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STRETCHING LEARNING THROUGH MAPPING ACTIVITIES - THE TRANSFORMATIVE INFLUENCE OF DIALOGUE

Arniza Ghazali[1*], Alwani Ghazali[2]

[1]   School of Industrial Technology, Universiti Sains Malaysia (USM), 11800 USM, Penang, Malaysia,
       Email: arniza@usm.my
[2]   Centre for Civilisational Dialogue, Universiti Malaya (UM), 50603 Kuala Lumpur, Malaysia,
       Email: aghazali@um.edu.my
*   Corresponding Author

Article Info:

Abstract:

A fidgety character and an extremely low self-confidence were glaring circumstances of two learners in a first-year classroom. Mapping activities were designed for interactivity, considering the low aptitude for the English language as the instructional medium. While the fidget transformed into a focused learner upon role-play as a dialogue star in the coordinated classroom talks, the most reserved, diffident learner turned into an expressive participant. The cognitive engagement of the classroom population was evident from the significantly expanded knowledge map constructed by the students. The exploratory nature of classroom oracy drove the outcome within the dialogic space designed to engender the transformation. Space for active participation was mainly enabled by simplifying the verbal expression by extensive use of keywords in mapping. While the approach ruled out the need for correct English usage for expression of ideas, the seed map drawn by the instructor prompted learners to leave their seats to write an idea on the whiteboard. The freewill had links to the oracy that allowed for rewording and change of stance which was the primary ingredient of dialogue embedded in the mapping activities. Grafting of students' ideas into the existing scientific concept was an essential outcome of dialogue externalised on the constructed map, driven by the dialogic space encouraging listening and thinking along the path of higher logic. The dialogic space in mapping activities and the resultant vibrant classroom of cognitively engaged participants provide evidence for designable classroom activities to uplift the immediate learning impacts.

Keywords:

Mapping, Dialogue, Fidgety, Classroom-Talk, Transformative

Introduction

A phenomenon associated with brain chemistry (Mind, 2013), fidgety, is an inability to pay attention, manifested by the body's small movements, suggesting discomfort and restlessness (Nicholle, 2020). Fidgeting actions signal a drifting thought (Mind, 2013; Nicholle, 2020), a temporary distraction, and a "mental break," allowing the body to stay focused on the task at hand and relieve stress (Nicholle, 2020).

Excess of energy and tension can be dissipated by fidgeting (Markel, 2014), but out-of-control fidgets may be disruptive as it suggests a person's inability to interact discretely. Fidgety and the underlying health issue may remain unearthed until a form of social interplay takes place. The classroom provides an interplay where teaching can help sense the gravity of the problem frequently visible from the way learners behave throughout the learning session. Fidgety, which can overlap with ADHD mild symptoms, may fall in the contingent of impulsivity, inattentiveness, and hyperactivity characters (BFC, 2018).

However, a fidgety character in a classroom could pose a challenging situation; demotivation to both instructors and learners, loss and non-learning of the fidgety learner if the situation prolonged, and annoyance of those who had long invested an unconditional willingness to learn. With an ingrained idea that the classroom should offer the maximal learning and thinking opportunity, the challenge has justified the mission to design a conducive learning atmosphere custom-made for the learner's pleasant inclusiveness facing the unique circumstance of the residual adolescence years.

Classroom Personalities

Flashing back to her first-degree experience three decades back, a 17 years course mate was the youngest that she had back in her 1990s varsity classroom. There seemed no maximum age limit for one to enrol in a varsity study program. A middle-aged man was one of the top 10 scorers, while experienced engineers were part of the flock, posing real-live questions related to the formula written on the blackboard. The process helped the class link between mathematics and the real process (corrosion chemistry, specifically). Back then, a high level of note-taking skills, aptitude in the English language, and the ability to embrace ethical standards were prerequisites for entry to university undergraduate and the deciding factors for survival, conquering learning, and graduation.

For the core course, IWK103 Pulp Production and Paper Recycling, the enrolling candidates were between the narrower age of 19 to 20 years, 12 electing as core courses for the Bachelor of Technology degree in Bioresource, Paper and Coatings Technology (BPC) (now renamed Bioresource Technology, BRTech) and two candidates from School of Biological Sciences enrolling as a minor course. The small classroom size enabled easier handling, better monitoring of the individual student's learning, and as research shows, a higher possibility of better students' performance (Maisel, 2006).

