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Conceptualizing Collaborative Teaching and Learning in Technical and Vocational Education and Training Institutions: A Psychological Science Perspective

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Abstract

Whatever the teaching strategy, it is advisable to incorporate questions and answers, discussions, hands-on activities, and other ways of getting learners actively involved in the learning of the content. Students learn best when they are actively involved in the learning experience. Practical oriented subjects in Technical and Vocational Education and Training (TVET) lend themselves easily to hands-on activities, but it can be a challenge in social sciences subjects such as sociology and psychology. Whereas one should try to avoid lecturing for lengthy periods, it is very important to listen to the learners and allow them to become aware of the content in order to construct knowledge as opposed to trying to "teach" them knowledge. Thus, feedback should be provided before any type of evaluation is administered. Collaborative learning, also referred to as group learning or cooperative learning has clear benefits for student in terms of retention of information, critical thinking and consolidation of learning from different parts of a programme. Groups provide opportunities for learning that are difficult to establish in traditional settings. They are particularly useful to enable learners to take part in discussion, active participation, feedback and reflection, and to consolidate learning, clarify understanding, and explore ideas and concepts. Depending on the purpose and nature of the group, group learning can also help to develop 'transferable' skills, such as study skills, communication skills, teamwork, problem solving and personal development. Teaching and Learning in groups has a valuable part to play in the all-round education of students. It allows them to negotiate meanings, to express themselves in the language of the subject, and to establish more intimate contact with academic staff than more formal methods permit. It also develops the more instrumental skills of listening, presenting ideas and persuading. This paper conceptualizes the meaning, purpose and strength of collaborative work in teaching and learning as opposed to traditional teaching and learning.

Key words: ***Teaching, Collaborative/group learning, TVET, psychological science***

Introduction

Collaborative learning (also known as cooperative learning) occurs when small groups of students, called collaborative groups, work together to complete an academic task. As its name suggests, in order for collaborative learning to be successful, students must collaborate productively and work together on a task, sharing ideas and learning from one another. Researchers have found that if collaborative learning is designed properly, students learn more than when working individually (Brookfield, 2006; Astin, 1997; Tinto, 1998; National Survey of Student Engagement, 2006). Conversely, poorly designed collaborative learning does not promote learning goals effectively.

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All individuals learn to value and respect their peers, to appreciate diversity, and to develop friendships. Collaborative projects can help students develop a host of skills that are increasingly important in the professional world (Caruso & Woolley, 2008; Mannix &Neale, 2005).Positive collaborative experiences, moreover, have been shown to contribute to student learning, retention and overall college success (Astin, 1997; Tinto, 1998;National Survey of Student Engagement, 2006).Properly structured, collaborative projects can reinforce skills that are relevant to both group and individual work, including the ability to break complex tasks into parts and steps, plan and manage time, refine understanding through discussion and explanation. Collaborative projects also give and receive feedback on performance, challenge assumptions and develop stronger communication skills. Collaborative projects help students develop skills specific to collaborative efforts, allowing students to tackle more complex problems than they could on their own, delegate roles and responsibilities, share diverse perspectives, pool knowledge and skills and hold one another (and be held) accountable. Collaborative projects are good in receiving social support and encouragement to take risks. Students learn to develop new approaches to resolving differences and establish a shared identity with other group members as well as find effective peers to emulate while developing their own voice and perspectives in relation to peers. These aspects are denoted in the figure below:

Cooperative Learning Structures

Fig. 1: Cooperative Learning Structures

Benefits for Instructors

Collaborative learning allows teachers to assign more complex, authentic problems to groups of students than they could to individuals. It also introduces more unpredictability in teaching, since groups may approach tasks and solve problems in novel, interesting ways. This can be refreshing for instructors. Additionally, collaborative assignments can be useful when there are a limited number of viable project topics to distribute among students; and they can reduce the number of final products instructors have to grade.

