CHAPTER 3

Student Collaboration Through Assessment, Feedback and Peer Instruction

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Conflicts need to be seen as windows of opportunity instead of threats to progress.

Van den Bossche, Segers, & Kirschner, 2006

Introduction

In terms of increasing the effectiveness of group-based learning in the collaborative active learning (CAL) environments, the framework of participation developed by Black-Hawkins (2013) can serve this purpose quite well. If so, two principles mentioned in the framework, that is, participation concerns all members of a group and participation requires learning to be active and collaborative, can influence the efforts invested in enhancing student readiness for CAL. This is because collaborative

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active learning entails some sort of change in the way learning is conceptualised. Consequently, it is reasonable to provide training to students to equip them with skills required to collaborate effectively in group-based learning. Still though, students need reasons as to why they have to collaborate when all the while in a teacher-centred approach they compete rather than collaborate. To this end, the Social Interdependence Theory developed by Johnson and Johnson (2013) proposes five elements to maximise the collaborative potential of groups.

Further, feedback plays an essential role in supporting student learning since it encourages self-evaluation which is one of the skills that typifies self-regulation; feedback also enhances group discussion as in peer formative feedback. However, according to Carless and Boud (2018), feedback literacy is crucial for students to make use of the information provided to improve their learning and it lays a bridge between teaching and learning. In this regard, lecturers should use feedback to narrow the learning gaps of students by feedforward to them on what to do based on the learning evidence gathered. Lastly, feedback is not about correcting mistakes or providing correct answers; it plays an important role in supporting learning from mistakes, learning by constructing meanings from peers and learning by collaborating and building on one another's ideas.

In a similar vein, assessment can be used for learning. To illustrate, instead of teaching certain learning outcomes and then assess students' understanding through assignments and tests as it is normally practised in teacher-centred approach, lecturers can turn the assignments and tests as group-based learning activities where students acquire the learning outcomes through collaborative interactions and at the same time be awarded marks and grades too. This simple practice of using assessment to support learning is known as assessment for learning (Heritage, 2016). In addition to blending assessment activities with learning, the use of authentic assessment in the CAL environments highlights the underlying principles of assessment for learning, that is, making learning explicit and promoting learning autonomy (James et al., 2007). It also helps students in their regulation of learning and that of their peers to meet the learning goals.

Indeed, regulation of learning—and self-regulation in particular—are beginning to be used in peer instruction together with peer formative feedback in CAL to facilitate students' control of their learning and self-regulation of discussion leading to reconstruction of understanding in

their own terms (Green, 2019). In this context, peer instruction engages students in self-assessment to appraise their level of knowledge and skills (Arico & Lancaster, 2018), as a result they benefit in terms of learning from the reflective observation. However, looking at self-regulation and also social interaction through a different lens reveal that they are also the possible causes of student resistance to CAL. The resistance is particularly strong from the lower-performing students because of their weaknesses in self-regulation and social interaction. The social cohesion of this group of students is weak and their sense of community is not well developed (Chang-Tik & Dhaliwal, 2022). Nevertheless, in this chapter the author suggests some strategies to mitigate the resistance.

Getting Students to Collaborate Effectively in Group-Based Learning

As the studies covered in the review of collaborative active learning (CAL) indicated, the effects of group-based learning are considerably more positive when students receive well-structured group work experiences or when they are instructed in group work strategies (Hattie, 2009). In this respect, well-structured group work is already extensively discussed in Chapter 1 (Chang-Tik, this volume). As for the group work strategies the author shall present them in the current chapter together with the importance of social collaboration to promote group-based learning (Mercer, 2008). According to Kirschner et al. (2006), students' skills to collaborate effectively are not self-evident. If so, it is reasonable to refer to the framework of participation developed by Black-Hawkins (2013) to identify pedagogical practices that conceptualise participation. Among the five principles mentioned in the framework, two of them are of particular interest in this section. They are participation concerns all members of a group and participation requires learning to be active and collaborative.

Participation Concerns All Members of a Group

From a learning and teaching perspective, in order to involve all members in a group- based activity it is pertinent to ensure that students are engaged in the pre-class activities before they meet to collaborate in a group. According to Chang-Tik and Goh (2020), the lower-performing students may need extra assistance for them to comprehend and respond effectively to these activities. Specifically, they need a source to refer

to when they are "confused or clueless". In this context, lecturers can arrange for them to study together so that they can mutually corroborate one another's understanding. Additionally, it may be beneficial to have online live chat (e.g., using Google Hangouts) on certain days and times. The aim is to provide guidance, to clarify doubts and importantly, for the students to respond to the activities. At this pre-class stage, it is crucial to emphasize strongly to the students the focus is on their responses and not correct answers.

