

Use of Visible Thinking Tools in Teacher-Led Discussions to Develop Critical Writing Skills in Economics

Lin Pei
Zeng Wenjie
Lim Wan Yang

Temasek Junior College
Singapore

Abstract

Based on the principles of Visible Thinking (Ritchhart & Perkins, 2008), students adopted routines in question interpretation and answer design to help them develop more comprehensive argumentative texts that respond to 'A' Level economics questions. Teachers adopted 'talk moves' (Chapin, O'Connor & Anderson, 2013) to facilitate whole-class discussions on students' question interpretation and answer design. The result of the intervention showed that academically stronger students respond better to whole class discussion and thinking routines than academically weaker students. The study surfaces the challenges faced by teachers and students in the use of Visible Thinking tools and whole class discussions, and offers recommendations to overcome these challenges.

Introduction

Critical and inventive thinking skills have been identified for managing the complexities and ambiguities of contemporary economic issues (Curriculum Planning and Development Division, 2016, p. 2). Yet, many students perceive the 'A' Level Economics curriculum as being very difficult. One common challenge they face is their inability to address the demands of the questions. Secondly, students find it difficult to structure arguments surrounding economic issues. Last but not least, students tend to loosely use technical terms that have specific meanings in Economics, resulting in a lack of accuracy and clarity in their arguments. In response to these challenges, Economics teachers nationwide creatively think of strategies and methods to help students acquire the skills and knowledge outlined by the 'A' Level syllabus, so as to enable the students perform up to their potential in the national exams.

In Temasek Junior College (TJC), Economics teachers leveraged a "Dissect and Design" approach to help students cope with the rigorous requirements of the 'A' Level syllabus. This approach made use of thinking routines and spatial organisers that helped students to breakdown the question (dissect) and put together elements of an argument (design). Talk moves used by the teacher facilitator were adopted to make the thinking behind the question dissection and answer design "visible" and audible. This study examines how these skills leading to the construction of an argumentative text were taught in Economics over the course of two academic terms in two JC Year 1 classes.

Literature Review

Informed by a disciplinary literacy approach (Moje, 2008; Shanahan & Shanahan, 2008, 2012) of explicitly teaching the language and genre processes of the discipline, a series of lessons was designed to scaffold the writing of the argumentative response to a given task. Lessons incorporated teacher-facilitated group discussions where students were actively engaged in peer critiques of each other's work. This was grounded in the principles of Visible Thinking (Ritchhart, Church & Morrison, 2011) which included the beliefs that the development of thinking is a social endeavour with a constant interplay between the group and the individual, and that fostering thinking requires making thinking visible (Ritchhart & Perkins, 2008).

The idea of student engagement in productive discussions was also influenced by Meyers (1986), who highlighted the need for 'cognitive dissonance' (Festinger, 1957; Piaget, 2005) in class to challenge students to question the validity of the information presented to them. Structuring the learning tasks and peer interaction to promote critical thinking (Meyers, 1986) was realised in a teacher facilitated 'Dissect' (where literacy demands of given tasks were unpacked) and 'Design' approach (where students were guided to design appropriate responses using subject-specific terms) through teacher-guided discussions with students.

Dissect and Design Approach with Teacher-Led Discussion

The Dissect and Design method aims to help students cope with the essay questions in the 'A' Level Economics curriculum (Curriculum Planning and Development Division, 2016). In the Dissect phase, students unpack the individual words or phrases of a question to determine the task given to them.