Whatever the benefits in terms of teaching, instructors should take care only to assign as collaborative work tasks that truly fulfill the learning objectives of the course and lend themselves to collaboration. Teaching in groups affords distinct benefits over the more widely used lecture and one-on-one methods (De Villers, Bresick& Mash, 2003; Jacques, 2003)

There are three main activities that collaborative teachers have to manage simultaneously: managing the group, managing activities and managing the learning.

In many collaborative teaching situations, the role of the teacher is that of facilitator of learning: leading discussions, asking open-ended questions, guiding process and task, and enabling active participation of learners and engagement with ideas. However, small groups function and behave in various ways and have different purposes. Teachers, therefore, need to be able to adopt a range of roles and skills to suit specific situations, often during the same teaching session. According to (McCrorie, 2006), other roles that may be adopted include that of:

a) The instructor, who imparts information to students
b) The neutral chair
c) The consultant, from whom learners can ask questions
d) The devil's advocate
e) The commentator
f) The wanderer, such as in a larger workshop
g) The absent friend

Through questioning, the exchange of experiences and ideas, the members of the group are able to discuss issues, clarify points and obtain immediate feedback on their doubts and questions (Jacques, 2000; McCrorie, 2006). Through small group tutorials, students are better able to hone their critical thinking and problem solving skills; they also gain substantial interpersonal and communication traits (De Jong et al., 2010). During the tutorials, considerable emphasis is placed on students developing an ability to communicate ideas and on the improvement of their self-confidence and critical analysis of the subject (Mamede, Schmidt & Norman, 2006; Dolmans & Schmidt, 2006; Lohman & Finkelstein, 2000). Small group tutorials also provide opportunities for learning that are difficult to establish in large group settings. They are particularly useful in enabling learners to actively participate in discussions, provide feedback and reflection, and also help students to consolidate their learning, clarify understanding, and explore ideas and concepts (Costa, van Rensburg & Rushton, 2007; Dochy, Segers, Van de Bossche & Gijbels, 2003). Small group events place a greater emphasis on active learning (as opposed to teaching), a specific task or focus, and require the students to interact and actively participate.

Reward Structures

According to Robert Sla-vin (Slavin, 1990, 1996) reward structures is the most well-known proponent to promote learning in groups. Slavin has distinguished between three methods for assigning rewards to a group. The first is that the entire group can receive a reward for its performance (for example, each group member receives the same grade on a group project). This method does not encourage positive interdependence; the most skilled student may do all the work to ensure a high grade. Other students may loaf or be excluded. In a second method, students work together in a group but receive individual grades. This method discourages social loafing because each group member is individually evaluated, but it provides no reason for students to work together. Lastly, students can receive group rewards based on individual improvement on quizzes or worksheets over class periods. For example, students might receive

a group reward based on the average individual improvement on a math quiz to be taken after the collaborative work. This provides incentive for students to help each other. The more proficient students will want to help the less proficient students because their reward depends partly on the performance of those students on the quiz. The less proficient students have an incentive to collaborative in order not to let the group down. Slavin has recommended that the rewards for average group improvement not be grades but rewards such as class points that can be exchanged for free time, computer times, or stationery items.

The use of rewards in group work is controversial because many researchers have argued that tangible rewards undermine intrinsic motivation (Johnson & Johnson, 1991). Researchers investigating group rewards for average individual performance have typically not included measures of motivation. In addition, the learning tasks that have been investigated have typically been relatively simple tasks such as the straightforward study of textbook material for a quiz, rather than more complex tasks. Rewards may not be needed for more complex, authentic problem-solving tasks that are more intrinsically interesting (Cohen, 1994b).

Methods of Cooperation in Collaborative Learning

In guided cooperation, students are directed to use specific cognitive strategies, such as summarization or elaboration. There are many kinds of guided cooperation, including scripted cooperation, peer-assisted learning strategies (PALS), guided peer questioning, and reciprocal teaching. Research has supported the efficacy of all of these methods.

In scripted cooperation (O'Donnell, 1999), students (usually working in pairs) are given specific instructions to summarize texts and evaluate each other's summaries. PALS is a guided cooperation method in which pairs work together to improve reading comprehension (Fuchs, Fuchs, Mathes, & Simmons, 1997). One of its core components is a form of scripted cooperation. The stronger reader reads the text for five minutes while the weaker reader acts as a tutor, responsible for correcting any mistakes the reader makes. After the reader finishes reading, the tutor asks the reader to explain what he or she has learned and fills in any missing information.

