



Fulbright Distinguished Awards in Teaching Program for International Teachers (FDAI)

**The Metacognitive Teacher-Learner:
Questioning as Thinking**

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Biography and Executive Summary

Biography

Faith Ong has been an educator for more than 15 years and has taught English as a first language and foreign language in Singapore and Japan respectively. She has a B.A. in English Literature from the National University of Singapore and a M.A. in Effective Learning and Teaching from University College London.

As a teacher-researcher, Faith has published a book chapter in *Teaching Literature in Singapore Secondary Schools* for Pearson Education South East Asia in 2013 and an article for the English Language Institute of Singapore (ELIS) in 2016. She also recently published “Teaching Shakespeare- Star Crossed Profiles: Romeo and Juliet in a Singapore Classroom” in *English Journal* by the National Council for Teachers of English (NCTE) in 2021. She believes that to foster a community of ‘intellectual life’ for her students, thinking should be valued and actively promoted in all classrooms where technology is harnessed to develop student agency and amplify students’ voices. As a Lead Teacher, she is also committed to ongoing professional development for teachers of all experience levels. She is also an advocate of mentoring and believes that a strong mentoring culture in schools is fundamental to create a valuable teaching force that will in turn create classrooms where every child can flourish and is valued for their unique talents and strengths.

Executive Summary

Teaching with metacognition is essential to develop a self-directed learner who is ready for the 21st century. As teachers, we must provide our students with opportunities to become more self-aware of their own cognition and help our students to develop the competency to monitor their own progress and thinking. In fact, research (Tomlinson & McTighe, 2006) states that metacognitive students are effective learners. As Singapore’s Education Minister Chan Chun Sing outlined in his recent Work Plan Seminar speech on

September 20, 2023, Singapore will refresh our 21st century competencies (21CC) framework and foreground adaptive and inventive thinking.

In this project, the research focus will be on:

- How can teachers become more aware of promoting metacognition in the classroom?
- How can teachers make use of technology (e.g. AI) to support the provision of metacognitive self-regulated feedback?

This project aims to create a professional development workshop to guide teachers in Singapore on how they can be more metacognitive about their pedagogical practices and use metacognitive questions to promote active learning in the classroom. Such an approach ensures teachers are first given the chance to be more reflective and then opportunities are provided for teachers to become more reflective about how they help students think and discuss and therefore adjust and revise their own knowledge and deepen their learning. The outcomes of this project include a teachers' self-rating survey, questions that teachers can use in the classroom and a ChatGPT prompt sheet that leverages on artificial intelligence that teachers can use to provide self-regulatory feedback to promote students' metacognition.

Chapter 1

Introduction

Metacognition includes both knowledge of one's knowledge, processes, cognitive and affective states, and the ability to consciously and deliberately monitor and regulate one's knowledge, process, and cognitive and affective states. (Hacker et al., 1998, p. 11)

What makes metacognition important and what can be done to ensure that teachers are equipped to create metacognitive learning moments in their classroom and the feedback they provide for their students? Prompted by these questions, my study focuses on equipping the Singaporean teacher to become a more metacognitive teacher-learner.

In this project, I will focus on how teachers can become more metacognitive teacher-learners through the introduction of a self-rating survey that would help teachers be more self-aware of how they plan and teach and the use of proposed metacognitive questions that teachers can use in the classroom with the opportunity to leverage on artificial intelligence to enhance the self-regulatory feedback they can give to students to promote metacognition. This is supported by research that shows how teacher feedback can influence the choice of a student's strategy towards learning (Bylieva et al., 2021).

Overview

Metacognition... is a key to deepening language learning through enabling successful self-directed learning... we need to engender a culture of learning that supports curiosity in the English Language classroom. Students' curiosity about the language and its use gives them the reason for developing metacognition. (Leong, 2021, 3:36)

The recent developments in Singapore's Ministry of Education (MOE) English Language Syllabus (ELS) 2020 and the rapid developments of artificial intelligence in education have made it even more important for students of the twenty first century to be both conscious of their own cognitive process and their metacognition (where students become aware of their own thinking). Metacognition is often seen through the use of two aspects: (a) awareness of the process they need to complete a task and (b) their cognitive monitoring – the ability to determine if the task is completed accurately and to make revisions where appropriate (Baker & Brown, 1984). Furthermore, Kolencik and Hillwig (2011) also sees metacognition as the following:

- Thinking about thinking
- Learning how to learn
- Knowing how to learn
- Controlling one's own learning
- Regulating one's own learning through planning, monitoring and evaluating and reflecting on one's learning
- Self-awareness of knowledge construction
- Knowing what to do, when to do it, how to do it and what to take into consideration

Based on Kolencik and Hillwig's (2011) metacognition definitions, metacognition should play a central role in teacher education (Noushad, 2008). In the busyness of teaching life, teachers should be given more opportunities to be self-reflexive about lessons they plan, teach and to provide them a means for them to seamlessly integrate the use of metacognitive questions and leverage on the possibilities of artificial intelligence to provide more self-regulatory feedback for our students. Thus, metacognitive skills are crucial skills that

teachers should develop both in themselves and their students so that they can foster and develop learners who are adaptive thinkers and possess the inventive thinking that are crucial for the 21st century (Ministry of Education, 2023).

This is supported through Marzano's (1998) research where metacognitive talk is one of the powerful vehicles to improve student learning and he also shares teachers are often reluctant to use thinking terms for fear that students would not understand. Furthermore, Yildiz and Akdag (2017), show that knowledge of metacognitive strategies increased teachers' teacher-self efficacy beliefs about student engagement and instructional strategies. This is especially when research has shown when students who possess metacognitive knowledge and strategies during the process of learning English often experience academic improvement and self-efficacy (Zhang & Zhang, 2019). It is hoped that these strategies will help teachers of all profiles become more self-reflexive and promote the spirit of constant thinking and inquiry so students will become more self-directed learners who are capable of metacognitive thinking.

