from the domain of adult-child interactions to teacher-student interactions. Since then, the notion of scaffolding has evolved from an individualized support as assistance provided by an adult to a child to multiple affordances in larger learning communities such as classrooms, companies, organizations, etc. (Puntambekar & Hubscher, 2002).

**FIGURE 1. THE ZONE OF PROXIMAL DEVELOPMENT**

Based on the original meaning of scaffolding, a number of educational researchers (e.g, Hannafin, Land, & Oliver, 1999; Jackson, Stratford, Krajcik, & Soloway, 1994; Linn, 1995) later on introduced scaffolds as additional aids in learning process including tools, guides, and/ or strategies employed by teachers or peers. These aids purposefully support students in achieving higher levels of learning performance that would be beyond students’ reach if they worked alone. Thus, scaffolding has been seen as critical teaching instruction provided by teachers that facilitates students in learning (Jumaat & Tasir, 2014).

The significant development in technology has led learning forms and reach extended beyond the traditional settings. Various types of learning environments, learners, instructors, and contexts have been appeared. The notion of scaffolding therefore has been widened and became diverse (Jumaat & Tasir, 2014; Simons & Ertmer, 2005). As
information and communication technologies (ICT) joined the educational world, the instructional scaffolding is no longer occurred only in traditional face-to-face (F2F) settings but applied in technology-based learning and blended learning as well (McLoughlin, 2004). More recently, many researchers argued the concept of scaffolding has been interpreted broadly in educational studies (Van de Pol et al., 2010). Puntambekar and Hubscher (2005) criticized that “the scaffolding construct is increasingly being used synonymously with support.” (p. 1). For instance, Rasmussen (2001) identified scaffolding as “a form of support for the development and learning of children and young people” (p. 570).

In general, since its first introduction in 1976, “scaffolding” has been defined and criticized widely by many educational researchers. However, no consensus exists regarding to defining the notion of scaffolding (Van de Pol et al., 2010). Though, for this study, I use the definition of scaffolding suggested by Sawyer (2005): “Scaffolding is the support given during the learning process which is tailored to the needs of the student with the intention of helping the student achieve his/her learning goals” (p. 11).

2.1.2 Characterizing scaffolding

Despite the multiple definitions and interpretations of scaffolding, there are some clearly common characteristics recognized and summarized by Van de Pol et al. (2010). These characteristics include contingency, fading, and the transfer of responsibility that are summarized in a conceptual model (Van de Pol et al., 2010) illustrated in Figure 2.

The first common characteristic of scaffolding is contingency, meaning that the scaffolding in which teachers provide to students is contingent upon students’ ability and current level of students’ performance. According to Puntambekar (2009), being contingent is one of the most important feature of scaffolding due to the fact that the adult or teacher actually makes continuous evaluation on the learner(s)’ progress and then provides appropriate supports just in-time to the right person(s) in specific task(s). The contingency in scaffolding is often referred to as adaptive, responsive, tailored, calibrated, adjusted, or differentiated support (Puntambekar, 2009; Van de Pol et al., 2010).
In order to provide contingent support, *ongoing diagnostic strategies* are employed as an effective tool. Teachers therefore should have thorough understanding and knowledge not only of the tasks, but also of the learners’ capabilities and their changes as the learning progresses (Puntambekar & Hubscher, 2002). Thus, teacher must initially determine the students’ current ability, then make ongoing diagnostics based on differences from individual to individual and changes of the same individual at different time points. The strategies of diagnostic in scaffolding can be done through several ways (Van de Pol et al., 2010) such as: dynamic assessment, formative assessment, online diagnosis, or monitoring and checking students’ understanding. For example, Macrine and Sabbatino (2008) suggested a program called “Dynamic Assessment and Remediation Aproach” (DARA). DARA was viewed as a model of assessment to support students who have troubles with reading, in which it “measures progress overtime and provides remedial plans based on assessment results” (p. 1). This approach employed dialogue between teacher and students as a type of scaffolding that allows on-going authentic assessment of students’ reading.
The teacher therefore is able to have a better view of students’ current strengths and weaknesses in dealing with textual information.

The second common characteristic of scaffolding is *fading* or the “gradual withdrawal of the scaffolding” (Van de Pol et al., 2010, p. 5). As scaffolding progresses, at certain points a learner gains understanding and can be able to carry out a task, solve a problem or fulfill a goal independently by her/his own, then the scaffolding or the teacher’s presence is fading. The support therefore can be removed when no longer needed (Wood et al., 1976). However, Lepper, Drake, and O’Donnell-Johnson (1997) concerned that students may return to lower levels or even ground zero when scaffolding is removed. Hence, it is important for teachers to fade in appropriate levels and times during the learning process. A study of Bulu and Pedersen (2010) presented a sound example of sequencing fading in a problem-based hypermedia learning environment. 6th grade students (N=415) were asked to solve four ill-structured problem-solving activities related to solar system. There were three kinds of prompts: static questions, examples, and sentence starters which were served as scaffolding to support students. In this research design, such supports was faded gradually over the four problem solving activities: the prompt of examples was faded after the first activity, followed by both examples and questions which were removed after the activity 2, and after the third problem-solving activity, the three kinds of prompts were all withdrawn. That is, there was no scaffolding provided for the last activity. The results revealed that students performed better when solving problems in the third and last activities in which additional supports were faded.

The fading feature of scaffolding is tightly related to the third common characteristic of scaffolding namely the *transfer of responsibility*. When the contingent support from teachers is faded over time, learners progress their competence and take control in their learning. The responsibility of performing a task is gradually transferred from the teacher to the learner (Van de Pol et al., 2010). That is, the ideal scaffolding will eventually lead to learners’ internalization of the support provided (Rogoff, 1990; Stone, 1998). The responsibility in this sense can broadly be referred to students’ cognitive and metacognitive activities or to students’ affect (Van de Pol et al., 2010). The study of Bulu and Pedersen
(2010) mentioned above suggested that the fading of scaffolding, if conducted effectively, can be able to facilitate students’ transfer of problem-solving skills.

The Figure 2 illustrates clearly the relation between the three posed characteristics of scaffolding. In general, it can be said that scaffolding is a kind of teaching method that comprehensively views on different facets of learners in their learning process. In order for scaffolding to happen, a teacher needs to provide supports contingently based on students’ ability and responses. If the students gain better understanding and competence over time, the teacher should fade their presence and also transfer the task’s responsibility to the students so that they can proceed the task fulfillment independently.

Besides, several other characteristics of scaffolding should be considered such as common goals, dialogues and interactions.

Common goals or a shared understanding of the goals of learning activities is critically important in successful scaffolding (Rogoff, 1990). Rogoff described this shared understanding as intersubjectivity that refers to the intersubjective relations of all perspectives in a scaffolded learning process including teachers, students, content, and task. All related parties share a combined ownership of the task and set a common goal. This provides motivation for students and leads them to better understanding of the goals needed to be achieved.

Dialogues and interactions are seen as the nature of scaffolded instruction. This is linked to the characteristics of ongoing and adaptive support mentioned above (Puntambekar & Hubscher, 2002). In fact, dialogic interactions between teachers and students are extremely useful that allow the teacher to make ongoing assessment on students’ performance, monitor their progress, give appropriate support, and eventually fade the support to let the students proceed the learning independently. At the same time, the dialogues enable students to regulate the situation’s dynamics and negotiate the instructional interaction based on their evolving understanding (Reid, 1998). That is, the students no longer are passive participants who only receive one-way information transfer.
provided by their teacher. They become negotiators and active participants in the learning process.

Through the characterization of scaffolding posed above, it is very important to emphasize the role of the teacher as one of the most critical aspects of scaffolding (Puntambekar & Hubscher, 2002). In other words, the teacher plays many crucial positions in scaffolding. Particularly, the teacher must be thoroughly knowledgeable not only about the content of instructions, the task and its components, but also about skills and strategies needed for effective teaching (Puntambekar & Hubscher, 2002). Besides, he or she should be skillful as a facilitator in understanding students’ current ability, monitoring students’ progress, and motivating them by providing proper support they need so that they can fulfill the task. Moreover, the teacher needs to foster the shared understanding of the task among participants and encourage students’ active participation in learning through dialogues and interactions. Generally, for scaffolding to occur, the teacher should simultaneously be knowledge provider, educational designer, progress monitor, learning facilitator, instructional supporter and communicative interactor.

2.1.3 Classifying scaffolding

In its evolution and development, the notion of scaffolding has been paid a huge attention and interest of educational researchers. There are various types of scaffolding that have been classified and analyzed from a variety of aspects (Yu, Tsai, & Wu, 2013). The following part will present different scaffolding classifications based on (a) the dynamic level of support; (b) modalities; (c) functions; and (d) mechanisms/ methods.

**Scaffolding based on the dynamic level of the support**

In a research of investigating the potential of scaffolding used to support students solving ill-structured social problems, Brush and Saye (2002) classified scaffolding into two levels: soft and hard scaffolding. *Soft scaffolding* or *adaptive scaffolding* refers to adaptive, dynamic, and situation-specific support that a teacher or peer employs in order to proceed students’ learning process. In this sense, this type of aid requires the teacher to ongoing diagnose the students’ current understanding and give appropriate support or guidance.
when needed as the instruction progresses. Brush and Saye gave an example about how the teacher scaffolds students in a history class: while seeing that students fail to detect differences in the messages of two civil rights figures, the teacher might foster students’ thinking by asking questions such as “What does John Lewis mean when he says ____? Why do you think he uses the word ____? Do you find similar words in Martin Luther King’s speech? Do you notice any difference in his tone and King’s?” (Brush & Saye, 2002, p. 2). Then the teacher can suggest students to further their reading from other documents to gain deeper understanding once they discover the existence of those differences.

In contrast, hard scaffolding or fixed scaffolding is conceptualized as static supports that “can be anticipated and planned in advance based on typical student difficulties with a task” (Brush & Saye, 2002, p. 2). In their study, Brush and Saye employed hard scaffolds to assist students in “solving a problem, monitoring and regulating their progress, and considering alternative solutions to the unit problem.” (p. 4). They also mentioned that this type of support can be embedded and developed in the multimedia and hypermedia software to flexibly help students while using the software.

**Scaffolding based on modalities**

Belland (2014) reviewed several ways that educational researchers have suggested to provide scaffolding and focused on discussing the three main modalities including (a) one-to-one scaffolding; (b) peer scaffolding; and (c) computer/paper-based scaffolding. The author noted that “the three modalities are not mutually exclusive, but rather can be combined to form a system of distributed scaffolding that together can serve students’ scaffolding needs.” (p. 507). In the study’s conclusion, Belland (2014) criticized that these such scaffolding modalities promote intersubjectivity, customization, and transfer of responsibility in different levels. General understanding of the three modalities is explained below.

*One-to-one scaffolding.* This modality is generally considered as the ideal scaffolding because it provides tailored supports on each individual student needs based on
the teacher’s ongoing diagnosis of the students’ performance. In one-to-one scaffolding, the teacher should fade the support in appropriate points to promote transfer of responsibility for students (Belland, 2014; Van de Pol et al., 2010). Many existing studies argue that one-to-one scaffolding has been employed by teachers in elementary and middle schools with various subjects such as reading, science, mathematics, social studies and language arts (Belland, 2014). For instance, regarding to reading instruction, Jadallah et al. (2011) analyzed one-to-one scaffolding process of 4th grade students in reading discussions. The research findings presented the scaffolding moves which were most frequently used by teachers are “asking for clarification, prompting for evidence, praising in the use of evidence, and challenging” (p. 208). Such scaffolding moves can “initiate long chains of influence on children’ talking and thinking” (p. 223) during reading discussions.

