

SUBJECT LITERACY

INQUIRY DIGEST

ISSUE 2, 2017



CONTENTS

Article 1:

Enhancing Students' Content Learning through Productive Classroom Talk in Primary Science

pp.
04-08

Article 2:

Deepening Individual Students' Reasoning and Summarising in Geography and Mathematics through Teacher Questioning and Talk

pp.
09-13

Article 3:

Helping Students to Answer Source-based Questions in Social Studies

pp.
14-18

Acknowledgements

The editors would like to thank Shalini Damodaran, Foo Kum Fong, Susan Gwee, Viyaya Rani Nadarajah and Lloyd Yeo for reviewing the articles.

FOREWORD

In our second Subject Literacy Inquiry Digest, we feature several new inquiry projects by teachers who are exploring how to enhance their pedagogies after considering the teaching and learning of mathematics, science, geography and social studies through the lens of subject literacy.

In so doing, they are taking the professional learning ideas acquired through their interaction with their ELIS consultants, who have co-authored these articles, and applying these ideas in their classroom practice.

This issue highlights the role of talk moves in adapting classroom interaction patterns to help students learn more effectively.

At Townsville Primary School, two Science teachers have worked with ELIS consultants and a Science Master Teacher from the Academy of Singapore Teachers (AST) to explore how classroom talk moves could be used to deepen Upper Primary level students' conceptual understanding of seed dispersal and reproduction in plants.

Likewise, at Paya Lebar Methodist Girls' School (Secondary), a Geography and a Mathematics teacher investigated how talk moves could be integrated into their classroom discourse, so that students would have more opportunities to reason and explain. They found that, over time, students realized that engaging with each other's thinking through discussion can be a productive form of interaction in the classroom.

Finally, two teachers at Seng Kang Secondary School looked into a problem they had identified with their Social Studies students who faced difficulty in writing good responses to source-based questions. Drawing on their learning from ELIS's WSA-EC programme of professional learning courses, they devised cognitive and linguistic scaffolding to help the students improve their inferencing skills and written responses.

Taken together, these articles demonstrate how teachers can be empowered by ideas relating to subject literacy and applying them through teacher-led inquiry into their practice. In this way, they explore how to enhance their students' learning by working on developing students' communication skills.

Together, students, teachers and professional developers build communities of practice that strive to improve and move forward. This involves taking small steps and reflecting on the path taken, so that they can discern the path ahead.

Dr Paul Doyle
Deputy Director, Subject Literacy
ELIS



Enhancing Students' Content Learning through Productive Classroom Talk in Primary Science

Suhaizan Talib, *Townsville Primary School* and Alan Lim, *Sengkang Green Primary School*
Caroline Ho and Leong Chui Pink, *English Language Institute of Singapore*
Anne Wong, *Academy of Singapore Teachers*



INQUIRY FOCUS

Two Primary Science teachers were keen to help Upper Primary students develop their conceptual understanding through eliciting, probing and building on students' responses as they co-construct knowledge through teacher-student interaction. Through a collaborative inquiry with ELIS and AST consultants, the teachers examined how they could use classroom talk to engage students in productive academic discussions to enhance their learning.

BACKGROUND

Studies into classroom talk highlight that providing opportunities for students' voices to be heard through the exchange of ideas is important for more effective learning (Alexander, 2008; Mercer, Dawes, Wegerif, & Sams, 2004). Teacher-student oral interaction stimulates and extends students' thinking, which, in turn, advances students' learning and understanding (Scott, 1998; Tank & Coffino, 2014). Researchers have given increasing attention to how classroom talk can support student meaning-making (Tytler & Aranda, 2015) and generate productive academic discussions that are "sustained and purposeful" (Zwiers & Crawford, 2011, p.1).

Newton and Newton's (2001) study of Primary Science teachers showed that the "potential of oral discourse

for supporting learning" (p.372) is even more significant than content knowledge for effective teaching. Tank and Coffino's (2014) review of Primary Science studies indicated that "building communication skills in science are essential" (p.193) and that an "integral part of communicating knowing and doing science" is through "participating and expressing science understanding through talk" (p.195). This study, in examining Primary Science teacher-student talk and interaction, fills a gap in research in local classroom contexts. Our specific interest is the way teachers co-construct knowledge with students and develop a shared understanding through strategic questioning and active engagement with students in meaningful discussions.

PROCEDURE

This section provides the context of the inquiry and describes the teachers' efforts at improving their classroom talk and interaction with students. The teachers in this study examined the impact of integrating strategic questioning into their classroom practices. The research question guiding their inquiry was: How can teachers enhance students' learning in Primary Science through using classroom talk to engage students in productive academic discussion?

Context

The study involved forty high progress students in one class and thirty-nine low progress students in another class, both at Upper Primary level, in Townsville Primary School, where the two teachers worked at the time of the study. The lessons featured in this article focused on the topic of *Seed Dispersal*, under the theme of *Cycles/Reproduction in Plants*.

The teachers planned lessons with ELIS and AST consultants. The ELIS consultants offered input on integrating talk moves at specific segments of the lessons and expanding teachers' repertoire of questioning to facilitate productive academic discussion. The AST consultant discussed pedagogic considerations related to the Science content, for example, focusing on the overall conceptual idea, as well as suggestions for improving students' learning activities. The teachers recorded themselves teaching four different topics in the year and analysed their classroom talk with guidance from the consultants.

The data sources comprised transcripts of recorded lessons, the teachers' instructional materials, students' written work, the teachers' feedback from semi-structured interviews and students' feedback from focus group discussions. The consultants and teachers used thematic open coding to identify key features of teachers' questioning and cross-checked with each other for consistency in classification. They also selected examples for illustration of the various categories of teacher talk.

