Using Knowledge Building in English Language Classrooms to Improve Students' Expository Writing

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Abstract

This paper presents the findings of the research undertaken to understand the impact of the use of Knowledge Building (KB) on students' expository writing in Singapore. The research was conducted in Secondary 2 classes by a teacher-researcher (a secondary school teacher) with the guidance of consultants (NIE Faculty and ELIS officers). The Discussion-based Approach using KB was adopted to help Secondary 2 Normal Academic students improve their English Language writing competencies. In this approach, with the consultants the teacher-researcher designed thinking scaffolds to facilitate the students' discussion in order to help them expand their general knowledge with an integrated online discussion forum, which promoted the students' collaborative work. The analysis of data collected strongly suggested that this approach provided a good opportunity for the students to think more deeply before their writing task and enabled them to improve their writing competencies through building on each other's ideas.

Introduction

Language is an intrinsic part of life; we use language to communicate with others, express our emotions and thoughts, and share new information or knowledge with others. Even though language is deeply rooted in almost every part of our lives, our learners consider that language learning is challenging, especially in the context of developing their writing skills. In an era of highly advanced technology, writing and representing are essential productive skills embedded with interdisciplinary thinking and 21st century competencies, and thus matter a great deal in the lives of the students. As educators, we are fully aware that it is crucial to engage our students in the classroom to maximise the efficacy of their learning. Yet many teachers continue to observe that students often consider writing an expository essay a challenging task. They are, in general, not motivated to plan prior to the formal writing task. Rather, their interest lies primarily in online socialising and networking; they are constantly ready to share their opinions online and check new information and their friends' posts.

Many students are IT-savvy and use a range of innovative applications on their mobile devices. Extensive research has also shown that teenagers display a higher level of engagement and a more positive attitude towards ICT-infused lessons (Sutherland, Robertson, & John, 2009). Learner engagement plays a crucial role in motivating students to take ownership of their learning. There are mainly three types of engagement: affective, behavioural and cognitive (Fredricks, Blumenfeld, & Paris, 2004). When students are cognitively engaged, they are committed and willing to put in time and effort to master complex concepts and the process of learning, which naturally contributes to enhancing the quality of their work.

Knowledge Building (KB) pedagogy and technology that focus on placing students' ideas at the centre of the classroom enterprise have been deemed effective approaches to fostering high levels of engagement in learning among students. The principal challenge has been enabling students to take effective responsibility for the improvement of ideas. Knowledge Forum serves as an online discourse platform developed specifically to support multiple users' discussions. It has been employed as a technological platform to facilitate students' discussions and knowledge building efforts and to deepen their knowledge about essay topics (Vokatis & Zhang, 2016).

Literature Review

Reasons for focusing on Knowledge Building and Knowledge Forum

The Knowledge Building approach in this research refers to an integrative adoption of knowledge building principles, pedagogy and technology.

KB principles: The knowledge building approach is grounded on 12 sets of principles that define the interactions, intent, and objectives of a group of people working together. For example, the theory of 'diversity of ideas' provides the principles of building an environment rich in ideas so that students get to work through ambiguities and complex situations.

KB pedagogy: Knowledge Building pedagogy encourages teachers to treat their classes as knowledge building communities in which all ideas are improvable. Teachers focus on developing in the students an appreciation of the hard work needed to improve a promising idea. KB pedagogy creates a classroom that provides the collaborative learning environment needed for students to explore authentic problems related to the world around them. These ideas and problems can be shaped by teachers in relation to key concepts within and beyond the curriculum. The KB approach leverages the different perspectives and expertise of students to bring about deep learning for all. Using the analytics of students' interaction and the analysis of their work after the intervention of the Knowledge Forum (KF, an online space which will be explained in the following paragraph), both teachers and students can reap the benefits through focused and meaningful discussions.

KB Technology: KB is only complete when there is an articulation of ideas and explanations through concrete artefacts. Thus, an online space, the Knowledge Forum (KF), is needed for knowledge building to be meaningful and effective in class. KF is an effective online space where students' ideas and questions are archived in ways that allow them to own their learning. On KF, students read and build on each other's ideas, seeking information to improve their explanations of them. While improving their ideas and explanations, students naturally deepen their understanding of the topics. KF has been employed to facilitate students' discussion on given topics in terms of idea generation and idea development (Sun, Zhang, & Scardamalia, 2010). This online platform allows multiple users to post their ideas based on a selection of relevant knowledge building scaffolds (such as sentence starters, e.g., 'The evidence for this is …') designed by the teacher-research and the NIE consultant. Key features of Knowledge Forum include (i) KF views that serve as a conceptual space for students to post their notes, (ii) individual notes that students can write and post on the space, which students can start by selecting a series of scaffold supports; (iii) the facility for students to read and respond to (or build on) their friends' posts and build-ons which

are mapped as a web-like structure that traces the students' development of ideas; (iv) different visualisation tools such as word clouds and contribution graphs are embedded within Knowledge Forum (Chen & Zhang, 2016).