Small classrooms also enabled easy handling of diversity and abnormal behaviour. Fidgety is one of the unique challenges, and for an instructor, an ardent duty was to ensure learning activities could transform the fidgety behaviour into a good learner. Indeed, learning and succeeding are all-students' rights, and the essence of this is to support thinking, commensurate

with an observant philosophy stating, "If our attempt is to be successful, we must be ready to learn thinking" – Heiddegger in Wegerif (2010, p4).

Reason for Charting Dialogue

The design adopting mapping activity and inquiry to construct a map was initially regarded as an inquiry-based approach. However, the designed classroom criteria revealed receptiveness elements, giving room for free expression of ideas and rationalizing them and unique correctional strategy, among others, were beyond the scope of the inquisitive approach. More inclined towards the oracy continuum, the classroom activity, students' responses in the form of inquiry, remarks, and peer-group conversations were analysed. Considering the indirect instructions to literacy skills (Lee, 2016) and specific tribute that allowed for more learning opportunity (Lee, 2016), the overall atmosphere seemed resemblance to dialogic teaching that aided students to achieve the tremendous cognitive potential as posited by Alexander (Simon, 2018) and hence greater meaning in learning.

Dialogue, defined as a simple discovery method by the philosophers like Aristotle, Socrates, and Plato, happens through effective (respectful, objective) listening and responding (TER, 2016). Dialogue *"develops students' reasoning by promoting two types of talk: cumulative talk (consensus building) and exploratory talk (constructive criticism)."* Luby 2018.

Creating a genuinely dialogic classroom requires careful planning, mutually respectful relationships, and skilful facilitation not decided by a single teaching method but rather as a wide range of strategies and techniques that recognize and respect the complexities and uniqueness of different classroom contexts (Simon, 2018). The next section reviews the choice of mapping activities from our previous attempts to add meaning to students' learning.

Essential Learning Elements in Mapping

Mapping as the pre-identified thinking tool with a needful range of benefits was the adopted tool to awaken minds, stimulate curiosity and keep the thinking process going (Ghazali 2015; Ghazali 2016; Ghazali 2017; Ghazali, 2018). On a simple single layer topical map sketched for guiding a classroom discussion, principal points and the underlying meanings can be visualized to ensure cognitive connectivity and rule out the deceptive learning manifested through physical engagement. The approach also defied the traditional classroom lecture and drill type of assessment done to sense learning. On the contrary, learning was allowed based on meaningful communication amongst learners in the course instructor's presence as a referral point and moderator. The quality of communication is hereby analyzed to check the coincidental overlap and the degree of fulfilment of Bakhtin's concept of dialogic talk and Alexander's dialogic teaching. In the inquisitive approach adapted to the thinking classroom for the 2016/17 batch of fresher students, mapping as the driver to thinking (Ghazali, 2016) and communication (Ghazali, 2018) was adopted. Due to the elements of interactivity, human relations that were believed to have eliminated the robotic type of monologue interaction (Wegerif, 2010) were engendered. Mapping was also chosen as a guiding tool as the survey shows that students unanimously agreed that a map is a powerful visual of knowledge, difficult to construct but a valuable reference. In terms of dialogue, the multi-modality that a map brings about is analogous to graphics' effect in giving multi-modal dialogue as proposed by Wegerif (2007) by broadening or deepening the dialogue space. These were packaged together with the

original thinking classroom (TC 1.0) to overcome the persistent and new learning challenges stated in the proceeding section.

Problem Statement

The fidgety character was of current concern of the semester, and a challenge was regarded as a touchstone for a classroom design that would in a package overcome the overall ineptitude in the learning language or medium of instruction that earlier researchers (Lahesvouri, 2013; Alexander, 2018) posited as giving profound effect on the development of thinking skill. The ensuing challenges include instructor-learner language barrier, poor notetaking, poor listening skills, and semantic inability, to name a few. Indeed, literature shows the power of language as a force constantly "interacting with, shaping and reacting with the ideas that precede and those to come, with words posing the cues to the answer" (Middendorf, 1992).

ThinkingClassroom^{TM} designed with a rich verbalization by learners and guided by map, was deployed to support learning taxonomy and reduce rote learning by enhancing learners' reasoning ability. The approach was also aimed at directing students to use knowledge in new situations (Mayer 2004). As a result of the intervention, classroom sessions that had normally been 50% lecture were revamped and redesigned to suit the learning community. Redesigning was strategized as part of the touchstone of responsibility in providing the right conditions (Kumar, 2012; Robinson, 2013) to allow every learner to grow and blossom. The inquisitive atmosphere was designed by interfacing with mapping as a powerful visualization tool. The idea was to provoke thinking and allow students to understand the learning contents objectively despite the aforesaid language circumstances. This commensurate with the whole idea of learning posited by Wegerif (2010), which is learning to think better.