Teachers' strategic questioning for focused academic discussion

The teachers learnt about talk moves: "strategic ways of asking questions and inviting participation in classroom conversations" (Chapin, O'Connor & Anderson, 2013, p. 11). They aimed to help students verbalize explicitly what they were thinking in order to increase accuracy and precision in students' reasoning. The teachers practised crafting questions that guided students to observe, reflect and make logical links during class discussion. Purposeful questioning helped them to sharpen the focus on science concepts in class discussion as students engaged in meaningful dialogue with each other and the teacher, as seen in Figure 1.

Speaker	Lesson transcript	Talk Moves
Teacher:	What do you notice about fruits and seeds that you've drawn, in terms of shape and texture? Take note of your observation.	Initiate discussion
Student 1:	Some seeds are light, have wing-like structure for example, Angsana, fleshy fruits.	
Teacher:	Would anyone like to add on to what Student 1 had mentioned?	Guide a student to build on another student's contribution
Student 2:	Has fine hairs.	
Student 3:	Hooks.	
Teacher:	You can add on, improve or elaborate any of the points on the board.	
Student 4:	Fibrous husk.	
Teacher:	Yes, fibrous husk.	
Student 5:	Waterproof.	
Teacher:	I heard someone said waterproof.	
Student 6:	Traps air.	
Teacher:	Student 1, can you elaborate a little bit more on fleshy fruits? What did you observe? Can you give me an example?	Seek clarification
Student 1:	Kiwiberry and cherry tomato.	
Teacher:	What did you notice about those fruits?	Probe for reasoning or evidence
Student 1:	Vibrant colours.	
Teacher:	Oh, vibrant colours. Do you know why it is important to have vibrant colours?	
Student 5:	To attract animals.	

Figure 1. Excerpt of classroom transcript from Primary Science lesson annotated to show talk moves.

In this teaching sequence extracted from the lesson, the teacher carried out the following actions:

- began by drawing out the students' observations: "What do you notice about..." and guided students by drawing attention to specific characteristics to be noted as in "shape, texture"
- elicited other students' responses with the invitation to build on another student's contribution: "Would anyone like to add on to..."
- encouraged students to develop responses elicited through expanding on their peers' earlier contributions in specific ways: "You can add on, improve or elaborate..."
- through active listening, drew on a student's utterance as a means to push the conversation further: "I heard someone said..."
- elicited students' views to seek clarification: "Can you elaborate a little bit more on fleshy fruits?"
- prompted for specific information: "What did you observe? Can you give me an example?"
- adopted a questioning focus that not only guided students in their observations: "What did you notice about..." but also probed their reasoning: "Do you know why it is important to have..."

Thus, the teachers' deliberate actions promoted interactions which surfaced students' observations and guided them to build on other students' responses. Rather than have students accept unquestioningly what other students said, the teacher guided them to probe or extend each other's initial responses.

Students maintaining extended academic discussion through peer interaction

Over time, students showed a growing ability to maintain extended academic discussion using a variety of language features that built on and developed their responses. There was greater peer interaction as students actively listened to each other and guided by the teacher, explained, justified and elaborated their reasoning. The following extract is an illustration:

Speaker	Lesson transcript
Teacher:	OK, anyone of you agree or disagree with Student 1 or Student 2?
Student 3:	<i>I agree with Student 2 but sometimes</i> they might fly over the river and the seeds will just drop into the river.
Teacher:	So what happens to the seed?
Student 3:	They cannot grow.
Teacher:	Any other views?
Student 4:	<i>I neither agree nor disagree but</i> then it depends on the situation of the plant. <i>If</i> the plant is on the Pacific Island, it can't travel very far when dispersed through any methods on land but on water, it travels long distances, <i>depending</i> on the environment around it.
Student 5:	<i>I agree with Student 1. Sometimes it depends</i> on the plant <i>because</i> water is at that place so it can only disperse seed at that place <i>but then</i> coconut can float a far distance.

Figure 2. Excerpt of classroom transcript from Primary Science lesson with language features that extend the discussion shown in italics.

Students used language introduced by the teacher to build on their peers' ideas and also to challenge others' views, such as: "I agree with", "but sometimes" and "sometimes it depends on". Students also qualified their perspectives through the use of hedge words such as "sometimes". They also took up neutral positions using language such as: "I neither agree nor disagree but".

They were able to suggest alternative contexts by using "if", and contrasting situations shown by "but" and "depending on", demonstrating an awareness of the limitations or constraints of their statements in specific contexts.

Students were able to establish logical links in their reasoning, accounting for why things happened, and also providing qualifications. In the extract in Figure 2, Student 5 provides his reasoning for agreeing with Student 1: "Sometimes it depends on the plant because water is at that place so it can only disperse seed at that place but then coconut can float a far distance". The students' reasoning is introduced by "because", and then a consequence is indicated by "so" and that is followed by a qualification introduced by "but".

With careful choice of prompts, the teacher helped students to justify, qualify or elaborate their responses. In this way, the teacher sustained students' reasoning through peer interaction and an exchange of ideas.

FINDINGS

Teachers' perspectives

Teachers' perspectives on how productive academic discussion enhances students' content learning highlighted a range of benefits. These are outlined below, followed by representative comments from the teachers.

Teachers sharpened their awareness of language-specific issues in teaching and learning Science, and their role in making explicit the necessary links to develop conceptual understanding:

Teacher 1

Moving from a simple explanation in everyday language to a scientific explanation is not an easy task. The teacher needs to guide students to identify relevant key points from discussions to help students make meaningful cognitive connections.

Teacher 2

I am now more aware that the greatest barrier to learning Science is language. By lowering this barrier, language can be used to facilitate students' learning. Specific strategies of questioning and attention to language used during lessons can enhance Science teaching and learning.