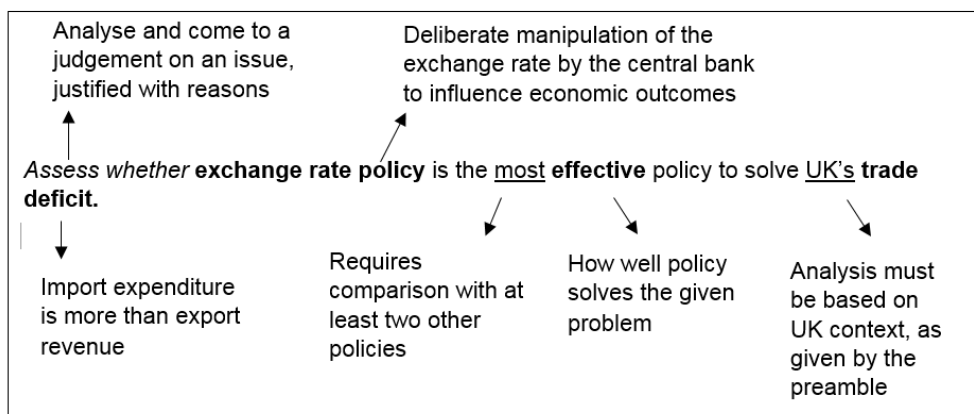


Figure 1. Question Dissection

Figure 1 shows the process of question dissection. Students are trained to adopt a routine where they have to elaborate on given phrases and words in a question to unpack their meaning, so as to fully comprehend the demands of the question. In their presentation of the question in Figure 1, students have to explicitly verbalise that the word "assess" requires the writer to present a judgement on an issue, backed up by analyses. Also, the word "most" requires the writer to compare and weigh the given economic policy with other possible policies that are not given in the question. Students also have to identify 'exchange rate policy' and 'trade deficit' as two concepts that they have to elaborate on and explain in their essays. The presence of the word "UK" requires students to know that their assessment has to be centred on an economy that is part of the European Union, but which does not share the common European currency, and, hence, is not restricted by the monetary policy set up by the European Central Bank.

Ideally, the full process of question dissection should be presented by a student from the class. Other students, in groups or as individuals, then give comments or pose questions to the presenter on the question dissection, riding on the principle of Visible Thinking where students explain their thinking to one another and brainstorm alternative interpretations for one another (Ritchhart, 2016). Teachers keep track of the conversation and pose more guiding questions or comments where necessary, to improve the thoroughness of question dissection.

To help all students in class access the learning points generated through the presentation and discussion, the annotation of the question is usually done on the board by the teacher, or the presenter, or an appointed class scribe. The annotation helps to clarify the interpretation of each word posed in the question. Figure 2 shows a question that has been collectively ‘dissected’ by the class, with the annotation done by students.

