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How People Learn through Peer Learning

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Abstract: Peer learning is a practice that has been used for many years, and it is becoming increasingly popular nowadays, especially in higher education. Previous research has provided different explanations about whether peer learning is effective or not based on different learning theories. For example, some researchers have suggested that peer learning is helpful based on the constructivism theory. In contrast, others have found that peer learning can be problematic from other perspectives, such as the behaviorist and cognitivist perspectives. In this paper, I use the theoretical model created by Topping and Ehly to analyze the features that make peer learning the most effective. Topping and Ehly's theoretical model suggests that five subprocesses lead to the effectiveness of peer learning. The findings of this paper indicate that peer learning can be improved by focusing on these five subprocesses and combining various learning theories.

Keywords: Peer learning, Peer tutoring, Cooperative learning, Constructivism

1. Introduction

Peer learning is a practice that allows people with equal status to acquire knowledge and skills by actively supporting each other without having professional teachers give instructions [1]. There are different types of peer learning. According to Topping, peer tutoring includes the specific role of the tutor or tutee, and cooperative learning asks people to work in groups to pursue shared goals [1]. Both peer tutoring and cooperative learning emphasizes how learners construct knowledge and interact with other people. The effectiveness of peer learning is supported by constructivist theory. From the constructivist perspective, learners construct meaning individually and socially for themselves [2]. In other words, learners are not passive receivers of knowledge, but active participants in making sense of the knowledge, and the knowledge can be constructed individually or in the community. Furthermore, during peer learning, the learners have the opportunity to construct meaning socially through peer interaction, which is characterized by the exchange of thoughts and information [3]. However, peer learning can be less supportive and problematic when considering other learning theories. The use of peer learning has been increasing, and educators must understand how people learn through this practice and its limitation. Because there are various forms of peer learning, the advantages and disadvantages of those forms and their alternatives should also be introduced. This paper will include all these topics. First, I will discuss how peer learning is effective from the perspective of constructivism. Then, I will talk about other learning theories like behaviorism and cognitivism and how they raise questions about peer learning. Next, I will talk about academic research on peer learning and how they suggest the features that make this

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practice most effective. I will also mention some alternative approaches. Finally, I will conclude the paper with the possibility for further research and action on peer learning. This paper mainly aims to show people why they should incorporate peer learning and how they can improve their current use of this practice.

2. Theoretical Framework

There are two main types of peer learning: peer tutoring and cooperative learning. Both types of peer learning are grounded in the constructivist view of learning. Peer tutoring can be defined as tutors helping tutees to learn in a group setting. The tutors are the more advanced learners, and the tutees are learners who need support. However, the interaction between tutors and tutees is not the same as between teachers and students. Peer tutoring does not focus on transmitting knowledge from one group to another, and the roles can be switched [4]. The tutees are not only the receiver of knowledge but also people who construct meaning during practice. From the constructivist perspective, the learning principles also indicate that learning is not passively accepting existing knowledge [2].

Learners with different roles construct meaning differently. Tutors are learning by teaching [4]. When they help other people learn, they can put what they have learned into practice. It matches the constructivists' learning principles that learning is to "involve learners engaging with the world" [2]. Also, Duckworth mentioned that students should learn and teach or look at how other people learn and teach [5]. During peer tutoring, the tutors get to do both of those things. The tutors are not only teaching tutees but also learning from tutees because constructivism assumes that the role of teaching needs to understand students' thoughts rather than merely explaining things to them [5]. Understanding tutees' thoughts is a way for tutors to learn from their tutees. Tutees learn by observing how tutors learn and teach and by explaining thoughts to tutors. According to Duckworth, learning is primarily about explaining since people must clarify their thoughts before explaining to others [5]. As tutees make their thoughts clear, they construct meaning individually, and then they are allowed to construct meaning socially through interaction with tutors.

Unlike peer tutoring, cooperative learning does not assign specific roles to each learner. Instead, it asks learners to work together in small groups to accomplish a shared goal. The similarity between these two approaches is that both of them follow constructivism. The guiding principle of constructivist thinking indicates that learning is an active process and social activity, and it is contextual. As an active process, learning requires learners to do something when they learn. For example, learners must fully engage in learning and construct meaning. As a social activity, learning values interactions and conversations with other people [2]. These two guiding principles can be seen in the process of cooperative learning. According to Vermette & Foote, collaborative learning practices often expect learners to develop personalized meanings, incorporate prior and new knowledge, and engage in classroom-wide conversations [6]. Developing personalized meaning and incorporating known and new information is associated with learning as an active process, and classroom-wide conversations can be connected with learning as a social activity. In addition, the philosophy of cooperative learning is manifested in problem-based learning, which encourages learners to learn by solving realistic problems, and authentic assessment, which asks learners to use their knowledge in realistic situations [6]. This information shows that cooperative learning is contextual. It means that learning must not be separated from reality. The problem-based learning and authentic assessment provide learners opportunities to connect learning with their lives. In short, cooperative learning is associated with constructing meaning, connecting with other people, and combining learning with real-world situations. Therefore, cooperative learning matches up perfectly with constructivism.