The teacher's role and students' role in the knowledge building trajectory

Students are deeply engaged in inquiry. It involves them in determining their own learning goals and strategies, reflecting on their own learning, and providing and receiving feedback with their peers. Gathering data, searching for information and presenting conclusions remain necessary in the inquiry process. In a KB classroom, the student is responsible for his or her own learning, accountable to his or her classmates. The student is truly a self-directed and collaborative learner.

No doubt, the teacher is important in facilitating the learning – beyond providing feedback, and developing materials and activities. Teachers facilitate the inquiry process by supporting team building and collaboration, mediating communication between students. In a KB classroom, every individual is a contributor. The teacher is a subject expert, but not the sole expert.

Teachers design experiences and environments that cultivate and develop skills and attitudes for learning. It is a contrast to manufacturing learning that is pre-packaged and funnels students along a pre-determined path.

Problem Statement and Research Questions

According to the Diagnostic Test which students attempted in Term 1 2017, there were several learning gaps observed in terms of idea generation, development and organisation. Many essays also showed a lack of links and coherence. Instead of giving further details about a point they would like to put across, many students simply listed various points, which made the essays superficial and desultory.

Rather than merely using their prior knowledge, students needed to develop in-depth knowledge about the topic given to substantiate their proposition, which would in turn make their essay sound more reasonable and convincing to the readers.

The KB approach (KB principles, pedagogy and technology) is the intervention used in this study to engage students in generating and improving ideas for their exposition writing. The two research questions are as follows:

- Does the knowledge building approach with the Knowledge Forum technology enhance students' knowledge of the content needed for expository writing?

- How does the KB approach impact the students collaborating during the writing process?

Methodology

Sample

The 60 participants involved in this study are the students studying in the Normal Academic Stream at Secondary 2 Level in a local secondary school in Singapore. This paper will discuss the quality of the individual ideas and collective idea-threads in relation to the students' use of Knowledge Forum (KF).

Design and intervention

(i) Thinking Scaffold

Prior to the KF lessons, the teacher-researcher and the NIE consultant designed thinking scaffolds or prompts based on the lesson objectives to create opportunities for the students to interact with one another more effectively in the online space. Also, before the KF lessons were carried out, the login accounts of the students were created and were known to them.

At the start of the KF lessons, the students were briefed about their expected behaviour and the ground rules they had to adhere to in order to minimise possible disruptions and focus better on discussions during the ICT-incorporated lesson. Moreover, they were guided on how to use some tools on KF and encouraged to use the thinking prompts to contribute their ideas. Some examples of the thinking prompts are:

> 1) The fact about this (problem) is …
> 2) The advantage of this is …
> 3) I need to understand …
> 4) I wonder …
> 5) The evidence/ example for this is ….

(ii) Collaborative discussion using the Knowledge Forum – A web-like idea-building map

The topic of the first expository essay was 'Fast food should be banned', in which the students were tasked to write a persuasive essay. At the beginning of the lesson, the students' thoughts about fast food were elicited. They happily shared examples of fast food, and how popular and tasty fast food was to youngsters. Some of the students conversed about the fact that an excessive consumption of fast food for a period of time was harmful or unhealthy to many. To further arouse the students' interest in the topic, the teacher-researcher showed a video which described what happened to a person's brain and emotions after eating fast food. Then, the students talked about why we should not eat fast food too often. The students were quite surprised to see detrimental effects on the brain after the consumption of fast food for a period of time.

The students were then directed to an online space in KF created earlier on, and they were encouraged to post their ideas using their prior knowledge and online resources. When the students were seen to be busily posting their ideas, they were also reminded to read their peers' ideas, clarify their doubts if they had any, answer questions posted by their classmates, rebut their peer's ideas and refine their theory or ideas through meaningful discussion.

During KF lessons, other than classroom management, the teacher's role was to read the students' notes or ideas and commend insightful ideas which had not been developed or had gone unnoticed by their friends so that the friends would read those ideas and build on them. Moreover, the teacher-researcher needed to walk around and give timely feedback to the students who needed clarifications. In KF lessons, the teacher-researcher was a facilitator who directed the students' attention to building on other's ideas for a fruitful discussion.

KF was used to capture the flow of the students' interactions and trace the students' development of ideas in the discussions. After three hours of a KF lesson on the same topic, the students were tasked to synthesise the information on KF and complete their essay individually.

The second essay topic students worked on was 'Should students spend one year of their secondary school life studying abroad?'

KF has a suite of learning analytics embedded within it. The learning analytics provided visualisations that helped the teacher-researcher and the NIE consultant understand how actively each student had participated in the discussion. The learning analytics included:

(i) social network pattern showing how students interact with one another

(ii) scaffold growth tracker showing the kind of sentence starters used by students

(iii) emerging connections of students' ideas (represented by keywords)

Results: Data and Analysis

The data collected to address Research Question 1 and Research Question 2 were as follows:

a) the students' written notes on Knowledge Forum on the exposition topic;

b) the types of scaffold (sentence starters) used by the students in each of their notes;

c) the students' individual essays written after the intervention.

The research team sought to answer Research Question 1 in the following areas:

a) the students' ability to generate ideas;

b) the students' ability to discuss ideas;

c) the students' general knowledge about the topic;

d) the students' ability to elaborate on points.