Dialogic 2016/17 Classroom

The elements of a 'dialogic discourse' defined as the quality of classroom talk to promote understanding by holding the different perspectives together (Wegerif, 2010) was embedded in the ThinkingClassroom^{TM} as elsewhere described by Ghazali (2017). The measure transformed the so-called 'traditional' Thinking Classroom (TC1.0) to Dialogic Thinking Classroom (TC2.0).

Research Questions

The designed interactivity in the ThinkingClassroom^{TM} had transformed the fidgety behaviour, hereby addressed as "Joe" to an energetic, committed learner. This study delves into these questions:

1. Did the classroom talk fulfill the criteria of dialogue?
2. How did the dialogic elements in the designed mapping activities transform the classroom (learners and instructor's preparation) atmosphere?

Having appreciated the transformed behaviour of Joe from week three onwards, the instructor then attempted to identify the elements of dialogic thinking in her classroom as a post-mortem process. In this regard, Alexander (2018) and the Education Empowerment Foundation (2017) report were set as a benchmark. In the attempt to unravel the research questions, two of the six principles of SoTL (Scholarship of Teaching and Learning); an inquiry into students' learning (de Braga et al., 2015) and a study conducted in partnership with students (Poole and Chick, 2015) were embraced throughout the journey of uncovering the two objectives framed towards

developing an understanding of the observed transformative effect of dialogue on learners in the designed classroom.

Objectives

The SoTL research was strategised towards achieving these objectives:

1. To screen for criteria of dialogue from the classroom activities planned and executed by the instructor,
2. To describe the transformative effects of the dialogic elements occurring in the map-assisted classroom activities.

Design and Methodology

Sensing the Needs of Batch 2016/17

In the first two weeks of the semester, students' needs analysis was performed by reflecting students' behavioural engagement in class, quality of notes - which implied students' note-taking skills, the present characters, level of cooperation, and reason behind hesitance to participate. The presence of a fidgety behaviour, hereby addressed as Joe, was central in deciding the classes' design through the consecutive weeks. Specific to Joe, the fidgety character may overlap with the ADHD mild symptoms involving minor contingent of impulsivity, inattentiveness, and hyperactivity characters as posited by experts at the Brain Forest Centers (2018). The cyclical reflection effects throughout the first two weeks had influenced both students' learning and instructional plans. Among other participants addressed in the subsequent section is "Bob" who was the class's clown, and "Ash" who manifested behavioural transformation.

Dialogue Star, Front, and Centre

Joe's lack of ability to focus had prompted the instructor to assign Joe a vital role to play in every learning session (tasking). Joe was appointed the "Dialogue Star" who was given ample opportunities to speak out and pose questions to trigger thinking and dialogue. The instructor chose to be at the back of the classroom (Closest to G6, also see Fig. 1) to observe students' participation and changed position when giving feedback to misconceptions. Besides fidgety behaviour, there was also less grievous affective elements such as poor self-confidence that prevented the manifestation of the learners' true intellectual abilities. This is grouped in apparent learning engagement terms, as shown in Table 1.

Table 1: Grouping of Students by Participation Domains

Active (AE, BE)		Moderately Active (<BE, <AE)		Passive	
CE	xCE	CE	xCE	CE	xCE
G1	G2	G3	G4	G5	G6

AE≡Affective engagement; BE≡Behavioural engagement; CE≡Cognitive engagement; x≡absence of.

TC2.1 was principally designed for making all (G1 to G6) students talk. In a map-based dialogic thinking classroom (TC2.1), the central idea would be drawn on the whiteboard or mahjong paper as the main keyword to form a single-layer brainstorming map. Maps are also the tool to help the instructor sense and assess the occurring dialogue by breadth or depth. In specific sessions, responses to the central idea initiated by Joe, the Dialogue Star, were drawn

as the points breeding from the main keyword. Joe's classmates gave the breeding points based upon their understanding of lectures captured in their notes and lecture handouts. Next was to call upon the learners to elaborate on the points they suggested, allowing freedom to choose their position and freedom to write on the whiteboard. In the end, Joe was usually requested to wrap up the dialogue. Each student was given at least one opportunity to coordinate the classroom talk. In this kind of dialogue, the position of the instructor was flexible, depending on needs.

Analysis

The map constructed by students was analyzed by comparing it with the previously constructed map. Figure 1 presents the initial output when students were thinking through the topic of process efficiency. Significant conversations were also recorded as a few students preferred expressing their views verbally. Important marks on the map were also tracked to relate to synchronous learning. Qualitative assessment of students' verbal and mapping responses was evaluated. These were ongoing assessment of learning and assessment for learning to influence the subsequent class designs.