**Peer scaffolding.** In its early age, scaffolding was defined to be supports between one adult/ expert and one child in which the adult or expert promotes the child to move in his/her ZPD (Wood et al., 1976). As this notion has evolved, a number of authors advanced the idea that such support can also be provided by peers (e.g., Gillies, 2008; Pata, Lehtinen, & Sarapuu, 2006). Peer scaffolding has been argued as an effective way to provide scaffolding to all students in an educational setting. This type of scaffolding is explained by the fact that students have different levels of abilities in learning, thus there might be some students who can be able to give help to others to achieve higher order thinking. However, it is important to notice that students can not automatically do the peer scaffolding because they don’t have expertise to do so. Therefore, students need to be provided guidance in order to scaffold their peers in effective ways (Belland, 2014). For example, Pifarre and Cobos (2010) designed a program called the KnowCat in which university students were asked to provide peer scaffolding by making instructional psychology critiqued classmates’ reports about specific topics. Guidelines were given to students to consider “content adequacy, personal elaboration of the ideas, organization of the ideas, presentation strategies, and conclusions” (Pifarre & Cobos, 2010, p. 244). The findings indicate that when providing peer scaffolding to each other, students are able to self-regulate their learning.
Computer/paper-based scaffolding. Such modality involves computer or paper-based tools as scaffolds that can support students in their learning. Based on the summary of previous studies, Belland (2014) stated that computer-based scaffolding can only be effective when there is also one-to-one scaffolding provided by teacher to all students in a classroom. According to him, computer-based scaffolds “can be either context specific or generic.” (p. 511). To be specific, context-specific scaffolds are mentioned as tailored scaffolds related to “the content associated with the unit in which they are embedded.” (p. 511). For example, Linn et al. (2003) introduced a Web-based Inquiry Science Environment (WISE) which was designed to support students in exploring scientific issues. The scaffolds available in the WISE allows students to articulate thinking about causes and possible solutions to presented scientific problems. Meanwhile, generic scaffolds are described as scaffolds designed for students to let them interact with learning material in and beyond a classroom. Such support can be applied with various units in various subjects (Belland, 2014). In the study of Belland, Glazewski and Richardson (2011), the use of Connection log which was considered as computer-based argumentation scaffolding was examined. The aim was to view its impact on middle school students’ argumentative construction during a problem-based learning unit. Evidence showed that such scaffolding is able to foster the development of students’ argumentation ability.

Scaffolding based on functions

Historically, scaffolding has been employed by teachers to serve various functions to support students to gain better understanding and competence in their learning. By summarizing previous relevant studies, Jumaat and Tasir (2014) showed a list of scaffolding types: metacognitive scaffolding, conceptual scaffolding, procedural scaffolding, strategic scaffolding, technical support, and content support. However, according to them, the four typical types of scaffolding which are commonly recognized are the ones defined and developed by Hannafin et al. (1999) in their study about fostering students in open learning environments. Table 1 describes these types of scaffolding with their functions and related methods and mechanisms suggested by Hannafin et al. (1999).
### Table 1. Open Learning Environment Scaffolding Classifications

<table>
<thead>
<tr>
<th>Scaffold Types and Functions</th>
<th>Related Methods and Mechanisms</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Conceptual</strong></td>
<td>Recommending the use of certain tools at particular stages of problem solving</td>
</tr>
<tr>
<td>Guides learner in what to consider; considerations when problem task is defined</td>
<td>Providing students with explicit hints and prompts as needed (Vygotskian scaffolding, intelligent tutoring)</td>
</tr>
<tr>
<td></td>
<td>Providing structure maps and content trees</td>
</tr>
<tr>
<td><strong>Metacognitive</strong></td>
<td>Suggesting students plan ahead, evaluate progress, and determine needs</td>
</tr>
<tr>
<td>Guides how to think during learning: ways to think about a problem under study and/or possible strategies to consider; initial role in finding and framing problems, and ongoing role during resolution</td>
<td>Modeling cognitive strategies and self-regulatory processes</td>
</tr>
<tr>
<td></td>
<td>Proposing self-regulating milestones and related monitoring</td>
</tr>
<tr>
<td><strong>Procedural</strong></td>
<td>Tutoring on system functions and features</td>
</tr>
<tr>
<td>Guides how to utilize the available OLE features; ongoing “help” and advice on feature functions and uses</td>
<td>Providing “balloon” or “pop-up” help to define and explain system properties</td>
</tr>
<tr>
<td><strong>Strategic</strong></td>
<td>Enabling intelligent responses to system use, suggesting alternative methods or procedures</td>
</tr>
<tr>
<td>Guides in analyzing and approaching learning tasks or problem; provided initially as macro strategy or ongoing as needs or requests arise</td>
<td>Providing start-up questions to be considered</td>
</tr>
<tr>
<td></td>
<td>Providing advice from experts</td>
</tr>
</tbody>
</table>

**Conceptual scaffolding** is served to guide students on what to consider and prioritize fundamental concepts. Such support is provided when there is a problem defined by the teacher under learning. Conceptual scaffolding can be designed to help learners to reason with misconceptions or complex problems during learning. Several methods and mechanisms to implement conceptual scaffolding are: recommending the use of certain
tools at particular stages of problem solving; providing students with explicit hints and prompts as needed; and providing structure maps and content trees. For example, Hannafin et al. (1999) described the Jasper environment in which it supplies video clips that allow the main characters present their thinking using think-loud dubbing.

_**Metacognitive scaffolding**_ provides guidance to help students on how to think during learning. This kind of support is linked to the individual thinking management during the ongoing learning process. Metacognitive scaffolding can be “either domain specific, such as where enabling contexts are externally induced, or more generic where the enabling context is not known in advance.” (Hannafin et al, 1999, p, 133). Several methods used for metacognitive scaffolding are mentioned: Suggesting students to plan ahead, evaluate progress, and determine needs; modeling cognitive strategies and self-regulatory processes.

_**Procedural scaffolding**_ assists students in utilizing tools and resources that are available in the learning environment. In addition, such assistance is also a kind of ongoing help and advice on feature functions and uses. For instance, when some learners may become disoriented in open learning environments, procedural scaffolding through “balloon” or “pop-up” help window can guide students to return to desired location.

Finally, _**strategic scaffolding**_ gives students alternative ways to solve problems raised in learning. Particularly, such scaffolding can suggest possible approaches to appropriately identify and select necessary information, relate new knowledge to prior knowledge, as well as evaluate available resources. These approaches can be: enabling intelligent responses to system use; suggesting alternative methods or procedures; providing start-up questions to be considered; and providing advice from experts.

**Scaffolding based on mechanisms/ means**

There are a huge number of researches suggesting various methods, means and mechanisms about scaffolding that has been employed by teachers. Generally, there are six scaffolding means recognized including: (1) Feeding back, (2) Hinting, (3) Instructing, (4) Explaining, (5) Modeling, and (6) Questioning (Van de Pol et al., 2010). Besides, different
types of scaffolds are suggested by Alibali (2006) including: advance organizers, cue cards, concept and mind maps, examples, explanations, handouts, hints, prompts, question cards, question stems, stories, and visual scaffolds. Researchers argued that these types of scaffolding can be used flexibly and combined to accommodate students’ different levels of knowledge and ability (Alibali, 2006; Van de Pol et al., 2010).

2.1.4 Evaluating scaffolding’s effectiveness

In order to fulfil a task or solve a problem to acquire knowledge during a learning process, learners need to bridge prior and relevant knowledge and skills to the current learning situation and then construct new knowledge. Through this process, the learners may encounter difficulty relating to regulating learning, choosing appropriate strategies, making proper decisions or dealing with many kinds of challenges that arose, etc. (Reiser & Tabak, 2014). Thus, there should be scaffolded activities that support the learning’s implementation.

In contrast of traditionally instructional approaches, scaffolding can be seen as an element of “contextualized holistic approaches” that focus on real-world learning activities toward the ultimate goal in which learners can apply what they learn into practices (Reiser & Tabak, 2014). In a scaffolding process, teachers provide initial supports such as hints, prompts, scripts, etc that help to regulate the sequence of relevant learning actions. As the instruction progresses, the teachers monitor learners’ performance then give contingent aids to facilitate the appropriate learning based on learners’ responses. Gradually, learners get used with the guidance and will begin to regulate by their own with less demands of help from teachers (internalization). Fading phase will occur in this sense when scaffolding as an external guidance is no longer necessary for learners’ regulation. Eventually, the learning responsibility is transferred to the learners and they can proceed their learning competence independently. This is an explanation of one of the mechanisms of how scaffolding can help learning.

Historically, scaffolding has been researched through a huge number of studies and mainly focused on how scaffolding helps learning, its potentials and effects to learners’ knowledge
acquisition and success in learning (Jumaat & Tasir, 2014; Van de Pol et al., 2010). Generally, scaffolding is suggested as an effective instructional method in various educational settings such as online and blended learning (e.g., Huang et al., 2012; Reingold et al., 2008; Sharma & Hannafin, 2007). There are numerous empirical studies analyzing the effectiveness of scaffolding from multiple aspects that affects learners such as: learners’ engagement, perception, interactions, behavior, performance, outcomes, satisfaction, etc. The following part will be a view of several empirical studies that have been done related to scaffolding’s effectiveness from multiple perspectives.

Research has shown that scaffolding can promote students’ metacognitive thinking. Reingold et al. (2008) found that students’ reflective and metacognitive processes were promoted through the instructors’ scaffolding in an online course about democracy and multiculturalism, which was being taught as a part of a teacher education program. In this course, 68 students who were experienced teachers working in Bedouin and Jewish schools in Israel were divided into two groups to work through an asynchronous online forum. They were asked to make discussions concerning to sensitive issues such as democracy and inter-cultural conflicts in Israel’s society. The instructor scaffolded the students by providing responses to each student through online postings. Findings revealed a strong positive correlation between the instructor’s feedback and students’ metacognitive reflections expressed by postings relating to three metacognitive dimensions (personal, task, and strategy). The metacognitive scaffolds given by the instructor included “presentation of the rationale for the task, fostering the integration across various course readings and course objectives, supporting reflective writing, differentiating between conclusion, fact, opinion and hypothesis, supervising text comprehension, focusing on the process of learning and encouraging interactions among the participants.” (p. 147). These scaffolds were all found to increase the level of students’ reflection on their task and engagement with the learning community.

In the study of Mercer*, Dawes, Wegerif, and Sams (2004), the authors demonstrated the effectiveness of ‘Thinking Together’ program in which the teachers facilitate ‘Exploratory talk’ to help primary school students in talking to and reasoning together in small groups during science class. Through the 12 lessons of this program, scaffolded activities provided
by the teachers were asking constructive questions and modelling problem-solving skills. These lessons’ aims were to enhance students’ talking skills such as critical questioning, sharing opinions and information, or negotiating a decision relating to specific concepts in science. The results showed that experimental students (N=109), who got trained to use this program, were better skillful in producing reasoning talks than those who were in the control condition (N=121) that did not receive such training (this was analyzed based on transcripts of children’s talk). Moreover, the first groups of children reached higher levels of attainment in the science learning than the latter groups both on group and individual measurements.

Azevedo et al. (2005) examined the effectiveness of scaffolding in three different conditions namely adaptive scaffolding (AS), fixed scaffolding (FS), and no scaffolding (NS) on students’ (7th and 10th grade) learning about the circulatory system in a hypermedia learning environment. The AS was provided by a human tutor through external regulation to facilitate students’ self-regulation. The FS was embedded in hypermedia that contained static interface structures. Pretest and posttest data, and verbal protocols were collected in order to measure changes in students’ regulated learning which is related to aspects of mental models of the topic and declarative knowledge. Findings stated that students who got AS or FS gained more declarative knowledge on the human circulatory system (measured by description task, labeling tasks, and essay task) than students in NS condition. Additionally, the students in the AS condition had significant shifts in their mental models than those who were in other conditions. These AS condition-received students are also reported to be better in regulating their learning: “planning and activating prior knowledge, monitoring their cognitive activities and their progress toward learning goals, using several effective strategies, and engaging in adaptive help-seeking.” (p. 381).

Regarding to the effects of scaffolding to students’ cognitive abilities: Demetriadias et al. (2008) conducted a case study to investigate the hypothesis that whether scaffolding provided by using a questioning strategy can help to improve students’ learning performance in ill-structured domains. The learning was implemented in a technology-enhanced learning environment that supports cased-based instruction. Computer science students (N=32) were assigned to two laboratory classes and each received different
treatment condition: the experimental group was scaffoded with elaborative questions prompts to activate the context-generating cognitive activities, while the control group was not given such scaffolding. Findings revealed that students in the experimental group performed better in both domain knowledge acquisition and knowledge transfer compared to the control group. That is, scaffolding treatment affects significantly on students’ performance and appropriate questioning strategies can be seen as an effective scaffold that triggers their cognitive processes.

