CHAPTER 13

Optimisation of Collaborative Active Learning in Different Settings and Disciplines in the Tertiary Setting

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Introduction

In the 1980s, tertiary institutions were urging faculty to actively involve and engage students in the process of learning. "Despite the urgency of these calls, research consistently has shown that traditional lecture methods, in which professors talk and students listen, dominate" our tertiary classrooms (Bonwell & Eison, 1991). The Bonwell and Eison report provided an excellent summary of active learning in Higher Education. They outline how it could be incorporated into the classroom through modified lectures, the inclusion of questioning and discussions,

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and the barriers to change. Bonwell and Eison's comprehensive overview of strategies that promote active learning, listed below, is similar to many of the strategies featured in Section B of this book:

- Visual-Based Instruction
- Writing in Class
- Problem Solving
- Computer-Based Instruction
- Cooperative Learning
- Debates
- Drama
- Role Playing, Simulations, and Games
- Peer Teaching.

The nine chapters in this book present tertiary classroom research from a new educational era—an era that has seen the advancement of computer-based instruction. Bonwell and Eison described computer-based instruction as high cost, drill and practice, data management, word processing, and learning to program. There is little need to outline the changes in computer-based instruction over the past three decades since the Bonwell and Eison report. It is sufficient to say that the tertiary classrooms of today and those of 30 or more years ago are vastly different mainly due to the inclusion of education technologies—as they are now called.

The discussion in this chapter aims to draw together the nature of collaborative active learning (CAL) as presented by the nine chapters in Section B of this book. Section B gave practical activity-based approaches drawn from several different disciplines. This book can be considered a case study of a selection of tertiary institutions in Kuala Lumpur, Malaysia, and their implementation of collaborative active learning from various Faculties. Not all faculties, departments, schools and centres could be included. Still, what has been described can, we feel, be considered representative of the Universities involved and the collaborative active learning approach for this particular geographical location at this specific point in time—a time of educational change due to global pandemics and greater autonomous student learning.

We do not intend to describe or critique each of the nine chapters individually. Instead, we have focused on the corpora of ideas (the data) across

and within the nine chapters collectively. We have conducted a quantitative frequency analysis of this corpus in the form of a word cloud so that visualisation of collaborative active learning was possible. We then undertook a qualitative analysis of the nine chapters to reveal a shared understanding of the process of active learning in our context. Thus, we present this chapter in two parts. Initially, we offer the word cloud analysis to provide a visual overview of text in the nine chapters of Section B. Word clouds do not illuminate linguistic knowledge or the semantic context of phrasing. Thus, we then present a qualitative thematic in the second part of the chapter. A conceptual framework was derived from the analysis of the nine chapters. Each of the authors in Section B of this book has grounded their work in this framework. Their ideas, tools and insights contribute to a common lens that supports our collective understanding of active learning in university settings in Kuala Lumpur, Malaysia.

A Visual Overview of Collaborative Active Learning

We used word cloud software (WordArt, 2022) to undertake a statistical analysis of the research presented in Section B of this book and then to deliver this analysis in a visual form. Word clouds are used to give a visual overview of a text by depicting the words that occur most often within the text. We used the nine chapters presented in Section B of this book as our text corpora for this chapter. We thus converted a large amount of one-dimensional text data (58,141 words) into a two-dimensional data configurational form in space (Ma et al., 2022). Typically, word cloud software prepares a statistical overview by positively correlating the font size of the words from the text with the word frequency utilising a spatial layout. The more often a word appears within the text corpora, the larger the word appears in the image generated. The font size indicates how often the word occurs in the text corpora, normally after having 'stop words' removed. Stop words are a form of a negative dictionary (Rajaraman & Ullman, 2011) where words are filtered out (stopped) before or after processing text data. Stop words are the most common words that search engines avoid processing to save space and time. The most common stop words are short function words, such as *the, is, at, which*, and *on*.

The advantage of creating a word cloud is the subsequent ease of identifying the most commonly occurring words and their relative frequency

compared to others. However, it isn't easy to make accurate numerical estimates of those frequencies. We found the generation of the word cloud to help analyse and interpret our vast corpora of data (58,141 words) and provide the text's focus and the key concepts previously inaccessible at first glance.