Uplifting Teachers' Pedagogical Practices: The Singapore Teaching Practice (STP)

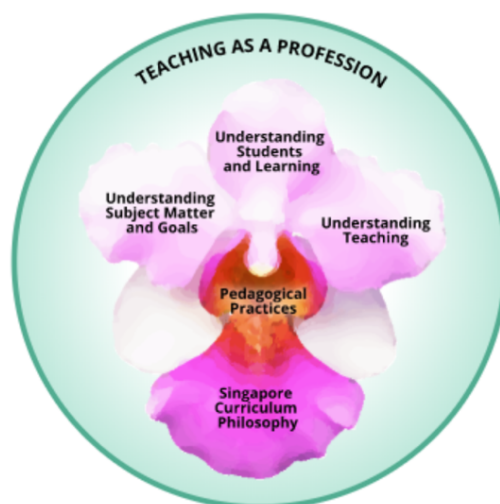
It will be the reference point for us to examine our own professional practice, think deeply about it and improve it, in all the different aspects of the work that we do....We will look at the actions we undertake in the classroom, the moves that we make, and the instructional approach that we deploy in our classroom to help our students become better learners. (Wong, 2017)

Since 1997, Singapore through its Thinking Schools Learning Nation (TSLN) vision has emphasised on the development of 21st century competencies (21CC) and engaged learning in students. One key strategy to achieve this vision of quality teaching and learning

in every classroom is by uplifting and improving teachers' pedagogy in the classroom. The Singapore Teaching Practice (STP) (Fig.1) makes explicit how effective teaching and learning is achieved in Singapore and articulates the pedagogical practices that lead to engaged learning in the classroom. What makes the STP distinctive is how the different components work together to guide effective learning and teaching in Singapore schools.

Figure 1

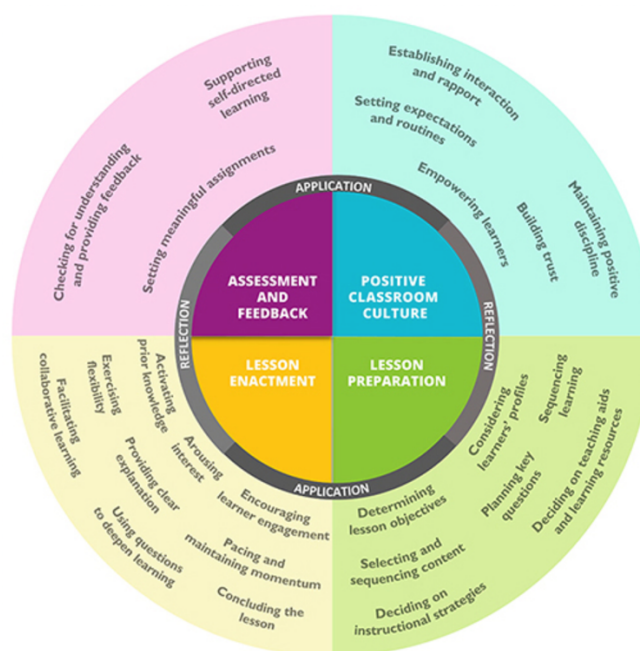
Singapore Teaching Practice (STP) (Ministry of Education, 2017)



The pedagogical practices located at the centre of the STP are the Pedagogical Practices (PP) which encapsulates the professional practices and experiences of Singaporean educators. At the heart of good teaching, the PP (Fig. 2) comprises of four fundamental teaching processes: Positive classroom culture, lesson preparation, lesson enactment and assessment and feedback. As educators, we are invited to apply and reflect on the four teaching processes and look into the some of the corresponding teaching areas. The STP also provides a common framework for teachers to plan, enact and reflect on their teaching and learning practices. In essence, the STP helps teachers become more reflective and competent practitioners who are able to effectively develop their students' 21CC.

Figure 2

Pedagogical Practices (PP) of the STP (Ministry of Education, 2017)



Context and Rationale

As someone who plans and drives the professional development of teachers back home in my school, there were opportunities to engage in classroom observations, mentoring conversations with critical school partners like School Leaders, Heads of Department (HODs), and Subject Heads (SHs) to talk about how we can better develop teachers of different profiles. One common refrain among educators was the lack of time for them to sit down and reflect more intentionally about their lesson planning and instruction on a regular basis; HODs and SHs often also struggle to have more meaningful pre-lesson observation conferences with the teachers under their charge.

In Singapore, English is used as the main medium of instruction in Singapore classrooms. The ELS 2020 for secondary schools' places emphasis on the students' ability to use language effectively and affectively. Furthermore, with the fast-changing language

teaching-learning landscape in Singapore, teachers need to pay attention to how exploratory talk, multiliteracies and metacognitive strategies help students achieve the 21st century competencies across all areas of language learning (Ministry of Education, 2019).

Emphasis is placed on students speaking and monitoring their speech responsibly, bearing in mind the potential impact of what they say on listeners and to be able to inquire into the intention of speakers and messages received, and communicate with confidence and persuasion. With the integration of receptive and productive language skills, the use of print and non-print sources and the way information, media and visual literacy skills are incorporated, they help students to achieve the language learner outcomes of being empathetic communicators, creative inquirers and discerning readers.

What this raises for educators is how they can be more well-equipped to develop their students' metacognitive abilities while at the same nurturing our own ability to be metacognitive about the planning and instruction of our own lessons? Furthermore, to “provide students with the opportunities to develop metacognition, teachers may need to revisit their beliefs and practices as teachers of English language” (Leong, 2021, 3:58). In research, this calls on teachers to shift from “what” and “how” questions to “why” questions and this transition for teachers to move from “what I found out about that” to “what I have learned about that in relation to myself and my practice” is one that occurs within a social space (Wall & Hall, 2016). Eventually, using the students' own questions (Leong, 2021, 4:34) will also provide students with the opportunities to develop metacognition.

Chapter 2

Developing Metacognitive Competencies

Flavell (1979) coined the term “metacognition” as a cognitive process that was aimed at achieving an intended goal or outcome through conscious self-monitoring. Metacognition requires learners to be consciously aware of themselves as they problem-solve and accurately determine their own level of learning where they are aware of what they know and what they do not know (McGuire, 2015; as cited in Voorhees et al., 2022). This is further reinforced as student success includes self-regulated learning. As such metacognitive self-regulated learners are described as, “these learners monitor their behaviour in terms of their goals and self-reflect on their increasing effectiveness. This enhances their self-satisfaction and motivation to continue to improve their methods of learning” (Zimmerman, 2002, p. 66). Yet, research points to a disconnect between the instructional models that make students metacognitive and the instruction in classroom. Thus, this causes teachers to wonder if they have a strong pedagogical understanding of metacognition.

Teachers’ Pedagogical Understanding of Metacognition

Voorhees et al.’s (2022) work reveals students need models of strategies, guided practice, and independent practice with the strategies that teachers implement in the classroom. Providing students with a suitable learning environment where students are able to reflect on their thinking process is a form of explicit application for students to reflect on their thinking and the appropriateness of the strategy they have applied. Teachers’ understanding of what is required for teaching and learning has a strong impact on their practice (Voorhees et al., 2022) and thus, metacognition is not just only a skill to be taught but a disposition of what it means to think and learn (Wilson & Bai, 2010). Thus, in my research, I analysed various instruments (Balcikanli, 2011; Wilson & Bai, 2010). By using the PP of the STP (Ministry of Education, 2017) as a framework, I created a Teacher

Metacognition self-rating tool which is designed to assess the participant's perception of their knowledge of metacognition, their pedagogical knowledge of metacognition, and the instructional strategies the teacher uses.