2.2 Scaffolding in Blended Learning Environments

2.2.1 Blended learning

Defining Blended Learning

In the academic world, there have been many terminologies that are hardly being concrete concepts. “Blended learning” is not an exception. In order to gain deep understanding about this ambiguous term, a review of historical contexts for its emergence will be explored and its definitions are examined.

In research literature, “blended” and other terms such as “hybrid”, “mixed-mode instruction”, “technology-mediated instruction” are interchangeable when using (Martyn, 2003). Blended learning, in its early development, had been considered as a verb, an act of combining any technologies and pedagogies, or in other words, including nearly all forms of learning and instruction (Graham, 2006). Driscoll (2002) provided several definitions of “blended learning” which the common point considered is that blended learning means “different things to different people”:

Blended learning v. [sic]

1. To combine or mix modes of web-based technology (e.g., live virtual classroom, self-paced instruction, collaborative learning, streaming video, audio, and text) to accomplish an educational goal.
2. To combine various pedagogical approaches (e.g., constructivism, behaviorism, cognitivism) to produce an optimal learning outcome with or without instructional technology.

3. To combine any form of instructional technology (e.g., videotape, CD-ROM, web-based training, film) with face-to-face instructor-led training.

4. To mix or combine instructional technology with actual job tasks in order to create a harmonious effect of learning and working. (p. 1)

There was a remarkable definition that was documented by Graham, Allen, and Ure (2003, as cited in Graham, 2006): “Blended learning is a combination of online learning and F2F learning instruction” (p. 2). According to Graham (2006), this BL defining is more accurate and clear in reflecting the historical emergence of the BL systems. The use of the term BL since then has been more widely consensually understood in its meaning, particularly in the higher education context (Friesen, 2012).

The year 2006 marked an important milestone for the historical development of the term BL with the publication of the first Handbook of Blended Learning (Bonk & Graham, 2006). In the first chapter titled “Blended Learning Systems: Definition, Current Trends, and Future Directions”, the author Charles Graham reviewed all previous broad kinds of BL definitions then focused on speaking of blended learning systems. He used the idea of “BL is combining online and F2F instruction” as a foundation for his own definition: “Blended learning is the combination of instruction from two historically separate models of teaching and learning: traditional F2F learning systems and distributed learning systems. It is also emphasized the central role of computer-based technologies in blended learning.” (Graham, 2006, p. 5).

In this definition, BL is considered as part of the ongoing convergence of two typical learning environments (Graham, 2006). The F2F approach has been familiar and popular in teaching and learning for centuries. Meanwhile, distributed learning environments have begun growing and blooming thanks to considerable developments in technologies that allow various possibilities for distributed communication and interactions. Because of the
clear review and explanation, Graham’s definition of BL became to be broadly accepted (Friesen, 2012). However, since it is not obvious to identify and recognize clearly two sets of the term BL in just one short definition, the following explanation will explore the historical development of the two sets, their relationship and the tendency of blending them.

**Figure 3. Four Dimensions of Interaction in F2F and Distributed Learning Environments**

Graham (2006) illustrated the interaction between F2F and distributed learning environments (see Figure 3). Historically, the two environments have been separated based on four dimensions namely space, time, fidelity, and humanness. There are obvious differences of characteristics between F2F learning and distributed learning: “F2F learning has operated at the left-hand side of each of these dimensions while distributed learning has operated at the right of each of these dimensions” (Graham, 2006, p. 4). This can be explained by the differences in using technologies and pedagogies to meet the demands of different audiences among those two archetypal learning environments. Particularly, in the past, F2F learning system prioritized person-to-person interactions in a live synchronous, high fidelity environment. Meanwhile, in a distributed learning environment, typical conditions for its occurrence were self-paced learning in an asynchronous, highly machined, and low fidelity environment.
Since the middle of 20\textsuperscript{th} century, the significant and rapid development of technology, especially digital technologies, has gradually filled the gaps between the two environments. Constrains in distributed learning environments have been solved in most dimensions and therefore possibilities of integrating multiple technologies into traditional systems have been increased quickly. For example, concerning the time and space dimensions, ICT now allows us to mediate learning activities and interactions that are synchronous and lively regardless of geographical distances through video conferencing, instant messaging, etc. In the dimension of humanness, distributed learning environments are more social by facilitating human interactions through blogging, virtual communities, online emotional expressions, etc. (Graham, 2006). As a result, the convergence of distributed learning environments and F2F learning environments allowed the emergence of blended learning environments. Traditional F2F learning involves interactions between educators and learners in real-time and same place, whereas distributed learning or technology-mediated learning employs ICT to mediate interactions with unlimited space and time.

Besides, from a different approach, Phipps and Merisotis (1999) labeled BL as the “third generation” of distance education systems. The first generation employed a one-way instructional delivery method such as mail, radio, and television known as correspondence education. The second generation was commonly known as distance education which utilized single technology (computer-based or web-based learning). The third generation is BL which adopts a combination of technologies with advantages of traditional methods (F2F) to maximize the learning delivery (Phipps & Merisotis, 1999; So & Brush, 2008).

Generally, the notion of BL is nowadays commonly understood as a learning delivery method that combines face-to-face instruction with technology-mediated instruction into one instructional approach.

\textit{Benefits and Challenges of Blended Learning}

The BL approach has been employed by educators, trainers, or learners as a learning option for a number of reasons. Singh and Reed (2001) showed various benefits that BL provides compared with using only single learning delivery alone: (1) improved learning effectiveness; (2) extending the reach; (3) optimizing development cost and time; and (4)
optimizing business results. Later on, Osguthorpe and Graham (2003) stated six goals of using BL including: (1) pedagogical richness, (2) access to knowledge, (3) social interaction, (4) personal agency, (5) cost effectiveness, and (6) ease of revision. Then Graham (2006) suggested that the three most common reasons for choosing BL are: (1) improved pedagogy, (2) increased access/flexibility, and (3) increased cost effectiveness. Following will be explanations for the benefits of BL that are commonly identified:

**Improved learning effectiveness:** Existing studies confirmed that a blended learning approach actually improves learning outcomes because the learning activities offered through blending meet learners’ desires (Singh & Reed, 2001). Particularly, BL methods are effective in promoting the process of collaborative learning (Carr-Chellman, Dyer, & Breman, 2000; Gabriel, 2004; So & Brush, 2008). Besides, the learning outcomes of students in blended courses shown high levels of completion rates and academic performance (Graham & Dziuban, 2008). Students’ self-motivation and self-management in BL environments are also reported to be increased because of the less in-class time and more emphasis on self-regulated learning (Graham, 2006; So & Brush, 2008).

**Improved pedagogy:** Several studies (e.g., Collis, 2003; Hartman, Dziuban, & Moskal, 2000; Morgan, 2002) suggest that the use of instructional pedagogy such as active learning, peer-to-peer learning, and student-centered learning is facilitated and improved through BL approaches.

**Increased access/flexibility and extending the reach:** It is said that using a single learning delivery method limits the reach of knowledge transformation and interactions. Thus, combining best advantages of traditional and technology-mediated instructions definitely expands the reach of teaching and learning. For instance, a learning activity which is conducted in a classroom using video conferencing actually is not only accessible for those who can attend at a fixed time and location but also reachable for those who are in remote areas or could not attend at a specific time (Singh & Reed, 2001).

**Improved cost and time effectiveness:** BL courses allow the participation of huge numbers of global learners in a short period of time. Spending on teaching facilities may
require less. Additionally, travel costs and time spent on learning and teaching have been reduced for both educators and learners (Graham, 2006; Singh & Reed, 2001).

Besides various benefits of BL mentioned above, challenges are also reported. A number of studies (e.g., Aycock, Garnham, & Kaleta, 2002; Bonk, Olson, Wisher, & Orvis, 2002) stated that learners encountered difficulties in getting familiar with and adjusting to BL. For example, learners’ poor management skills are reported as a dominant obstacle in hybrid courses (Aycock, Garnham, & Kaleta, 2002). So and Brush (2008) mentioned another problem of BL which is the less effective cognitive load in learning processes if components of BL environments are not well integrated. Regarding to designing BL, several major issues are identified by Graham (2006) including: (1) the role of live interaction, (2) the role of learner choice and self-regulation, (3) models for support and training, (4) finding balance between innovation and production, (5) cultural adaptation, and (6) dealing with the digital divide.

In sum, BL is considered as a teaching approach that combines both traditional and technology-mediated instructions into one instructional learning delivery with the aim to optimize the learning effectiveness and the best advantages of multiple teaching approaches’ aspects. There are many pedagogies that can be employed to blend multiple instructional methods. One of the most common pedagogy employed by teachers in blended learning is problem-based learning (Barrows, 1996). The following part will present overall review of this pedagogy.

2.2.2 Problem-based learning

Problem-based learning (PBL) is considered as one of the most innovative instructional delivery method implemented in education (Hmelo-Silver & Barrows, 2006; Hung, Jonassen, & Liu, 2008). Historically, PBL was first introduced in the 1950s in clinical settings. Initially, this pedagogical method was designed to support medical students in problem-solving and self-directed learning skills by embedding them to studying in real-life contexts (Hung et al., 2008). Due to its success in medical education, PBL has gradually been employed more broadly in various domains such as business, economics, law, engineering, architecture, etc. (Barrows, 1996). Especially, the use of PBL has been more
common in education, emphasized in higher education and K-12 education through 1990s (Hung et al., 2008). In educational contexts, PBL is defined as a student-centered pedagogy that typically involves students working collaboratively on complex and authentic problems in real-life contexts with facilitation from an instructor (Hmelo-Silver & Barrows, 2006). The ultimate goal of PBL is to help students enhance learning through problem-solving and therefore allow students construct their own knowledge and solutions.

This type of methodology has unique characteristics and features as presented in Hung et al. (2008). Firstly, it is problem focused, meaning that learning is carried out within the settings of actual ill-structured problems in real-world concerns. The content knowledge and skills are built up through the problem-solving process. Secondly, PBL is student-centered. That is, instead of focusing on teaching, PBL shifts the focus to learning in which students learning’s abilities are enhanced by having the students engage in finding solutions for authentic problems. Thirdly, PBL is self-directive and self-reflective. That is to say, students individually and collaboratively take initiative and responsibility for what occurs in their learning process. Besides, students are required to self-monitor and assess their learning progress. Finally, the teacher in PBL play a role as a facilitator, not merely as a knowledge provider. To be specific, teachers should be able to “support and model reasoning processes, facilitate group processes and interpersonal dynamics, probe students’ knowledge deeply, and never interject content or provide direct answers to questions.” (Hung et al., 2008, p. 489).

A numerous of existing studies show that PBL has certain effects on students’ learning outcomes related to acquisition of domain knowledge, retention of content, problem-solving skills, higher order thinking, self-directed learning, self-perception and confidence (Hung et al., 2008). Especially, PBL has been seen as an effective pedagogical approach in fostering students with problem-solving processes (Allen, Donham, & Bernhardt, 2011). For example, Gallagher et al. (1992) run a PBL course called the Science, Society, and Future to conduct an experimental research among higher school students. The findings showed that students considerably increased the use of critical problem-solving technique from pretest to post-test. Moreover, according to Lohman and Finkelstein (1999, as cited in Hung et al., 2008), PBL students are facilitated to enhance their abilities in applying
basic science knowledge and transferring acquired problem-solving skills into real-life contexts. Besides, PBL has been reported to have positive impacts on students’ higher order thinking or critical thinking skills (Hung et al., 2008). For instance, Shepherd (1998) applied the Probe Method in a 9-week PBL course and used the Cornell Critical Thinking Test to measure critical thinking skills among 4th and 5th grade students. It was evident that students gained better critical thinking skills after participating the course. The increase in skillful problem-solving and critical thinking leads students to be more confident, motivated, and self-directed learners (Hung et al., 2008).

2.2.3 Scaffolding PBL in blended learning environments

In BL environments, students’ self-regulation and self-management are emphasized because of the shifting from teacher-center approach to student-centered feature. Moreover, BL environments are better effective by taking advantages of both technology-mediated and traditional F2F learning environments. However, several constrains that students encountered when learning in BL environments were reported (Aycock, Garnham, & Kaleta, 2002; Bonk, Olson, Wisher, & Orvis, 2002). Students were found that have struggles when adjusting themselves in BL environments. Besides, considerable obstacles for students when learning in BL environments were lack of ICT literacy and self-management skills. Moreover, students were able to face the poor cognitive load in learning processes if components in a BL environment were not well worked together. These lead to the essential role of instructors as facilitators who provide appropriate scaffolding that supports students in dealing with possible struggles occurring in BL environments. Especially, within PBL contexts, the potential of scaffolding provided by the instructors that affects students’ performance was reported. Simons and Ertmer (2005) argued that the potential involved the three crucial goals: “1) initiating student’s inquiry; 2) aiding learners with concept integration and addressing misconceptions; and 3) promoting reflective thinking” (p. 4).