The methodology was as follows:

1. Combined the full text of all nine chapters into a single word file
2. Removed all chapter titles, authors' names and institution names
3. Removed all abstracts and keywords
4. Removed all section headings and subheadings
5. Removed all references
6. Copied remaining text (n = 58,141 words) into the free online *WordArt* word cloud generator
7. Visualised the word cloud to include the 50 most frequently used terms
8. Cleaned the resultant word cloud for erroneous stop words not automatically filtered (n = 4 (CI; onto; hunt; not)
9. Edited the text colour of the representative keywords to 'black' to remove auto-randomised text colour (removal of distractor non-variable)
10. Saved the resultant word cloud (see Fig. 13.1).

Figure 13.1 is the resultant word cloud depicting the 50 most representative keywords from the nine chapters. As Fig. 13.1 exhibits, the key representative term is 'student'. The 49 most frequently used words in the text corpora, after student, are randomly placed around the central location of the key representative term. The visualisation is reassuring as we expect the student to be at the centre of collaborative active learning. This indicates that the academic community that wrote the chapters is firmly focused on their students. The nine chapters' key content and thematic information are being active with learning. Peers, groups or teams, time, skills, practices, discussions, feedback and so on are all important.

All word clouds are static visualisations, providing no interaction capabilities. As a result, they have limitations in providing a purely statistical summary of isolated words without taking linguistic knowledge about the words and their relations into account. Thus, the semantic context of phrasing is lost. We have overcome this limitation by conducting a

Fig. 13.1 Representative keywords characterising the research around collaborative active learning

thematic analysis of the authors' ideas and understandings. We present this as a conceptual framework in the following section.

A Conceptual Framework of Collaborative Active Learning

Braun and Clarke (2013) outline a thematic analysis as a "distinctive method with a clearly outlined set of procedures" (p. 178). Thus, a thematic analysis is a data analysis method that identifies themes and patterns of meanings across a dataset. As identified at the beginning of this chapter, our data set are the nine chapters that constitute Section B of this book. We adapted the seven analytical steps of Braun and Clarke:

1. Reading and familiarisation—each chapter was read several times to gain an understanding of the CAL research
2. Coding—the identification of phrases that captured the essence of the CAL research
3. Searching for themes—the frequency of codes illuminated themes
4. Reviewing themes—the themes and codes were scrutinised to reveal themes and subthemes

5. Defining and naming themes—terms derived from the language used by the authors of the chapters
6. Finalizing the analysis—the themes and subthemes were considered in light of the literature cited within the chapters
7. Presentation of the thematic analysis as new knowledge—new theoretical relationships combining cited and new research was visualised into a process (a conceptual framework) to explain CAL. This process is our contribution to existing CAL knowledge.

As depicted in Fig. 13.2, our thematic analysis indicates CAL is a process of optimisation. We introduce the conceptual framework *Optimising Collaborative Active Learning in Tertiary Settings* (OCALiTS). OCALiTS indicates three phases are involved in the process of optimising CAL.

Phase 1 is concerned with opportunity—the opportunity to think critically. Central to the provision of this critical thinking is the role of the facilitators and the students' actions. The authors of the nine chapters were employed across various disciplines (Psychology, Statistics, Engineering, Anatomy, Gender Studies, Information Technology, Accounting, and Finance), yet the similarities are striking. Faculty need to understand they have the responsibility of going beyond the traditional lecture teacher-centred approach to teaching. Tasks need to change, ICTs need