Then, the students switch roles. In guided peer questioning (King, 2002), students are given a series of questions with blanks, such as “How is _____ different from _____ that we learned about before?” Students in pairs question each other with questions that they construct from these question stems. Answers require students to use strategies such as elaboration and explanation. In reciprocal teaching (Palincsar & Brown, 1984), students typically work in groups of three or four. Students take turns being the group leader. All students read the passage and then the leader summarizes the passage and asks questions based on the passage, which the entire group should discuss. Then the leader offers a prediction or asks for a prediction about the next part of the text. All of these guided cooperation methods seek to promote learning goals by creating explicit demands for students to employ high-quality cognitive strategies in their conversations.

Complex Tasks

Many researchers have called for the use of more complex tasks in collaborative group work, such as writing skits, conducting research, creating multimedia presentations, investigating scientific questions, and solving real-life problems (Cohen, 1994b). These tasks can take hours, days, or weeks to complete and require much higher-level and complex strategies and thinking. Complex tasks require the use of multiple strategies and diverse knowledge; it is critical that no student has enough knowledge to complete the task individually. Many researchers support the production of public artifacts (such as posters presented in a poster fair) in complex tasks to promote engagement and adoption of high standards for work.

There are several specific approaches to the use of complex tasks that have strong research support. In Group Investigation (Sharan & Sharan, 1992), the class begins with a broad topic provided by the teacher. Groups of students choose and investigate specific topics of their choice within this topic. Students work out how to divide the work and work toward a presentation for the whole class.

Constructive Controversy is a method in which students engage in argumentation about a topic. Students work together to discuss reasons or evidence supporting an argument but remain open-minded about changing their minds. In one version of this approach, pairs of students first explore one side and then another side of an issue, interleaving pair work with work in groups of four. Students ultimately work out their final position in groups of four (Johnson & Johnson, 1995).

In Complex Instruction (Cohen, Lotan, Scarloss, & Arellano, 1999), students work collaboratively, moving to different stations in the classroom. For example, in a unit on feudal Japan, students might perform tasks such as preparing a skit addressing life in feudal Japan or developing a model showing patterns of social stratification in a castle town (Lotan, 1997).

Interventions to reduce status differences are very important in Complex Instruction. One such intervention is the multiple-ability treatment, in which the teacher emphasizes to students that in order to complete complex tasks, the group needs many different cognitive abilities, such as problem solving, writing, planning, public speaking, and hypothesizing. Then the teacher must make it very clear to the students that "None of us has all of these abilities; each one of us has some of these abilities" (Cohen, 1994a, p. 128, italics in original). Complex tasks for which this is true are thus essential to Complex Instruction. A second intervention is providing separate instruction to the lower-status students so that they can become experts on the task and teach it to the higher-status students. Teachers also highlight the contributions of students who make contributions to the groups.

Knowledge Forum provides students with a computer environment in which they can jointly explore issues, posting their ideas and responding to peers ideas (Scar-damalia & Bereiter, 2006). The goal of knowledge forum is to create classrooms in which the class taken as a collective whole is engaged in constructing knowledge that is new to all of the students. This simulates real-world knowledge creation that occurs in real settings such as research teams in

universities, task forces in government, or design teams in corporations.

Student Presentations

It is observed that there are numerous advantages of introducing the concept of student presentations during group tutorials. For example, the close contact between tutor and student during such sessions provides tutors with a more effective method of continuous assessment and of monitoring their students' progress rather than solely relying on the traditional method of a formal written final examination. Considerable emphasis is, thus, placed on developing the participating students' ability to communicate ideas effectively and to improve their overall self-confidence. Moreover, the presentations allow for more comprehensive discussions of the topics assigned, and thus, enable the students to understand them more deeply and with greater clarity. Overall, it is found that the concept of having presentations during small group tutorials indeed help to develop students' skills in the areas of critical thinking, analysis, mutual cooperation, teamwork and their self-confidence; this approach also promotes intellectual interaction among the students and also between students and tutor. This format also provides a great opportunity to learn from the students as they share an enormous amount of critical and novel information during the course of their presentations. It is believed that by using this approach, students are able to be guided and motivated and they learn a complex module in a simple, conducive and friendly environment. At the same time, it also serves to enrich students' knowledge of the subject.