As discussed above, scaffolding has been suggested as an effective instructional method in various educational settings such as BL (e.g., Huang et al., 2012; Reingold et al., 2008; Sharma & Hannafin, 2007). It is said that scaffolding employed by instructors in BL
environments has been taken in many forms through utilizing technology. According to Lajoie et al. (2001), teachers can integrate multimedia in classroom to scaffold students by “providing (a) multiple modalities for representing real-world problems; (b) adequate information, advice, and feedback when and where needed; (c) opportunities to solve and reason about problems while applying scientific knowledge, and; (d) online resources that reduce memory load and increase the time for in-depth thinking.” (p. 157). Social media and networking technologies (such as Facebook, LinkedIn, course managements systems, blog services, etc.) are also utilized by teachers in classroom settings (Chen & Bryer, 2012). These can be seen as scaffolds to facilitate collaborative interactions, problem-solving, connection between textbook knowledge and real-life issues. Besides, Puntambekar and Hubscher (2005) reviewed several software tools which can be used to scaffold students in classrooms by structuring complex tasks and providing visualization and modelling. Particularly, for science learning, teachers can engage students using some tools such as: ThinkerTools, Knowledge Integration Environment, Model-It, or WorldWatcher environment, etc. (Puntambekar & Hubscher, 2005). Moreover, interactive technologies were reported to be effective scaffolds that support students’ cognitive and metacognitive thinking (Belland et al., 2011; Lajoie, Guerrera, Munsie, & Lavigne, 2001). For example, in the experimental study of Belland et al. (2011), a teacher employed Connection Log seen as computer-based argumentation scaffolds to facilitate 7th grade students with the skill of producing evidence-based arguments in a PBL unit. The Connection Log is actually a database-driven website which includes a conceptual framework that defines “(a) evidence-based arguments, (b) difficulties that middle school students have in creating evidence-based arguments, and (c) the process by which students create evidence-based arguments in PBL units (e.g., develop claim), and provides guidelines for the development of hard scaffolds to support the process (e.g., embed scaffolds within a system and have students articulate their thoughts).” (Belland et al., 2011, p. 672). The teacher supported students through encouraging them to use the Connection Log as well as guiding them how to use such scaffolds effectively. The finding stated that students who utilized the Connection Log during their learning considerably gained abilities in constructing evidence-based arguments.
To recap, scaffolding matters in a blended learning environment. Due to the complex features of BL environments, teachers need to provide appropriate scaffolding to support students in getting used with the learning delivery method, promoting collaborative interactions, self-regulation, cognitive and metacognitive thinking. Various types of scaffolds can be integrated in BL environments to serve those aims.

2.2.4 Implementing scaffolding into educational settings

In the scope of my study, scaffolding PBL in BL environments is focused. As presented above, students can get various benefits in learning from being scaffolded, especially within PBL in BL environments. However, this may lead to challenges for teachers who have to provide appropriate scaffolding for effective teaching. Scaffolding’s implementation for achieving crucial goals in supporting students’ learning is not easy. The difficulty in scaffolding students may come from both teachers and students. On the one hand, scaffolding’s effectiveness highly depends on teachers’ skills and ability in knowing how to create and apply assistance in teaching (Simons & Ertmer, 2005; Van Der Stuyf, Rachel R, 2002). Van Der Stuyf and Rachel (2002) explained several challenges that teachers may encounter when employing scaffolding in teaching. The biggest challenge is time-consuming because teachers need to anticipate, monitor and provide supports to meet the needs of students individually. Another challenge is that teachers may not be trained properly with scaffolding skills and methods, therefore the implementation of scaffolding may lead to unwanted or unclear effects. On the other hand, scaffolding’s success also depends on students’ ability in recognizing support provided as helpful or useful. In fact, despite of teachers’ intentions when designing and applying scaffolding into teaching, students may not be inclined to take advantage of such support (Simons & Ertmer, 2005).

The presented overview has shown many aspects of scaffolding in blended-learning environments. It is clear that many researchers investigated the effectiveness of scaffolding from the perspectives of teachers and multiple design’s factors. However, there is a lack of studies that would examine scaffolding’s success based on students’ viewpoint and recognition of the scaffolding provided. This present study serves to fill this gap.
3 AIM AND RESEARCH QUESTIONS

This study focuses on students’ interpretation of scaffolding provided by instructors in a blended learning environment. The main goal is to examine different types of scaffolding recognized by students that have impacts on their learning. Another goal is to consider the effectiveness of scaffolding based on students’ perspective.

The following questions are formulated to guide the research process:

*Question 1.* How do the students interpret instructors’ scaffolding in a blended learning environment?

*Question 2.* Are the students’ interpretations of scaffolding aligned with actual scaffolding when learning in a blended learning environment?

*Question 3.* How do the students evaluate the scaffolding’s effectiveness for their learning in a blended learning environment?

*Question 4.* Is there a correlation between the students’ interpretations and evaluation of scaffolding’s effectiveness in a blended learning environment?
4 RESEARCH METHODOLOGY

4.1 Research Design

In order to collect data for serving the aim of my research, I conducted a case study in a form of a blended training course. I cooperated with a local non-governmental organization in Danang, Vietnam named GreenViet Biodiversity Conservation Centre (GreenViet) to conduct a training course (as a non-formal education activity) for young people who have desires of contributing to biodiversity conservation. The course was planned, designed and coordinated by the researcher. This process was approved and supported by GreenViet’s department of communication and education.

The main aim was to design and implement interactive and effective learning situations in order to support learners achieving these two objectives:

- Gaining basic knowledge and understanding about Son Tra Nature Reserve and the endangered species red-shanked douc langur. The knowledge is supportive for designing and implementing communication and educational products and activities.
- Gaining basic knowledge and skills about designing communication products in the field of conserving biodiversity.

With the aim of creating flexible and interactive learning environments for students, blended teaching strategies were employed by combining traditional approaches with technology-enhanced teaching. The course lasted 6 days from October 27th to November 1st, 2015 with 3 main consecutive phases:

(1) Online learning – The three-day online training part was designed to equip learners with a sound knowledge base to nature conservation. The content consists of general information about Son Tra Nature Reserve and its conservation status as well as basic knowledge about environmental communication strategies. This phase was instructed and coordinated by the researcher through online learning platform “Versal” and a Facebook group named “Voicing out for Nature”.

(2) Fieldwork experience - A half-day fieldwork was conducted for all participants to observe biodiversity and conservation status in Son Tra Nature Reserve. The excursion was instructed by two educational officers of GreenViet.

(3) Group-work – 20 students were formed in groups of 4 members based on geographical areas of their living places. After taking the online training part and fieldwork experience, each group flexibly worked online and offline to design and present a communication product to raise awareness of target audiences about an endangered species in Son Tra Nature Reserve. A presentation day was held face-to-face that provided an opportunity for students to present, discuss their ideas and receive feedback and comments from instructors.

The course language was in Vietnamese. The following table 2 will give a brief summary about the course activities and corresponding educational purposes:

**Table 2 Summary of the course activities**

<table>
<thead>
<tr>
<th>Section</th>
<th>Time</th>
<th>Content</th>
<th>Activity and task</th>
<th>Learning method</th>
<th>Educational purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Online Learning</strong></td>
<td>Flexible in first 3 days</td>
<td>3 lessons through Versal platform: - Lesson 1: General information about Son Tra Nature Reserve and the endangered primate species red-shanked douc langur; - Lesson 2: Knowledge about Environmental</td>
<td>- Reading and watching materials in Versal platform; - Individual work: 2 quizzes and 3 assignments related to the three lessons;</td>
<td>- Self-learning through e-learning platforms; - Peer discussing</td>
<td>- Providing students basic knowledge about Son Tra NR and its conservation status as well as environmental education and communication.</td>
</tr>
</tbody>
</table>
Problem-based learning as an instructional approach

The researcher employed PBL as the main instructional approach in designing and implementing this course. Particularly, the learning situations that are set up in the course were based on the principles of PBL. The problem was introduced at the beginning of the course played as a main reason that makes the whole learning process matters. Participants were first activated prior knowledge, were provided relevant knowledge and skills through online learning and fieldwork phases, then were asked to work in small groups toward a
solution for the given problem under the instructor’s facilitation. The instructors were responsible for monitoring and supporting five groups during the problem-solving process.

**Learning environment platforms**

**Versal**

Versal is an open publishing e-learning platform that allows teachers to create interactive lessons. The researcher employed this platform to design lessons and store all of knowledge and relevant information of the course (see Figure 4). Here is the link to the learning platform: [https://versal.com/c/en0a7y/l-n-ti-ng-cho-thi-n-nhi-n](https://versal.com/c/en0a7y/l-n-ti-ng-cho-thi-n-nhi-n).

**FIGURE 4 THE COURSE’S PLATFORM IN VERSAL.COM**

Various learning sources were embedded into the online platform and formed with a logical and clear structure that helped learners easily to do the self-learning and search for necessary information. Besides, the platform allowed:

- Collaborative learning through the connect with joint writing and brainstorming;
- Interactive activities that kept learning interesting and informative;
- Enable discussing with peers and instructors through discussion box.
Facebook

In recent years Facebook has become a popular social networking site and a potential in teaching and learning. A study of Wang, Woo, Quek, Yang, and Liu (2012) indicated that Facebook Group is functional as a learning management system when conducting a course. Taking advantage of many benefits from Facebook, I used Facebook Group as the main channel for connecting participants of the course. In fact, Facebook Group served as the following functions:

- Learning management system that allowed instructors provide scaffolds to support learners: posting up announcements, task reminding, sharing recourses, and organizing learning activities;
- Connecting instructors and learners as well as conducting online discussions, supporting social interactions among participants: peer discourses and teacher-learner interactions.
- Learning platform that allowed learners to submit learning tasks/ assignments; view, discuss and exchange thoughts with peers.

Besides, Facebook instant message was used to facilitate interactions between teachers and learners.

In sum, these learning environments provided various learning needs and possibly facilitated interactions and discussions among participants both on synchronous and asynchronous perspectives.

4.2 Participants

There were 20 students participated in this study (N=20), 75% of those students were female and the average age was 21 years old. These learners were chosen from those who voluntarily registered the training course through a register form, which was introduced via Facebook page and website of GreenViet. A consent form was sent to all participants to inform them about the study and ask their permission for collecting data. All participants were students from different universities in Danang, Vietnam. Learners were asked to join
all the course activities, be active in discussing and contributing to joint learning through FaceBook and groupwork; and return a feedback form after the course ending.

The researcher of this study was the main instructor and coordinator of the training course. Coordinating activities were conducted through internet via email and Facebook from Finland. Besides, there were two educational officers from GreenViet, Danang, Vietnam who joined the course as instructors mainly in face-to-face phases.

4.3 Data Collection

As discussed above, the main aim of this research is to study different types of scaffolding provided by instructors based on students’ perspective during the blended training course. In order to accomplish this aim, the researcher used different methods to collect data. These methods can be divided into two main sets: self-completion questionnaires and text-based documents including FB postings, chat discussions, emails, and instant messages.

4.3.1 Self-completion questionnaires

Self-completion questionnaires are broadly used as a common data collection method in medical, educational and social science researches (Bowling, 1997; Lister-Sharp et al.,; Scott and Usher 1999; as cited in Strange, Forest, Oakley, & Ripple Study Team, 2003). They are recommended because of cost effectiveness, particularly when collecting data from a large sample. Besides, in some situations, self-completion questionnaires are preferred because people are often more comfortable when expressing their opinions and thought by self-writing rather than being interviewed.

In this study, questionnaires were delivered to learners via email at the end of the training course to get their feedback about various perspectives of the course and their reflection of the learning process. There are 17 questions including closed-ended and open-ended questions divided into four main parts: (1) Self-evaluation; (2) Instructor’s role; (3) Course overall; (4) Suggestions (see Appendix A). These data are important for understanding the learner’s interpretation of instructors’ scaffolding.
17/20 questionnaires were returned from 20 learners.