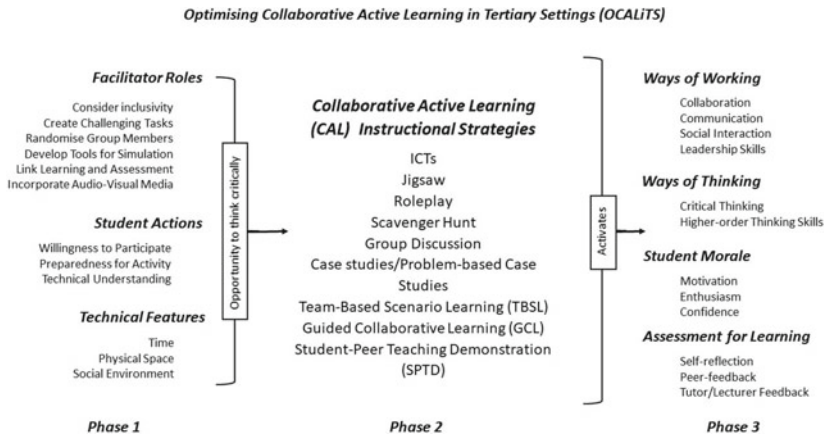

Fig. 13.2 The Optimising Collaborative Active Learning in Tertiary Settings (OCALiTS) conceptual framework

to be developed, and student experience needs consideration. However, this needs to co-occur as the student becomes aware that they need to be a participant in the process. The students need to be willing to think deeply, get out of their seats and comfort zones, and construct their knowledge instead of absorbing and repeating already known knowledge. Thus, CAL is a pathway for deep learning—shifting away from surface and rote learning.

CAL strategies aim to engage students in the classroom and ensure their active participation and, hence, learning. However, students may themselves pose challenges for the tutors or facilitators to implement such strategies effectively in the classroom. Ortega and Jambaya (2022) found that students were resistant and unwilling to participate in the CAL classroom. Students' reluctance to work with one another results from the differences in their personality types, cultural variations, and shyness (Dharmaratne et al., 2022). Students were not always adequately prepared for the CAL class and did not take ownership and responsibility for their learning (Ortega & Jambaya, 2022). The lack of understanding of technical concepts is another challenge for successfully implementing CAL strategies (Peranginangin, 2022).

To complement the human side of CAL, technical features also need to be considered. The acknowledgement that CAL takes time is essential. Time for both the faculty and the students to develop CAL teaching and learning skills and time to collaborate is critical. Then provision also needs to be made to create a physical space for the CAL to occur and develop the social environment. CAL strategies can be time-consuming (John & Sagadavan, 2022) and require a socially conducive environment for learning (Goh, 2022). Goh suggested that students find it highly challenging to enhance their critical thinking, personal confidence, mutual respect, and mutual learning in and beyond the CAL classroom due to a lack of safe space.

Facilitators need an adequate amount of time to learn the online learning tools and preparation needed to plan and implement these collaborative active learning strategies (Ortega & Jambaya, 2022; Von & Gopalai, 2022), and this can cause facilitators to be resistant to using such strategies (Dharmaratne et al., 2022). Problems may arise as the facilitators engage in the design of the tasks. The task must be challenging and relevant for students (John & Sagadavan, 2022) and open-ended to encourage multiple responses from the students. The tasks need to be designed to challenge students such that answers cannot be found

on smart devices (Von & Gopalai, 2022). Furthermore, facilitators must ensure the linking between learning activities and assessment tasks to ensure the commitment of students and the inclusion of different types of audio-visual media (Goh, 2022). The inherent nature of the CAL strategies involves group/teamwork. Therefore, issues such as equal distribution of workload (Dharmaratne et al., 2022), free riders, social loafers and inactive members (Peranginangin, 2022) need to be considered. Randomising group members can assist in this area (Dhoraisingam & Subramaniam, 2022; Von & Gopalai, 2022).

Phase 2 of the OCALiTS Framework relates to the instructional strategies employed to implement CAL. This phase is central to the framework. Although the terminologies have changed, we can see familiar strategies to those listed in the Bonwell and Eison (1991) report. To replace computer-based instruction, we now have Information Communication Technologies (ICTs). Although the CAL instructional strategies may appear somewhat conventional to contemporary teaching, the distinction is made that it promotes students' achievement when utilised through a CAL approach.