Outcome and Analysis

Learning Time and Space Through Classroom Talk

Table 2 presents the effects of dialogic elements (the initially planned classroom talk) on the ThinkingClassroom[TM] design. As a consequence of embedding interactivity that emphasized careful listening to learners' responses, providing tactful feedback to learners' responses, and maximal attempts to accommodate the new views and thinking rather than strictly adhering to the textbook contents, the duration of the planned input and assessment processes changed tremendously.

Table 2: Approximate Time Consumption Pattern by the Varying Intervention

Input and Purpose	Estimated Duration of Activities (Minutes)	
	TC1.0	**TC2.1**
Instructor	50 (Lecture)	30 (Lecture)
Assessment for Learning	20 Quiz	20 (Clarification, Q&A) -
Assessment of Learning	20 Mark Quiz Together	20 (Verbatim) – Mapping Activities
Feedback	Instant verbatim + Written for individuals	Instant verbatim + Written for individuals
Synchronous Student Learning Time	Group and Individual	Predominantly Group Prominent Roles: Dialogue Star, Super Learners, Peer-to-peer knowledge exchangers

NB: TC1.0 ≡ 'Traditional' Thinking Classroom | TC2.0 ≡ Dialogic Thinking Classroom | TC2.1 ≡ Dialogic Thinking Classroom with map as supporting tool.

The classroom detailing towards truly dialogic teaching required careful planning, mutually respectful relationships, and skilful facilitation (Simon, 2018) was taxing in terms of time and effort as also experienced by researchers elsewhere (EEF, 2017). Next was to pray for a pleasurable outcome.

Transformative Elements

The appointment of Joe as a dialogue star was observed to have reduced Joe's fidgety behaviour significantly. Joe was loudest in the class mainly as he shared information, joked about facts related to the learning material, posed questions to twit his classmates to imagine, demonstrated, or summarised specific points to check if he had understood stuff accurately and sought clarification. According to Gutierrez (2016), verbalizing knowledge has a strong association with better performance, and the transformation of Joe from a fidget to an energetic learner provides live evidence of this. In a package, the map and the carefully controlled oracy had supported Joe gear his fidgety character to the betterment of learning. Besides the positive impacts the intervention gave on Joe, the friendly learning atmosphere supported Ash in incredible ways. Ash offered verbal responses more frequently. Whether in clarifying uncertainty or offering answers, Ash did it in a very confident manner with clarity. The progress portrayed by Ash is consistent with the documented case study in the UK (EEF, 2017), summarising an enhancement in students' self-confidence with dialogic teaching intervention.

Sensing Dialogic Thinking from Map Expansion

The instructor typically began mapping activity after a 30 minutes lecture. Joe, the dialogue star, was sometimes appointed to role-play as an examiner to mark the answers written by his classmates. A couple of times, Joe was also assigned as dialogue coordinator. In such an instance, the instructor intervened to prevent a prolonged misconception that bears the risk of becoming deep-seated. If Joe were required to be a regular participant, Joe would have to orally present the overall meaning of the map constructed together in the classroom.

It is noteworthy that only simple maps were used to initiate discussion because the primary idea was to engage learners to learn from the three domains, affective (A), behavioural (B), and cognitive (C), with dynamic cycles due to the bi-directional property. Long observation in a mapping activity shows a specific learning equilibrium pattern that can be translated into equation 1. Hypothetically, an awakened feeling (A), drives such learning action (B) as participation that leads to thinking and exploring to solve a question (C) usually laid by the instructor as Pits on a Map.

$$A+B \rightleftharpoons C \ldots [1]$$

The missing phrase ("friction of," Fig. 1c) on the right was also evidence of cognitive engagement from the ensuing freedom of thought and action. The missing (verbalized) phrase implied a higher speed of thought (C) in comparison to the hand capacity (B) for speed at writing, as findings of Schafer (2010) show.