It is evident that learning can be fun if students feel safe to make mistakes, and to openly interact with their peers contributing and commenting on one another's ideas (Molinillo et al., 2018). To this end, it helps to create a climate of mutual trust that encourages students to speak freely. Specifically, mutual trust implies the shared perception that every member of a group protects the interests and rights of one another and performs tasks deemed significant to the group interest (Fransen et al., 2011). In relation to that, lecturers should make themselves approachable for students to interact with them regarding their learning problems and other matters indirectly related to learning. One effective method is to assume an encouraging demeanour in order to establish an approachable rapport with students and to set a tone that helps them be more comfortable with asking questions and the possibility of being wrong (Tharayil et al., 2018). In doing so it gives them the impression you are here for them. Additionally, during the small group discussion workshop, lecturers can listen to the students' views and probe them to think of alternatives. This approach is in line with Van Zee and Minstrell (1997) "reflective toss" where the lecturers ask questions and throw the responsibility of thinking back to the students. Initially, the sharing of thoughts is between lecturers and students, but over time a comfort zone is developed for students to openly discuss any ideas with their peers. To further strengthen peer interaction, always refer students to their groups for support, therefore, granting them the authority to collaborate and to take greater responsibility for the group collective work, in line with Frykedal and Hammar Chiriac (2018) argument. To this end, peer interaction helps to develop the feeling of connectedness, of being accepted by their peers and these feelings may help to improve students' engagement (Sidelinger & Booth-Butterfield, 2010). Eventually, they will develop mutual trust and thus, are more open to communication and less wary of being laughed at.

Participation Requires Learning to be Active and Collaborative

Theoretically speaking, socio-constructivism that provides the framework for active learning opens up group-based learning of which collaboration is the nexus. According to Baker (2002), collaboration is defined as knowledge construction where participants build on others' ideas and thoughts and not just accumulate them. The main activities of collaboration are negotiation of shared meanings, elaboration, mutual explaining, and reasoning. In this regard, it is reasonable for lecturers to design learning tasks that require team effort to complete. To illustrate, each member of a team of five has to share his/her understanding of an assigned concept posted in Google Doc. Upon questioning from the peers, the student has to elaborate and explain his/her interpretations of the concept, which may be counter-challenged by the peers. In what follows, the students have to collectively and collaboratively select three of their best interpretations to argue orally in class a new phenomenon but somewhat related to the earlier assigned concept. In this exercise, students work as a group to pick the best outcomes and apply them in a new situation; notes and Internet links may be provided to assist them in their understanding.

It is believed that challenges and even conflicts are unavoidable in human interaction and thus, also in collaborative active learning (CAL). During collaboration as described above, students negotiate for shared meanings through arguments, challenges, reasoning, debate and elaboration. These activities may lead to socio-cognitive conflicts which are advocated as essential for the cognitive growth of individuals (Buchs et al., 2004). However, the lower-performing students tend to avoid socio-cognitive conflicts in order to attain a cordial learning environment (Chang-Tik & Goh, 2020). In what follows, they argue less and agree more, they ask questions for clarifications and not elaborations and they seldom challenge one another. Therefore, to create a learning environment that encourages collaboration, it is appropriate for lecturers to inform their students that socio-cognitive conflicts are essential for cognitive growth. In this regard, Van den Bossche et al. (2011) added constructive conflict is a significant behaviour to build shared mental models, where mutual understanding and mutual agreement are needed (Dillenbourg & Traum, 2006) to actively integrate students' contributions in the existing representation (Jeong & Chi, 2007). It is alright to argue and challenge peers' views, but it is not acceptable to overreact and

get personal. However, in most circumstances, when students are challenged out of their comfort zones, socio-cognitive conflicts may give rise to socio-emotional conflicts (Naykki et al., 2014) and students have to learn how to regulate these conflicts. In relation to that, it is the responsibility of every group member to ensure that emotional conflicts do not disrupt the learning process. This is because in CAL, practising shared leadership is more beneficial than individual leadership (Kayes, 2004). In this respect, students in the group have to apply the interpersonal and small group skills, one of the five elements in the Social Interdependence Theory (Johnson & Johnson, 2002, 2013), to resolve conflicts. Nevertheless, the well-functioning group is more capable to regulate emotion and prevent it from turning into detrimental conflicts (Darnon et al., 2006; Sommet et al., 2014) which is negatively related to group cohesion, commitment and performance (De Dreu & Weingart, 2003).