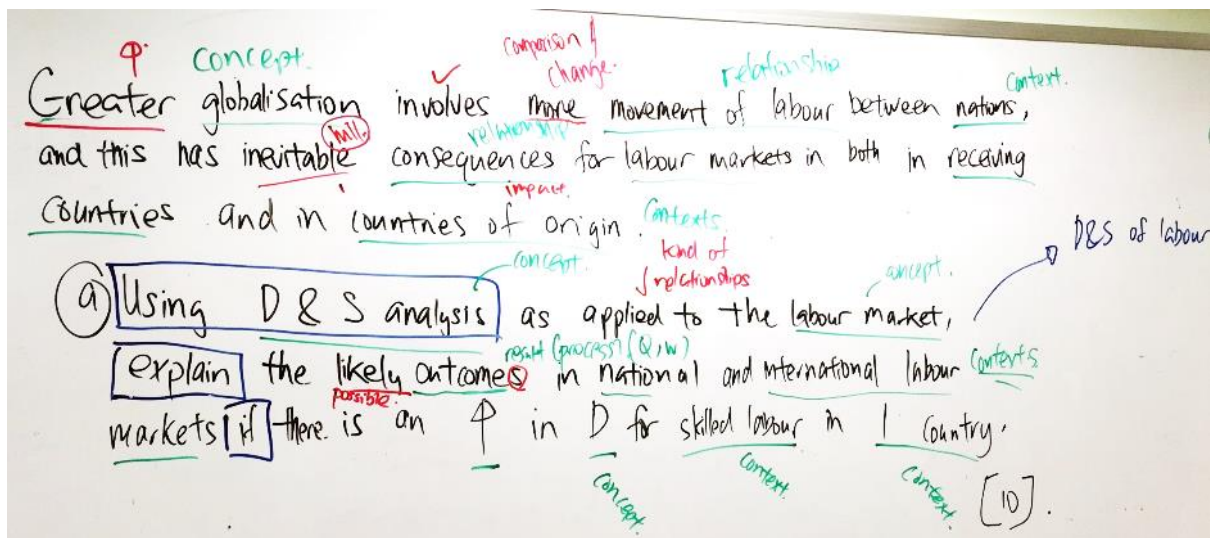


Figure 2: Annotation of Essay Question

In this inquiry, we recognise that the students were in the first year of their Economics education, and that more prompting from teachers was required to help facilitate students’ growth in their ability to interpret questions and engage one another in alternative views. Therefore, when students and teachers were briefed on the pedagogical method, they were told that “teachers would pose questions and provide comments after the students were given the chance to offer their comments and questions”. Teachers also made use of ‘talk moves’ to encourage students to elaborate on their views and to tease out further points of view. Chapin, O’Connor & Anderson (2013) defined ‘talk moves’ as “strategic ways of asking questions and inviting participation in classroom conversations”. An example of talk moves used by teachers during the question dissection phase, as well as the purpose of those moves are shown in Table 1.

Table 1

Talk Moves by Teachers during Question Dissection

Teacher's Questions / Prompts	Talk Moves
What does 'explain whether' tell you to do?	Elicit information
Anything else? Maybe it depends on...	Guide students to build on other student's contribution.
Yes. More specifically you need to weigh the reasons, and see which reason outweighs the other.	Revoice for verification.

Through the question dissection, students identify elements of the question requirements that help them design their answer, which forms a plan or a guide to their essay. An example of the essay plan design is shown in Figure 3.