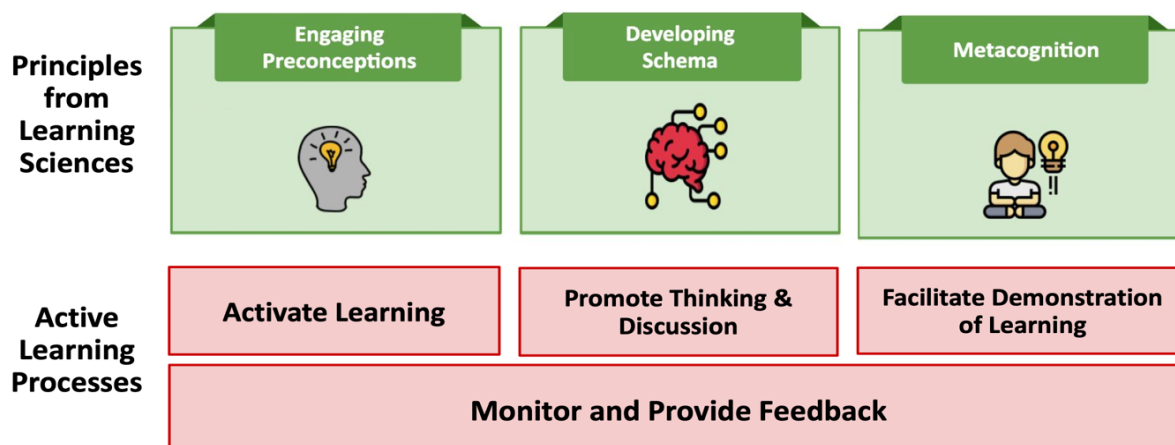
Proposed Teachers' Metacognitive Self-Perception Reflective Tool

The intention of the metacognitive self-perception reflective tool is intended to provide a way for the development of metacognitive self-knowledge and a means for discovering what aspects teachers perceive as influential in their own development as teacher-learners. The instrument was thus designed to heighten the participants' beliefs and metacognitive awareness regarding their pedagogical practices in the classroom. This study aims to build and modify the existing metacognitive inventory for teachers (Balcikanli, 2011) for use in Singapore. It is believed that when teachers become more aware of their own teaching, it could act as a starting point for change in their own professional learning journey. The survey is aimed to help teachers realise their own metacognitive levels of teaching. The inventory was constructed based on the principles of the PP in STP (Ministry of Education, 2017) and the way we design for active learning (Fig. 3) based on the different learning interactions such as student-content, student-student, teacher-student and student-community.

Figure 3

Active Learning Processes and Learning Interactions (Ministry of Education, 2021)

Active Learning Processes and Learning Interactions



In conversations with teachers, many highlighted they would appreciate if the reflection tool could also focus on specific instructional approaches where they could consider using to promote metacognition as part of the lesson planning stage. Consequently, after the instrument was constructed, I sought content validity through conversations with teachers of varying years of teaching experiences (ranging from 5 to 25 years in service). Teachers expressed the tool was useful for lesson planning as it made them more aware of certain pedagogical actions and decisions they make in the classroom. They also highlighted the need for more concrete examples of how metacognitive questions can be used in class during the different active learning processes which I will touch more on in Chapter 2. These conversations prompted me to modify my original list further, and I tried to align the reflective questions vis-à-vis the lesson observation and development checklist used in my school. Upon modification, I also had further conversations with teachers who have mentoring or supervisory responsibilities such as HODs or SHs who felt this instrument could potentially be useful for coaching and mentoring conversations prior to lesson observations or developmental conversations with their teachers. The value of this professional development (PD) tool lies in the teachers' ability to use the rubric to facilitate their own planning, monitoring evaluation. With the self-assessment survey, it enhances learner awareness which has a positive correlation with self-efficacy. This is in line with Huang's (2022) work where rubrics are able to enhance teachers' self-regulation skills in educational contexts and empowers the teachers to be accountable for their own performance. The details of the tool are found in Appendix A. This survey thus functions as a means for teachers to critically reflect on their pedagogical practices and ensure that there is follow-up by making adjustments for example on the way instructional strategies are planned for. This helps teachers continually build on their knowledge bases, look for collaborative opportunities with colleagues, and even seek coaching or mentoring help from expert

teachers. Students are at the centre of what teachers do and thus connecting students' learning needs to the teachers' ability to address those needs is one way to invite more active participation, and, therefore, have a positive impact on their self-regulation (Hughes & Partida, 2020) and teachers' self-initiated change orientation.

Using Questioning to Promote Metacognition

Thinking is driven by questions and not answers. Questioning skills are therefore essential to stimulate students' critical thinking skills and deepen their understanding. In fact, one of the cornerstones to effective teaching is the skill of questioning (Rahmatih et al., 2021). More notably, the use of quality questioning is an effective pedagogical practice that helps student reap benefits when it comes to developing metacognition (Kolencik & Hillwig, 2011; Walsh & Sattes, 2011). In order for that to happen in classrooms, teachers must first believe in the potential of using questioning as a one of the strategies to promote metacognition and eventually provide opportunities for students to become self-directed and eventually own these metacognitive questions for themselves (Khezrlou, 2012, Hughes & Partida, 2020). Furthermore, as Roelle et al. (2017) highlight, skilled teachers would use both cognitive and metacognitive learning processes and questions to "set the stage for each other" (p. 1). More importantly, the use of these metacognitive questions alone will not be sufficient to develop learner capacity, teachers must also foster a classroom climate that holds students accountable, provide opportunities for students to learn collaboratively and also role model the skills required for effective collaborative discussion (Walsh & Sattes, 2011).

Teachers often struggle with the use of metacognitive questions as most questions posed in the classroom tend to be only at the level of cognition (Rahmatih et al., 2021). To build metacognition, teachers will have to consciously limit the use of using only review and procedural questions and deliberately use strategies like Think-Pair-Share to allow students to collaboratively share their thinking and build shared knowledge. In addition, asking questions

in class which promote clarifying, probing and allowing students to adjust and self-assess their learning while practising Wait Time 1 and Wait Time 2 allows teachers to role model the way questioning can be used to build students' metacognition and also simultaneously, teach skills of collaborative discussion and communication (Ritchhart & Church, 2020).