Teachers were convinced of the value of classroom talk and interaction. They believed that teaching in a more interactive and dialogic manner made a difference in meeting their students' learning needs:

Teacher 1

I realise that proper questioning is crucial. Sometimes, questions which seem easy to comprehend (for us) may not be easily understood by students. Paraphrasing may be needed. I try to have a more interactive and dialogic class. I allow for more peer-peer interaction which leads to multiple points of view, especially when students challenge each other's views.

Teacher 2

Classroom talk should involve both teacher and students. If you are interested in what students have to say, you plan to provide space for students' views. This expectation will also be evident in students who listen to you. It is important to let students speak and think through speaking.

Teachers benefitted from the collaborative inquiry with ELIS and AST, and valued the learning process through the cycles of planning, teaching, reflection and conferencing they experienced:

Teacher 1

Meaningful reflection and conferencing in each cycle made me more aware of making connections in my classroom talk to what I aim to achieve in teaching. I become more critical of how questions are asked in class. I value opportunities to develop professionally in strengthening the design and planning of my lessons to integrate purposeful talk in class.

Teacher 1

I notice that when I challenge my students' assumptions, my students appear very excited and engaged. Planting questions which challenge their thinking helps raise engagement to a higher level.

Teacher 2

I now learn to provide more than just a few seconds for students to answer questions unlike the past where I talked most of the time. This is a necessary prerequisite for mental information-processing. When we talk non-stop, students have no chance to think over what is being said, formulate intelligent responses, or ask for clarification.

Students' perspectives

Feedback from the students showed that they gained from the purposeful discussion facilitated by their teachers in several ways. These are outlined below and followed by representative student comments.

They valued the teachers' reinforcement of the key ideas through making conceptual links:

Student 1

The way you questioned us is very good. Although you talk about a lot of concepts (points), you always relate to the main concept.

The targeted questioning built up their confidence in responding to given tasks:

Student 2

I am now better in answering science questions as my teacher went through detailed discussions of concepts by questioning us.

Teacher-guided productive discussion deepened students' conceptual understanding:

Student 3

You can dive more deeply into the concepts. We can then get the concepts better for further interpretation and understanding.

Fostering peer critique and feedback during class discussions sharpened the clarity of their explanations as they built on each other's contributions:

Student 4

During class discussion, you let us try to answer a question. You ask us whether we agree or disagree. Then, we edit the sentence, help change the sentence (improved version) so that we can use it as an answer that everyone understands.

DISCUSSION

Implications for teachers' personal beliefs and perspectives on facilitating learning

Teachers need to be aware of their own beliefs about knowledge construction and how to facilitate learning in the classroom. They could learn to release greater responsibility to students in order to encourage student participation in classroom discussions. The shift from a teacher-fronted classroom to a more dialogic, interactive one which creates opportunities for students to engage with each other and with the teacher is critical in supporting students' learning (Alexander, 2008). When teachers foster an academically stimulating and socially conducive environment, students are more open to engaging in productive academic discussions.

Implications for teachers' pedagogic practice

The study emphasized the need for planning of time and space for students to voice their views, ask questions and clarify conceptual understanding. By focusing on students' learning needs, teachers can design learning activities that provide opportunities for "safe" and active student engagement. This will enable more students' voices to be heard in class. Students can then clarify ideas and build on their peers' contributions as they refine their own understanding and sharpen how they describe and explain scientific phenomena.

Implications for teachers' professional learning

This study highlighted the importance of equipping teachers with skills to orchestrate classroom interaction and foster students' engagement in their learning. It shows how teachers can expand their questioning repertoire when they are clear about the purpose of different talk moves and their use at various stages of lessons. They also need to practise crafting key questions in their subject area to initiate discussion. Teachers can learn how to provide explicit instruction with the appropriate prompts to help students who have difficulty responding. Over time, students will be motivated to initiate discussion themselves and build on their peers' contributions to maintain a productive discussion.

The study also demonstrated that teachers benefit from learning how to transfer their learning to colleagues in collaboration with ELIS. The analysis of the transcripts of recorded lessons enabled the teachers to identify key talk moves and alternative talk moves which they could use. Iterative cycles of planning, discussion, implementing, and reflecting with the ELIS and AST consultants helped the teachers to progress as a team. They developed stronger teacher agency and ownership of their own and their colleagues' professional learning, and built the capacity to sustain the effective practices in their use of classroom talk over time. The teachers are ready to integrate the talk moves into other lessons.

REFERENCES

- Alexander, R. (2008). *Towards dialogic teaching: Rethinking classroom talk* (3rd ed.). Cambridge, UK: Dialogos.
- Chapin, S. H., O'Connor, M. C., & Anderson, N. C. (2013). *Classroom discussions in math: A teacher's guide for using talk moves to support the common core and more, grades K-6*. Sausalito, CA: Math Solutions.
- Mercer, N., Dawes, L., Wegerif, R., & Sams, C. (2004). Reasoning as a scientist: Ways of helping children to use language to learn science. *British Educational Research Journal*, 30 (3), 359-378.
- Newton, D. P., & Newton, L. D. (2001). Subject content knowledge and teacher talk in the Primary Science classroom. *European Journal of Teacher Education*, 24 (3), 369-379.
- Scott, P. (1998). Teacher talk and meaning making in science classrooms: A Vygotskian analysis and review. *Studies in Science Education*, 32, 45-80.
- Tank, K. M., & Coffino, K. (2014). Learning science through talking science in elementary classroom. *Cultural Studies of Science Education*, 9 (1), 193-200.
- Tytler, R., & Aranda, G. (2015). Expert teachers' discursive moves in Science classroom interactive talk. *International Journal of Science and Mathematics Education*, 13 (2), 425-446.
- Zwiers, J., & Crawford, M. (2011). *Academic conversations: Classroom talk that fosters critical thinking and content understandings*. Portland, ME: Stenhouse Publishers.