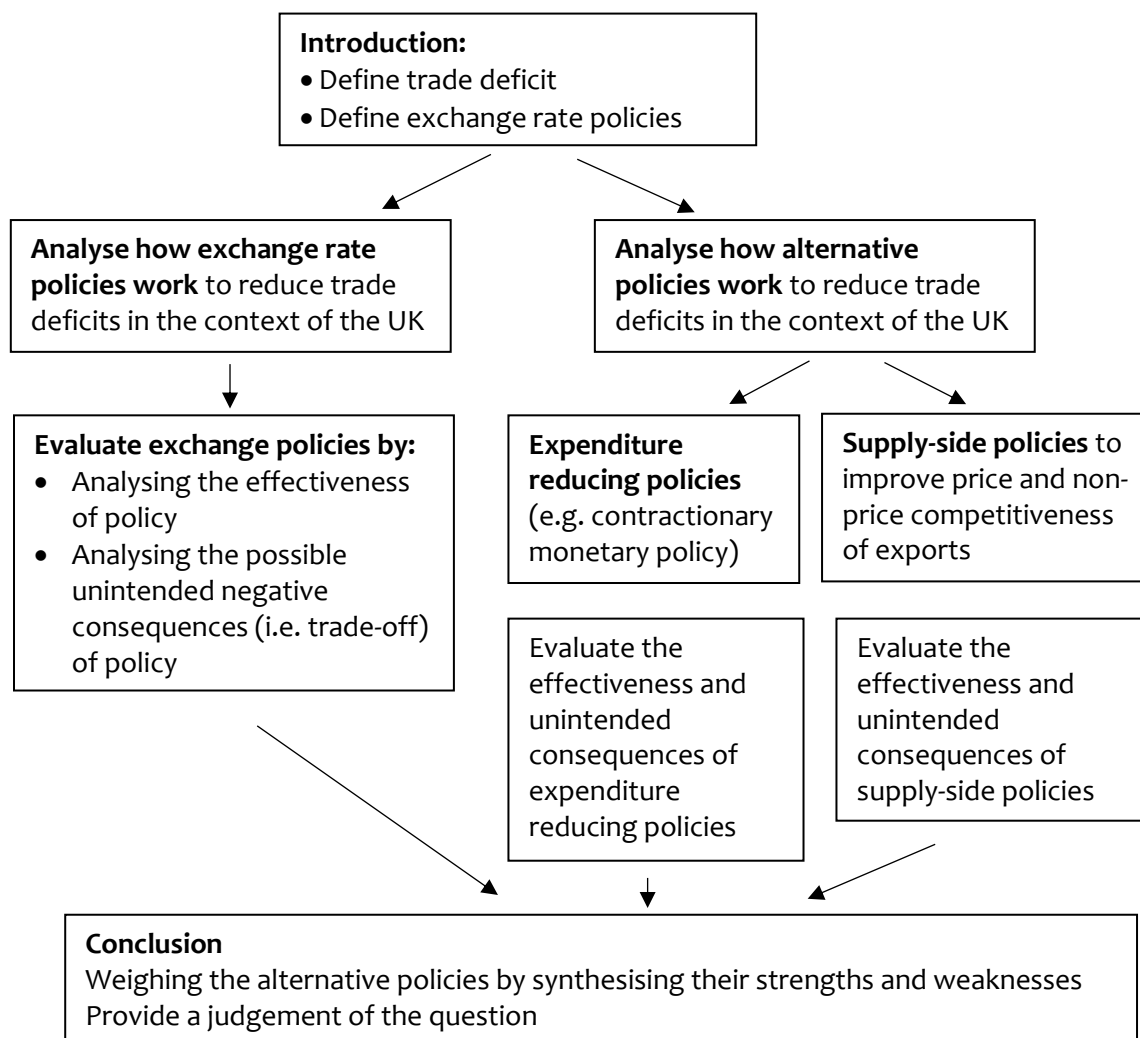


Figure 3: Answer Design

Teaching how to craft arguments has been identified to be one of the challenges educators face. The use of schematic plans and flowcharts has been one of the techniques widely recommended

(Ong & Borich, 2006). In the design of essay plans, students are encouraged to make use of schematic plans to outline their arguments. Therefore, the presentation of the essay in Figure 3 is done in the form of a schematic plan.

Similar to the routine for question Dissection, students, as individuals or in groups, present the plan to the whole class, before receiving comments and questions. The inexperience of students in the discipline of economics again forms an important consideration behind teachers taking an active role in facilitating the discussion of essay plans. An example of a student version of an analysis in response to a question is in Figure 4.