1a. To measure the students' ability to generate ideas

The word map of the whole-class discussion shown in Figure 1 was used as one of the learning analytics for us to visualise how students generate their ideas. The word map comprises two elements:

(i) word nodes: words that occur frequently in the text (the bigger the node, the higher the frequency). Each word in a bubble loosely represents an 'idea';

(ii) connecting lines: the lines that connect the words represent collocation between word nodes.

Twenty-five keywords (common words such as 'the', 'I' and 'we' were not considered as key ideas) that were relevant to the topic were frequently used (represented by the word nodes), and 19 collocations (represented by connecting lines) were formed.
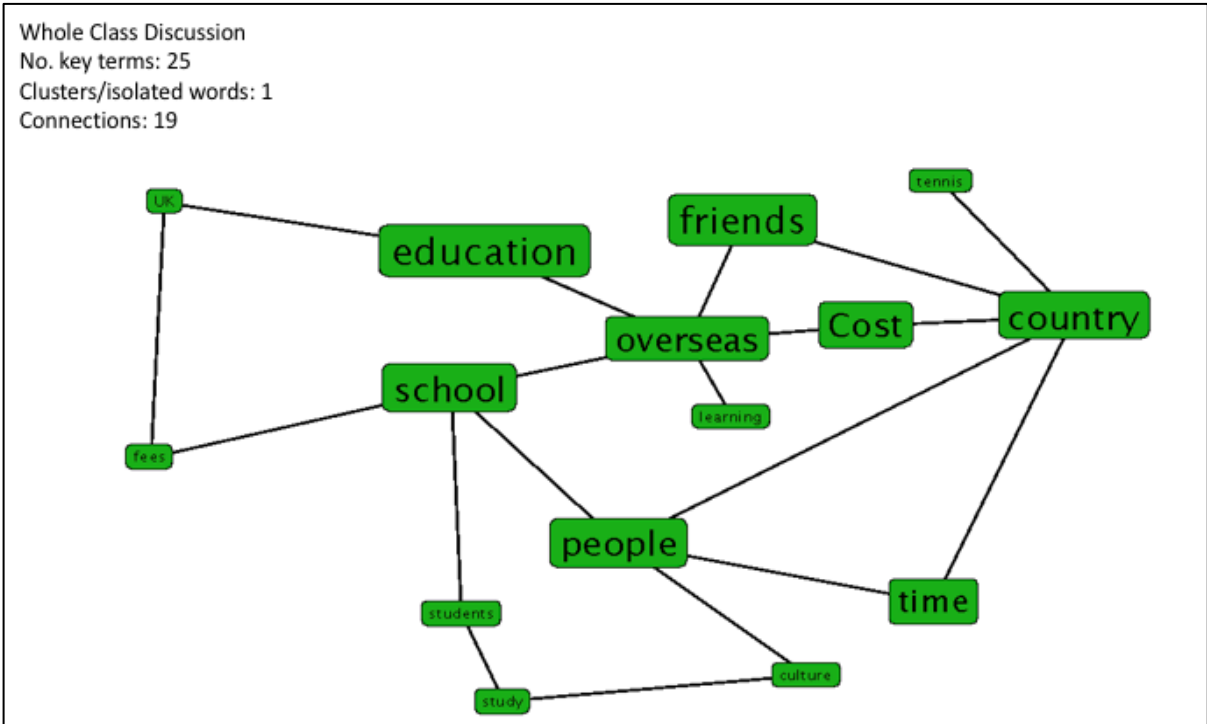
Figure 1. A word map generated from a whole class discussion about '*Should students study overseas*?'

All the text from students' KF notes was uploaded in chronological order to the KB software. The learning analytics in the KB software included a text-mining feature that processes the text in the students' KF notes. The learning analytics look for recurring words in the whole-class text and identify relevant terms based on the frequency of use and represent them graphically. In the graph, larger nodes represent more frequent terms, and connections represent relationships between them. In this case, the relationship means that the two words either appeared in the same KF notes or in connected KF notes (build-on notes). Here, the word map is used as a proxy to understand the cohesiveness of the students' ideas in the discussion. The ideas the students had generated collaboratively provided effective references for their writing.

1b. To measure students' ability to discuss ideas

We analysed the types of scaffold supports (sentence starters) used by the students in their notes as proxy to the way they contributed to the discussion. Two types of thinking scaffold were used in this study: basic scaffolds which were more direct responses, such as 'I need to understand' and 'The fact about this is…', and advanced scaffolds that required higher order thinking, such as 'This theory doesn't explain…' and 'A better theory…'. Based on Bloom's Taxonomy, when a sentence starter (e.g., 'The fact about this is …') required the students to simply define and state, it was categorised as a basic scaffold; when a sentence starter (e.g., 'The point to support the topic is …') required the students to support or justify their stand, it was categorised as an advanced scaffold.