When teachers consciously use metacognitive questions and invite students to pose questions that will invite them to move towards more complex thinking, students are able to plan, monitor, adjust, evaluate, reflect on and revise their practices in the different areas of language learning such as listening, speaking, reading, writing, grammar and vocabulary. To dispel the myth that metacognition is not for weaker learners, prompts, scaffolds and cues can help to reduce the processing demands on less-skilled learners (Tay et al., 2020).

Teachers, therefore, have to first model the pedagogies that support productive talk about learning; and...the metacognitive processes (Wall & Hall, 2016) that help students become more metacognitive. This is also reiterated in Walsh & Sattes (2011) where research shows enhancing student motivation enables students to develop an attitude of self-efficacy and "response-ability for their learning" (p. 130). So, when educators use metacognitive questions, it will deepen learning and thereby develop more metacognitive learners. Some teachers will naturally worry and may not feel necessarily equipped to know what sort of questions to ask in order to promote metacognition. To address potential anxieties, I created a list of questions that are based on the active learning processes to address the concerns that some teachers face in using metacognitive questions in the classroom. These include differentiating between cognitive questions which may invite students to interact with the material through mental manipulation (such as making mental images or relating new information to previously acquired concepts or skills) or physically (such as writing summaries) versus metacognitive questions that invite students to be part of the processes in

planning for learning, monitoring their understanding and evaluating how well they have learnt a learning objective. The details of the proposed question list are found in Appendix B.

The proposed list of questions focuses primarily on teacher-student interactions and invite students' to build their metacognition. As teachers become more confident in using questions in class, students' confidence will grow too. Eventually, students will be able to own their own questions and be able to visualise and make decisions about questions they wish to ask and adapt the question to fit the nature of the task, skills they are learning or emotions that they face at hands. These questions eventually also invite students to self-assess, evaluate their own strengths and weaknesses, and make adjustments to their learning, developing more self-directed learners.

Chapter 3

Leveraging Technology to Support Provision Of Self-Regulated Feedback

Bandura's social-cognitive theory (2001) suggests that human experiences, thoughts and actions are determined by personal, environmental and behavioural factors and reciprocal actions. In application, student achievement therefore is shaped by students' self-regulated learning (SRL), teachers' pedagogical practices and also the relationships that parents share with teachers and their child. In SRL, we look at how cognitive and metacognitive strategies are used by students to help them with task processing and eventually engagement with academic tasks. It is thus no wonder that a student's SRL is often seen as a crucial precursor for academic achievement (Katsantonis & McLellan, 2023). Teachers' provision of effective feedback is also a powerful tool that can be used to enhance classroom teaching, student learning and development. In their work on the four levels of feedback, Hattie and Timperley (2007) share on the interactive power of feedback when teachers provide feedback at the process and task level to improvement in task confidence, self-efficacy, and deep learning.

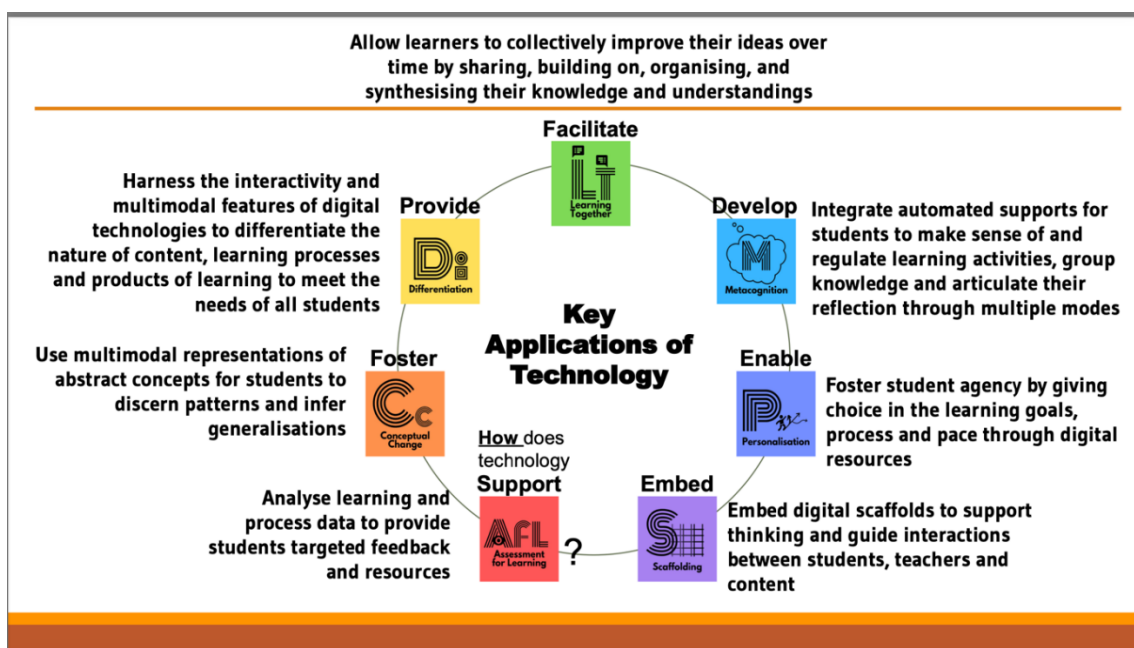
Hattie (2012) also saw task level feedback as more suitable for beginning learners while process and self-regulatory feedback is more suitable for proficient learners. Finch (2021) also suggests that the use of self-regulatory feedback could possibly "reflect teachers' assumptions about students' levels of expertise" (p. 55). Furthermore, to support this study on metacognition, Oinas et al. (2020) also highlighted that metacognition is intricately linked to the feedback as a process and that "technology enhanced feedback should support (students') own active reflection of the learning process" (p. 1039). Self-regulated learners are able to set learning goals and they can reflect, control and adapt their levels of knowledge (Zimmermann, 2002). As such, we can see the importance of self-regulated feedback to develop students' metacognition and also consequently develop 21st century skills like

adaptive thinking also social-emotional competencies such as self-awareness and responsible decision making.

In Singapore, with the launch of the SLS Pedagogical Scaffold (PS), one of the questions asked is, “How does technology mediate interactions and support the learning process?” In Singapore, we have identified seven Key Applications of Technology (KAT) (Ministry of Education, 2021) where technology can be best leveraged to support our pedagogical actions (see Fig 4). In developing metacognition, teachers must also recognise that technology as an important enabler to provide support for weaker learners through optional scaffolds or prompts. It is also an effective medium for students to make their thinking visible and easily revise or adjust their learning as they deepen their knowledge of a topic or skill. More importantly, the use of technology also allows students to creatively express their reflection through different modes and digitally capture student voices and class learning.