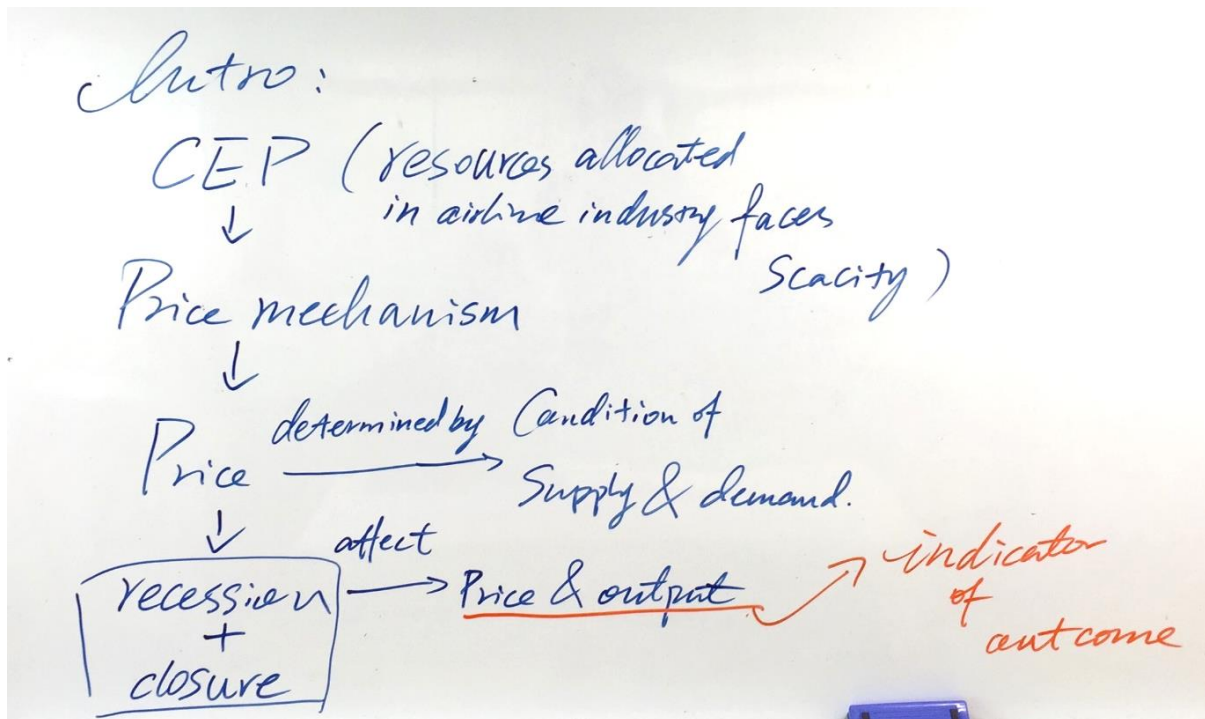


Figure 4: Answer Plan Presented by Students

In their facilitation of student discussion, teachers make use of talk moves to help students elaborate on their ideas, pay attention to one another, and explain the thinking behind their arguments. Table 2 shows the transcript of talk moves used by a teacher to help students expand on the rigour of their analysis.

Table 2

Talk Moves during Answer Design Phase to Expand Rigour of Analysis

Role	Transcript	Talk Move
Teacher (T)	Yes. Short term and long term. Sorry, Sh Carry on. Anything else apart from advertising? Or you are only doing one?	Eliciting student's views on other student's ideas
Student 1	(Discusses with teacher and class)	Teacher applied wait time
Student 1	OK. So anyone have any other points apart from advertising is not beneficial? Anyone?	Student inviting views from peers
T	Do you think there might be economies of scale? Economies of scale is a benefit because of...	Probing for reasoning
Class	Large quantity of output.	
T	Large quantity. So with increased competition, what happens?	Probing for reasoning
Student 1	Then they will expand the firm, so that, in the end, so that it is beneficial.	
T	Wait. Wait. Wait. I have a market (?). I have three firms serving the whole market, my fourth firm comes in, output total. How?	Challenge student's statement or assumption
Student 1	In the case of telecommunications, right, usually they have, if you want to pull out or cancel a subscription, you have to pay a withdrawal fee, so economies of scale may not affect them as much as they could.	
T	It might. OK, you see the thing is, it really depends on the situation, right?	Summarising the discussion

Note. T denotes teacher; C denotes response from the class; Sh denotes the student that is presenting; S denotes a student from the class that was responding to the teacher's question.

The emphasis on talk moves used in the intervention contrasted with the conventional didactic teaching adopted by many Economics teachers, where the teacher took on the "heavy lifting" of interpreting the questions and presenting the answers to the students as compared to the role reversal where students were made to take on what is usually the conventional role of the 'teacher'.

Methodology

Class and Teacher Profile

Two classes of students, taught by two separate teachers, were involved in the research featuring the teacher-led discussion of question dissection and answer design. The students involved were from the JC Year 1 Economics cohort. All students attended the same Economics lecture and the teachers were guided by the same scheme of work.

In terms of teachers' profiles, Class A was taught by a teacher (28 years old) with five years of teaching experience and Class B was taught by another teacher (30 years old) with six years of teaching experience. Both teachers are considered strong in the teaching of the discipline. Both teachers were also the form teacher for their respective classes, where they had similar opportunities to build up rapport with their classes.