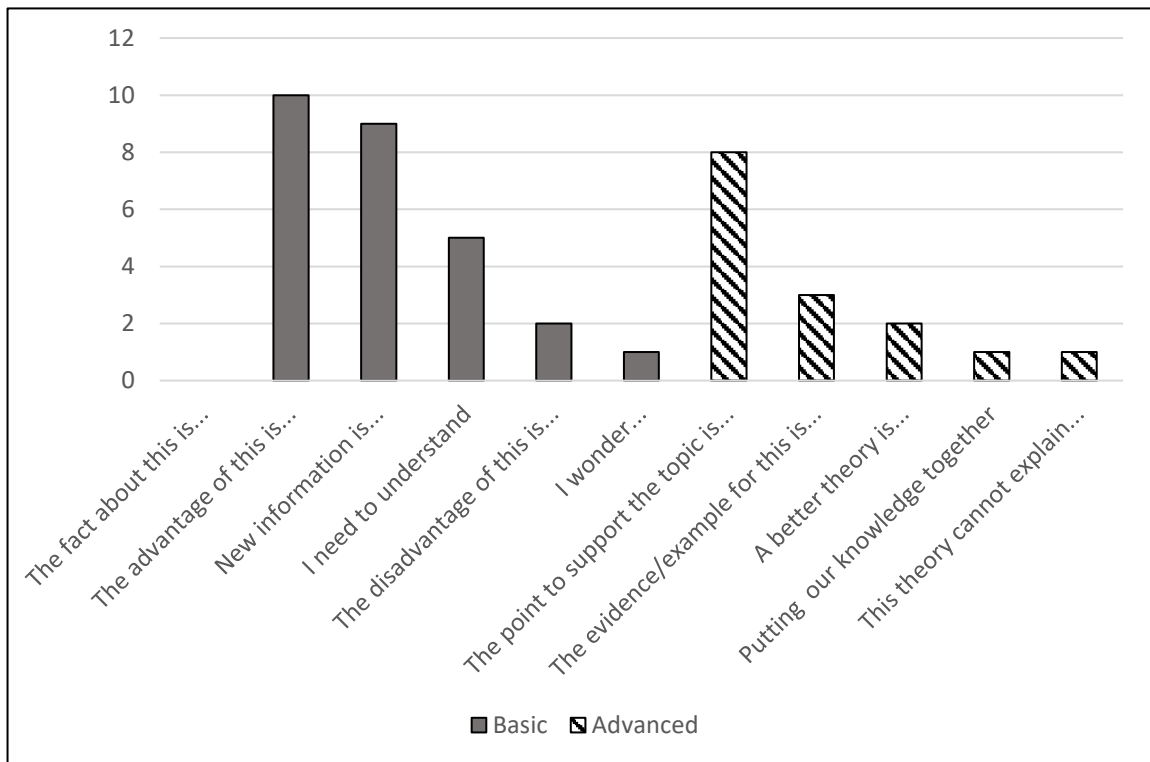The scaffolds used in the two classes are shown in Figures 2a and 2b.

Figure 2a. Graph of scaffold supports used by students in Class 1. Percentage of advanced scaffolds used: (15/42) * 100 = 35.7%.

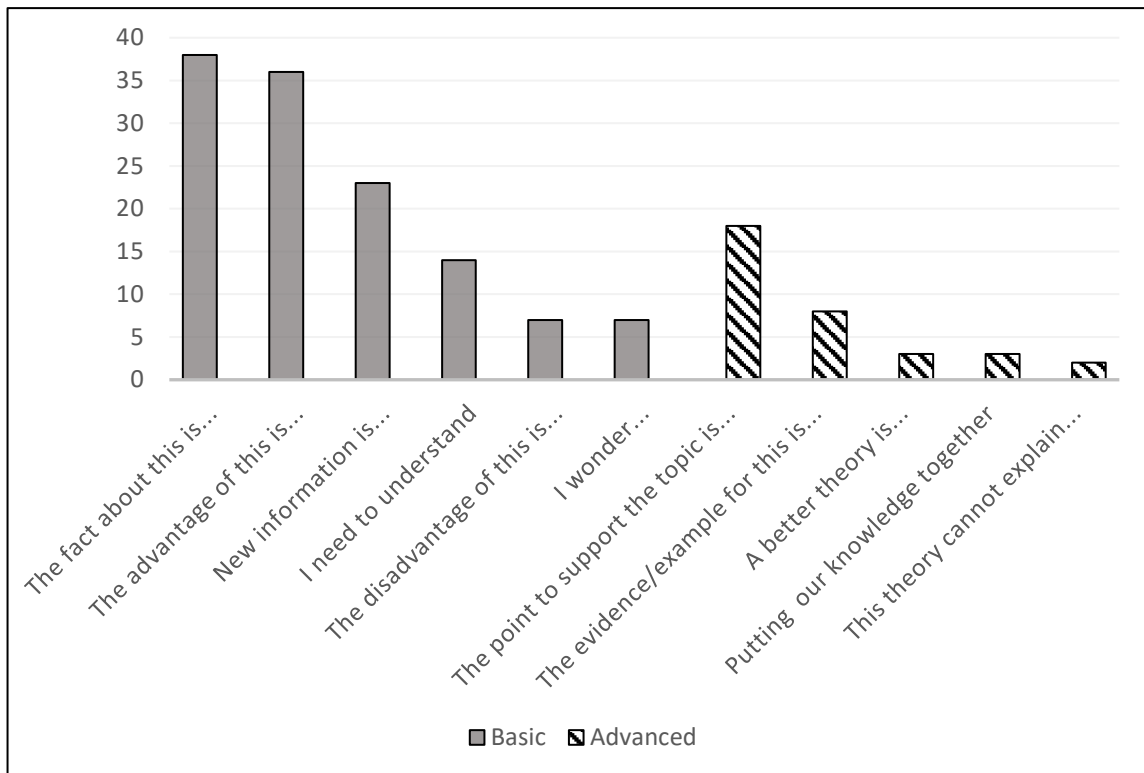*Figure 2b.* Graph of scaffold supports used by students in Class 2. Percentage of advanced scaffold used: (34/159) * 100 = 26%.