Reflection on the speed of dialogue, "Bob" could have been excited about the opportunity to be expressive in the classroom and very keen on externalizing the meaning of the keyword he wrote on the map for sharing with his classmates. The maps in Figures 1a and 1d (relative to the original map in Fid. 1b and 1c), overall, provides evidence for the energetic participation of students electing the course as core and minor subjects. The classroom dialogue's breadth and depth were the deciding factors for expanding the map in Fig. 1b and 1c - the original map based upon the points covered in the previous year. By comparing and contrasting, the four maps (Fig. 1a to 1b and Fig 1d to 1c) demonstrate the changes that were driven by dialogic discourse occurring in the 2016/17 classrooms through TC2.1. The depth of the discourse and

handling of varying perspectives had added points and gave students the experience of a socio-intellectual interplay, which characterizes a community practicing ' dialogic thinking.' Each student's elaborations mentioned above, whether by verbatim or by writing, would serve as the breeding points, responsible for the map expansion. This enhances students' ability for reasoning, which in turn helps reduce rote learning -the lowest learning order in Bloom's Taxonomy).

An example of a query from learners that triggered the path to reasoning was "What if..", naturally came from Joe and Bob, and others also duplicated the thinking track. The instructor's feedback to the pattern of question commonly involved cause-and-effect specificity. The transcription to illustrate the scenario:

1. Learner1: *What if we grind sisal right after harvesting?*
2. Instructor: *Grinding only suits dry, lightweight biomass, such as Baby's Breath.*
3. Instructor: *Imagine slicing sisal right after harvest.. what would likely be the experience?*
4. Instructor: *Reflect on the video on the decortication of sisal. Was it a waste-free, clean process?*
5. Learner2: *No. Sticky green stuff came out.*
6. Instructor: *Now imagine slicing the fresh sisal leaves.*
7. Learner3: *Yes. We can put the stickies on the face and improve skin texture* (class - laugh) – *Hanis, demonstrate to us.*

The immediate illustration of grinding practicality by picking Baby's Breath (BB) as an example was an essential aid to help students visualize fibrous dry biomass pre-processing, which involved effortless processing techniques. Owing to the biomass's nature, pre-processing could skip washing, cutting, and debarking, as usually laid in textbooks for such huge biomass as wood logs. Samples of BB was brought to the class to allow students to appreciate the lightweight feature. The authoritative nature of the response in line 2 was necessary to swiftly realign thinking and rule out any misconception.

In the next line, the instructor invited learners to imagine the contrasting feature of sisal compared to BB. For granularity, the instructor referred to the video on decortication of sisal that shows the biomass's size and weight and the entailing green liquid waste flushed to the stream. At this point, Bob acted like a clown of the class and hilariously suggested an application of the green waste, which is very similar to aloe-vera extract. This marked the learning engagement beyond behavioural engagement but a cognitive connection that allowed translation of scientific content to application with spontaneity. The act prompted better readiness to pursue more learning and express more curiosity. Indeed, having conveyed the idea of cumbersome processing, an essential point for a learner to relate was also the recoverable side-product stated by Learner 3 in line 7. The thinking track linked perfectly well to the next topic on Resource Recovery.

Reflection and Elements of Dialogue

The map transformation from Figure 1b and Figure 1c to the matured elaboration in Figure 1a and Figure 1ddepicted upon Figure 1 is evidence of student's confidence in the ideas they were generating throughout the classroom conversation. Students' ability to think beyond Figure 1b

was driven by repeated cycles of oracy involving stating, clarifying, and reasoning, which were the processes of drawing the more logical 'ideal truth' lamented by Wegerif (2013) outcome of the process of the dialogue itself.

Joe and Bob mainly portrayed the batch's apparent commitment to the learning sessions while Ash, together with backbenchers of super-learners, and few who had difficulty with the English language were unconditionally cooperative. While Ash was more accurate in her verbal presentation of answers, Joe transformed from a fidget to the 'super-addressee' described by Bakhtin as the conversant who "always seeks responsive understanding, does not stop at immediate understanding but presses further and further (indefinitely)." Since the number of 'Super-addressee' made the majority, the dialogue is regarded as 'shared inquiry.' Questions posed by suffixing with "*What if*..", for instance, also invited the instructor to map out criteria (of biomass, for instance) to needs (processing needs, e.g.). The outcome is a cause-and-effect linkage or simply, logical reasoning (for suitability of one biomass to a processing technique).

The synergistic energy dissipated by both learners and the instructor was plausibly the trigger to Ash's participation, which was also a transformation. A memorable remark voiced by Ash was on the logical monetary benefits of resource recovery, "..collect the waste, ..sell and make money" for instance, signalled cognitive engagement, internalization, and an expression of internal dialogue from a learner who was initially reserved and used to present more misconceived ideas than not. The recorded transformation may be regarded as dialogic illumination, which had significant repercussions. The resultant learning atmosphere had directed the "collaborative construction of knowledge," which illustrates an ultimate dialogic illumination.