Hrastinski (2008) asserted that social interaction is a key factor that influences CAL. When students interact in a group, they develop a sense of affective connections between themselves and the other members. This connection known as social presence affects the degree of development of a community (Smith & Flaherty, 2013) as well as the emotional (e.g., fun, interest, enjoyment) engagement (Finn & Zimmer, 2012). Specifically, when students feel at ease to communicate freely with their peers and lecturers, enjoy the atmosphere of openly expressing themselves without any fear of being laughed at, then it increases both their feeling of belonging to the group and the emotional engagement. Even though there are some positives here, social presence may invoke "groupthink" (Janis, 1972) leading to an uncritical acceptance of solutions. Still though, what matters most here is a conducive CAL climate which is essential for students to exchange and integrate ideas (socio-cognitive conflicts) and to regulate emotional conflicts when they arise.

Speaking of student effective collaboration in group-based learning, the two principles of the framework of participation provide the foundations to implement the main activities of collaboration from pre-class to the regulation of conflicts. In addition to the framework, it seems that students also need reasons to collaborate. Specifically, if they were taught in a teacher-centred approach where they competed with one another rather than collaborated. In this regard, the Social Interdependence Theory developed by Johnson and Johnson (2013) proposes five elements to maximise the collaborative potential of groups. Among the elements, positive interdependence gives students a strong reason

to collaborate, that is, the perception of being linked to other group members enhances the probability of their achieving their joint goals and rewards. After all, according to Frykedal and Hammar Chiriac (2018), positive interdependence gives the group increased opportunities for developing collaborative processes by working together to complete the group tasks or assignments and be rewarded with good marks and grades. In addition to the positive interdependence, another two elements of the theory, individual accountability and promotive interaction, are also necessary.

First, in terms of individual accountability, there should not be free riders in the group, which incidentally, may destroy the spirit of collaboration. This is because free-riding behaviour is contagious (Kayes et al., 2005). On that note, it is the responsibility of every member to contribute his/her share of the work. In other words, students should not remain silent claiming their thoughts are similar to the one presented. By providing one student a chance to avoid sharing ideas may lead to more members of a group using this excuse. Eventually, the main activities of collaboration will collapse because there are very few students interacting.

Second, in relation to promotive interaction, students generally want to contribute to group discussions. However, at times language problems, personality traits, and missing or low prior knowledge may hinder students' participation. After all, according to Woolley et al. (2010), the group's success may depend on the students' attitude, motivation and personality traits. To this end, for group members to encourage each other's efforts through discussions and explanations, it is important that they know their learning partners' prior knowledge. The reason being this awareness ensures a target-oriented coordination of knowledge exchange (Dillenbourg & Betrancourt, 2006). In other words, it can trigger gap filling learning behaviours such as providing learning partners information about the missing knowledge and in general show a willingness to help other group members.

Further, in the context of the Social Interdependence Theory, the three elements discussed above (positive interdependence, individual accountability and promotive interactions) are necessary to maximise the collaborative potential of group-based learning. As such, to implement the three elements into group work requires active participation from students. This suggests that the use of the three elements together with the framework of participation could contribute to enriching collaborative group-based learning. In other words, to increase the effectiveness

of group-based learning, the Social Interdependence Theory and the framework of participation can serve this purpose quite well. If so, the grouping of students can influence our efforts in enhancing group-based learning simply because the cognitive load theory entails that an incomplete knowledge base is important to create optimum conditions for collaborative learning (Retnowati et al., 2018). In the case of a homogeneous grouping, it is difficult for the members to fill the knowledge gap as they have a similar knowledge base (Zhang et al., 2016). However, in a heterogeneous grouping, obtaining information from other group members may be possible. Therefore, homogeneous grouping may cause collaboration to be redundant and thus, less effective than individual learning.

In what follows, a relevant question is how should lecturers group their students? Based on the findings presented, it is still possible to allow students to choose their group members due to the development of transaction memory. According to Hollingshead (2001), this memory provides group members knowledge of what each member knows and how to communicate this information. Therefore, there is an advantage to having group members who are more familiar with each other than otherwise. However, lecturers may have to intervene if there is any group where all the members are high distinction students or the other extreme. Of note, this situation is unlikely to frequently occur.

Lastly, in relation to the cognitive load theory again, there are two advantages of collaboration. First, when completing complex tasks, group members can reduce the intrinsic cognitive load of the tasks (stems from the to-be-learned materials) by offloading the cognitive effort across group members' working memories. Second, the extraneous cognitive load (generated by instructional designs) can also be reduced by learning relevant information communicated from other group members (Kirschner et al., 2009).