The second class view shows us that the students had been interacting with each other much more than those in the previous class. The large increase in the number of ideas in the second class was observed as well as the fact they used more advanced scaffolds. However, both classes should be encouraged to use more advanced scaffolds such as 'this theory cannot explain', 'a better theory' and 'putting our knowledge together'.

1c. Students' elaboration skills

To analyse how much students had improved their essays in terms of elaboration, we formulated a coding scheme (Table 1) to analyse them. It was found that there was an improvement in the students' level of elaboration after the intervention of KF lessons compared to their previous work.

Table 1. *Coding scheme of quality of students' elaboration.*

Level	Elaboration	Connectors/ conjunctions	Sentence structure	Terminology
1	little or no elaboration	little evidence of connectors	frequent sentence fragments/ simple sentences	simple words (e.g. bad health)
2	some elaboration or loss of focus	some coordinating connectors/ some compound sentences	many simple sentences & some compound sentences	some terminology (e.g. poor nutrition, poor health and weight gain)
3	good elaboration strategies (examples, definitions, descriptions, quotation, facts)	some conjunctions	some compound and complex sentences	good terminology (e.g., obese, nutritionally valuable, artificial fat, consumption, depression, diabetes.)
4	different elaboration strategies (examples, definitions, descriptions, quotation, facts; anecdotes)	frequent use of conjunctions	frequent use of complex sentences	frequent use of good terminology (e.g., devastating effects)

Note. In order to find out whether students had improved in terms of elaboration, the following rubrics were adopted to analyse students' essays. Adapted from *Middle / High School Instructional Support Materials for Writing* (Washington Office of Superintendent of Public Instruction, 2006).
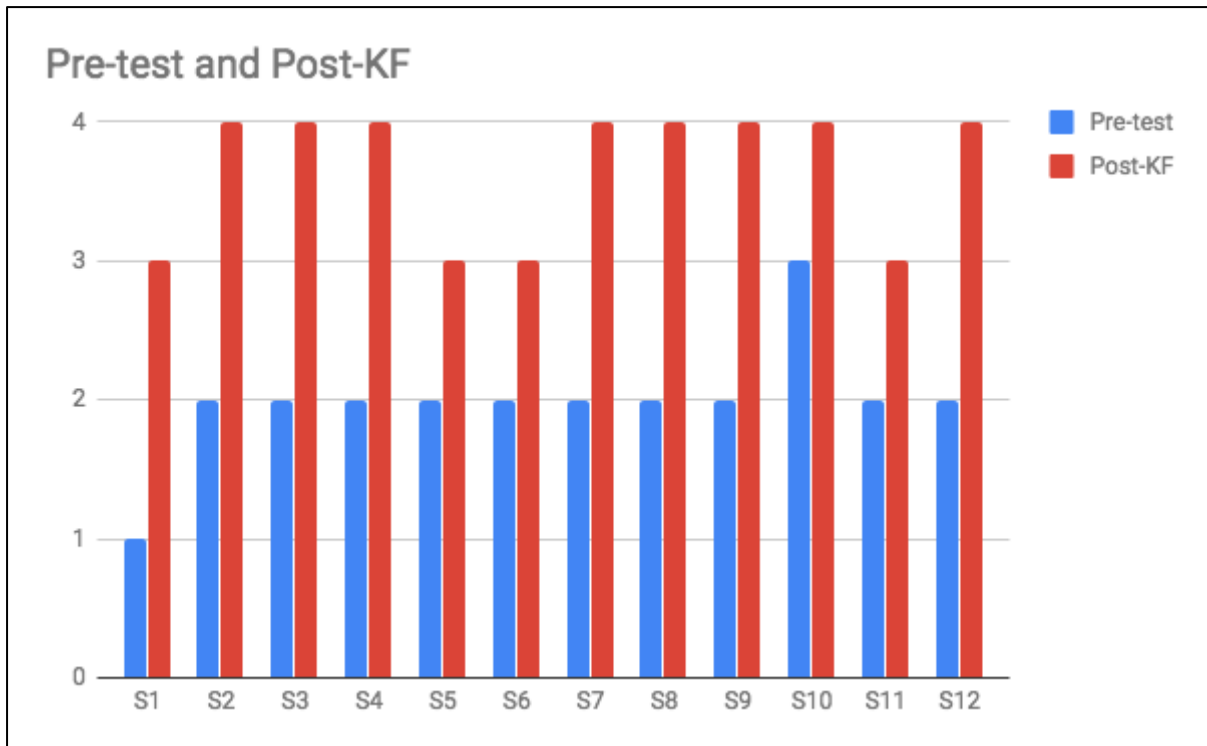
Figure 3. The graph shows the level of elaboration achieved by 12 students (six randomly chosen from each class) in their pre- and post-tests.