Besides map and conversation journeys, the instructor's positioning in the classroom also influenced students' readiness to participate in class. Figure 2 presents the two positions (💙) frequently taken by the instructor as a symbol of passing the learning autonomy to students.

(a)   (b)
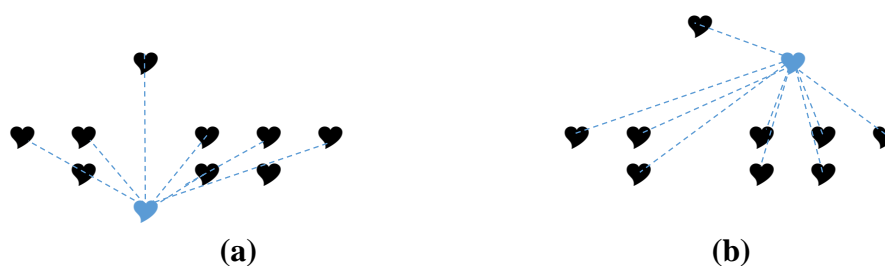
Figure 2: Dialogic Illumination by Repositioning of the Instructor (a) at the Rear of the Class and (b) In Front of the Class

The lines in Fig. 2 represent "dialogic illumination" or line of interactivity and connectivity between learners and the instructor, as students coordinating the class discussion were positioned at the front and centre. The position at the stage centre was typically reserved for dialogue star, and the instructor would sit right opposite to agree and encourage further thoughts to sustain the class dialogue – the latter often happened if Joe had uncertainties. Despite the circumstance, Joe's genuine responses illuminated the great potential of his self-improvement. In conditions of misconception or false response to Joe's uncertainty, the

instructor would take the position in Figure 2b and intervene without belittling the serious efforts Joe had put in coordinating the lively class dialogue.

For a science course, the instructor needs to monitor classroom talk closely and align derailed ideas immediately. Students' preoccupation to classroom talk for shaping thinking, learning, and understanding with the instructor jives well with the following illumination:

"*..largely through the teacher's talk that the students' talk is facilitated.*" (EEF, 2017).

The instructor's repositioning in Figure 2 was also to engender "classroom interaction that opens up students' speaking and listening and hence their thinking and which strive to distribute the ownership of talk more equitably", EEF (2017).

Other criteria of the designed classrooms translated as actions are presented in Figure 3. These are the check-listed criteria in the six Repertoires and ten indicators outlined by Alexander as criteria for dialogic teaching.

At this point, we shall appreciate an instructional plan that fulfils the criteria of a dialogic classroom not initially known as 'dialogic'. Therefore, the reported outcome provides an insight into the ways of facilitating dialogue as the cornerstone for other skills or simply "metacognition" as posited by Fisher (2007). To the instructor, this is one of the synchronous gateways for functionalizing classrooms as the central learning platform where learners and instructors are ideally appointed to meet. The extended maps are the live-proofs of dialogue as having "..role in the shaping of thinking, learning, and understanding, and it is largely through the teacher's talk that the student's talk is facilitated, mediated, probed and extended.." (Alexander, 2018).

Considering the need to let students freely talk within the learning frame and be expressive, some of the designed sessions served more as brainstorming grounds. Despite giving instant feedback to the details in the map, the ideas were ultimately refined to support students visualization of (1) the common main factors, which is usually the primary layer of the map, (2) the factors they miss, and that (3) all mechanical effects are bound to the principal factors with details determined by the design of each machine. These are features presented in Figure 4.

Final Analysis & Conclusion
Having been the eyewitness of the 14 learning sessions spanning over 28 formal hours, the instructor noted the continuum of rapport and interactivity that had occurred. With the blessing of time, the uncontrolled learning domain, the class was overall, interactive the cooperative and color of the 14 students as the co-constructors of knowledge were highly notable. The initial annoyance of the 'ADHD' character portrayed by Joe, thus far mentioned as fidgety behaviour, had successfully been overcome by the classroom's positive energy. Joe's transformation from a disengaged fidget to a dialogue star who co-coordinated energetic, interactive, and very healthy learning atmosphere was not coincidental but implemented by careful analysis, design, and preparation of Plan A backed by Plan B to ensure continuity of class energy.

As an instructor, the touchstone was to walk with students through their learning journey, and it was a unique mandate for her to support the learning journey of an exceptional Joe who could be facing an unknown level of difficulty coping with his unique circumstances. Driven by empathy devoured from mentoring and Mental Health Facilitation (NBCC-i) training, the instructor was obliged to encourage vigorous participation. The move enabled students to share their perspectives with the instructor interjecting without offending wrong responses but rectify by soft measures incorporating scientific reasoning and logical thinking. This persuasive element within the dialogic radar could also be the reason for Ash to daringly look straight into the instructor's eyes when expressing views while figuring out answers through internal dialogue. Ash's progress and responses gave a true reflection of:

"*Beyond the dialogue of the voices, then, is a dialogue of minds*." Alexander 2005.