4.3.2 Text-based documents

Text-based documents are another important data sources in this study. These documents include: FB postings, FB instant messages, and emails among teachers and students occurred during the training course. The documents are all copied and stored in Word files that are served for content-data analysis. This kind of data is essential to reveal the manifestation of instructors’ scaffolding during the course.

4.5 Data Analysis

4.5.1 Research methodology

This study employed a qualitative case study approach (Baxter & Jack, 2008; Stake, 1995; Yin, 2003) as the main guideline to understand students’ expressions on instructors’ scaffolding in a blended-learning environment. The approach was considered because of these following reasons:

First of all, I used qualitative methodology as a main approach for my study. Searching for the key features of qualitative research presented in Schreier (2012), I realized that my study case’s setting and purpose are fixed using the suggested research methodology. Followings will be several features of qualitative research mentioned in Schreier (2012) (and the link to my study case: (1) Qualitative research is interpretive: the methodology helps me deal with the visual data that requires interpretation. Data interpreted serves the aim of describing the meanings of a social phenomenon, which is teachers’ scaffolding to support students’ learning in a blended course; (2) Qualitative research is naturalistic - it emphasizes the real-life contexts in its settings because this brings authentic, meaningful and rich information for data collected. In my case, the context was a blended training course conducted for young students in Danang, Vietnam; (3) Qualitative research is situational because contexts matter in forming the meanings of data. In other words, the data is highly dependent on specific contexts; (4) Qualitative research is reflexive: this feature emphasize the element of human beings among participants in social studies. In
this sense, I as the researcher and my partners co-conducted the process and co-produced data and meanings of the research; (5) Qualitative research is inductive meaning that concepts and categories are let to be emerged from the data itself; and (6) Qualitative research is case-oriented that allows a holistic view and in-depth understanding of the study.

Secondly, case study was employed as the research strategy following suggestions of Yin (2003) when considering the use of case study approach: (a) the study focuses on answering questions of “how” and “why”. Research questions in this sense are generally related to how the students interpret the instructors’ scaffolding and actual scaffolding is manifested in the blended learning environment; (b) the researcher cannot manipulate participants’ behavior; and (c) the contextual conditions are covered because they are related to the study’s phenomenon. In particular, the case was conducted with the participation of voluntary students and teachers in a non-formal educational activity context seen as a blended course focusing on the teachers’ scaffolding that helped students' learning. This setting enables the researcher to have an authentic picture of the instructors’ scaffolding in the given learning environment.

Additionally, the case study I conducted is descriptive. In other words, I used descriptive case study with the aim to describe the phenomenon of instructors’ scaffolding occurring in real-life context (Yin, 2003), which is a blended training course for young students about wildlife conservation education.

For the reasons mentioned above, I would conclude that qualitative case study methodology is the most appropriate approach to be used in my study.

4.5.2 Data analysis

Qualitative content analysis (QCA) was used as an analyzing strategy. QCA is a method for “systematically describing the meaning of qualitative material” (Schreier, 2012) - QCA helps researchers construct meanings for given materials in order to describe phenomena purposefully (or in certain perspectives to serve specific purposes). According to Schreier (2012), QCA is a systematic and flexible method that fits with main features of qualitative
research. To be specific, in line with the qualitative research approach mentioned above, QCA shares its characteristics: it is interpretive, which is applicable in interpreting visual data; it is naturalistic and situational in considering the interpretation of data in the specific real-life context; it is reflexive in the way that taking other people’s perspectives into account when interpreting data and coming up with findings; and it is inductive in partly letting categories and concepts generated from data. For the nature of these features, I decided to employ QCA as the suitable method to get findings from available materials. Besides, quantitative methods were also used to deal with statistic data available in data sources.

By processing relevant data, the study’s concerns were revealed. The following parts will reflect the procedure of analyzing data in order to answers the four research questions.

Firstly, codes were given to instructors and learners with the aim to simplify the data analysis and respect participants’ anonymity. Participants were abbreviated with alphabet letters (instructor as “I” and learner as “L”) and followed by the corresponding number of instructors or learners (example: I1, I2, I3 and L1, L2,…,L20).

Secondly, data was gathered and selected to be processed. Because the case study was conducted in various learning environments and platforms, sources of data are abundant. Therefore, it is essential to emphasize the concentration on data processing. In other words, I was aware of what to look for through data in order to find out answers for the problems. My analyzing followed steps suggested by Schreier (2012) as illustrated in Figure 5.

Initially, after reviewing the research questions and selecting appropriate materials, I developed a coding frame based on selective previous studies about types of scaffolding. Particularly, the studies I referred including Hannafin et al. (1999) about types of scaffolding in open learning environments and Jumaat and Tasir (2014) about types of scaffolding in online learning environment.
Next, relevant text-based documents were divided into paragraphs which were served as the units of analysis. The boundary between paragraphs was based on changes in topic. To be specific, in questionnaires data, paragraphs constituted of learners’ opinions and expressions were marked by different questions. Meanwhile, paragraphs from FB postings, messages, and emails were divided based on changes in topic of discourses among participants. Statements from each unit of analysis then were all coded.

In order to answer the first question concerning to students’ interpretation of instructors’ scaffolding, I started coding students’ feedback and only the feedback related to interpreting scaffolding was counted. As a results, there are 102 scaffolding-related statements in total. At this point, I combined concept-driven and data-driven strategies (Schreier, 2012) for the development of the coding system. To be specific, statements from students were initially categorized based on the above coding frame, which was following the concept-driven approach. Then, based on what students expressed, I modified and developed the coding frame and came up with the categories generated from data itself (data-driven approach). The corresponding functions and methods of the found types of scaffolding were also explored based on students’ explanation. Table 3 illustrates the coding framework about four types of scaffolding as a result of the data analyzing:
### TABLE 3 CATEGORIES OF SCAFFOLDING - THE CODING FRAMEWORK OF THE PRESENT STUDY

<table>
<thead>
<tr>
<th>Categories</th>
<th>Operational definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procedural scaffolding</td>
<td>Assists learners in using available functions and features to proceed learning procedure</td>
</tr>
<tr>
<td>Cognitive scaffolding</td>
<td>Assists learners in acquiring content knowledge available in the course</td>
</tr>
<tr>
<td>Metacognitive scaffolding</td>
<td>Guides learners in how to think during learning: ways to think about a problem under study and/or possible strategies to consider</td>
</tr>
<tr>
<td>Social scaffolding</td>
<td>Assists learners with social and mental aspects</td>
</tr>
</tbody>
</table>

Regarding to answering the second question about actual scaffolding manifested during the blended training course: Statements from instructors were also all coded based on modified coding frame to see the alignment between students’ interpretations from their feedback with the actual scaffoldings provided. Examples are given to demonstrate the alignment.

For answering the third and forth question, I used statistics including frequency, mean, standard deviation and Spearman correlation.

In this present study, I employed *triangulation strategy* (Jick, 1979) through qualitative and quantitative methods to facilitate the *validation* of interpreted data and confirm the findings. To be specific, the effectiveness of scaffolding provided by the instructors in the training course was examined based on multiple methods including asking students about their interpretations to the scaffolding, analyzing actual scaffolding’s manifestations during the training course, and asking for students’ rating of the scaffolding’s success.

For the reliability to be calculated, I used intra-rater reliability (Rankin & Stokes, 1998) as a measure for the research’s consistency. That is, a comparison of the two codings about types of scaffolding interpreted by students from the same researcher on two occasions (2-week difference) was made to examine the degree of consistency. The intra-rater agreement in this case was 84.51% (Kappa: 0.84). As this figure is high, the reliability therefore was confirmed.
5 RESULTS

Based on students’ feedback, various aspects of scaffolding provided by the instructors were revealed. Students recognized and appreciated the scaffolds that helped their learning. The findings are presented following corresponding research questions that are mentioned above. Tables and visual figures are created to illustrate clearly the results.

5.1 Students’ Interpretation of Instructors’ Scaffolding in Blended Learning Environment

There are four types of scaffolding that were recognized by students based on the basis of their functions and mechanisms. Scaffolding’s functions emphasize the purposes served, and mechanisms stress the methods used when scaffolding is provided (Hannafin et al., 1999). These types include (a) procedural scaffolding; (b) cognitive scaffolding; (c) metacognitive scaffolding; and (d) social scaffolding. Table 4 presents frequencies of students recognized the scaffolding provided by instructors and their statements mentioned about such support. In general, cognitive scaffolding is most recognized by 94.12% of students with 40 scaffolding-mentioned statements whereas metacognitive scaffolding was the least recognized scaffolding type by 58.82% with 20 scaffolding-mentioned statements.

Table 4. Frequency of Students Recognized the Instructors’ Scaffolding and Statements Mentioned About It

<table>
<thead>
<tr>
<th>Type of scaffolding</th>
<th>Learners</th>
<th>Statements</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$f$</td>
<td>%</td>
</tr>
<tr>
<td>Procedural scaffolding</td>
<td>11</td>
<td>64.71</td>
</tr>
<tr>
<td>Cognitive scaffolding</td>
<td>16</td>
<td>94.12</td>
</tr>
<tr>
<td>Metacognitive scaffolding</td>
<td>10</td>
<td>58.82</td>
</tr>
<tr>
<td>Social scaffolding</td>
<td>13</td>
<td>76.47</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>N = 17</strong></td>
<td><strong>102</strong></td>
</tr>
</tbody>
</table>
Each of these four types of scaffolding is presented in Table 5 has its own functions as well as the mechanisms and methods employed by instructors that support the learning process. Following is the detailed description of each type of scaffolding:

**TABLE 5. TYPES OF SCAFFOLDING BASED ON STUDENTS' PERSPECTIVE**

<table>
<thead>
<tr>
<th>Scaffolding types</th>
<th>Functions</th>
<th>Related Methods &amp; Mechanisms</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Procedural scaffolding</strong></td>
<td>Supports/ guides to utilize the available course's functions and features; ongoing help and advice to smooth students’ learning procedure</td>
<td>Coordinating learning activities: Help students in registering course, enrolling web-based learning platform, joining FB group discussion, grouping, arranging time schedule, etc. Technical advising: Guide learners how to use and employ tools and resources provided in the course</td>
</tr>
<tr>
<td><strong>Cognitive scaffolding</strong></td>
<td>Tools, scaffolds and ongoing help that support learning and course content</td>
<td>Designing and providing learning platforms; making a variety of resources and materials lively by using infographic, visuals and imagery, etc. Cognitive advising: Providing additional information, experiences and explanations related to content-knowledge</td>
</tr>
<tr>
<td><strong>Metacognitive scaffolding</strong></td>
<td>Guides how to think during learning: ways to think about a problem under study and/or possible strategies to consider</td>
<td>Providing issues, questions, hints and prompts to facilitate learning and discussions among participants</td>
</tr>
<tr>
<td><strong>Social scaffolding</strong></td>
<td>Create and maintain helpful learning atmosphere and social interaction</td>
<td>Creating learning environment that possibly allows learners engaging in learning activities Inspire learners based on knowledge, experience, attitude and behaviors</td>
</tr>
</tbody>
</table>
5.1.1 Procedural scaffolding (11 learners, 19 statements)

Procedural scaffolding is provided by instructors using scaffolds such as supports/ guides to utilize the course’s functions and features or ongoing helps and advices to smooth students’ learning procedure. From students’ feedback, this type of scaffolding is to make sure all questions and problems related to learning procedure raised during the course are explained and solved reasonably by instructors. Generally, the learners felt comfortable and easy to attend learning activities thanks to such assistance. In other words, procedural scaffolding plays the role as lubricant to smooth the learning process and makes it accessible.