In their essays, varied sentence structures and more profound vocabulary were used compared to their previous work. In summary, most of the students' work progressed at least two levels based on the rubrics.

1d. Students' ability to elaborate on points: Comparison of connectors used in students' work, based on their essays

After the KF intervention, students used a greater variety of conjunctions ('although', 'because', etc.), transitional words or phrases ('in conclusion', 'therefore', 'secondly', 'thus', 'on the other hand', etc.) and paired structures ('either … or', 'not only … but also', etc.). Accordingly, they tended to use more complex sentences with much fewer errors after the intervention. Table 2 shows two samples of students' work before and after the KF intervention.

In addition, by reading articles online or their peers' posts, many students were also able to pick up appropriate terminology, such as 'detrimental to health', 'devastating effect', 'mass-production', 'privilege', and 'racial discrimination'.

Table 2. *Analysis of students' work - examples of students' improved elaboration.*

	Pre-KF	Post-KF
Example student elaboration 1	*Either approach them during recess or after class. Don't be shy, be willing to try when others don't.*	*Moreover, students will be able to become more independent and stop relying on adults in their life to help solve every single problem that they are faced with.*
Example student elaboration 2	*After a few days talking to her, I and her started to be friends and start talking to each other in 2C3.*	*Therefore, living abroad can prove to be life-changing (*life changing) as we can learn the skills to be independent, which will be extremely helpful when we grow older.*

2. How students became more empowered as a result of using the software to build up ideas

Two indicators were used as proxies for the construct of empowerment. These were (i) 'reading and being-read patterns' which provided data pertaining to how actively students were engaged in learning, and (ii) 'idea-building patterns' which showed how students were interacting with each other when building onto each other's ideas. Figures 4a and 4b (*overleaf*) are visualisations that represent the two patterns.
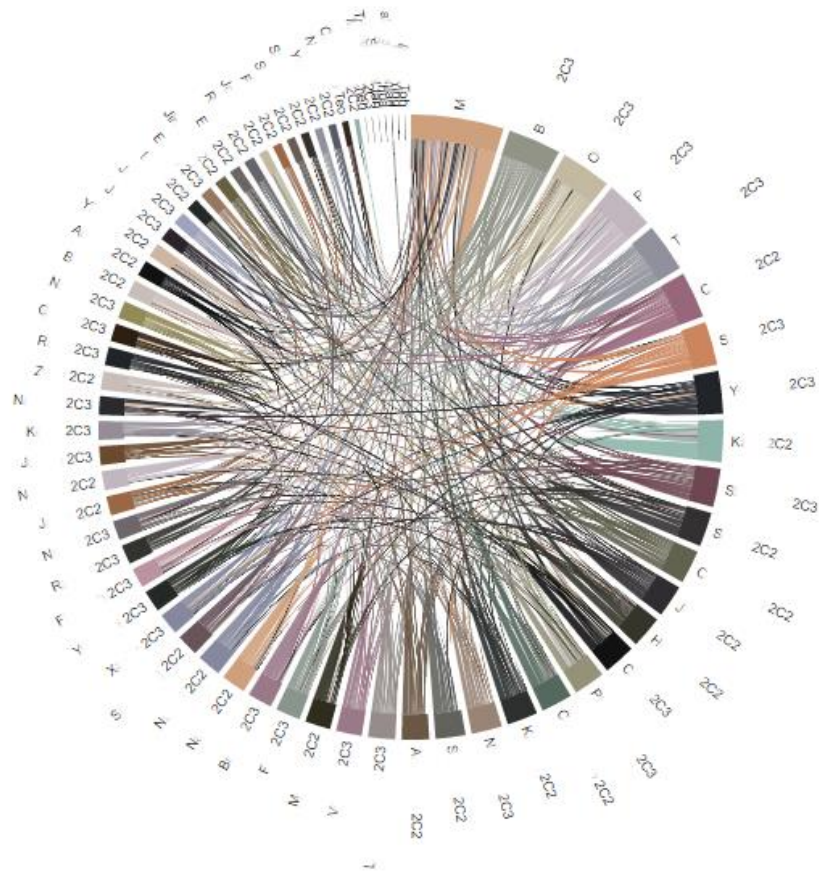
More often than not, it was observed that there were some students who were too shy to express their ideas and feelings in class. One of the reasons that they kept silent during the discussions was that they dreaded being judged or laughed at when they articulated their ideas. Often, even though there were things that they were certain about or certain questions that they might have answers to, they chose to remain quiet.