Figure 4

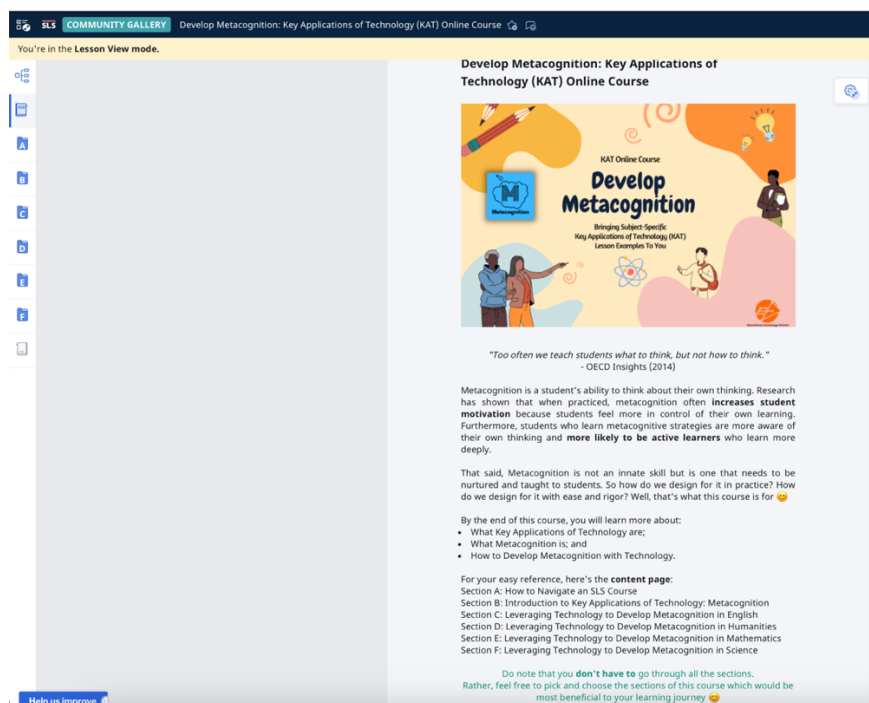
Key Applications of Technology within the SLS PS (Ministry of Education, 2021)



In order to equip educators in Singapore, the Ministry of Education (MOE) has also created an online learning module (see Fig. 5) for teachers to learn how technology can be leveraged to promote metacognition in classroom teaching and learning. There are also recommended lesson plans that allow educators to examine the affordances of using technology to develop metacognition.

Figure 5

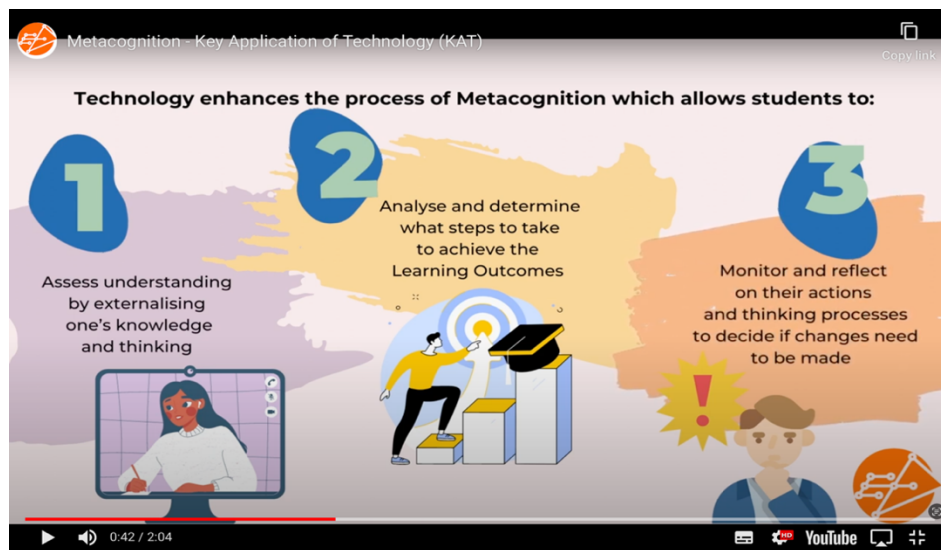
Online Course for Singaporean Educators on Singapore Learning Space (SLS) (Ministry of Education, 2021)



In this online course, they also focus on the three key areas that teachers need to take note of when they plan and create lessons that aim to develop their students' metacognition (See Fig 6).

Figure 6

The role of technology in enhancing metacognition (Ministry of Education, 2021)



Singapore's Approach to Blended Learning in Secondary Schools

In 2020, due to the COVID-19 pandemic, Singapore implemented full home-based learning (HBL) during the country's circuit breaker period. In 2021, MOE shared that it was important for Singapore to continue to build on the technology progress and gains made during the full HBL and thus saw it fitting to make blended learning (BL) a distinctive feature of the schooling experience. This is especially crucial as in this digital age, it is essential for students to be equipped with the “necessary knowledge, skills and dispositions to thrive in an interconnected, diverse and rapidly-changing world” (Ministry of Education, 2020). As part of BL implementation, schools will have scheduled HBL days to complement the schooling experience.

With BL, students are given more opportunities to “review past lessons, and ask all the questions they want...[and] chart their own learning journey, at their own pace [where]...there can be online discussions with classmates and teachers, to review and share what they have learned outside of the curriculum” (Ong, 2020). As BL becomes the new normal in Singapore's secondary schools, educators are given additional opportunities to support student learning especially with the Singapore Student Learning Space (SLS), a national learning management system for students and teachers. This is especially pertinent

as “learning analytics (LA) tools allow for the collection and analysis of student data to explore students’ learning processes” (Pardo et al., 2019 cited in Sauchelli, 2023, p. 2). This allows teachers in Singapore the ability to provide feedback in a more effective and efficient manner. However, Education Minister Chan (2023) asked

How do we use technology to create new teaching methods? What are new insights to how we can be more effective in the way we teach to ensure that our students learn? That is our next lap of challenge. The highest value-add for us is to have a breakthrough in the way we teach different students according to their needs, interests and abilities. (Chan, 2023)

Echoing Chan’s words, it becomes all the more crucial that we use the benefits of technology to help us provide more customised differentiated feedback for our students and leverage the efficacy of technology to enhance student engagement, make learning more personalised so that the unique learning needs of each child is met as teacher feedback is pitched appropriately to suit their learning abilities.