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Although the constructivism theory supports peer learning, there can be some problems when we look at it from a behaviorist perspective. Behaviourism focuses on observable behaviors rather than unobservable minds. From this perspective, people learn through environmental stimulus, and the environment shapes their behaviors. The use of rewards is a way to shape learners' behaviors. It positively reinforces the learner's behaviors by providing them with desirable outcomes in response to them [7]. In this way, the learners are more likely to repeat those rewarded behaviors. There are two types of rewards, which are extrinsic rewards and intrinsic rewards. The extrinsic rewards come after a behavior, while the intrinsic rewards are part of the behavior and are "self-reinforcing" [7]. Cooperative learning has to do with intrinsic rewards. Cooperative learning is more than working together. As learners pursue their shared goal, they are "structuring positive interdependence", which is the belief that everyone in the group can reach their own goals after the shared goals are met [8,9]. When the personal and shared goals are achieved, the learners receive intrinsic rewards. However, it only works when the learners care about those goals. If the learners do not regard meeting their goals as rewarding, they will not be motivated to participate actively in the cooperative learning practice.

Besides behaviorism, the cognitivist views also expose the potential problems of peer learning. Cognitivism is similar to constructivism since both consider learners active participants in processing information. One of their differences is that cognitivism does not entirely deny the existence of objective truths. Although learners can construct knowledge in groups through peer learning, considering this practice from the perspective of cognitivism suggests that the shared knowledge constructed by those groups might not always be objectively true. Another difference between cognitivism and constructivism is that constructivism focuses on the knowledge itself.

In contrast, cognitivism emphasizes how learners process that knowledge in their minds through metacognition, which is "the ability to consciously monitor and regulate one's cognitive processes and to regulate behavior" [10]. Furthermore, peer learning is used to help learners achieve specific learning outcomes [11]. Therefore, people who participate in peer learning might care more about the knowledge they construct than their cognitive process, even though the National Academies of Sciences, Engineering, and Medicine have mentioned the critical role of cognitive processes in leading to successful learning [10].

3. What Features Make Peer Learning Most Effective?

Peer learning has existed for about 25 years and has been increasingly used in university courses [1,11]. Therefore, it requires more attention from researchers as well as educators. The constructivism theory explains why peer tutoring and cooperative learning effectively encourage learners to interact with others and construct their knowledge. Besides knowing why peer learning is effective, we can also focus on how it becomes effective. One question worth researching in depth is, "what does educational research suggest about the features that make peer learning most effective?"

In order to understand how peer learning positively affects learners, Topping and Ehly have developed a theoretical model for peer learning based on existing research. According to their model, five sub-processes influence the effectiveness of peer learning: organization & engagement, cognitive conflict, scaffolding & error management, communication, and affect [12]. In addition, the authors provided a brief introduction for each sub-process.

Organization & engagement “includes organizational or structural features of the learning interaction” [12]. For example, the immediacy of feedback is one of those features. Students in higher education regard feedback as “a vital component in shaping and improving their learning experience” [13]. Those students' views on feedback show its effectiveness. This helpful feature is often included in peer tutoring because tutors and tutees can give either implicit or explicit feedback

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during this practice. Implicit feedback can occur spontaneously in the early stage of peer tutoring, and the quantity and immediacy of both types of feedback can be increased throughout the process [12]. From this finding, we can see how feedback occurs and how its immediacy develops during peer tutoring, which then contributes to the effectiveness of peer learning. Besides peer tutoring, feedback can also come from peer assessment, another type of peer learning. Although Topping and Ehly found that peer assessment might not be as reliable and valid as teacher assessment, peer feedback has greater volume and immediacy than teacher feedback, which can help compensate for the quality disadvantage [12]. This finding further supports how immediate feedback contributes to the effectiveness of peer learning.

Cognitive conflict includes the conflict and challenges involved in peer learning, reflecting the Piagetian schools of thought [12]. From this point of view, cognitive conflict can be defined as "a perceptual state where one notices the discrepancy between one's cognitive structure and environment, or between the components of one's cognitive structure." Lee and Kwon also mentioned that cognitive conflict is central in the Piagetian account of cognitive development. Researchers have known its positive effect on conceptual change [14]. In peer tutoring, when there is more cognitive conflict, there is usually more cognitive engagement for the tutor and more co-construction from the tutees [12]. So conflict and challenge are necessary for the effectiveness of peer learning.