In order to understand how Knowledge Building lessons made an impact on shy or quiet students, the data on 'reading and being-read patterns' and 'idea-building patterns' are now analysed further.
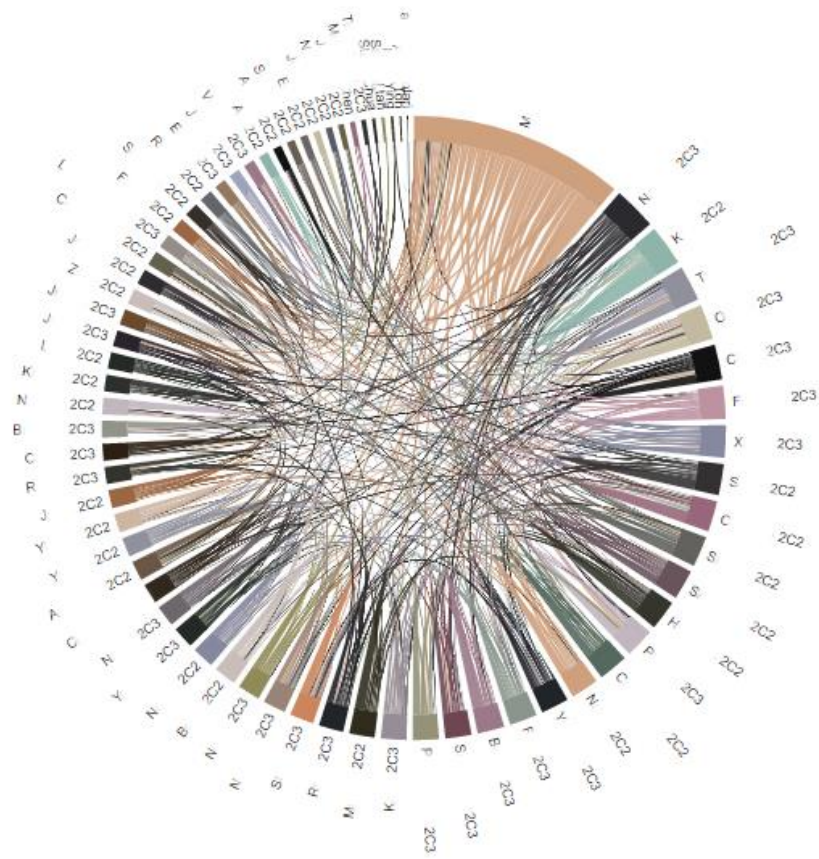
Figure 4a represents a visualisation of the class discussion. The words around the large circles are the names of the students who contributed their ideas. The width of the coloured strands connecting student names represents the number of ideas the students have contributed to the discussion.

In Figure 4b, the size of each circle in the visualisation varies based on each student's contributions. The bigger the circle for a student, the more active was the student's participation. The arrows in the diagram in Figure 4b indicate the two different directions of the ideas contributed by the students. The arrows that start from Circle A and radiate out to other circles show that the student was building on other students' ideas, whereas the arrows that move towards Circle A indicate that other students were building on this student's ideas.

Thus, the teacher-researcher was able to gauge how active each of the students was through the two types of analytics generated by the KF: 'reading and being-read patterns' and 'idea-building patterns'. Both patterns show that the KF provided a conducive online learning environment and the students felt free to churn out their thoughts without dreading being judged or laughed at when they did so. This kind of online space also enabled them to craft their answers in a more discreet way. When they were asked about how they felt about using the KF, they indicated they felt more encouraged to contribute their ideas at their own pace.
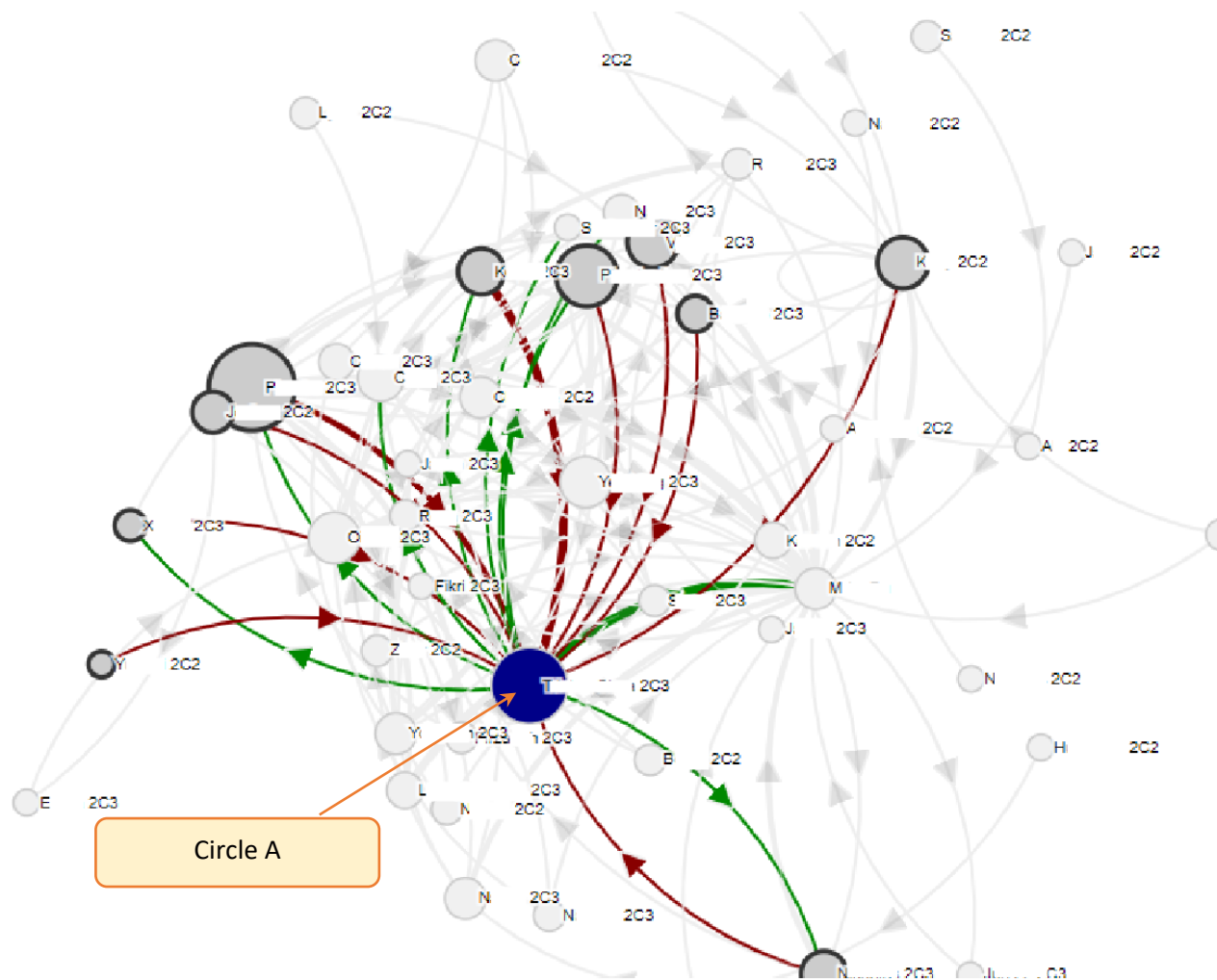
Reading Network