Using self-regulated feedback (SRF) can be a powerful tool used by teachers to deepen student learning. Vottoy and Smith’s work (2019) underscores how self-efficacy beliefs of both students and teachers have a part to play in the classroom where students’ self-efficacy beliefs enable them to regulate their own learning and shape their motivation and achievement; whereas teachers’ beliefs in the students’ efficacy shape how they create and facilitate learning environments that motivate and stimulate students’ learning processes. The teacher’s pedagogical abilities remain essential as responsive pedagogy which consists of “recursive dialogue between the learner’s internal feedback and external feedback provided by significant others” (Smith et al., 2016, p. 9) has been shown to help deepen metacognition as teacher feedback promotes self-regulated learning and leveraging the affordances of technologies in fact help students to make these strategy adjustments may occur more

efficiently (Sauchelli et al., 2023). With technological affordances such as the SLS in Singapore, teachers can respond effectively and efficiently to individual students or groups of students, and the interactive nature of the platform allows teachers to create many “metacognitive learning moments” as students revise and adjust their individual and collaborative knowledge.

Using ChatGPT to Support SRF in Education

Effective writing instruction often involves teachers providing frequent individualised feedback on multiple drafts for each student. As such, process writing is often highly time-consuming, and the benefits of process writing may also be hindered by the lack of timely feedback given by teachers. Thus, it would be worthwhile to examine if the invention of generative artificial intelligence (AI) technologies such as ChatGPT can be harnessed to provide students with feedback on their writing and if the quality is indeed comparable to more traditional forms of feedback. Echoing Chang et al.’s (2023) work, navigating this brave new world requires educators to boldly venture into the unknown so they might capitalise on the affordances of AI and establish clear pedagogical principles for its use.

ChatGPT’s “back-and-forth conversation” (Kohnke et al., 2023) design with users allows it to create human-like conversation and opens up exciting possibilities for language learning. Furthermore, Jeon and Lee (2023) outlined that ChatGPT had four main roles: interlocuter, content provider, teaching assistant and evaluator. The three roles of the teacher include orchestrating different resources with quality pedagogical decision, making students active investigators, and raising AI ethical awareness. This is especially true for students who still need teacher regulation and additional practice to acquire the metacognitive skills (Afzaal et al., 2023). For the purposes of this research, I will only focus on the use of ChatGPT by educators first to provide timelier SRF to students’ work. As such, the prompt sheet proposed is meant for educators to use to enhance and modify the metacognitive

questions generated by ChatGPT and use their own pedagogical knowledge and wisdom in selecting materials that are pitched accordingly based on student learning needs and readiness. Teachers are able to select and modify from the proposed list of questions proposed by ChatGPT and use them based on their instructional contexts and background. This reinforces that it is not simply the AI tool itself facilitating learning but rather “the teachers’ pedagogical expertise was strengthened by the AI-generated data” (Jeon & Lee, 2023, p. 3).

Proposed ChatGPT Prompt Sheet for Teachers to Promote SRF

When teachers make use of metacognitive questions to allow students to self-assess, reflect, and make adjustments of their own learning, students are given the opportunities to grow in their own awareness of their strengths and areas for improvements. Thus they can modify and set new goals for themselves or adjust the strategies that they use in their learning. This aligns with Zimmerman’s (2002) SRL model of self-control. Chat GPT supports teachers by simulating authentic interactions. ChatGPT’s conversation-like responsiveness allows teachers to interact with it to provide clarifications and additional details if needed. Thus, the teacher can use ChatGPT to generate metacognitive questions that can be given as self-regulatory feedback on a students’ work.

In order to generate a prompt template, it is crucial to first outline the key task, instructions, context and settings or parameters so that we are able to yield the best results from generative AI applications such as ChatGPT (Ramlochan, 2023). Furthermore, when I tested ChatGPT, I tried to be as clear and concise as I could so that my request could direct ChatGPT towards the most optimal outcome. One difficulty that I encountered when creating the prompt template was selecting linguistic terms to use in it so that an appropriate response could be generated. This is because ChatGPT and other generative AI applications work “based on large language models...trained using a process that primarily relies on

unsupervised learning...data consist(ing) of...websites, articles, books, and other forms of written content” (Ferrara, 2023, p. 39). I had to work with ChatGPT to counter the cultural and linguistic bias that occurred when I blindly used terms peculiar to Singapore. Thus, I had to rephrase certain sentences and at the same time keep them as succinct as possible so that it would not ‘overwhelm’ ChatGPT.

Building on Ramlochan’s (2023) article as well as discussion with a fellow educator, I was able to create a prompt recipe which focused on the use of instructions, context and settings or parameters. One of the key indicators is deciding on the indicators and type of feedback that ChatGPT will be asked to generate. Effective feedback prioritises essential features and is kept manageable, in terms of quantity and student’s writing ability in subsequent drafts (Hattie & Timperley, 2007). It is important to note that AI is dynamic and thus the process and prompt sheet proposed is not fixed but a “living methodology” (Ramlochan, 2023). As such, this recipe is definitely open to further refinement and improvement as ChatGPT 3.5 evolves over time. The prompt template found in Appendix C.

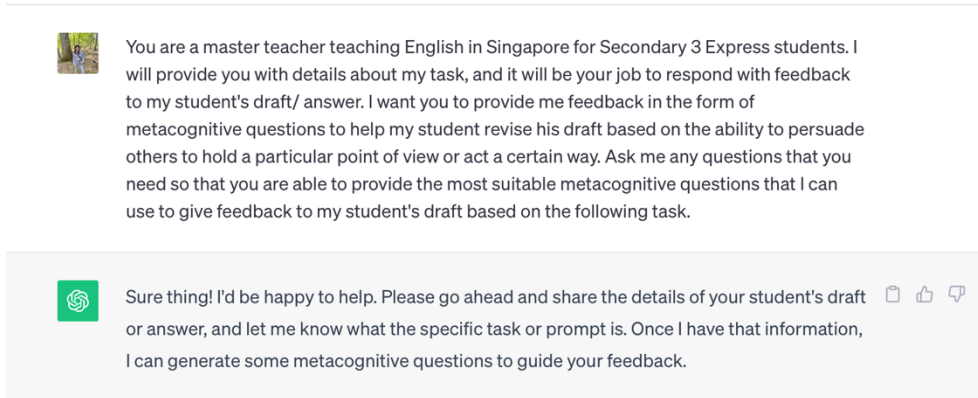
Application of the Prompt Sheet in a Secondary English Classroom


Teachers can make use of the first part of the prompt sheet to set the context for ChatGPT as indicated in Figure 7.