Deepening Individual Students' Reasoning and Summarising in Geography and Mathematics through Teacher Questioning and Talk

Neeraja Vijayakumar and Wong Khai Yu, *Paya Lebar Methodist Girls' School (Secondary)*

Jonathon Adams and Gavin Lee, *English Language Institute of Singapore*



INQUIRY FOCUS

This inquiry examined how teacher talk moves improved the quality of classroom talk in Upper Secondary Geography and Mathematics lessons. A Geography teacher and a Mathematics teacher from Paya Lebar Methodist Girls' School (Secondary) participated in the inquiry, guiding their students to engage in extended talk related to the subject content.

BACKGROUND

This inquiry is based on the position that talk is central to deepening learning and that it is essential to have focused talk around the content being taught. Resnick, Michaels, and O'Connor (2010) highlight that "without disciplined talk, scientific, mathematical, and humanistic knowledge remains unused" (p. 163). The authors point out that special care is needed to create educative environments that nurture and develop reasoned discourse (p. 172).

One approach to developing student learning through effective talk in the classroom is the use of teacher talk moves. The teacher talk moves used by the teachers in this inquiry are adapted from the work of Michaels and O'Connor (2012) and Zwiers and Crawford (2011). The teacher talk moves were classified into focus areas of teacher talk (see Figure 1).

Focus areas of teacher talk	Teacher talk moves and frames for prompting
Deepen a student's reasoning	Probe for reasoning or evidence What's your evidence for that? Challenge a student's statement or assumption Are you sure that ...?
Engage with another student's reasoning	Elicit a student's view on another student's idea What do you think about what X has just said? Guide a student to build on another student's contribution Who can add on to the idea that X has just shared?

Figure 1. Focus areas of teacher talk, teacher talk moves and frames for prompting (adapted from Michaels and O'Connor, 2012; and Zwiers and Crawford, 2011).

PROCEDURE

In their inquiry, the teachers noticed that many of their students were not active in classroom interactions. Students tended not to choose to answer questions or interact with each other. The students who did respond tended to give one-word answers or very short responses. With this lack of interaction in mind, the teachers each chose a class in which to explore talk moves. Together with the ELIS consultants, the teachers developed approaches to building focused academic talk. The teachers' goals were to get their students to support their comments with reasoning and build on contributions from their classmates.

Teacher inquiry cycles

After attending the course, Opening Up Talk for Learning in Subject Classrooms, a WSA-EC core curriculum professional learning course conducted by ELIS, the Geography and Mathematics teachers each participated in two separate teacher inquiry cycles. These inquiry cycles were adapted from Timperley, Wilson, Barrar, and Fung (2007). Each inquiry cycle comprised five stages (see Figure 2).