There are 19 statements written by 11 students recognizing procedural type of scaffolding. Besides the function of this scaffolding mentioned above, related methods and mechanisms used by instructors are also recognized. There are two main mechanisms, namely coordinating learning activities and technical advising presented as follow:

**Coordinating learning activities**

The main instructor of the training course acted the role of course coordinator in order to organize learning and teaching activities as well as get learners involved in the learning process. The coordinating activities that were mentioned in students’ feedback include: supporting students in registering the course, enrolling web-base learning platform, joining FB group discussion, grouping, arranging learning schedule. The following example is taken from a student’s feedback, which is a demonstration for the procedural scaffolding using coordinating methods:

*Group formulation was flexibly discussed and arranged based on geographical area and conditions about means of transport (motobike) that helped learners are able to attend the excursion together as well as have F2F group meetings.* (L16)

Another student confirmed the help of the instructor concerning to the course’s enrollment: “*When I could not receive emails because of my mistake, Ms. Huong contacted me on Facebook so that I could continue to attend the course*” (L4).
**Technical advising**

In addition to the coordinating learning activities, the instructor also provided ongoing supports and guides that helped students use and employ available tools and resources. This kind of scaffold is identified as technical advise, aiming to get leaners be familiar with the course’s functions and features, as well as provide a technologically friendly learning environment. Common comments from students are: Learning tools are simple and easy to use; the video of the course’s general instruction is useful, clear and easy to follow step by step. The example below is an illustration for the student’s interpretation of this scaffold:

From L3’s feedback:

*When I didn’t know how to fill information into the Google doc in the first lesson, I asked and quickly received answer from the teacher. It was very easy to understand and follow her instruction.*

From L10’s feedback:

*When observing the red-shanked douc langurs in Son Tra Nature Reserve, the instructors assisted learners using binoculars so the learners could observe the species clearer.*

5.1.2 Cognitive scaffolding (16 learners, 40 statements)

Cognitive scaffolding is the scaffolding that was most recognized by the students with 16 out of 17 students (94.12%) reflected in 40 statements. Developed from students’ feedback, cognitive scaffolding is defined as a type of scaffolding in which the instructor provides tools, scaffolds and ongoing help that support learners to acquire content-knowledge of the course. A number of students wrote that the instructors’ scaffolding in cognitive perspective was an important support to facilitate the process of internalizing provided information into their own knowledge. Mechanisms employed to provide cognitive scaffolding are identified into two main groups as presented below:

**Course designing**
Most of students appreciated efforts of the instructors who designed and provided an accessible and interesting course for them so that they easily absorbed content-knowledge. Generally, the course design techniques recognized by students include: planning and preparing lessons; providing learning platforms; visualizing learning resources and materials; and gamification.

A student wrote “The theory lessons of this course are concise, interesting and understandable that attract learners. For example, the video ‘I am a red-shanked douc langur’ is very creative and informative”. Another emphasized “Knowledge and information are easy to understand and remember through games such as quizzes and matching”. Concerning the method: providing appropriate learning platforms, there is a comment: “The learning platforms are designed lively and interactively with infographics, visuals and imagery, etc. that encourage learners to self-learning and discovering.”

**Cognitive advising**

A number of students reflected that they found out their instructors as cognitive advisors who were supporting their learning during the training course. The cognitive support includes providing additional information, explanations and sharing experiences related to content-knowledge. A learner wrote: “The instructor Tuan provided practical concepts and examples related to the red-shanked douc langurs that helped me gain knowledge clearly. The instructors Trang and Huong always shared their own working experiences with learners to better orientate learners in the learning field.” Another learner confirmed: “The instructors provided additional knowledge to help me gain more understanding about environmental communication.”

5.1.3 Metacognitive scaffolding (10 learners, 20 statements)

The function of metacognitive scaffolding found was in line with description by Hannafin, Land, and Oliver (1999): “guides how to think during learning: ways to think about a problem under study and/ or possible strategies to consider” (p. 131). As showed in table 4, there are 10 learners (account for 58.82% of total learners) recognized metacognitive scaffolding provided by instructors. 20 out of 102 statements (19.61%) from students
mentioned this type of scaffolding. Generally, what was commented by learners about this support is through providing issues, questions, hints and prompts that helps facilitating self-learning and discussions among participants during the training course. Here are several examples:

*L1*: The teacher posed situational issues that helped learners to see the problems from multiple perspectives/both sides of an issue. Ex: the debatable issues related to breeding wild animals in semi-wild conditions.

*L7*: When I wonder the possibility for red-shanked douc langurs living in semi-wild habitats, the teacher (Huong) helped me to examine both sides of the issues and then suggested us to seek more advice from an expert in this field (the RSDL researcher) when we go for the field-studying.

*L3*: The instructors provided understandable hints to guide learners in thinking and solving problems.

5.1.4 Social scaffolding (13 learners, 23 statements)

Social scaffolding is a category that I developed from the students’ feedback using the data-driven approach. The students mentioned and emphasized the learning atmosphere and social interaction given by instructors during the blended course. According to many of them, the instructors were always *happy, patient, and enthusiastic* when teaching and explaining things to learners. There were many more adjectives using when the learners described their instructors, namely: *close, friendly, cozy, helpful, devoted, open, caring, inspiring and passionate*. The learners confirmed that these characteristics and attitudes from instructors created a friendly and social learning atmosphere that allowed them to feel free and comfortable while studying and even made a great impact on their thinking. Thus, I developed a new type of scaffolding as *social scaffolding*. I defined this scaffolding as *social/mental supports* from instructors that help create and maintain positive and inspiring learning atmosphere for learners.
Social scaffolding during the course was the second most mentioned by students in their interpretations. There are 13 out of 17 students (76.47%) recognized this type of scaffolding with 24 statements. There are two sub-categories of social scaffolding as its mechanism interpreted from these statements, as presented below:

**Creating positive learning atmosphere**

The learners indicated that a friendly and happy learning atmosphere given from the instructors through their attitudes allows and promotes them engaging in learning activities. Several comments from the learners about this:

- **L2**: The instructors always made cozy and friendly learning atmosphere to encourage learners ask and share thinking more easily.
- **L3**: The instructors were very devoted in teaching, explaining and providing knowledge. The way of explanation is friendly that helped me feel comfortable and do not feel scary to join the course.
- **L10**: During the field trip, although it was scorching hot, the instructors Tuan and Trang always answered every questions from learners happily and enthusiastically.

**Inspiring learners**

Besides creating positive learning atmosphere, the instructors also can inspire learners based on their own knowledge, experience, characteristics, and behaviors. One of the learners wrote: “The instructors are very enthusiastic and passionate about wildlife conservation.” Another shared: “The instructors are very enthusiastic and have great experiences in the field of researching and communicating for wildlife conservation. What they have worked fore inspired me to have better motivation in pursuing my career.”
5.2 The alignment between the Students’ Interpretations of Instructors’ Scaffolding and Actual Scaffolding Manifested in Blended Learning Environment

The second research question aims to find out the alignment between students’ interpretations of the scaffolding provided by the instructors and the actual scaffolding happened during the blended training course. Findings confirm this alignment and present the alignment nature.

**Actual scaffolding manifested through instructors’ statements**

The four types of scaffolding recognized by the students were confirmed in actual scaffolding provided by the instructors. Table 6 presents frequencies of scaffolding-related statements mentioned by students in their feedback and provided by the instructors during the training course.

**Table 6. Frequency of statements indicated the scaffoldings from students’ feedback and instructors’ statements**

<table>
<thead>
<tr>
<th>Types of Scaffolding</th>
<th>Students’ scaffolding-mentioned statements</th>
<th>Instructors’ scaffolding-related statements</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
</tr>
<tr>
<td><strong>Procedural scaffolding</strong></td>
<td>19</td>
<td>18.63</td>
</tr>
<tr>
<td><strong>Cognitive scaffolding</strong></td>
<td>40</td>
<td>39.22</td>
</tr>
<tr>
<td><strong>Metacognitive scaffolding</strong></td>
<td>20</td>
<td>19.61</td>
</tr>
<tr>
<td><strong>Social scaffolding</strong></td>
<td>23</td>
<td>22.54</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>102</td>
<td>100</td>
</tr>
</tbody>
</table>

**Procedural scaffolding** was the type of support most employed by instructors. 61 out of 130 statements from instructors are functional for supporting the procedural aspect of the learning process. For example, there is a FB posting from the main instructor guided and informed the learners to join the upcoming learning activities:
I finished forming groups, based on your geographical living locations for the convenience of group working. Please go to this google doc link to see the details, find and contact your group’s members to start working and arranging motorbikes together for the excursion next Friday. (II)

**Cognitive scaffolding** was the least scaffolding type provided by instructors. There are only 9.23% of instructors’ statements with 12 statements used for scaffolding learners in the aspect of perceiving content-knowledge during the training. Through the postings, the instructors provided additional information and explanations related to contend-knowledge. For instance, when a learner answered to a question about environmental communication methods through Facebook, the main instructor made a comment:

> Besides what you have mentioned in your answer, you can also consider listening skill as an important factor. This skill help us to understand the target audiences, be aware of their feedback and then can lead to better adjustment and adaptation in communication method. (II)

**Metacognitive scaffolding** was the second scaffolding type most used by the instructors with 33 statements posted. These postings guided the learners on how to think and find out strategies for solving problems. The guide can be questions or issues posted in Facebook to create a debate between learners, for example:

> Debatable issues: In the project proposal “Restoring terrestrial and marine ecosystems at Son Tra Nature Reserve” by the Danang’s Department of Environmental Protection (11/2011), there is a suggestion: “Piloting breeding conservation prioritized wildlife species in semi-wild conditions” including the species red-shanked douc langur with the aim to conserve animal species with rare genes. Are you for or against this suggestion? (II)

Metacognitive scaffolding can also be hints or prompts posted during learners’ discussion to guide them think as well as facilitate the learners’ engagement. A discussion among participants about answering the debatable issues mentioned above is selected to illustrate the metacognitive scaffolding:
I1: Besides several advantages of this approach that you mentioned, you can consider drawbacks. For example: wild animals can be traded through semi-wild farms.

L11: The issues seems to be broader and more complicated than I thought.

I2: So we need to discuss and debate more to find out the most appropriate solutions. There is not really perfect solution for this issue.

I1: when joining the excursion to Son Tra Nature Reserve next few days, you can ask Tuan, an expert in researching primates to see what is his opinion about whether red-shanked douc langurs can be adaptive well or not in the semi-wild conditions.

As can be seen in this example, the instructor I1 provided a hint to guide the learners think about drawbacks besides advantages in order to examine both sides of the given issues. This instructor then suggested learners to seek help from an expert to finalize the answer for the debatable issues.

Social scaffolding was also manifested through 18 statements posted by the instructors. These statements were mainly used for promoting social interactions between participants and creating a friendly leaning atmosphere. According to a learner’s feedback, the introductions from the three instructors through Facebook postings helped the learners feel the friendly and cozy atmosphere. An instructor’s introduction is given below:

Hi all, I am Trang, who is in charge of conducting communicating activities to inspire communities to love and protect for the Red-shanked douc langur in Son Tra. I have been famous with the Danang’s youth with the saying ‘Except money, I can give you everything’. I hope that you will exploit me as much as you can. (I2)

The alignment between students’ interpretation of the instructors’ scaffolding and the actual scaffolding
As showed in Figure 6, there are similarities and differences when aligning the learners’ interpretations about the instructors’ scaffolding with the actual scaffolding manifested during the blended learning. The group of similarities includes metacognitive scaffolding and social scaffolding. It means there are not much difference in the frequencies in the percentage of the number of statements related to scaffolding interpreted by students and given by the instructors. Concerning with metacognitive scaffolding, 25.38% of statements posted by the instructors are served to this type of scaffolding and there are 19.61% of statements that the students wrote to mention it. About social scaffolding, the two figures are 18.47% and 22.54% respectively. Reasonably, with percentages of scaffolding related-statementsthat the instructors used in supporting the learners with metacognitive and social aspects, their students’ reflection shows the the similar percentages of scaffolding mentioned-statements.
On the other hand, the group of differences includes procedural scaffolding and cognitive scaffolding. The figure 6 shows clearly these huge differences. Regarding to procedural scaffolding, while the instructors gave 46.92% of scaffolding related-statements to scaffold the learning procedure, their students only mentioned this type of scaffolding in 18.63% of their statements about scaffolding. Meanwhile, concerning to cognitive scaffolding, while the instructors only used 9.23% of scaffolding related-statements to support learners in perceiving content-knowledge, the learners recognized this type of scaffolding the most with 39.22% of scaffolding mentioned-statements.