Unlike cognitive conflict, scaffolding & error management reflects Vygotskian schools of thought. It suggests that peer learning involves support and scaffolding from the more advanced learners and emphasizes fitting the management of activities in the zone of proximal development for both advanced learners and those who need help [12]. Vygotsky defines the zone of proximal development as "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem-solving under adult guidance, or in collaboration with more capable peers" (p. 86) [15]. When less capable learners participate in peer learning, they can solve challenging problems with the help of the more advanced learners. In addition, advanced learners can benefit from cognitive exercise by monitoring the performance of their peers and managing errors [12]. These findings have explained how scaffolding & error management makes peer learning effective for both groups of learners.

Peer learning heavily demands communication because if learners want to understand a concept fully, they will need to explain it to others and embody their thoughts in language. Explaining concepts to peers tells learners whether they have learned those concepts correctly. Communication in peer learning involves "listening, explaining, questioning, summarizing, speculating, and hypothesizing", and all these skills are valuable and transferable [12]. Learners can practice and develop these skills as they communicate during peer learning. Furthermore, according to Boud, the opportunities for this type of communication are limited without peer learning activities [16]. So communication can be regarded as a unique feature that contributes to the effectiveness of peer learning.

Affect refers to the affective components of peer learning, which include motivation, accountability, modeling, ownership, and self-disclosure, as mentioned by Topping and Ehly [12]. The authors discussed how these affective components could be facilitated in their article. For example, self-disclosure is likely to occur when the learner has a trusting relationship with a peer without authority. When it occurs, it enables diagnosing and correcting ignorance and misconception. In the previous paragraph about peer tutoring, I mentioned how Topping claimed that the roles of tutor and tutee could be switched, which makes the relationship in peer learning different from that between teachers and students [4]. In this way, both groups of learners have a similar amount of authority, which helps facilitate self-disclosure. In addition, the motivation of less experienced learners can be enhanced by modeling enthusiasm and competence and making success

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simple. Finally, both groups of learners can keep being motivated through a sense of loyalty and accountability to each other. Based on Topping and Ehly's findings, we can conclude that the affective components are crucial to the effectiveness of peer learning.

Combining the five sub-processes can extend and modify current capabilities and restructure new understandings of learners, adding to their "declarative knowledge, procedural skill and conditional and selective application of knowledge and skills". As a result, peer learning enables the "consolidation, fluency, and automaticity of core skills", even though the learners might not always find the process explicit [12]. To further explain this process, when learners learn a new concept, they can transfer this knowledge from a specific setting and apply it to a more generalized situation through peer learning. Then, Topping and Ehly suggested that peers can give immediate feedback to each other during this process. Their partnership may also make explicit reinforcement possible, for instance, by praising each other. After receiving the feedback, the learners will be more conscious of their learning interaction and monitor the effectiveness of their learning strategies [12]. This process explains how the five sub-processes make learning effective during peer learning. It becomes a cycle when positive outcomes contribute back to the five sub-processes.

4. Alternative Approaches to Peer Learning

In this paper, I have introduced and analyzed the two main types of peer learning: peer tutoring and cooperative learning. Besides these two approaches, there are other types of peer learning that incorporate the sub-processes, like the peer assessment mentioned previously. Peer assessment allows learners to evaluate "the level, value or worth of the work, products or outcomes of learning of others" [12]. Therefore, feedback makes up a crucial part of peer assessment. Topping and Ehly claimed that the feedback from peer assessment has to be formative in order to help learners improve their performance. Also, peer assessment can be used frequently and immediately during the development stage instead of at the end [12]. Because of how reflexive peer assessment is, it can give all participants a clear view of themselves. There are not only different types of peer learning but also various ways of incorporating them. For example, combining information technology with peer learning has become increasingly popular. The technology can aid the assessment process, making the feedback more regular, frequent, and immediate [1].

5. Conclusion

Peer learning is a practice that allows both more and less experienced learners to support each other without having one group being authoritative. The two main types of peer learning discussed in this paper are peer tutoring and cooperative learning. Although peer learning has existed for a long time, it is still commonly used in school settings, especially in higher education. Peer learning allows learners to make sense of the knowledge individually and socially as active participants, supported by the constructivist view of learning that learners contribute meaning individually or in a community. Nevertheless, other learning theories like behaviorism and cognitivism have pointed out the potential problems of peer learning in making intrinsic rewards effective and paying attention to the accuracy of knowledge and cognitive processes. Fortunately, after analyzing the five sub-processes of peer learning, we can see how those features can improve the effectiveness of peer learning. Other types of peer learning, like peer assessment, and information technology, can be used in addition to peer tutoring and peer assessment. In addition to the approaches I have discussed, there is still room for improving peer learning. One thing educators should do to make learners benefit more from peer learning is to think about how they can maximize the positive effects of the five sub-processes. Also, the researchers should improve peer learning by examining how to combine it with learning theories other than constructivism.

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