Due to administrative and structural considerations, there were differences between the classes that participated in the research. Firstly, all 22 students in Class A were enrolled in the Arts Stream, taking subjects such as Geography, History, English Literature and Mathematics. All 25 students in Class B were enrolled in the Science Stream. The students took Chemistry and Physics, as well as Mathematics. Secondly, the male student percentage of Class A was 16 percent, while that of Class B was 32 percent. Thirdly, the class differed in academic achievements at the 'O' Level. Class A's mean L1R5 was 10.14, ranking 10th among the 15 H2 Economics classes in the JC. Class B's mean L1R5 was 8.3, ranking third. It should also be noted that Class B had a significantly higher proportion of international students on scholarships (44%). It had also been observed that since the beginning of the academic year, students in Class B had had higher levels of academic motivation.

Preparations for Research

The teachers and students were briefed on the conduct of the research. Term 1 of 2016 was used for the teachers to trial the method and to iron out any uncertainties regarding the use of talk moves to make thinking visible. The preparation period was also used to help students get used to lessons being filmed and recorded.

Data Collection

The academic achievements of students in the experimental groups relative to the non-experimental groups were measured by comparing the mean subject grades in their JC1 exams against the mean L1R5 from the 'O' Levels. Video recordings of Economics tutorials and transcripts of classroom talk of the experimental groups were examined.

The teachers' perspectives were elicited through interviews that reflected their professional development, identification of pedagogic practices that were easily adopted, as well as the challenges encountered with constraints formed by limited time versus the need to complete the curriculum (see Annex A for interview questions for the teachers). Students' perspectives were elicited from group interviews after the implementation of the intervention (see Annex B for questions for the students). Data from responses to the Student Engagement Survey, an annual college-wide survey conducted on randomly chosen students from each class for each subject, was used as a gauge on whether talk moves and the use of Dissect and Design increased students' motivation, and improved their attitude towards the subject or whether they perceived themselves to be more prepared for the writing of essays.

Results

Results for Mid-Year and End-of-Year Assessments

During the mid-year assessments (MYA), Class A had a mean subject grade (MSG) of 6.23, ranking 15th (last) position among the H2 Economics classes. Class B had an MSG of 5.12, ranking 5th out of 15 classes. For the End-of-Year Assessments, Class A's MSG had improved to 5.41, but it was still the last ranked (15th) class. Class B registered an MSG of 3.88, positioning them as the 2nd highest performing class (see Table 3).

Table 3

Ranking of Experimental Classes among 15 Economics Classes

	Class A	Class B
By mean L1R5	10	3
By mean subject grade at Mid-Year Assessment	15	5
By mean subject grade at End-of-Year Assessment	15	2

Student Engagement Survey Results

Besides the differences in academic achievement, the Student Engagement Survey showed significant differences in the students' interest levels towards their respective Economics tutorials. The Student Engagement Survey was conducted for randomly chosen students from each class across the whole cohort. It comprised 39 questions that captured students' self-perceived responses on their behaviour in approaching each subject they took, the level of cognitive challenge they faced in each subject, and their level of affection towards each subject. The students' responses were captured on a Likert Scale of "strongly agree", "agree", "slightly agree", "slightly disagree", "disagree", and "strongly disagree".

From the 39 questions, we chose the responses from two of them – "I find my classes interesting", and "Tutorials are effective in helping me tackle essay questions" to find out whether students in the experimental groups had a more positive experience in the Economics tutorials than the cohort average. Responses to these questions provide us with a sense of whether the use of peer feedback and discussions helped to increase the students' motivation towards the subject, as well as the perceived effectiveness in helping students meet the demands of the 'A' Level Economics curriculum. The results are summarised in Tables 4a and 4b.