5.3 Students’ evaluation on the effectiveness of instructors’ scaffolding to their learning in blended learning environment

<table>
<thead>
<tr>
<th>Table 7. Students’ rating of scaffolding’s effectiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max</td>
</tr>
<tr>
<td>10</td>
</tr>
</tbody>
</table>

In overall, the students highly evaluated the effectiveness of the instructors’ scaffolding in helping their learning. As shown in Table 7, with the evaluation scale from 0 to 10, the mean rating given by the students as 8.60 and the standard deviation was 1.61. The maximum value given is 10 while the minimum rated value is 5. It can be said that, the instructors’ scaffolding was well-recognized by the students and there was not much difference in the students’ evaluation about the benefits of the scaffolds for their learning in blended learning environment.

There are 12 out of 17 (70.59%) learners rated the effectiveness of the instructors’ scaffolding above the average point (8.60) with the values are 9 and 10. Through the explanation of this group of students about their evaluation, all types of scaffolding were mentioned. Majority of students stated that the instructors’ scaffolding helped them gain more knowledge and skills related to wildlife conservation and communication. Besides, a number of students explained that they felt free and enjoyed during the learning process
because the instructors were enthusiastic and friendly when teaching and interacting with the learners. Some of them confirmed most of their questions and issues raised during the training course were explained and solved thanks to the instructors. These students also described specific situations when the instructors’ scaffolding worked for them. For example, the learner L1 shared a situation when she received metacognitive scaffolding: “In the phase of presenting communicating ideas, the instructors gave comments and questions that helped me to perceive problems concerning our group’s ideas.” Another learner gave an example about the cognitive scaffolding he got during the field trip: “When I was confused when distinguishing between male and female of the Red-shanked dour langur, the instructor Tuan thoughtfully explained that a male is the one who always sit with the two legs open widely while a female is the one who usually closes her legs when sitting.”

On the other hand, 5 out of 17 (29.41%) students rated the effectiveness of instructors’ scaffolding below the average point with the values are 8, 7, and 5. Some of these students specified both plus and minus points to explain their decision, meaning that there were situations in which the instructors’ scaffolding worked for them but there were also other situations that scaffolding did not work. One student stated that “Online lessons helped me gain content-knowledge easily”. Another shared a situation “When the deadline for presenting communicating ideas approached closely, the instructor quickly asked learners’ opinions and made appropriate adjustment based on groups’ current situations. This action from the instructor was helpful in orientating me and groups more clearly in preparing the presentation.” Meanwhile, several explanations and examples are also given to reason students’ low evaluation includes several issues such as: differences in time zone and distance between the main instructor and learners caused difficult and limited interactions as well as supports; the facilitation through Facebook and email was not really effective. For instance, a student (L17) wrote that “Because of geographical distance, learners could not work in person with the instructor, this led to the constrain in interactions between instructor and learners”.
5.4 The connection between the students’ manifestations and evaluation of benefits of the scaffolding in blended learning environment

TABLE 8. NUMBER OF STATEMENTS MENTIONED ABOUT SCAFFOLDING AND STUDENTS’ EVALUATION

<table>
<thead>
<tr>
<th>Learner</th>
<th>Number of statements mentioned about scaffolding</th>
<th>Evaluation for effectiveness of scaffolding</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Procedural scaffolding</td>
<td>Cognitive scaffolding</td>
</tr>
<tr>
<td>L1</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>L2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>L3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>L4</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>L5</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>L6</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>L7</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>L8</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>L9</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>L10</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>L11</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>L12</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>L13</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>L14</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>L15</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>L16</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>L17</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>19</strong></td>
<td><strong>40</strong></td>
</tr>
</tbody>
</table>

Table 8 shows the numbers of scaffolding-mentioned statements made by the students and their evaluations on scaffolding’s effectiveness. As a result from testing the correlation between the numbers of statements mentioned about instructors’ scaffolding by students and their evaluation of the effectiveness of that scaffolding, the value of R (Spearman correlation) is 0.22415 and the two-tailed value of P is 0.3871. By normal standards, the association between the two variables would not be considered statistically significant.
This is to say, there was no connection between the students manifestations and evaluations of the effectiveness of the scaffolding.

5.5 Summary of the results

In order to have a clear and close understanding of the study’s findings in relation of research questions, a brief summary is given below.

The first question aimed to find out how students interpret the scaffolding provided by the instructors that serves to support them in a blended learning environment. To be specific, the relevant concerns are: whether students are able to recognize the instructors’ scaffolding, which types of scaffolding that students interpret, and their detailed explanations related to the scaffolding. The findings show the recognition of scaffolding from students’ perspective based on their scaffolding-related statements they wrote in their feedback. There were four types of scaffolding recognized: (1) procedural scaffolding; (2) cognitive scaffolding; (3) metacognitive scaffolding; and (4) social scaffolding. Cognitive scaffolding was the most recognized type. Meanwhile, metacognitive scaffolding was recognized least. Besides, social scaffolding and procedural scaffolding received an average recognition.

Students interpreted these types of scaffolding by describing their functions and methods used by the instructors. Firstly, procedural scaffolding was employed by instructors through support, guides, advices and ongoing help to assist students in utilizing the course’s features and smooth their learning procedure. The two methods used by instructors to provide this assistance that were interpreted by students include: coordinating learning activities and technical advising. Secondly, cognitive scaffolding which was recognized by students is defined as scaffolds that assist students gain the content-knowledge of the course. Related mechanisms employed by the instructors were recognized as course designing and cognitive advising. Thirdly, metacognitive scaffolding type is defined as guides provided by the instructors that help students how to think during learning. According to students, the instructors delivered such support through providing issues, questions, hints and prompts that helped to facilitate students’ self-learning and discussions.
as well as interactions among participants during the training course. Finally, *social scaffolding* is considered as a support that is related to social and mental perspectives. Students confirmed such scaffolding helped create and maintain positive and inspiring learning atmosphere that allowed them to easily and comfortably attend the course. Moreover, students were inspired by the instructors’ teaching ways, knowledge, experience, behaviors, as well as characteristics.

Briefly, students did recognize the scaffolding provided by the instructors during the blended learning course and had their own understanding about such support from multiple perspectives. This leads to the second question that attempted to see the alignment between the students’ interpretations of provided scaffolding and actual scaffolding manifested during the training course. Concerning to the actual scaffolding, evidence shows that the four types of scaffolding interpreted by the students were manifested in actual scaffolding. The instructors employed procedural scaffolding the most in their teaching. Meanwhile, cognitive scaffolding was the least support provided by the instructors.

The alignment between students’ interpretation of the instructors’ scaffolding and the actual scaffolding manifested was examined by comparing the percentages of scaffolding-related statements given by students and instructors. As a result, there were similarities and differences. The group of similarities included metacognitive scaffolding and social scaffolding. That is, there were not much difference in the percentages of the number of statements related to these two types of scaffolding interpreted by students and given by instructors. In other words, with percentages of scaffolding related-statements that the instructors posted in helping students with metacognitive and social aspects, their students reflected such scaffoldings with similar percentages of scaffolding mentioned-statements. In contrast, procedural scaffolding and cognitive scaffolding belonged to the group of differences. Particularly, the percentages of scaffolding-related statements given by the students and instructors in the two scaffolding types were very uneven.

The *third question* aimed to explore the effectiveness of scaffolding to students’ learning based on students’ evaluation. The results showed that the students highly evaluated the effectiveness of the instructors’ scaffolding in helping their learning. The students who
gave these values explained the effectiveness of all four types of scaffolding in their feedback. These students also described specific situations when the instructors’ scaffolding worked for them. For some of students who gave lower points, they reasoned their evaluation by describing several situations when the instructors’ scaffolding did not work for them. Besides, there was not much difference in the students’ evaluation about the benefits of the scaffolding they received during the blended learning course.

The posed findings lead to the last question that was to consider whether there is a connection between students’ manifestations and evaluation of benefits of the scaffolding in blended learning environment. It means, if the students recognize the scaffolds more often, whether they also would give better grades for the effectiveness of such scaffolds. The result showed that the association between the numbers of scaffolding-mentioned statements by the students and their evaluation of the effectiveness of that scaffolding is statistically insignificant. Thus, there was no connection between the students’ manifestations and evaluations of the effectiveness of the scaffolding.
6 CONCLUSIONS AND DISCUSSION

6.1 Discussions

This empirical study aimed to explore how students interpret and evaluate the scaffolding provided by instructors that intentionally serves as support for students’ learning in a blended training course. Importantly, the findings show the recognition of four types of provided scaffolding from students’ perspective. The students highly evaluated the effectiveness of these scaffolds and such scaffolds were confirmed in the actual scaffolding manifested during the training course. However, the alignment between students’ interpretation of the instructors’ scaffolding and the actual scaffolding was partly uneven. Furthermore, despite of the high evaluation given for the scaffolding, this is not statistically associated with what students interpreted about such scaffolding in their feedback. The following part will be discussions about reflecting the results from theoretical framework and deepening the understanding of these findings.

Students’ ability in recognizing different types of scaffolding

As presented above in the theoretical framework, scaffolding can be classified in many different types based on the functions it serves and the methods or mechanisms used (Hannafin et al., 1999). Several common types of scaffolding were listed based on previous studies including: metacognitive scaffolding, conceptual scaffolding, procedural scaffolding, strategic scaffolding, technical support, and content support. There was evidence in this present study to show that students were able to recognize different types of scaffolding given by the instructors based on the functions the scaffolding served and methods the instructors used. For these students, the instructors’ scaffolding in general helped the students in various aspects of the learning process including metacognition, cognition, strategies, motivation, social interactions, etc. Students could also specify and describe the scaffolding’s methods employed by instructors in order to serve different functions of such scaffolding. This leads to a conclusion that the instructors’ scaffolding provided in the blended course was well-recognized by students. Reasonably, this should be a sound indicator for evaluating the success of scaffolding, because unless students are
aware of the availability of the provided scaffolding, they may not be able to take advantage of such support to maximize their learning.

Although students were aware of the existence of provided scaffolding, the findings showed that the levels of their recognition and interpretation about the scaffolding were not completely consistent with what the instructors actually scaffolded. In fact, procedural scaffolding and cognitive scaffolding are the two types of scaffolding that were shown much difference in students’ interpretation and actual occurrence. To be specific, while the instructors employed them with high intensity measured by instructors’ scaffolding-related statements, the students showed the low level in recognizing and interpreting them, and vice versa. There can be several reasons for this inconsistency. Regarding to procedural scaffolding, because of its function which is smoothing students’ learning procedure, the instructors have to utilize it through the entire learning process, including before, during and after stages. Meanwhile, students tend to underestimate the role of procedural issues, thinking that learning is much more focused on content-knowledge and outcomes. This probably led to the result that students gave little feedback on procedural scaffolding even though the instructors engaged it the most to make sure the whole learning process run smoothly. Concerning the cognitive scaffolding, as discussed: for students, content-knowledge is the most important focus when evaluating the learning’s effectiveness. Reasonably, they gave the most comments to mention how the instructors supported them in gaining knowledge in learning. Meanwhile, cognitive scaffolding was provided in the training course using various tools and resources in multiple learning platforms and activities (such as in Versal platform). This type of scaffolding, therefore, was not highly manifested in communications and discussions between instructors and students (which were mainly used to measure the actual occurrence of scaffolding).

The above discussions confirm the difficulty of implementing scaffolding in actual learning that occurs when there is possible difference between what instructors intend to design and apply scaffolding and what students are actually inclined to receive that such scaffolding during their learning. Additionally, there is also a need raised to have more appropriate measurements of scaffolding provided by instructors. As Van de Pol et al. (2010) stated that scaffolding is a dynamic process, so it is hard to capture the scaffolding’s
operationalization. Therefore, if students’ ability of recognizing a certain scaffolding is inconsistent with actual scaffolding, it is understandable.

Social scaffolding in blended learning environments

Social aspects were emphasized by the students when giving feedback about the instructors’ scaffolding. This led to the development of a category “social scaffolding” in this present study. In fact, evidence stated that students experienced and appreciated the humanity aspect in blended learning environments. According to them, the instructors did create a friendly, inspiring, and social learning atmosphere that allowed them to be engaged and motivated easily with the learning activities and community. That is, instructors could scaffold students with the social and mental aspects. This scaffolding was build up based on instructors’ manner including their own characteristics, attitudes, and behaviors manifested during the teaching process. Thus, it is clear to emphasize the humanity aspect when scaffolding students in a blended learning environment.