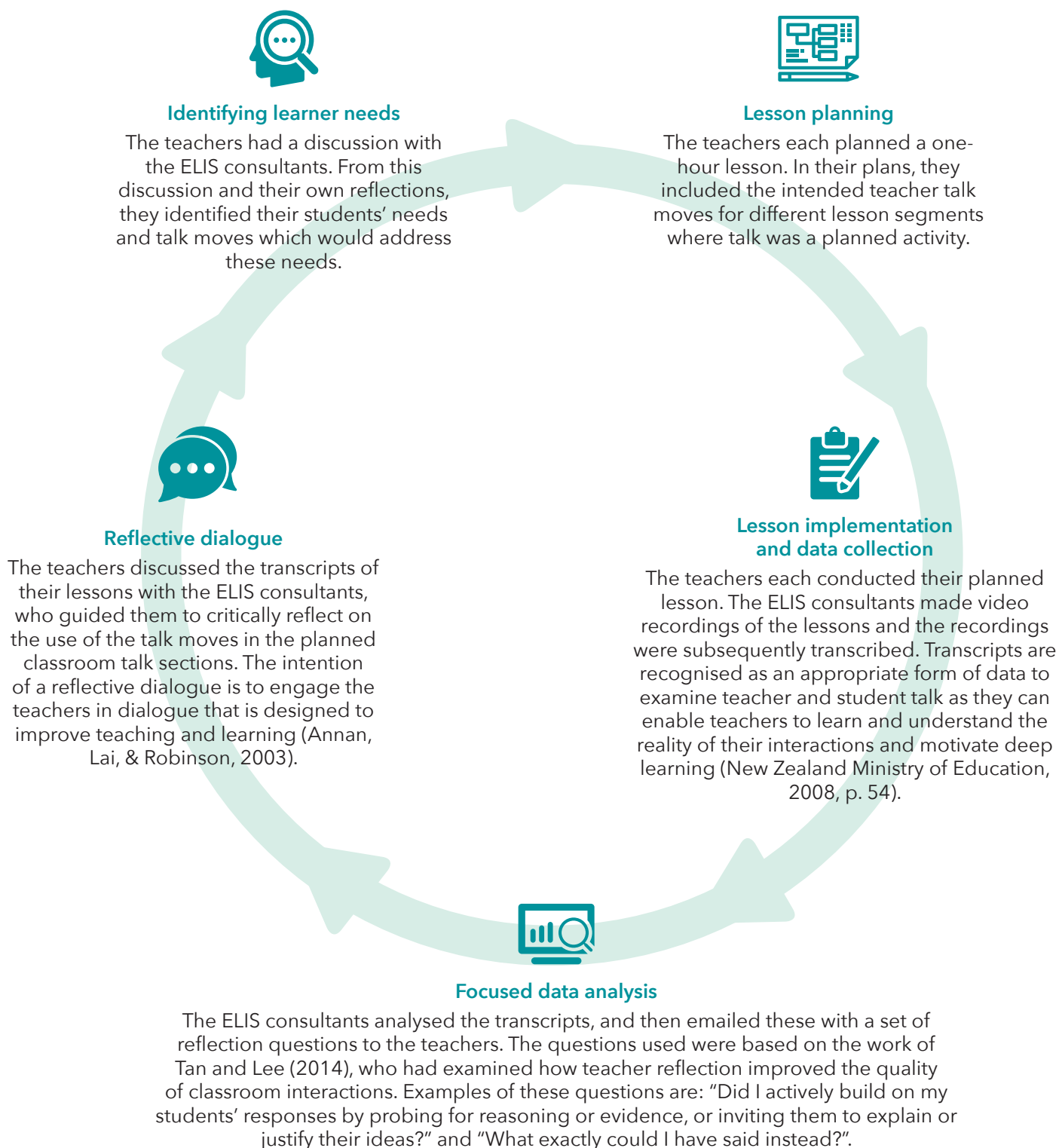


Figure 2. Teacher Inquiry Cycle (adapted from Timperley et al., 2007).

FINDINGS

Improvements in the Quality of Classroom Talk in the Mathematics Classroom

The first cycle of inquiry involved the Mathematics teacher examining his own teaching practices through reflective dialogue with the ELIS consultants using video data of a lesson. In the first recording of the Mathematics lesson on *Area of Composite Figures* with his Secondary 3 students, the Mathematics teacher frequently gave extended explanations and posed very few questions to the students, as shown in Figure 3. The questions posed were also not regularly followed up for a response from the students.

Following the reflective dialogue on the first lesson, the Mathematics teacher introduced and used the teacher talk moves with extended interaction opportunities with the same class for a month. Students were also given a list of teacher questions that they could expect.

Speaker	Lesson transcript
Teacher	Unit square. So you all have practised applying this formula for area. This will apply for any figure that is made up of straight line segments. So we have seen the two special examples, triangles, quadrilaterals. I think the papers will not be too cruel to you all. But even if you go to more like five, six, seven, it's the same idea, entirely the same idea. OK now we are done with the area portion. Thank you. Now you all see the next part after the area right?
Student 1	Three stars.
Teacher	Three stars. What does this star mean? I will explain to you. Can you look at example 28 at the back? We have come through two weeks of talking about coordinate geometry. There are many different parts of it. Do you remember what the very first thing we started off with was? Running up the slope?
Student 2	Gradient.

Figure 3. Excerpt of classroom transcript of first Mathematics lesson.

Over the course of the second inquiry cycle, a greater amount of talk by the same class of students was observed in the second Mathematics lesson on *Exponential Functions*. The Mathematics teacher used more focused questions to lead the students to explain and support their reasons.

Figure 4 shows a student being guided to demonstrate her reasons for a calculation. The student's talk is in longer and more elaborated utterances, which make visible her thinking processes and her ability to articulate her reasoning. She is also engaged in an extended exchange with the Mathematics teacher, demonstrating appropriate talk in the Mathematics classroom.

Over time, the Mathematics teacher observed that the students started using talk for learning during their classroom interactions. The students developed a habit of asking questions which engaged each other's reasoning, and not to just seek answers. The Mathematics teacher also noticed that the students' confidence had visibly grown, with the students having a clearer idea about how to present their solutions and express their thought processes. The students became better at standing in front of the class and speaking with more certainty.

Speaker	Lesson transcript
Teacher	OK, so once you're able to write this down for sure, it's $px^2 + qx + r$. How do you proceed on from there? What are you doing?
Student	I compare the coefficient. Then I'll be able to find the p , r and q values.
Teacher	Just by looking?
Student	No, you have to compare. You expand this equation, then you compare.
Teacher	Can you show one example? What are you comparing?
Student	You're comparing like you want to know what is p , right, and x^3 . Then, like this one and this one.
Teacher	She's saying that compare x^3 , so she's showing us what she's comparing.
Student	This one and this one. Compare.
Teacher	OK, how do you find q so easily? Most of your friends are stuck with q , so I'm very interested to know. Most of your friends are not too sure how the q came about.
Student	Oh because you get p right, so if you get p , so it's 2 times 2 which gives you 4. Then you need 5, so 5 minus 4 is 1.

Figure 4. Excerpt of classroom transcript of second Mathematics lesson.

Improvements in the Quality of Classroom Talk in the Geography Classroom

Figure 5 shows a transcribed segment of the interaction between the Geography teacher and a student during the first Geography lesson. The teacher repeatedly asked short and closed-ended questions that require a specific response. Students tended to give limited responses that did not usually consist of full sentences. As a result, the students also had little opportunity to contribute different views or add on to other students' responses.

During the first reflective dialogue with the ELIS consultants, the Geography teacher reported that the students were quiet in class, giving one-word responses, and did not build on each other's output. To address this, she decided to try out talk moves to get students to engage with the teacher and each others' reasoning, and she incorporated the talk moves into her subsequent lessons for a month.

Speaker	Lesson transcript
Teacher	OK, now that you've seen the video, OK, what is happening? Can somebody give me a brief summary of what you just saw?
Student	They're eating the leftover food.
Teacher	OK, they're eating the leftover food because?
Student	Not enough money.

Figure 5. Excerpt of classroom transcript of first Geography lesson.

The second Geography lesson observed in the inquiry a month later showed a change in the Geography teacher's classroom interactions. The students were given a range of articles to discuss in their groups. The Geography teacher made the lesson expectations explicit at the start of the lesson, which is one of the practices of applying teacher talk moves effectively. The students were expected to present their group discussions about different geographical contexts to the rest of the class, add on to the other groups' contributions and seek clarifications if they needed to. By making these expectations explicit, the Geography teacher made students aware of how they should interact with each other during the group presentations.