Student motivation and engagement become an important consideration (note willingness to participate from Phase 1) as participation cannot be assumed. The empowerment of student attitudes is also a consideration (leading into Phase 3). Faculty need to consider the strengths and weaknesses of their strategies and activities to present CAL as a useful blended whole. For example, in 1991, Borwell and Eison described computer-based instruction as a separate activity, devoid of integration into daily teaching and learning. Today, our authors describe ICT usage through a fully integrated approach. Although we have identified ICTs as a separate CAL instructional strategy in the OCALiTS Framework, we could also have incorporated it into each of the other listed strategies as the different strategies incorporated the ICTs into their delivery and the experience.

The CAL strategies employed several Web 2.0 technologies (Moodle, Padlet Wall, Wikis, Google Docs, Google Slides, Google Share, Videos, Discussion Forums, Simulated Scenarios, Asynchronous Video lectures, assessment tools) rarely used in isolation. Instead, the authors integrate the strategies depending upon the goals of the lessons or the larger unit of work. The nature of the CAL strategies itself was also limiting in some respect for the students. For example, a scenario simulation assessment could create stressful situations for students affecting their performance or participation (Dharmaratne et al., 2022), while a scavenger hunt involving

the physical activity of various degrees could be restricting for students with disabilities (Von & Gopalai, 2022). Moreover, a scavenger hunt is an effective CAL strategy; however, students often prioritise speed over accuracy due to its *race-type* format (Von & Gopalai, 2022).

Phase 3 is the outcome of the CAL process—the student learning that occurred during the CAL process. Above, we mentioned that CAL instructional strategy selection, in Phase 2, explicitly considers student achievement as a differentiating factor from contemporary instructional strategies. Student achievement is the desired outcome of CAL. However, not all authors emphasised or ensured student achievement, in the same way, indicating a possible disciplinary emphasis might exist. Ways of Working and Ways of Thinking were identified as mainly related to the much researched 21st Century skills so valued by employers. Student achievement was often housed in these two themes. Student morale was also recognised as benefiting from CAL activities. A number of our authors noted their assessment practices in relation to CAL.

Conclusion

This chapter has presented a dual analysis of the nine chapters in Section B of this book. Through the statistical analysis of the text, visualised via a word cloud, we determined the student to be at the centre of the research. The nine chapters tended to focus on the student's learning in relation to CAL. This leaves room in the future for further research to focus on the faculty as participants in CAL. We imagine such research could explore faculty identity as a teacher of CAL. We also conducted a thematic analysis of the nine chapters. We created a conceptual framework that describes the shared understandings of the CAL process in the unique context of the higher education setting in Kuala Lumpur, Malaysia. The authors within Section B of this book, who ground their work in this OCALiTS Framework, did so by sharing their ideas, tools and insights across the three phases of the optimisation process for CAL. The mode of instruction was shown to be important. The timing of this book is coincidental to the current COVID-19 pandemic. However, this timing has been beneficial as we have been given the privilege of seeing CAL implemented along a continuum from face-to-face learning (Sen & Selvaratnam, 2022) and blended learning (Dharmaratne et al.,

2022; Dhoraisingam & Subramaniam, 2022; Goh, 2022; John & Sagadavan, 2022; Peranginangin, 2022; Von & Gopalai, 2022) to fully online learning (Ortega & Jambaya, 2022).

The research presented in the nine chapters describes teaching in university settings that promote the use of strategies to advance students' knowledge (John & Sagadavan, 2022; Von & Gopalai, 2022), higher-order thinking skills (Dharmaratne et al., 2022; Peranginangin, 2022; Von & Gopalai, 2022) and values and attitudes (Dharmaratne et al., 2022; Goh, 2022; John & Sagadavan, 2022; Von & Gopalai, 2022). The teaching appears to be relevant to specific disciplines and offers feedback opportunities to the peers (Dharmaratne et al., 2022; Dhoraisingam & Subramaniam, 2022; Goh, 2022; John & Sagadavan, 2022; Ortega & Jambaya, 2022; Von & Gopalai, 2022), facilitators (Dharmaratne et al., 2022; Dhoraisingam & Subramaniam, 2022; Goh, 2022; John & Sagadavan, 2022; Ortega & Jambaya, 2022; Sen & Selvaratnam, 2022; Tee, 2022; Von & Gopalai, 2022) and self (Dhoraisingam & Subramaniam, 2022; Ortega & Jambaya, 2022).

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