Group Size and Composition

The ideal group size varies according to the task. Many effective implementations of collaborative learning (such as guided cooperation) have employed pairs. Others have used larger groups, typically no larger than six, however. Groups of about four may be best when working on complex tasks such as Group Investigation.

In composition, groups can be heterogeneous (composed of students of different genders, abilities, and ethnic backgrounds) or homogenous (composed of students who are similar to one another in these dimensions). Researchers have not identified a single ideal type of group composition. In addition, the idea of making groups heterogeneous along dimensions such as gender and ethnicity carries with it a major disadvantage: When students see that groups are always mixed in gender and ethnicity, this makes gender and ethnicity highly salient. If a class is made up of 25% of students from a minority group, it would be highly undesirable always to put a single minority student in every group of four, never allowing students from this minority group to work together. A good alternative to any fixed way of assigning groups is to use flexible grouping so that students form different groups on different days, depending on their interests, on who needs to work on a particular skill, or based on diversity of background knowledge relevant to a task.

What Nature of Collaborative Work is Productive?

There are various formats that promote interactive processes. (Barron, 2003; Cohen, 1994a,

1994b; Johnson & Johnson, 1990; Johnson & Johnson, 1991; Slavin, 1996; Webb, 1982; Webb & Farivar, 1994) have come up with conducive processes for learning. The first of these processes is engagement. When groups are engaged in the task at hand and interested in the task, they are naturally less likely to fall into off-task behavior or social loafing. Second, David and Roger Johnson have emphasized the importance of positive interdependence, which occurs when students can only complete a task by working together; the task cannot be completed as effectively or at all when working individually. Effective positive interdependence is likely to result in joint attention to the tasks at hand (Barron, 2003). This means that students are focused on the same task, often literally looking at the same information and certainly talking about a common topic. Students will also be more likely to work effectively if they have mutual respect for one another. Mutual respect will also reduce negative feelings and discriminatory feelings. Effective groups are also marked by balanced participation. When balanced participation occurs, all students in a group are contributing to the discussion. As they listen to each other, they display frequent uptake of ideas. Uptake refers to responding to peers' ideas by accepting and building on them through further discussion, or by engaging in constructive argumentation when students are not in agreement. Finally, students in collaborative learning groups should also engage in high-quality strategy use, which includes both social strategies and cognitive strategies.

A great deal of research has focused on cognitive strategy use in groups. Generally, students who use high level cognitive strategies such as elaboration, explanation, and coordinating theories with evidence learn more from collaborative work than students who do not employ these strategies. Webb, (1982); Webb & Farivar, (1994) and Webb, Farivar, & Mastergeorge, (2002) and her colleagues have produced a very influential body of work that has emphasized the importance of giving and receiving explanations during group work. For example, if students are working on mathematics problems in groups, when a student explains to another how to do a problem, or how to carry out some of the steps in the problem, the giver of the explanation typically benefits. The receiver of the explanation may benefit if the explanation is sufficiently elaborated and if the receiver proceeds to apply what was learned. In contrast, when one student simply tells another student the answer (this is called terminal help), this can even be harmful to the learning of the student who receives terminal help. Webb's research has pointed to the importance of designing collaborative learning formats in ways that increase the frequency of explanations in group work and decrease the frequency of terminal help.

Another class of highly productive strategies is providing alternative perspectives on issues and advancing reasons and evidence (Chinn, 2006). Students benefit from encountering ideas that are different from their own, and they gain a deeper understanding of ideas they are learning when they consider how claims are related to evidence for and against those claims.