Figure 6 shows the Geography teacher probing the students' responses for further information by seeking to elicit the range of people involved in stopping the spread of Ebola. The Geography teacher is also using questions to engage other students to add on or ask about another student's contributions.

Over the course of the two inquiry cycles, the Geography teacher felt that she had become more self-aware of the types of questions she was using and her use of wait time for student responses. As a result, she felt that she was in a better position to encourage and develop student responses in the classroom. As the students grew accustomed to the expectations of classroom talk, the Geography teacher felt that the students became more confident in applying their knowledge through classroom interactions.

Speaker	Lesson transcript
Teacher	So all this was happening at the same time. So do you think there was close co-operation? Or they all acted on their own?
Student 6	Close co-operation.
Teacher	So there was close co-operation. That is one of the major factors for how Nigeria was able to stop the spread of Ebola quite fast. Initially if you look at the article, it spread quite fast but after they took these actions then they managed to control it. Let's look at the Rwanda example. Student 7, your group? Maybe one of the other girls can present? What were the measures implemented in Rwanda?
Student 7	The government educated the community health workers [inaudible] of diseases.
Teacher	OK, so the government? Girls? Government?
Student 7	Educated the community health workers.
Teacher	OK, and then?
Student 7	And then the community health workers treat the people that have the diseases and train them. There's also community-based health insurance programme, and they give the health insurance to the poorest [inaudible] so that—
Teacher	When you give insurance to the poorer people, what are you doing actually? You're making it what?
Student 7	Affordable.
Teacher	Affordable for them, because remember yesterday one of the issues we discussed. The main challenge they have is the cost of the medicines, right? So if they give them insurance, it is one way of solving that problem. OK, I'll come back to your group. [Teacher looks at another student.] Your group? What would you like to add to that discussion? You have any questions, or you want to add on to what they've said?

Figure 6. Excerpt of classroom transcript of second Geography lesson.

DISCUSSION

This inquiry illustrated that the infusion of teacher talk moves into lessons and the use of teacher inquiry cycles can be effective in developing effective communication for learning in Upper Secondary Mathematics and Geography classrooms. For example, the Mathematics teacher observed:

"I'm having my students speak a lot more during lessons now, in the sense that really I try as far as possible to just start and end the lesson, and in between they are the ones speaking and with me asking questions."

A future area of inquiry identified by the teachers is to see how teacher talk moves can be applied to Mathematics and Geography students of younger ages. As a result of their inquiry, both teachers have been motivated to explore the impact of richer classroom talk on written test results, and to find out the views of students who experience new classroom practices involving teacher talk moves.

Acknowledgment

This study was carried out with financial support from the ELIS Research Fund [Grant Number ERF-2015-03-JLA]. The authors would like to acknowledge the contributions of Mr Tan Ek Ming, whose earlier work with Mr Gavin Lee laid the foundations for the methodology used in this project.



REFERENCES

- Annan, B., Lai, M. K., & Robinson, V. (2003). Teacher talk to improve teacher practices, *Set, 1*, 31-35.
- Michaels, S., & O'Connor, C. (2012). *Talk science primer*. Cambridge, MA: Technical Education Research Centers (TERC).
- New Zealand Ministry of Education (2008). *Ki te Aotūroa: Improving inservice teacher education learning and practice*. Wellington, New Zealand: Learning Media Limited.
- Resnick, L. B., Michaels, S., & O'Connor, C. (2010). How (well structured) talk builds the mind. In R. Sternberg and D. Preiss (Eds.), *Innovations in educational psychology: Perspectives on learning, teaching, and human development* (pp. 163-194). NY: Springer.
- Tan, E. M., & Lee, G. (2014, November). *The classroom interaction teacher reflection tool (CITReT) for teacher professional development*. Paper presented at the 3rd Annual WSA-EC Forum, Singapore. PowerPoint retrieved from [http://www.elis.moe.edu.sg/elis/slot/u54/news-n-events/past-events/wsa-ecforum2014/Presentations%20\(PPrimary\)/2.2b%20CITReT%20for%20Teacher%20Professional%20Development.pdf](http://www.elis.moe.edu.sg/elis/slot/u54/news-n-events/past-events/wsa-ecforum2014/Presentations%20(PPrimary)/2.2b%20CITReT%20for%20Teacher%20Professional%20Development.pdf)
- Timperley, H., Wilson, A., Barrar, H., & Fung, I. (2007). *Teacher professional learning and development: Best evidence synthesis iteration*. Wellington, New Zealand: Ministry of Education.
- Zwiers, J., & Crawford, M. (2011). *Academic conversations: Classroom talk that fosters critical thinking and content understandings*. Portland, ME: Stenhouse.

Helping Students to Answer Source-based Questions in Social Studies

Henry Kwek and Clarence Ng, *Seng Kang Secondary School*
Alison Tan and Tan Ek Ming, *English Language Institute of Singapore*



INQUIRY FOCUS

Two Upper Secondary Social Studies teachers at Seng Kang Secondary School observed that their students had difficulty writing strong answers to source-based questions (SBQs). In particular, students could not articulate clearly the purpose of source authors. To help their students perform better, the teachers developed literacy and language scaffolds for their classes. In this collaborative inquiry project with ELIS, they investigated the effectiveness of their efforts.

BACKGROUND

There is increasing recognition that content learning is inseparable from learning the ways of reading, writing, speaking and thinking particular to each subject area (McConachie & Petrosky, 2010; Moje, 2008; Shanahan & Shanahan, 2012). This implies that students need to be apprenticed in the language and literacy practices of a subject in order to learn and communicate in ways that subject experts deem appropriate (Council of Chief State School Officers, 2010; Draper, 2015). This subject literacy approach to instruction involves the explicit teaching of these practices and the provision of language support to students alongside content learning. Such support takes various forms and can include language scaffolding, as well as thinking and writing strategies (Chadwick, 2012; De La Paz, 2005; Gibbons, 2009).