Reasonably, this can be linked to the factor of social interaction in computer-supported collaborative learning (CSCL) environments. Existing studies found that social interaction is a key factor in CSCL (Kreijns, Kirschner, & Jochems, 2003) because of the fact that “the social process of developing shared understanding through interaction is the ‘natural’ way for people to learn” (Hiltz, 1994, p. 22). According to Kreijns et al. (2003), social interaction is important for “affiliation, impression formation, building social relationships and, ultimately, the development of a healthy community of learning.” (p. 349). However, within CSCL contexts, social interaction can be very limited because of two main pitfalls presented in Kreijns et al. (2003). A pitfall is “taking social interaction for granted” in which educators assume that social interaction can be easily achieved in CSCL settings like in F2F ones because technology permits it. It is to say, the humanity aspect is often underestimated by educators when implementing CSCL. Another pitfall is “restricting social interaction to cognitive processes”. That is, educators tend to limit learning activities to merely task context as well as educational dimension and ignore or forget the social dimension (such as getting to know each other, building up relationships among peers and between teachers-students). The researchers confirmed that the lack of this factor will cause
negative effectiveness to CSCL. Therefore, educators and teachers should pay special attention of social dimension when designing and implementing a CSCL. In line with BL contexts, instructors should consider providing social scaffolding to mediate the lack of humanity aspect as well as promoting social dimension in technology-enhanced learning environments.

**Scaffolding’s effectiveness based on students’ evaluation**

Because students are the main object of a whole learning process, as well as instructors’ scaffolding, when evaluating the scaffolding’s effectiveness, students’ viewpoint definitely should be counted. This empirical study shows that the students highly rated the benefits of scaffolding to their learning (8.6/10). That is, generally students appreciated the support they received from the instructors. However, when testing the connection between students’ ratings and what students interpreted about the provided scaffolding, there was no statistically significant association. This may lead to a conclusion that students’ evaluation of scaffolding based on rating point may not soundly reflects the actual effectiveness of the scaffolding. Actually, this disassociation can be explained by the fact that, the number of students participated in this study is very small (N=20) which is probably not enough for a statistical test. Therefore, a comprehensive approach should be flexibly employed to examine the scaffolding’s actual benefits toward students’ learning besides viewing students’ perspective.

**6.2 Implications**

As discussed, this present study examines the interpretation of students toward the instructors’ scaffolding in a blended learning environment. Through analyzing students’ viewpoint, the effectiveness of the provided scaffolding to students’ learning was revealed. Following the earlier studies, the research continued to explore the notion of scaffolding which was especially focused on students’ perspective as the main objects in receiving supports from instructors when learning. The findings can be useful for educators and instructors to gain more insight understanding about scaffolding in blended learning.
Implications and suggestions for teachers/ instructors/ educators to guide the scaffolding process are presented below.

Firstly, instructors should carefully design appropriate scaffolds considering their functions and the use of relevant methods to apply them in a blended learning environment. Aspects should be considered are related to metacognitive, cognitive, procedural, and social activities. Because students are able to recognize these scaffolds, this strategy may help students to take advantage of the support and therefore can maximize the benefits provided through scaffolding. However, students are not always aware of the availability of scaffolding provided by instructors and utilize such support in a way that the instructors intend. Therefore, in order to gain more effective on scaffolding students in blended learning, it is important to help students better recognize and take advantage of provided scaffolding. This can be done through strategies such as questioning, explaining, modeling, visualizing, etc. using both traditional and technology-mediated approaches contingently.

Secondly, instructors should consider social and humanity aspects as an important element when designing and delivering scaffolding in a blended learning environment. Because of the lack of humanness in distributed learning environments, when it comes in blended learning that combines the traditional approaches with technology-enhanced learning approaches, social scaffolding should be noticed and emphasized. Instructors can provide this type of scaffolding by creating a friendly and healthy learning atmosphere, facilitating social interactions between participants, and inspiring students with their own characteristics, knowledge, skills, behaviors and enthusiasm when teaching. Showing good manners is an appropriate approach to scaffold students with social aspects.

Finally, when it comes to evaluating scaffolding’s effectiveness, instructors should care about students’ viewpoint on the provided scaffolding. As teacher-centered approach has been shifted to learner-centered approach in the evolution of the educational instruction (Gibbs, 1981), the instructors should acknowledge students’ voice and what they perceive of scaffolding provided. From students’ feedback, the instructors can have lessons learnt about delivering appropriate scaffolds to meet the students’ needs. On the one hand, instructors can ask students for feedback at the end of the course to see the effectiveness of
the whole scaffolding process through their rating points, description and explanation of what scaffolding works and doesn’t work for them in learning. On the other hand, instructors can get students’ opinions continuously or at some certain points during the learning process, so that the instructors can contingently adjust and provide more appropriate scaffolds to their students. Additionally, besides viewing students’ feedback, instructors should consider different aspects to comprehensively evaluate the effectiveness of the scaffolding provided such as metacognitive, cognitive, learning outcomes, learning engagement, motivation, etc.

6.3 Directions for Future Research

It can be said that my study found certain results that lead to several directions for future research. First of all, future research should further investigate different types of scaffolding based on its functions and mechanisms that focus on levels and intensities of the scaffolding used as well as appropriate time points to provide each type of scaffolding. For example, future researchers can examine how much and which time-point should the instructor provide certain scaffolding type to contingently support students during the learning process. Second, social scaffolding should be put more attention to get deeper understanding. There should be more studies investigating the social and humanity aspects in scaffolding that affect students’ inspiration and perception. In addition, future researchers can study how to provide effective social scaffolding, suggest detailed guidelines to do it, especially in blended-learning contexts and in formal learning. Besides, measurements of scaffolding should be further studied to be able to more accurately capture scaffolding’s occurrence and operationalization. Finally, due to the fact that students’ feedback is important for instructors when designing and delivering necessary scaffolding, it worth conducts more research on possible methods that are able to get students’ feedback more accurately and flexibly not only after but also during the learning process. This probably contributes to the more effective contingent scaffolding.
7 EVALUATION

7.1 Reliability and Validity

In order to evaluate the quality of a research, there are certain standards set concerning to validity and reliability (Lewis, 2009). According to LeCompte & Goetz (1982), validity in research is concerned with the accuracy and truthfulness of scientific findings. Meanwhile, reliability refers to the consistency and repeatability perspectives of a research, meaning that a research considered reliable if it is able to yield consistently the same results over repeated testing periods (Lewis, 2009). As being a researcher, I carefully considered the standards of validity and reliability and applied them as much as possible in the research process. I have discussed several issues in previous sections, so the following part will be an overview of what I have considered:

Regarding to research questions, I formulated these questions reasonably based on the aims of my research as well as viewing carefully the existing theory related to scaffolding in the context of blended learning. Concerning to data collection: because the main methodology approach of this research is qualitative, the sample size was small. Although this is a single case study, the findings can not be able to generalize on a larger scale, but might be applicable in similar contexts as described in detail in this research.

Relating to data analysis: I coded the data using both theory-driven and data-driven protocol in which the theory-driven protocol played as a main coding frame for analyzing the data. Besides, I employed triangulation strategy (Jick, 1979) through employing qualitative and quantitative methods together to confirm findings. To be specific, the effectiveness of scaffolding provided by instructors in the training course was examined based on multiple methods including asking students about their interpretations to the scaffolding, analyzing actual scaffolding’s manifestations during the training course, and asking for students’ rating of the scaffolding’s success. I did ask participants to give concrete examples to reason their answers in their feedback. Furthermore, for the reliability to be calculated, I used intra-rater reliability (Rankin & Stokes, 1998) as a measure for the research’s consistency. The reliability of findings was confirmed due to the high value of the intra-rater figure.
7.2 Ethical Evaluation

Ethical concerns were respected and considered in this study following the principles of research ethics suggested by (Smith, 2003) including permissions, confidentiality, privacy, and fidelity.

Concerning to the aspect of permissions, all of relevant participants were informed and asked for permission. Particularly, before collecting data, I sent consent forms via email to all of students in which I presented the general information and aims of my research, stated benefits and confidentiality for the students, as well as asked for their permissions to allow me collecting necessary data that serve to do the research. 100% of students (N=20) returned the consent forms and agreed to voluntarily participate my research. Besides, the instructors of the course were also informed and explained via emails about the research. They all confirmed their consents to take part into this study.

Regarding to confidentiality and privacy aspects, several concerns were guaranteed. Codes were given to instructors and learners to respect participants’ anonymity. Besides, I set up the course’s FB group in secret status in order to meet the ethical issues of using social media in learning environments. Also, confidential communications among participants such as emails, FB messages, and students’ feedback were properly stored and protected by the researcher.

When it comes to fidelity aspect, honesty was respected in every phase of my research. All relevant materials used in this research were authentic and there was no influence from the researcher into students’ opinions and feedback. The research process was conducted and presented in accordance with research’s guidance provided by APA Manual (American Psychological Association, 2001) and the Faculty of Education, University of Oulu. Data analysis was processed and described in detail with reasons and explanations for choosing used methods. The results were reported strictly based on the empirical data and in line with relevant theory.
7.3 Limitations

There are certain limitations of this present research. A first limitation is about the sample size. Because this study is conducted in a small scale with 20 students in a short-period of time, reasonably the findings can not be generalized on a larger scale. Additionally, since the context of the training course was highly situational and specific, in which it was a non-formal educational training, the results may not applicable in academic settings. A second limitation is about the lack of sufficient data. Although the training course was implemented in a blended-learning environment, I only collected data from technology-mediated environments. There was no data in F2F-related activities collected. There was also no data collected from instructors’ perspective. These might be significant constrains to have a holistic view in examining the scaffolding in a learning environment which combined the both traditional and distributed learning approaches. Finally, due to the lack of human resources and the language barrier (The instructional language of my course was in Vietnamese), I could not find another coder to conduct the inter-rater agreement in interpreting the data which would be increase the reliability and consistency of the data analysis and results found.

In sum, I would say that my study was conducted under carefully considering every phase of the research process and gained certain results that met the research’s aims. Although there are few limitations and issues critically related to the validity and reliability of the findings, what I have done might be a contribution to the holistic understanding of scaffolding as well as to open possible directions for future research.
REFERENCES


Aycock, A., Garnham, C., & Kaleta, R. (2002). Lesson learned from the hybrid course project [electronic version]. Teaching with Technology Today, 8(6)


Camacho, M. (2010). *Teacher Training in ICT-Based Learning Settings: Design and Implementation of an on-Line Instructional Model for English Language Teachers,*


Shepherd, N. G. (1998). *The probe method: A problem-based learning model's affect on critical thinking skills of fourth and fifth grade social studies students*


APPENDIX

Questionnaire to get feedback from learners *(translated from Vietnamese)*

I. **Self-evaluation**
   1. What you have learnt from the course are …
   2. How many sessions did you attend in this course (there are 5 in total: lesson 1, lesson 2, lesson 3, excursion, problem-based collaborative work)?
   3. How many hours you spent on this course, including attending activities, doing readings, reviewing notes, writing assignments, and any other course-related work?

II. **Instructors’ role**
   4. On a scale from 0 to 10, In general, How would you rate the overall effectiveness of the instructor’s’ performance?
   5. What is the important role of instructors affecting the most in your learning?
   6. How successful were the instructors’ in helping you to learn during this course on a scale from 0 to 10?
      a. Explain why...
      b. Describe a situation when the instructions worked for you?
      c. Describe a situation when the instructions did not work for you?
   7. On a scale from 0 to 10, how successful the instructor was in helping you in employing what to consider in learning related to knowledge, contents of the course? Explain why…
   8. On a scale from 0 to 10, how successful the instructor was in helping you in employing the tools and resources that were provided on the course (i.e. web learning, FB group…)? Explain why…
   9. On a scale from 0 to 10, how successful the instructor was in helping you in employing alternative ways to tackle problems in learning?
   10. On a scale from 0 to 10, how successful the instructor was in helping you in employing how to think during learning? (ex: the instructor provided suggestions and questions to help you think such as: what is my goal, what should I do to acquire the goal, what should I do when I face with difficulties, who I can seek for help?, etc…)
11. What did you like best about your instructors’ teaching?
12. What did you like least about your instructors’ teaching?

III. Course overall
13. Did the course meet your expectations - explain your answer
14. What would you comments about the following aspects of the course
   - content
   - organization
   - environment
   - your peers

15. The best features of the course were…
16. The course could have been improved by...

IV. Suggestions
17. Any further constructive comments, feedback