Scaffolding in Collaborative Work

Students will need scaffolding to complete complex tasks successfully. Scaffolding refers to a variety of different kinds of help that enable students to complete tasks that they could not have completed on their own. Scaffolds may be provided by the teacher or built into the supporting

materials such as texts, worksheets, or computer software that students are using.

One method of scaffolding is pre-teaching needed knowledge and strategies. Teachers might provide instruction into how to construct arguments before asking students to complete tasks involving written argumentation. Another method, task decomposition occurs when teachers break tasks down into smaller parts. Teachers could help students break the process of conducting their own original science investigation into a series of steps such as generating a question, designing an experiment, and so on.

A heavily investigated method of scaffolding is the use of cognitive prompts, which are questions or directions to use specified strategies or to reflect on particular issues. For example, students learning about history from original sources could be prompted to consider whether authors of documents might be biased. One kind of prompt asks students to construct diagrams, such as diagrams of how evidence supports or contradicts a theory.

Researchers have also employed social and cognitive roles. A role in collaborative work consists of instructions to focus on a particular kind of task. An example of a social role is to be the discussion leader. Another social role is to take responsibility for making sure that everyone gets the opportunity to talk. An example of a cognitive role is the role of "explainer," who might be responsible for making sure that the group develops complete explanations for its ideas.

Hints can be provided when students are having difficulty. A number of researchers have developed computer-based learning environments that are capable of providing hints to students at times of difficulty. Researchers generally recommend that the provider of the hint—whether a teacher or a computer—provides the least possible amount of help to enable students to solve the problem on their own.

Self-evaluation is a powerful scaffolding method that encourages students to regulate their own learning processes. In self-evaluation, groups of students evaluate their own performance along criteria provided by a teacher or developed by them (Sharan & Sharan, 1992; Webb & Farivar, 1994). Self-evaluations help students learn the criteria by which high levels of performance are identified. For example, in their 1998 study White and Fred-eriksen had students evaluate their performance along criteria that included "being systematic" and "writing and communicating well."

An important principle of scaffolding, regardless of which form of scaffolding is used, is that scaffolds should be faded over time. This means that students are given less and less help until they can complete the task on their own. All of these scaffolding methods are designed to facilitate productive group processes as students work together in groups. Many scaffolding methods are particularly focused on promoting effective use of high-level strategies as students work on complex tasks. The complex tasks themselves are designed to encourage engagement, positive interdependence, and a desire to work well with peers to solve a challenging problem that requires all of their knowledge and abilities to solve.

Demerits of Collaborative Learning

Although there are many merits of collaborative learning, it is not without demerits. First, students in groups may waste time in off-task behaviour. Second, students in collaborative groups may engage in social loafing, in which some of the students in a group do little or none of the work, relying instead on others to do the work for them. Third, unequal interactions can occur, in which some students talk most of the time, and/or some students participate very little or not at all. Fourth, negative interactions among students can occur (for example, criticism, ridicule, or harassment). Fifth, there may be no interactions at all; although the teacher intends for the students to work together, they may instead work independently. Sixth, even if there are interactions, the interactions may be of low quality; students may not engage in the kinds of talk that can drive learning forward. Finally, there is the problem of social status differences, in which group work can exacerbate existing status differences among students (for example, students viewing others as more or less intelligent) (Cohen, 1994b).

Conclusions

Collaborative learning is potentially a highly effective method of instruction in practical subjects such as in Technical and vocational Education and Training. Its positive aspects include greater success in achieving course goals, more positive student relationships, and student's perceptions of enjoyment in the educational activities and tasks, and better achievement. However, it is not the case that any way of doing it will be effective, or even that most ways used commonly by teachers are effective. Only those methods that promote productive group processes and provide needed support to students as they engage in complex tasks are likely to be effective.

Recommendations

Recommendations arising from this paper allude to the fact that collaborative learning should be used for practical oriented courses such as Technical and Vocational education and Training. Empirical evidence may suggest that collaborative teaching and learning methods are beneficial and effective, but it is important to note that there is still much to be understood about the psychological circumstances under which cooperative learning is most effective.

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