Social Studies requires students to analyse and evaluate material from different texts, especially in source-based questions (SBQ). To perform well on assessments, students need a sophisticated set of literacy skills which include the ability to comprehend and draw inferences from given information, recognize different points of view, detect bias and “draw conclusions based on reasoned consideration of evidence and arguments” (CPDD, 2012, p. 59). Students must also represent their analysis in writing, a task considered to be one of the most challenging by scholars as it requires strong proficiency in academic English (Cloud, Lakin, Leininger, & Maxwell, 2010). Providing students with adequate language and literacy support for such a task, therefore, is essential to ensure their success.

PROCEDURE

The two teachers in this study began their inquiry with a written assignment – a practice SBQ which students had to complete individually (see Figure 1). This assignment was given to three Secondary Three classes before any literacy or language support was introduced.

The teachers then assessed their answers and found that while students were generally able to identify the content message of a source, a majority of them either could not explain its purpose fully or were not able to articulate it accurately in their writing. Two fairly typical examples of such incomplete answers are shown in Figure 2. In both examples, the students could identify the target audience of the source and interpret its message. However, they could not elaborate on the purpose of the source and its implications. Students could only use the word “tell” to indicate its informative purpose.

Practice Source-Based Question

Source C
Statement by High Court Judge Mr Justice Chua published on 21 October 1965.

Mr Justice Chua, pronouncing the death sentence on the two Indonesian marines involved in the MacDonald House bombing, said, “What they have done is a cowardly act. By their act, they have killed three innocent civilians in this state. The time has now come for them to pay the penalty for their dreadful crime. There is only one (death) sentence I can pass.”

Source: *The Straits Times* © Singapore Press Holdings Limited. Permission required for reproduction.

Study Source C.
Why was Mr Justice Chua’s statement published? Explain your answer. [6]

Figure 1. The practice SBQ given to the three Secondary Three classes.

Student A

Source C was published to tell Singaporeans and the world why the two marine soldiers were sentenced to death. This can be seen from Source C: “What they have done is a cowardly act. By their act, they have killed three innocent civilians in this state. The time has now come for them to pay the penalty for their dreadful crime. There is only one (death) sentence I can pass.” This meant that what the two marine soldiers did is morally cruel and wrong and Singaporeans will not be able to forgive what they had done. Hence, they will be executed in Singapore.

Student B

Source C is done to criticize the two Indonesian marines involved in the MacDonald House bombing by labelling their wrongdoing as a “cowardly act”. It is stated as a heinous act as it resulted in the loss of innocent lives. This can be seen from Source C which stated “What they have done is a cowardly act. By their act, they have killed three innocent civilians in this state.” This is done to tell Singaporeans and all readers about the MacDonald House bombing.

Figure 2. Two examples of student answers to the practice SBQ which were written before language and literacy support were provided.

This problem had also been observed in prior assignments. To understand the source of the problem, the teachers conducted interviews with their students and uncovered two main reasons for the difficulty: students were not clear about drawing inferences and lacked the vocabulary to fully explain the purpose of source authors, especially the intended audience outcomes.

Informed by the courses conducted by ELIS about language and literacy development in subject classrooms, the teachers designed two types of scaffolding to help their students write better purpose-focused SBQ answers. The first was a thinking frame which led students through the cognitive processes of drawing inferences from a given source. Supplemented with guiding questions, this frame also served as a discussion and writing guide because it made explicit all the

required elements of an answer seeking to fully explain the purpose of a source: author, target audience, message and intended audience outcome. The teachers called this the "AAMO" thinking frame (see Figure 3).

The second type of scaffolding targeted students' limited vocabulary and knowledge about the kinds of motives source authors might have. Students tended to only use words like "show" and "tell" to describe an author's communicative purpose, failing to infer possible intentions and outcomes relative to the source message and its context. To supplement both their vocabulary and knowledge about drawing inferences, the teachers developed a list of relevant words and phrases for students to learn about, and use (see Figure 4).

Over five weeks in the second semester, the teachers taught the AAMO thinking frame explicitly, introduced the words for describing authors' motives, and made sure students had multiple opportunities to discuss and practice their uses across different SBOs, both in talk and in writing. At the end of the semester, the teachers gave the students the same SBQ about the death sentence of the Indonesian bombers and analysed their answers using the same Levels of Response Marking Scheme (LORMS) (CPDD, 2012, p. 66) as before.

AAMO Thinking Frame / Guiding Questions	
Author	- Who is the author? - Was the author part of the actual party involved? Or was he a neutral 3rd-party? - What was the author's political stand/job?
Audience	- Who was/were the audience(s)? - How was/were the audience(s) related to the author? - What was/were the role of the audience(s) in relation to the issue?
Message	- What is the content message? - When was it published or distributed? - What is the issue? - When did it take place? Did it occur before, during or after any significant event? - What was the political, economic or social contexts at the time? - What are the different perspectives on the issue? - Does it appear in sequence to other sources?
Outcome	- What outcome/reaction did the author want from the audience(s)? - What kind of thinking/feelings did the author hope to arouse in the audience(s)? - What kind of support did the author hope to get from the audience(s)? - What kind of action did he hope they would take?

Figure 3. The AAMO thinking frame.

Words to describe author's motives		Words to describe intended audience outcomes
Assure	Influence	Support
Blame	Inform	Oppose
Brainwash	Justify	Sympathize
Calm/pacify	Mock	Scorn
Convince	Overturn	Accept
Cover-up	Persuade	Reject
Defend	Prove	
Educate	Raise understanding	
Gain support	Reassure	
Gain sympathy	Validate	
Incite		

Figure 4. Vocabulary list for author's motives and intended audience outcomes.