Table 4a

Responses to "I find my classes interesting"

	Cohort		Class A		Class B	
	#	%	#	%	#	%
Strongly Agree	29	17.9	0	0.0	4	57.1
Agree	79	48.8	2	25.0	3	42.9
Slightly Agree	41	25.3	3	37.5	0	0.0
Slightly Disagree	6	3.7	2	25.0	0	0.0
Disagree	5	3.1	0	0.0	0	0.0
Strongly Disagree	2	1.2	1	12.5	0	0.0
Total	162	100.0%	8	100.0%	7	100.0%

Table 4b

Responses to “Tutorials are effective in helping me tackle essay questions”

	Cohort		Class A		Class B	
	#	%	#	%	#	%
Strongly Agree	22	13.6%	0	0.0%	1	14.3%
Agree	79	48.8%	5	62.5%	4	57.1%
Slightly Agree	41	25.3%	2	25.0%	1	14.3%
Slightly Disagree	6	3.7%	0	0.0%	1	14.3%
Disagree	5	3.1%	1	12.5%	0	0.0%
Strongly Disagree	2	1.2%	0	0.0%	0	0.0%
No response	7	4.3%	0	0.0%	0	0.0%
Total	162	100.0%	8	100.0%	7	100.0%

It can be seen from the summary statistics in Tables 4a and 4b that the students’ level of motivation and perceived ability in the classes in writing essays differ, although the class teachers employ a similar pedagogy. In response to the survey question of “I find my classes interesting”, 66.7% of the cohort of students “agreed” or “strongly agreed”. This percentage was lower in Class A where only 25% agreed, and no student strongly agreed. The response in Class B was much more positive as all students agreed or strongly agreed to the statement.

When asked whether tutorials were effective in helping them tackle essay questions, 65.2% of the cohort “agreed” or “strongly agreed”. In Class A, 62.5% “agreed”, with no student indicating “strongly agree”. In Class B, however, 71.4% of the students “agreed” or “strongly agreed” with the statement.

Responses from Interviews with Teachers

In their responses in post-experiment interviews, the teachers reflected that the classroom routines of teacher facilitated peer critiques of students’ question interpretation and answer design had primarily helped the teachers to be more aware of their students’ abilities to use subject-specific terms in classroom dialogues. The teachers were therefore better informed to intervene and facilitate students’ learning in a more targeted manner.

Regarding the impact on pre-lesson preparation, both teachers observed that there was a more conscious effort to prepare scaffolding materials and questions to help the weaker and quieter students craft and share their comments or questions. The teachers also had to be more conscious about including “wait time” in the lessons to encourage students to contribute their views.

The teachers reflected that, by them encouraging students to speak up and respond to one another’s questions, the students’ confidence and motivation to communicate using subject-specific terms had increased.

Unsurprisingly, both teachers found it challenging to encourage the quieter and weaker students in the class to speak up and share their comments. Due to the differences in class profiles, the teacher of Class A faced this challenge more so than the teacher of Class B. The teachers also

agreed that a fruitful classroom discourse over question interpretation and answer design is premised upon the students' having a reasonable understanding of the content matter such as economic theories and concepts as well as current affairs.

Responses from Group Interview with Students

The students' responses largely corroborated the teachers' observations. The students commented that when the lessons required them to comment on one another's responses to questions, they were encouraged to be more alert during class and the lessons became more engaging. Through the presentation of the question interpretation by peers and laying out of the answer design in the form of flow charts, the students' thinking became more "visible" as they could understand the logic of how their peers' essays were crafted. During the interview, students reflected that, through the discussion of the essay plans in the form of flow charts, the inaccuracies in economics logic that led to inaccurate answers became more apparent.

However, the students also reflected that the main challenge of the teacher leading the entire class in the discussion of one essay plan was that some students dominated the discussions. Students who were quieter by nature might be left out of the conversation and the benefits they gained from the lesson might have been more marginal. The students also admitted that to gain fully from the whole class discussion, the answers that were to be discussed in the tutorial had to be fully prepared beforehand. They also made the same observation as the teachers that students who were weak in content knowledge might not be able to benefit as much from the group discussion of the answers.