Figure 7

Use of Part 1 of Prompt Sheet

Default (GPT-3.5)



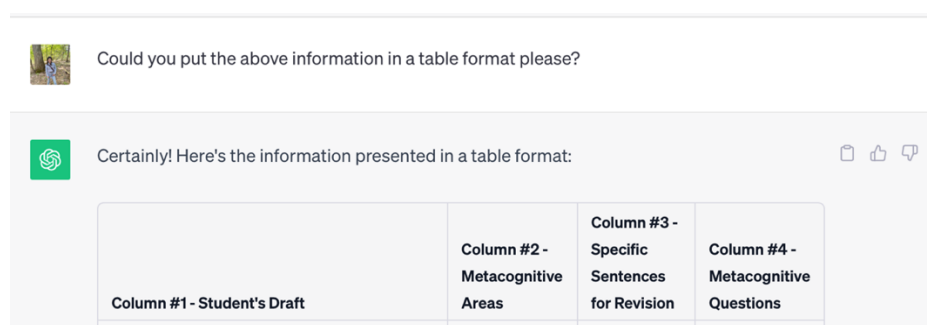
 You are a master teacher teaching English in Singapore for Secondary 3 Express students. I will provide you with details about my task, and it will be your job to respond with feedback to my student's draft/ answer. I want you to provide me feedback in the form of metacognitive questions to help my student revise his draft based on the ability to persuade others to hold a particular point of view or act a certain way. Ask me any questions that you need so that you are able to provide the most suitable metacognitive questions that I can use to give feedback to my student's draft based on the following task.


 Sure thing! I'd be happy to help. Please go ahead and share the details of your student's draft or answer, and let me know what the specific task or prompt is. Once I have that information, I can generate some metacognitive questions to guide your feedback.


Subsequently, I used the second part of the prompt sheet together with an extract from a student's work back in Singapore. At times, ChatGPT may not be able process the large body of text and may ignore certain set instructions. In such instances, the teacher has to 'remind' ChatGPT and restate the instruction(s) it might have missed out. In this instance, ChatGPT will 'remember' and it will be able to re-present the responses for example as seen below in Fig 8.

Figure 8

Interaction with ChatGPT



 Could you put the above information in a table format please?

 Certainly! Here's the information presented in a table format:

Column #1 - Student's Draft	Column #2 - Metacognitive Areas	Column #3 - Specific Sentences for Revision	Column #4 - Metacognitive Questions

As seen below, it shows the proposed metacognitive questions that teachers could use as a baseline indicator to provide students with feedback based on their submitted draft paragraphs.

Figure 9

ChatGPT's Responses

Column #1 (Student's Draft)	Column #2 (Specific Sentences for Revision)	Column #3 (Metacognitive Questions)	Column #4 (Explanation)
<p>Though there are still affairs which affect the elderly adversely, the Singaporean government is also inclining towards what can be done in the long run which aids in the years or even decades to come. One example based on my observations from google maps is the amount of nursing homes are evenly spread across Singapore, though this may lead you into thinking that the nursing homes are evenly spread for all the elderly. What about those elderly living in certain areas with a nursing home within a 1km radius but they have mobility issues such as Parkinson's disease (PD), it would be a huge trouble to travel. So let's think about how. What should be enforced, and why is it important!</p>	<p>Sentence: "One example based on my observations from google maps is the amount of nursing homes are evenly spread across Singapore."</p>	<p>Metacognitive Question: "How does using Google Maps contribute to the persuasiveness of your argument? Are there other sources of evidence that could strengthen this point?"</p>	<p>Explanation: This question prompts the student to reflect on the effectiveness of their evidence and encourages them to consider alternative sources, promoting critical thinking.</p>
	<p>Sentence: "though this may lead you into thinking that the nursing homes are evenly spread for all the elderly."</p>	<p>Metacognitive Question: "What assumptions might readers make based on this statement, and how can you clarify or provide additional context to strengthen your argument?"</p>	<p>Explanation: This question encourages the student to anticipate and address potential misunderstandings, fostering adaptive thinking.</p>

	<p>Sentence: "What about those elderly living in certain areas with a nursing home within a 1km radius but they have mobility issues such as Parkinson's disease (PD), it would be a huge trouble to travel."</p>	<p>Metacognitive Question: "How does highlighting specific challenges faced by elderly individuals strengthen your argument, and can you provide more details or examples to make it more compelling?"</p>	<p>Explanation: This question guides the student to delve deeper into their point, promoting inventive thinking by encouraging them to provide richer details or examples.</p>
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Based on the responses generated by ChatGPT, teachers must have the specific AI digital competencies in order to use ChatGPT in an ethical and pedagogically beneficial manner. This includes learning how to interact with ChatGPT to facilitate tasks that will work on its affordances to generate metacognitive questions as seen above and to be wary of the bias and possible inaccuracies in the responses given by ChatGPT for example when ChatGPT “hallucinates” and presents factually inaccurate information in an attempt to please the user. It requires teachers to be pedagogically sound and metacognitive teachers themselves in order to be able to select, modify and adjust the proposed feedback before they use it to respond to students’ work. One such instance would be to prompt ChatGPT with more specific instructions that might suit your student’s learning profile or even to simplify the language as in Figure 10.

Figure 10

Further Prompts between Teacher and ChatGPT



Could you refine some of the questions to suit the language proficiency of a 15 year old student in Singapore?



Absolutely! Let's make the questions more suitable for a 15-year-old student in Singapore:



In terms of pedagogy, teachers must adopt a criteria to decide if the feedback generated by ChatGPT is suitable for classroom use. Similar to a study conducted by Steiss et al (2023), this can include areas such as (a) whether the feedback clearly references the criteria for the task, (b) accuracy, (c) clearly stated directions for improvement, and (d) addresses essential areas that require feedback. Educators also need to be aware of the drawbacks and risks of using ChatGPT as seen in table 1, below, that was adapted from Kohnke et al. (2023)'s work to suit the Singapore context.

Table 1

Digital Competencies for Educators' Use with ChatGPT

Areas	Digital Competencies needed by teachers
Technological Awareness	<ul style="list-style-type: none"> • Be aware of the key task, instructions, context and settings or parameters of ChatGPT • Ability to create effective prompts to generate stronger responses from ChatGPT • Knowledge of cultural bias and inaccuracies such as hallucinations
Pedagogical Awareness	<ul style="list-style-type: none"> • Knowledge of how to enhance, modify or adjust ChatGPT's responses to students' work before sharing the feedback with the student • The decision to involve learners eventually to use ChatGPT for self-directed learning

Social Awareness	<ul style="list-style-type: none"> • Possess an awareness of ChatGPT’s drawbacks and shortcomings
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Admittedly, ChatGPT’s feedback is not perfect, but it can still serve as a helpful baseline tool to provide automated adaptive feedback by engaging and motivating learners while assisting teachers with managing large class sizes so that they have more time to customise feedback given to students. ChatGPT’s value is found in understanding both its strengths and limitations. This is done by educating teachers and subsequently students on how AI functions, how to use in a critical and reflective way and to find “utility in a fallible tool” (Grimes and Warschauer, 2010, as cited in Steiss et al., 2023, p. 33).