Being Read Network

Figure 4a. 'Reading and being-read pattern'.

One student (who was usually quiet in EL lessons) showed that he was active in learning during KF lessons. The student contributed 11 ideas in KF lessons, and 13 students built on the student's ideas.

Figure 4b. 'Idea-building pattern' of a student.

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Discussion

In a traditional classroom, students are encouraged to brainstorm for ideas before starting their essay writing. They are formed into groups of four or five students to discuss and present their ideas. Normally in this process, only the outcome of their discussion would be captured on paper. The process poses a challenge for students being able to keep track of their thought processes or idea development. Moreover, underperforming or shy students are given few opportunities or are too timid to voice their ideas, even though their ideas could be invaluable. Typically, during group discussions, high-performing or more confident students dominate the communication. Hence, it can be a frustrating experience for students who would like to elaborate or clarify their thinking. Group discussions seem to be more goal-oriented, stressing the outcomes rather than the thought processes and idea development that can deepen students' learning.

Using KF made it possible for the teacher-researcher to trace the development of students' discussions. Using the analytics generated by KF, it was possible to find out who had actively contributed ideas or built on others' ideas, and who should be encouraged to participate more in discussions in the next KF lessons. This helped the teacher-researcher as a facilitator to identify those who needed more guidance and approach them to give timely feedback. Through the key terms used and connections formed, it was clearly evident that students had been working closely together, focusing on the task.

KF lessons were naturally embraced by the tech-savvy students as they tended to be more engaged in ICT-infused lessons with purposeful designs. It was also noticeable that KF was a tool that students could utilise without difficulty, and that students were learning at their own pace. At the end of KF lessons, when they were asked about their feelings regarding using KF, their responses were always positive. Moreover, shy students or students academically underperforming in English were actively contributing their ideas as well as reading others' posts diligently. KF provided a conducive platform for them to express their ideas freely without the fear of being judged.

It was the experience of the teacher-researcher that students wrote better when they had been given enough stimulation and input for a specific topic. After the KF lesson intervention, students were able to write their exposition with a more focused and comprehensive approach, using the ideas discussed among themselves. Many of them were able to use a variety of conjunctions other than coordinating connectors to prove their point in their essays. They also made improvement in terms of writing more complex sentences rather than simple sentences and sentence fragments. Their responses were more thoughtful and their arguments were more formidable.

Last but not least, students from the remedial class used KF to discuss ideas about another topic – *advantages and disadvantages of technology*. It was interesting to note that the students had an opportunity to read extensively including articles and blogs online even though the duration given was only 1.5 hours. Usually, students would read only one or two articles that they were assigned. One fascinating observation made by the teacher-researcher when the remedial class was using KF was that the students chose what they wanted to read – relevant articles about the topic – and read them actively, processing the information at their own pace. In addition, through discussing with their peers, they became more conscious that they needed to share specific information with others. Therefore, it is believed that the use of KF benefitted students not only in writing but also, unexpectedly, in reading.

Conclusion

In conclusion, expository writing lessons integrated with the ICT tool, KF, have brought about several benefits related to enhancing the quality of students' essays. Based on the analyses mentioned earlier, it was evident that KF lessons promoted collaborative learning by creating a conducive environment for every learner, including shy or academically underperforming students. KF lessons have provided an effective platform for students to work collaboratively to discuss ideas, conduct research online, build on each other's ideas and eventually refine their ideas and essays. One limitation related to this research was the limited curriculum time allocated to KF lessons. In future studies, students could be assigned more hours on KF.

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