Discussion

This study affirmed the complexities behind the teaching of critical thinking and argumentative writing for H2 Economics. The use of the common methodology (i.e. teacher-led discussion of the "Dissect and Design" approach in crafting Economics essays) saw very different outcomes between two classes of very different profiles.

Video recordings and transcripts of the lessons provided meaningful insights to these outcomes. The teacher of Class B, the higher ability class, was able to use talk moves to encourage students to challenge the views of one another and to build on one another's arguments. On the other hand, the teacher of Class A, the lower ability class, had less success going beyond encouraging her students to elaborate on the application of economic theories in the scenarios in the questions. The talk moves utilised in Class A mainly consisted of moves that probed for elaboration rather than moves that elicited higher order skills such as "challenging assumptions".

The observations that weaker and/or less motivated students might be left out of the whole class discussions led to further deliberations about the techniques that could increase their engagement levels in the classes. One of the ideas raised was to provide students with checklists and a comments template to help the weaker and quieter generate their discussion points. Another suggestion was for teachers to provide more intervention and scaffolding for classes that were populated by students who were less motivated or who were less able to independently craft responses to tutorial questions. Tutors might have to set work that requires more basic skills rather than higher order skills to make the tasks more manageable for these students. By doing so, students might have a fuller set of answers in relation to the task for discussion in the tutorials. For students who were less motivated, tutors had to be stricter in enforcing structures and rules to ensure that the students wrote comprehensive answers to aid discussion in class. Last but not least, discussions could take place in a "written" form rather than a "verbal" form to encourage students who were shy to offer their views and responses. The degree to which such techniques might be

successful in bringing about a classroom culture that supported productive discussion of question interpretations and answer design remained to be seen in further studies.

Nonetheless, feedback from both teachers and students who were in the research group acknowledged that the facilitation of Dissect and Design using talk moves helped to make the students' thinking more visible, which resulted in clearer understanding about the strengths and weaknesses of different responses to Economics essay questions for the teachers. Building on that observation, the teachers who participated in the research commented that continuous professional training and sharing was needed to maintain consistency among teachers in their proficiencies in the use of talk moves to facilitate class discussions on the Dissect and Design of Economics essays.

Conclusion

From this research, it is clear that with the use in tandem of the Dissect and Design approach with talk moves, academically strong and motivated students go on to achieve beyond the cohort average. However, there are concerns that the academically average and less motivated students might not adequately leverage such structures, despite them knowing the benefits of such methods. Building on these observations, more effort has to be put into levelling up teachers' skills in customising academic discussions and scaffolding for students of varying academic strengths so that more students can benefit from classroom discourse on question interpretations and answer designs.

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Annex A: Teacher Post-project Interview

1. What are your personal take-aways from this study?

(Think of any aspect that you took away from the study, how did you personally benefit? You can also talk about problems that you encountered in understanding/using the implement (classroom discourse with the Dissect and Design framework))
2. How did this study develop your awareness of language-specific issues in teaching Economics?
3. How did this study affect the way you now design your task sheets, learning resources for use in class?
4. What did this study make you aware of in relation to the classroom discourse and interaction in class? Think of your questioning of and responses to your students etc.
5. What are specific changes to how you now plan for classroom discourse in your class?
6. What are specific changes to how you now interact with students in the classroom?
7. How did the implementation affect your students' learning? How did they benefit from it?
8. What do you think your students still need more help with?
9. What improvements do you think are needed for the implementation?

Annex B: Student Perspectives

1. Do you feel that your class has more discussion during Economics lessons in the past few months? Why?
2. Do you think that the discussion in the classroom has helped you study Economics better? In what other ways have you benefitted?
3. In what ways do you think discussion in the classroom has made it difficult for you to study Economics?
4. What do you think you are able to do better now when answering Economics questions?
5. How have you improved in your written answers?
6. What more would you like your teacher to help you with?