Development of Student Feedback Literacy and Peer Formative Feedback

One can approach the contributions of feedback to CAL from two perspectives. The first perspective suggests the student feedback literacy, thereby extending the scope of the students' involvement in CAL. For the second perspective, on the other hand, it involves the lecturers' contributions that may reflect a new dimension of feedback related to learning and

teaching. It is important to gain insights into these perspectives, starting from a common complaint from university students on the lack of feedback they received or more specifically the quality of feedback. To this end, universities have put in a lot of effort to improve the feedback quality, but according to Wingate (2010), it still does not result in improved student learning. It is important to note here that feedback is just a comment unless students act on it. If so, students are less likely to act on feedback if they perceive the assessment tasks are not authentic and/or relevant to their studies (Evans & Waring, 2011). Therefore, to make assessment and learning authentic and relevant to students, Garrison and Cleveland-Innes (2005) suggest to structure effectively the interaction among lecturers, students and disciplinary content. Additionally, Carless and Boud (2018) define feedback as a process whereby students make use of the information from various sources to improve their learning. The question is can students act on the information provided from the interaction and several sources? In other words, are they equipped with feedback literacy in order to make sense of the information? In what follows, the author discusses the framework of feedback literacy which consists of appreciating feedback, making judgments, managing affect, and taking action (Carless & Boud, 2018).

First, appreciating feedback—lecturers have to provide students with feedback, but do so to support learning and not because of increasing discourses of students as consumers and therefore, lecturers have to tell students what to do to achieve high grades (Bunce et al., 2017). It is important to note here that accepting these discourses may inhibit students from taking responsibility for their learning and eventually lead to passive student reactions to feedback. In doing so, they may not appreciate the value of feedback and sometimes fail to recognise feedback can take different forms other than written comments on submitted work. To this end, it is essential that students are made aware that lecturers may provide audio and video feedback. Additionally, while interacting in CAL environments peer feedback is a powerful tool that may lead to the development of a supportive learning community that mutually provides peer learning support (Gikandi & Morrow, 2016).

Second, feedback judgments—lecturers have to provide opportunities for students to make decisions on the quality of work of oneself and others (Tai et al., 2018). To illustrate, lecturers can explain to students how to self-evaluate one's work using a rubric. Consequently, point out areas for improvements. Once students have acquired the self-evaluation skills then

they are ready to carry out peer evaluation. It may be useful to note that self-evaluation is one of the skills that typifies self-regulation, which is at the nexus of CAL. Specifically, as students review their progress of a task, internal feedback is generated which students can refine in comparison with the external lecturer feedback. In doing so, feedback can beneficially be focused on supporting student learning than conventional feedback as telling (McConlogue, 2015).

Third, managing affect—generally students are defensive when they receive negative feedback such as critical comments or low grades. To this end, does it mean negative affective reactions may demotivate students in learning? According to Lipnevich et al. (2016), it depends on the tone of the feedback. Even though the feedback may be negative if it signifies that the lecturers care for the student learning, then student engagement with the feedback is enhanced (Sutton, 2012). Further, students' mixed activating affect, that is, positive activating emotions (e.g., enjoyment) and negative activating emotions (e.g., anxiety) are more likely to be triggered by socially-related factors rather than task-related factors (Tormanen et al., 2021). In CAL, lecturers facilitate student learning and not passively deliver information to students as it is normally practised in a teacher-centred environment. Consequently, through facilitation and social interaction an emotional engagement develops over time where lecturers show more interest and care in their student learning. In what follows, in this trusting atmosphere students are more likely to engage with the feedback provided.

Fourth, taking action – at the last stage of the feedback literacy students need to engage actively with the information in the feedback and use it to inform their later work, thereby closing the feedback loop (Boud & Molloy, 2013). It is pertinent that lecturers ensure the loop is closed, otherwise, the information given will remain as comments and not feedback designed to support learning. To serve this purpose, there are many possibilities. One, consider giving socio-constructivist feedback where students have to act on it in their group-based activities in order to proceed. Two, allow students to resubmit their work for better marks when they act on the feedback and explain how they use the information to improve their work. Three, incorporate peer feedback as a group-based learning activity requiring students to act on members' comments to arrive at the group consensus. Subsequently, when they exchange ideas and responses in intergroup discussions, they have to react reasonably to every feedback from their peers. Four, provide training to students

on how to affectively, cognitively and behaviourally engage with peer feedback and to encourage students to explore how they act upon peer feedback (Yu et al., 2019).