Backing one classroom design with multiple synchronous activities led to the dynamic changes in the instructional plans. The process involved a complex effort and required the sacrifice of the time that could have been invested in the publication of journal articles in the disciplinary research, which is of higher value in the research university lecturer's key performance indicator and promotion. However, reaping the fruit of seeing significant transformations in Joe and Ash and the resultant extraordinary energy of the classroom was a mandate that could not be left without understanding and sharing with the global teacher community.

Acknowledgement

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APPENDIX: CHECKLIST FOR THE CRITERIA OF TALK

Table A1: Criteria of Talk

	Cumulative	**Disputational**	**Exploratory**
Engagement	Do-not-challenge: no exploration of reasoning	Defeating	Critical: explicit reasoning
Stance	Accept preference of the majority	Fixed;	Made flexible by the dialogic space
Intention	Group Harmony	Narrow; self-image	For the best of functionality
Openness	Suppression of truth is regarded as necessity	Self interest	Reciprocal: Learn from each other
Relationship	Uphold sense of belonging to the group.	Non-mutual	Shared; long-term benefit
Benefit	Short-term	None	Long-term

Having fulfilled the criteria of communication outlined by Wegerif (2013), the interactivity of the classroom is thus classifiable as Exploratory
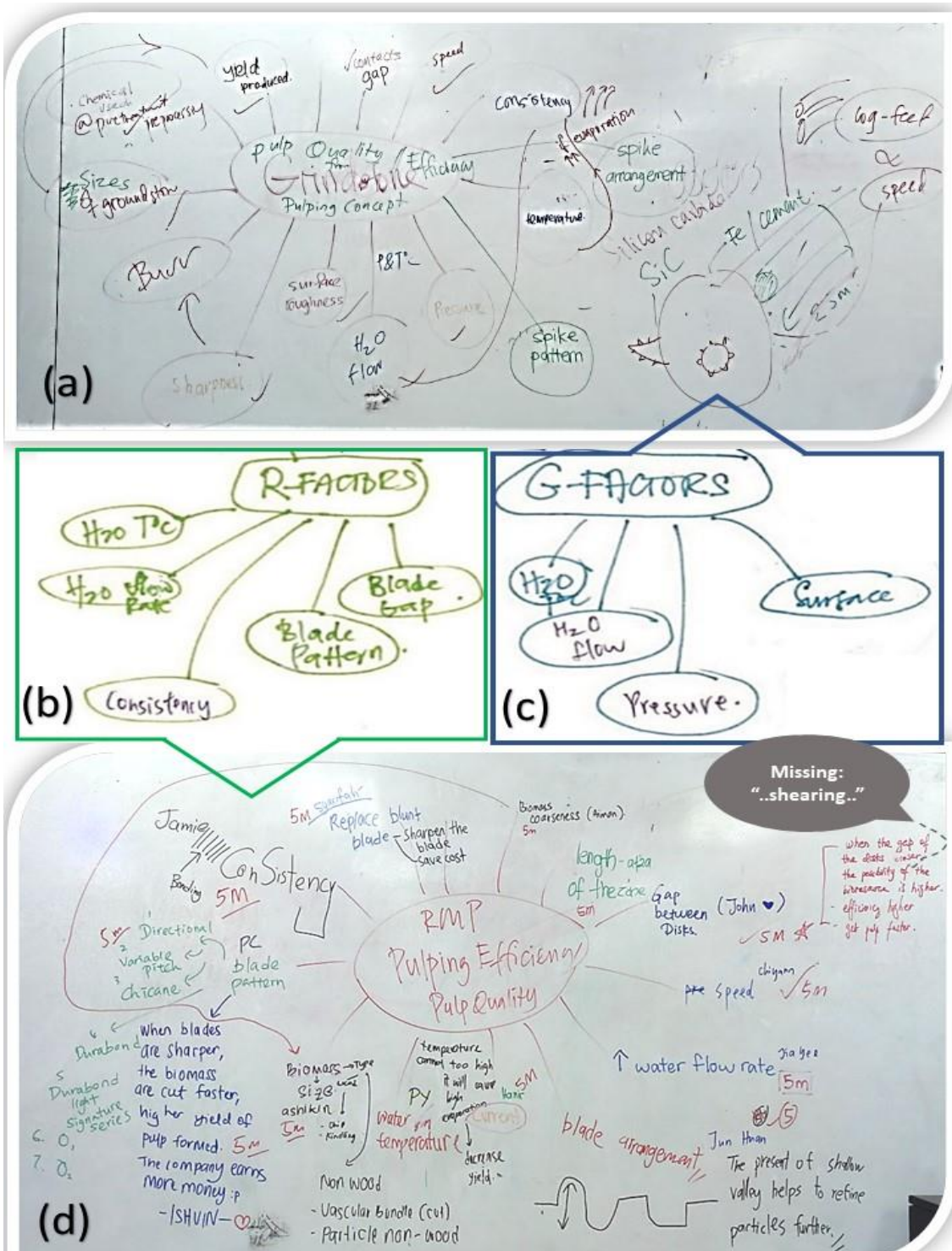
Figure 1: Maps Generated in the Classroom - (a) Factors Affecting Grinding Efficiency with (b) the Associated Initial Map Developed without Dialogue for Grinding Efficiency and (c) Refining Efficiency that Transformed to (d) the Expanded Map Upon Dialogue.
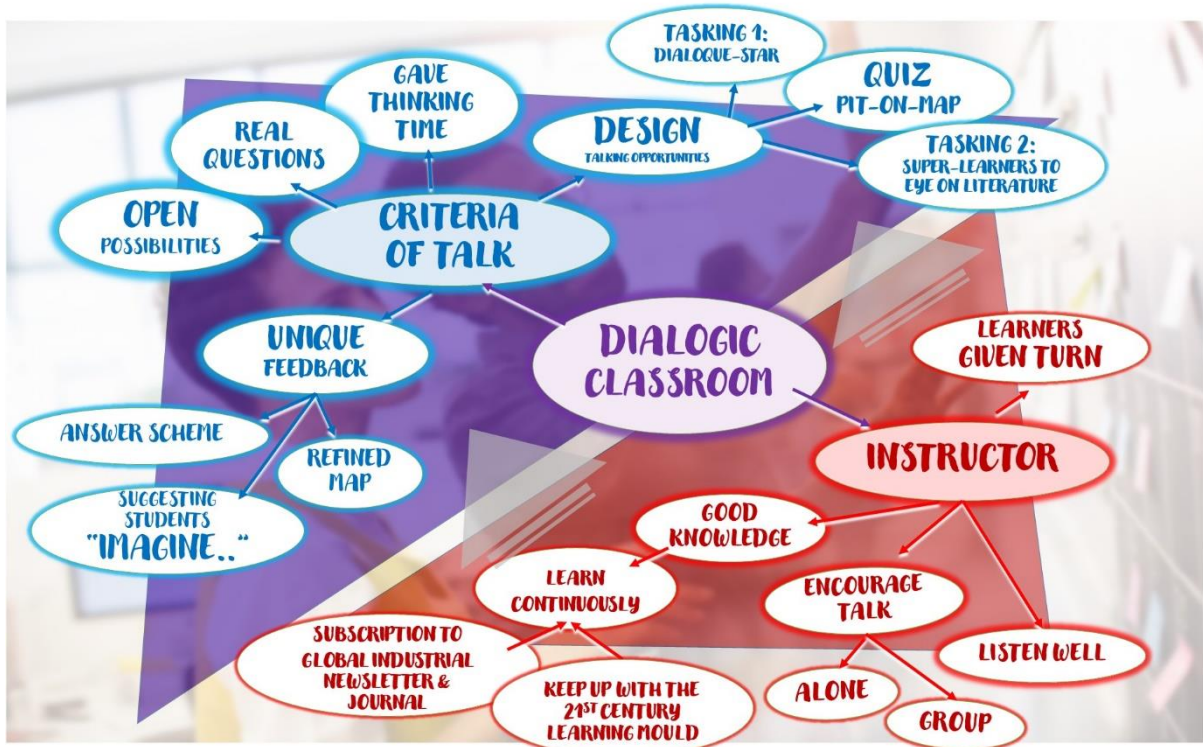
Figure 3: Activities in Agreement With The Checklist For Dialogic Criteria That Alexander (2018) Outlined As Six Repertoires and 10 Indicators.

(a)

(b)

**Figure 4: Refined Map as a Feedback to the Classroom Activity. Besides
Reorganisation, the Final Maps for (a) Refining and (b) Grinding Efficiencies also
Support Visualisation of the Common Denominator Shared by the Two Modes of
Mechanical Effects.**