FINDINGS

Over the course of the semester, the teachers noted gradual improvements in their students' explanation of purpose in their answers. In both their oral and written responses, students increasingly used elements of the AAMO Thinking Frame and words from the vocabulary list of author's motives. As they gained more familiarity with the scaffolding, they also needed less prompting from the teachers.

When students encountered the same SBQ again at the end of the semester, more of them were able to explain the purpose of the source and they did so more accurately. The improved answers of Student A and B can be seen in Figure 5. Both students demonstrated a stronger understanding of the question and provided more substantial explanations about the purpose of the source. They were careful to specify not only the audience ("Singaporeans and the world") but also the kind of audience response the source author might have intended to generate ("understanding" and "support").

At the end of the study, the teachers concluded that the thinking frame and the vocabulary list did help students produce better answers to purpose-centred SBQs, but only if students were carefully guided through their use. They attributed the improvements also to the frequency of practice and the opportunities for classroom discussions, both of which deepened students' learning and promoted facility for the ways of thinking and writing required by the task.

Despite the improvements described above, the teachers noted that some students still struggled to produce strong answers for the SBQs that they were given towards the end of the semester. For example, some of them would use the terms in the list like "raise understanding" and "support" but still failed to specify accurately the purpose or audience outcome. Their performance also varied from topic to topic, depending on their knowledge about specific (political or social) issues and source authors. The teachers recognized that as they provided scaffolding for thinking and writing, they would need to continue to enrich their students' knowledge base about the subject.

Student A

Source C was done to convince readers from Singapore and the world that the judge's decision of the death sentence was justified as the actions of the Indonesian marines were seriously wrong and they were at fault. This can be seen from the lines "they have killed three innocent civilians in this state" which shows that the Indonesian marines were to be blamed as they had caused innocent lives to be lost. The purpose of this source was to raise understanding and to gain support for the judge's decision.

Student B

The purpose of the source is to inform Singaporeans and the world and to convince them that the Indonesians' bombing of MacDonald House was very wrong and is not justified. This can be seen from the quote "What they have done is a cowardly act. By their act, they have killed three innocent civilians in this state. ... There is only one (death) sentence I can pass." This meant that the Indonesians should be punished for their heinous actions. Hence, the source is published to raise the world's understanding about the sentencing of the Indonesian marines and to gain support for the death sentence.

Figure 5. Answers of Student A and Student B at the end of the semester.

DISCUSSION

This study demonstrated the value of providing support for both the cognitive and linguistic demands of a task. The AAMO Thinking Frame made explicit the cognitive steps involved in what it means to "draw inferences" (CPDD, 2012, p.59) and helped students engage in the ways of reasoning that are valued in Social Studies. As each new word carried a new concept, learning the words on the vocabulary list increased students' knowledge and conceptual understanding about authors' motives and the implications for their audience. When given explicit instruction and multiple opportunities to practice their use, many students became more adept at making and describing the connections between the purpose of a source and its context. Through this study, the teachers realized that the language support, together with the thinking frame, helped students understand the content of the

subject more readily and developed their thinking in subject appropriate ways so that they could write more effective answers to the SBQ.

Encouraged by the results of this study, the teachers have shared their findings with their colleagues in the Humanities department. Together, they plan to incorporate these types of support into the Upper Secondary Social Studies and History curriculum for all classes in the next academic year, investigate their effectiveness across more classes, and continue to refine the strategies based on evidence of student learning and teacher feedback. They will also explore ways to integrate more classroom discussions into their lessons to deepen student learning of both the content and language of Social Studies.



Acknowledgments

The authors would like to thank Mr Lloyd Yeo, Master Teacher/History, Academy of Singapore Teachers, for his support in the report of this inquiry.

REFERENCES

- Chadwick, T. (2012). *Language awareness in teaching: A toolkit for content and language teachers*. Cambridge, England: Cambridge University Press.
- Cloud, N., Lakin, J., Leininger, E., & Maxwell, L. (2010). *Teaching adolescent English Language Learners: Essential strategies for middle and high school*. Philadelphia, PA: Caslon.
- Council of Chief State School Officers (CCSSO). (2010). *Common Core State Standards for English language Arts and literacy in history/social studies, science, and technical subjects*. Washington, DC: National Governors Association Center for Best Practices, CCSSO.
- CPDD. (2010). *A guide to teaching and learning for Upper Secondary Social Studies*. Singapore: Ministry of Education.
- Death for Indon bombers (1965, October 21). *The Straits Times*. Retrieved from <http://eresources.nlb.gov.sg/newspapers/Digitised/Article/straitstimes19651021-1.2.94.aspx>
- De La Paz, S. (2005). Effects of historical reasoning instruction and writing strategy mastery in culturally and academically diverse middle school classrooms. *Journal of Educational Psychology*, 97(2), 139-156.
- Draper, R. J. (2015). Using the Common Core State Standards to support disciplinary literacies. *Voices from the Middle*, 22(3), 59.
- Gibbons, P. (2009). *English language learners, academic literacy and thinking: Learning in the challenge zone*. Portsmouth, NH: Heinemann.
- McConachie, S. M., & Petrosky, A. R. (2010). *Content matters: A disciplinary literacy approach to improving student learning*. San Francisco, CA: Jossey-Bass.
- Moje, E. B. (2008). Foregrounding the disciplines in secondary literacy teaching and learning: A call for change. *Journal of Adolescent & Adult Literacy*, 52(2), 96-107.
- Shanahan, T., & Shanahan, C. (2012). What is disciplinary literacy and why does it matter? *Topics in Language Disorders*, 32(1), 7-18.



2 Malan Road, Block P,
Levels 1 and 2, Singapore 109433

 +65 6664 1724

 +65 6278 7145

 moe_elis_academy@moe.gov.sg

 www.elis.moe.edu.sg