Once students are equipped with feedback literacy, they are in a stronger position to review peers' work and offer formative feedback, which in turn helps them to develop self-assessment (Nicol & Macfarlane, 2006). For the feedback to achieve effectiveness in the formative processes, it has to be constructive (Gikandi et al., 2011) so that students have to play an active role in constructing their own meaning from the feedback they received (Nicol & Macfarlane, 2006). To this end, the peer formative feedback helps to foster self-regulated learning as it exposes students to alternative perspectives, which in turn triggers students' self-assessment to revise or reject their initial perspectives. As such, new knowledge is constructed collaboratively through negotiated meanings (Nicol & Macfarlane, 2006). Therefore, it is theoretically plausible to state that peer formative feedback is a form of collaborative active learning. Likewise, conceptualising peer formative feedback as self-regulatory learning, Green (2019) argues the need to enact feedback as a process that is both dialogic and empowering: students need to see their need to negotiate meaning through dialogue and to be empowered to "talkback" in order to reconstruct feedback in their own terms. In doing so, they are not suppressed into accepting feedback with no choice or say.

It is noteworthy that CAL can only succeed in a supportive learning community. One important ingredient to nurture this community is peer formative feedback where students mutually provide peer learning support and increasingly self-regulate their learning (Gikandi & Morrow, 2016). Interestingly, this learning community may stimulate students to narrate their prior knowledge and experiences that provide opportunities for collaboration and peer feedback. In doing so, it may help to connect their thinking to other broader contexts in ways that demonstrate authentic learning in the real-world environments (Gikandi & Morrow, 2016). In what follows, the second ingredient which complements the first in nurturing the learning community comes from the lecturers. They have to avoid providing feedback as a means of information transmission which is very similar to feedback as telling. Initially, lecturers may face strong resistance from students, especially those who still believe it is the lecturers' responsibility to convey correct information to them when they make mistakes. In other words, getting these students to construct meanings

from feedback is certainly beyond their beliefs and values regarding feedback and their role in the process. Nevertheless, lecturers have to guide students on how to engage constructively and to facilitate group discussions by providing responses for the students to reflect and to enrich the discourse with expansive ideas and probes. Lastly, lecturers should explicitly inform students that in CAL, peer formative feedback is a key aspect within the learning processes. As such, it is an individual and shared responsibility of every group member to contribute constructively to these processes. Evans and Waring (2011) concur that tackling students' perceptions of peer feedback should begin from the outset.

Assessment for Learning as Support of Student Self-Regulation

Traditionally, lecturers use assessment to determine how well students have learned. As a result, students usually associate assessment with marks and grades and rarely with learning. In what follows, based on the collaborative active learning (CAL) strategies, feedback as discussed in the previous section, and now assessment have been bestowed functional roles in support of student learning by the lecturers. Specifically, students are given activities with clear learning outcomes and performance criteria. Next, lecturers, students and peers elicit, interpret and reflect on the learning evidence obtained from observation, dialogue and demonstration. Following this evidence, lecturers shall take pedagogical actions to promote students' active involvement in the assessment process. In other words, the activities are forms of assessment, not for marks, but for learning and this practice is known as assessment for learning (Heritage, 2016). Besides lecturers, students should take an active role in assessing their own learning with the intention of making adjustments to their goal attainment in relation to the learning evidence obtained (self-regulation of learning). Finally, the peers in the group provide regulatory support through scaffolding (co-regulation of learning). When members of a group receive this type of learning support, it helps them to appropriate the learning processes, regulate their own learning and generate their own judgments of performance (Hadwin et al., 2011).

Having a socio-constructivist theoretical basis, the CAL strategies primarily deal with activities which are group-based and require collaborative interactions among group members. If so, in the context of assessment for learning, lecturers have to blend learning activities with

the assessment activities that mirror real-life uses of the discipline that helps students in their regulation of learning. Therefore, lecturers have to set clear learning outcomes and performance criteria (rubric) in the activities. Additionally, they have to explain the criteria in the rubric as well as the expectations of the learning outcomes. The reason being, the regulation of learning can only be carried out with respect to specific targets, in this case, they are learning outcomes and performance criteria. In what follows, activities that induce collaboration between students are tasks that compel them to work together. This is essential because assessment for learning is a process that requires constant inputs of information that students can use as feedback to regulate their own learning process and that of the peers to meet the learning goals (Black et al., 2004).

According to Swaffield (2011), lecturers can regulate opportunities for learning, but not learning per se which is solely the function of students. To this end, how can students self-regulate learning in the context of assessment for learning? It is important to note here that Boekaerts and Cascallar (2006) regard self-regulation entails setting goals, developing plans to attain goals, monitoring progress towards goals and finally adapting learning approaches to move closer to the desired goals. If so, the initial practice of assessment for learning is the setting of the learning outcomes of the activities and performance criteria by lecturers which can easily become the learning goals students have to set in self-regulation. Even though it is just a short-term goal in relation to the activities, students can learn from this experience and eventually set their own long term personal learning goals. Next, lecturers play a pertinent role to assist students in understanding the expectations of the learning outcomes and the performance criteria which will be used to draw evidence of learning under the assessment for learning practice (Heritage, 2018). In doing so, students learn to develop plans to achieve the expectations and criteria mentioned. Consequently, as the learning progresses more evidence emerges and in the CAL environments through co-regulation as in scaffolding, students monitor and adapt the learning approaches to attain the desired goals. In other words, co-regulation is a process of joint regulatory ownership between a student who is providing regulatory support and a student who is accepting regulatory knowledge and skills with the ultimate goal of students acquiring their own self-regulatory skills in learning (Heritage, 2018). Additionally, co-regulation encourages students to put more effort into goal setting, monitoring and group work (Lai, 2021) and it also increases students' attention to tasks and group

awareness, which according to Panadero and Järvelä (2015) is a vital factor in students' collaborative learning. Lecturers can also play a moderator role by providing pedagogical support to move student learning forward. Given all the insights above, it is reasonable to state that the practice of assessment for learning helps students to self-regulate their learning.

After reporting the practices of assessment for learning, it may be judicious to consider the effect of authentic assessment in these practices. According to Wiggins (1993), authentic assessment refers to real-world tasks that require students to demonstrate their knowledge and skills effectively and creatively. The nature of the tasks tends to reflect the kinds of problems usually faced by professionals in the field. Therefore, it provides opportunities for students to learn whilst undertaking the assessment (Swaffield, 2011). To this end, the opportunities themselves challenge the students to think like professionals in coming up with plans and strategies to complete the tasks. Unsurprisingly, students have to work in a group actively collaborating with one another to offer regulatory support through scaffolding. Of course, lecturers will facilitate the learning processes by giving the students autonomy in learning. Therefore, the use of authentic assessment in the CAL environments does serve the two underlying principles of assessment for learning, that is, making learning explicit and promoting learning autonomy (James et al., 2007).

Implementing Collaborative Active Learning Using Student Peer Instruction

The present section provides insights into a pragmatic transition from a traditional lecture style of delivery to an engaging constructive approach using peer instruction which is an effective active learning pedagogy (Mazur, 1997). In the context of collaborative active learning (CAL), every group member should be cognisant that peer instruction is a joint effort and not a sole responsibility of one or two members. In other words, peer-to-peer teaching resulted in a collaborative engaged learning. According to Arico and Lancaster (2018), during peer instruction, students are entirely in control of their learning, and self-regulate the discussion. They can refer to notes, discuss in small groups and even extend it across different groups. Based on the description of peer instruction enriched by self-regulation and discussion, it is pertinent that students must negotiate meaning through dialogue and be empowered

to "talkback" in order to reconstruct understanding in their own terms (Green, 2019). In other words, they are not suppressed into accepting their peer teaching with no choice or say. Therefore, peer instruction or, by and large, peer formative feedback in CAL appears to share a common element of self-regulation which is the ability of students to monitor and manage their learning. What matters most here is any nuanced distinctions that exist between peer instruction and peer formative feedback are just conceptual definitions with no significant impact on student learning.

What are the natures of learning activities that are suitable for peer instruction in the CAL environments? In this regard, the activities must be complex enough to mirror the real-life uses of the disciplines and yet challenging to compel students to peer teach and learn from one another. To illustrate, let's consider online and offline quizzes. Normally, quizzes are used to test students' understanding of the lessons taught. From a CAL perspective, quizzes can be turned into lessons for students to peer teach one another supported by notes and other learning materials. To this end, questions are set to stimulate thinking and discussion based on new concepts but somehow related to those already taught. Initially, students are invited to answer the questions autonomously and without consulting with one another. After that, they come together to peer teach, to reconstruct understanding and to negotiate meaning of the new concepts. In doing so, they collectively agree to the most appropriate answers to the questions and present them to their peers in the other groups as well as the lecturers. Following this presentation, students have to explain and defend their answers when they are challenged. Given all the insights above, it is clear that peer instruction assists students to collaboratively engage and construct understanding in the spirit of active learning.

The format of the activities can vary, that is, besides quizzes the other options are online forum discussion, small group debate in Zoom Breakout Rooms, and assessment for learning activities. All these different formats purport to bridge the significance of self-assessment to self-regulation so that the pragmatic insights of the transition to CAL using peer instruction can become stronger and more comprehensive. The ability to self-assess is an important metacognitive skill. According to Arico and Lancaster (2018), through self-assessment students are able to appraise their level of knowledge and skills prior to engaging in peer instruction. In a similar vein, they also benefit from reflective observation as described in Kolb's experiential learning model (Kolb, 2015). In this regard, peer instruction serves to strengthen the perception that students learn more when they teach others. This is because

during peer instruction students observe any inconsistencies between their existing understanding and the experience. Consequently, they reflect on the observation leading to improved learning. In addition, technology-enhanced peer learning has a positive impact on mentors' metacognitive awareness and on the development of communicative and collaborative competencies (Carvalho & Santos, 2022).

Strategies to Mitigate Student Resistance

A glance at the literature reveals that students respond positively to active learning (O'Brocta & Swigart, 2013), however, there are counterbalancing studies which show mixed student responses (Wilke, 2003) and even negative student responses (Lake, 2001). It is noteworthy that in active learning students have to construct meaningful mental models of new knowledge based on their prior knowledge by being cognitively involved and engaged in the learning process (Clark & Mayer, 2008). By allowing students to express themselves easily and to engage in the learning process, why do they react differently from positive consequences to negative effects? It may be useful to explore the possible causes of student resistance or negative reaction to active learning before engaging in strategies to mitigate the resistance. In what follows, under the collaborative active learning (CAL) environment for students to engage in the learning process, first it involves student self-regulation of the learning followed by group members' social interaction to arrive at a consensus. To this end, the possible causes of student resistance may lie in self-regulation and social interaction.

To illustrate, according to Zimmerman and Tsikalas (2005), being aware of missing or low prior knowledge may facilitate students' self-regulation to select appropriate strategies to fill the knowledge gaps. The problem is the lower-performing students may need assistance in regulating their cognitive processes (Vrugt & Oort, 2008) of self-regulation such as planning activities, awareness of comprehension and task performance and evaluation of strategies (Lai, 2011). Consequently, it is reasonable to state that the self-regulatory skills needed in CAL may trigger student disdain for active learning as they feel handicap in the learning process. In this regard, to mitigate the situation lecturers can set up an active community for the lower-performing students to support one another and for the more capable peers to assist them. If so, through the process known as co-regulation the peers provide regulatory support in

the form of scaffolding. When members of the active community receive this type of learning support, it helps them regulate their own learning and generate their own judgments of performance (Hadwin et al., 2011). Eventually, this group of students will learn self-regulatory skills. Also, in the community, students may receive personalised feedback from their peers which according to Zheng et al. (2022) may enable them to better co-regulate their behavioural patterns and to significantly improve their collaborative knowledge-building.

In terms of arriving at a shared co-constructed meaning through social interaction, ideally all members of a group should contribute to the discussion. However, occasionally there are individuals who put in less effort than is fair while adding little or no value to the group work; they are known as free riders. The majority of the free riders want to take advantage of the group, but there are a few cases where the students' academic ability and language problem may be an impediment to their contributions. Therefore, it may be judicious to resolve any misunderstanding by checking the students' commitments in the social interaction. This is crucial because social interaction is paramount in CAL and according to Abernethy and Lett (2005), free riders may cause students to feel anxiety and frustration about grades received for group work. If the problem is not mitigated it may drive other students to be free riders later on (El Massah, 2018). When it happens, social interaction will fail and according to the theories of social loafing and the sucker effect, free-riding behaviour has a cumulatively negative impact on student learning (Chapman et al., 2006).

Therefore, to address free riders in a collaborative group work there are three options: peer assessment, lecturer pressure and incentives and penalties. Studies suggest that peer assessment may improve student engagement when individual members assess their peers' contributions (Johns-Boast, 2010) and also reward students who make greater efforts (Hall & Buzwell, 2012). Furthermore, lecturer pressure may be effective in determining individual performance and somehow control free-riding (Jones, 1984). The author highlights that lecturer can randomly call upon any member of a group to query his/her understanding of the group work submitted as well as during the CAL interaction. In this manner, it may not add extra workload on the lecturer and at the same time, the students are reminded of their participation. Finally, employing a grading scheme that penalises unproductive group members may eliminate free riders (Roberts & McInnerney, 2007).

In terms of increasing the effectiveness of social interaction, besides addressing the issue of free riders, the social interdependence theory (Johnson & Johnson, 2009) is particularly helpful and essential to student collaborative work. Specifically, the element of positive interdependence among students that spells out every group member's contribution, commitments and responsibilities to the group learning process and product. Given the high expectations of the student participation, it is plausible to expect substantial role shifts for students and also student resistance to group work (Perumal, 2008). After all, according to MacGregor (1991), the transition from passive learning into CAL settings may cause students to struggle with several role shifts. Still though, what matters most here is what strategies lecturers used to mitigate the problems or resistance arising from the role shifts.

The author highlights a few pertinent issues as follows:

- Students have to play an active role as problem solvers rather than passive listeners. They are expected to contribute to group discussion, argue and defend their position and arrive at a group consensus. Lecturers can support students by valuing their contributions and engagements in group work (Stover & Holland, 2018). It is also important to take a look at students' personal preference for learning mode that may cause some resistance to CAL (Reynolds & Trehan, 2001) and the patterns of power dynamics related to race and gender within the collaborative group formation (Perumal, 2008).
- Students are expected to come prepared for group discussions as compared to a low expectation of preparation for a lecture class. They are required to respond to the pre-class learning activities in the forms of reading, watching a short video, attempting an online quiz, and virtual discussions. Lecturers can add values to the pre-class activities by linking them to the in-class activities and eventually to graded assignments. Furthermore, according to Chang-Tik and Goh (2020), the lower-performing students may need some scaffolding for them to comprehend and respond effectively to these activities. It may take the form of worked examples and process worksheets (Van Merrienboer, 1997) to provide descriptions of the activity students should go through, complete with some hints.
- Students are required to collaborate with peers rather than compete with them. Generally, since secondary school time students were used to competing with one another and not collaborating as a team.

Lecturers can encourage students to collaborate by explaining to them group work helps to build transferable skills such as leadership, management and communication skills (Curseu et al., 2012). In addition, it promotes deep, active, and experiential learning and the skills developed in a team will increase their chances for future employment (Davies, 2009). As students' skills to collaborate are not self-evident (Kirschner et al., 2006), lecturers have to teach them these skills as well as to provide feedback and encouragement for them to self-reflect.

- Students need to accept another source of authority and knowledge rather than from the lecturers alone. They find it difficult to be in a position where they are unsure of an answer and do not have an authoritative figure to distinguish the important content from others (Owens et al., 2020). Lecturers need to communicate clear intentions, and develop protocols and structures for active learning so that students are aware that peer feedback (Carless & Boud, 2018) and peer instruction (Arico & Lancaster, 2018) are valuable sources of knowledge. Additionally, to promote greater joint responsibility for group work and peer learning, lecturers should encourage students to refer to their peers for support (Frykedal & Hammar Chiriac, 2018) rather than focusing on only one source, that is, the lecturers themselves.

Conclusion

In a collaborative active learning (CAL) environment, students are expected to come prepared for group interaction, actively participate in the argument, elaboration and reasoning, and also to collectively regulate emotional conflicts. The majority of students are inexperienced in these activities, especially the lower-performing ones. Therefore, it is pertinent that lecturers have the pedagogical strengths to promote productive knowledge construction through the CAL approach. To this end, lecturers can rely on the framework of participation (Black-Hawkins, 2013) to increase the effectiveness of interaction and also the Social Interdependence Theory (Johnson & Johnson, 2013) to maximise the collaborative potential of groups. Otherwise, it may lead to student resistance and disdain for active learning.

To be included as pedagogical strengths, lecturers have to develop student feedback literacy so that students can actively act on feedback

in their learning process and to provide formative feedback leading to peer learning. On this note, lecturers have to explicitly inform students that in CAL, peer formative feedback is a key aspect within the learning processes. As such, it is an individual and shared responsibility of every group member to contribute constructively to these processes. Additionally, lecturers have to utilise assessment for learning as a foundation for students to acquire self-regulatory skills as well as co-regulation with the group members through the use of authentic assessment. Lastly, lecturers have to design complex and challenging activities to induce students to peer instruction in hospitable learning environments. It is pertinent that in peer instruction students must negotiate meaning through dialogue and be empowered to "talkback" in order to reconstruct understanding in their own terms (Green, 2019).

Practically speaking, placing students in groups is just the first initial step in the CAL approach. There are many essential moves needed to get them ready to reap the benefits of collaborative active learning. This suggests both lecturers and students have to mutually complement each other to achieve success in CAL.

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