Ultimately, to encourage self-regulation and reflection in learners during the learning process, we can harness the affordances of Google Docs as a platform to store and record the questions posed by the teacher and responses by students. Over time, students are also encouraged to revisit the questions and their own growing body of knowledge on the topic, serving as the foundation for self-directed learning through reflection and self-assessment.

Chapter 4

Discussion and Final Thoughts

This chapter examines the limitations of the research and possible implications of the research with respect to the broader considerations of professional learning and development of teachers. Subsequently, it ends with my reflection of the learning gained while embarking on this research.

Limitations of the Study

Given the time limitations of this research, I only had the opportunity to conduct brief content validation conversations with select members of the teaching community back in Singapore. As such, I do not have the opportunity to test the efficacy of the tool on students' work here in the USA or conduct any proper interviews with teachers, be it in the USA or back home regarding the tools that I developed. Prior to conducting any research on human subjects, institutional review board approval needs to be secured. As I only had one semester in the USA, I therefore depended entirely on observations and conversations with teachers back in Singapore and used past students' work in Singapore that were digitised in order to test and develop the prompt sheet proposed in Chapter 3.

With consultation and input from more stakeholders, these tools can be further finetuned and can be adjusted when used back home. Furthermore, with the constant evolving nature of AI, the prompt sheet will also need to be constantly refined and with some collaboration from the Education Technology Division in Singapore, there could be other supporting documents to help teachers of all profiles understand the use of ChatGPT and how the prompt sheet can be helpful. To close, I would like to highlight the ideas proposed in this research are not generalizable, nor intended to "explain things in terms of grand theories or universal truths" (Denscombe, 2010, p. 123).

Further Research

To complement this study, future research could be conducted to further finetune the Teachers' Metacognitive Practices self-perception survey shared in Appendix A. I would like to collaborate with other teacher-leaders back in my school and further align the questions with my school's Lesson Observation and Development template so that teachers will be able to find the reflective questions useful and serve the dual purpose of self-assessment and reflection. I also hope to evaluate the efficacy of the tool by teachers for self-reflection and also its effectiveness as a tool to facilitate mentoring and coaching conversations. It would be interesting to hear from the different profiles of teachers and their experiences with the tool proposed. Furthermore, further studies can be conducted to investigate students' responsiveness to metacognitive questions and analysing the longitudinal effectiveness of learning will be beneficial to gain a more holistic understanding of the effectiveness of this pedagogical approach (Gourlay et al., 2021).

Finally, another exciting possibility would be to do a cross-cultural study of both Singaporean and American teachers' use of metacognitive feedback and students' responses to the ChatGPT prompt sheet and examine the impact of the use of ChatGPT-enhanced self-regulated feedback on from both the perspectives of educators and also the impact on student learning when feedback is given more effectively and invites more responsive learning interactions between teacher and student.

Research Project Implementation

The outcome of this research project is a training workshop aimed at introducing metacognitive strategies to secondary school English teachers with the intent of helping English teachers more purposefully and meaningfully promote metacognition in their classrooms. This is one of the pedagogical emphases as highlighted in ELS 2020 and also one of the Key Applications of Technology (KAT) in the SLS PS. The 2-hour workshop will be

at the zonal or national level at one of the SgLDC Virtual Meetings or Teacher-Led Workshops organised by the Academy of Singapore Teachers (AST). In this workshop, teachers will be able to personally reflect on their own metacognitive awareness for lesson planning and instruction using a Teachers' Metacognitive Practices Survey. Another goal I seek to achieve would be to use questioning to encourage metacognition. Lastly, I would also like teachers to experiment using AI generative tools such as ChatGPT to generate a baseline template to provide self-regulated feedback in the form of metacognitive questions to students' written drafts.

In groups, the teacher-participants will engage in creating shared goals (e.g. using Mentimeter's rating tool) and collaborative inquiry at each stage when the different tools are introduced. The teachers will have an opportunity to personally reflect on their pedagogical practices and apply the questions created based on a stimulus provided from Voices at Play, Upper Secondary Unit 1 (Social Media), a material that is produced by the Ministry of Education for ELS 2020. Groups will be given a chance to comment on the utility of the tool and provide feedback to the facilitator for further improvement. The group discussions will be documented on Padlet and all resources used during the workshop will be shared via Google Drive. Lastly, when teachers are invited to apply the ChatGPT prompt sheet individually to their students' work, they are also invited to share how much they have used the ChatGPT generated responses and shared their adapted questions or their own metacognitive questions if they have decided not to use any of the ChatGPT generated responses at all. The integration of hands-on application throughout the workshop allows participants to be part of the creation process and aids transference of learning both as a group and individually. The details of the facilitation plan are found in Appendix D.

Reflections

Throughout this study, I presented myself as a teacher who had prior experience in developing and promoting metacognition in my classroom and conducting teacher professional development workshops but recognised that my experience is limited and subjective. Therefore, I decided to examine various literature on how teachers can also role model the competencies that we wish to develop in our students, and in so doing, promote metacognitive lifelong thinking and learning.

This research has allowed to me to develop a better understanding of metacognition, the dispositions and questions we can ask and how we as teachers, can use educational technology affordances like AI to provide greater customisation of students' learning where these digital tools and platforms allow us to enhance feedback and assessment and provide immediate and customised feedback to students.

This study reminds me that the *raison d'être* for developing the metacognitive teacher-learner is for the greater benefit of all the students that we will have the benefit of shepherding as Education Minister Chan (2023) shared in his recent speech delivered at the Work Plan Seminar held in Singapore: "Our real definition of success for our education system is how our students keep growing in the next 50 years of their lives beyond our school system. This applies equally to our teachers" (Chan, 2023). Thus, in order to build a classroom of metacognitive students, educators must constantly keep learning while deepening consciously deepen and reflect on our pedagogical competencies. Teachers can do this by reflecting on how lessons are planned and question in the classroom is conducted. Moreover, teachers might do well by embracing the affordances of AI and other technological tools in order to provide more timely and effective feedback to develop metacognitive self-regulated learners who are ready for

the 21st century. In so doing, teachers model for our students that *everyone* is on this journey of learning no matter their station in life.

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Appendix A: Teachers' Metacognitive Practices Survey

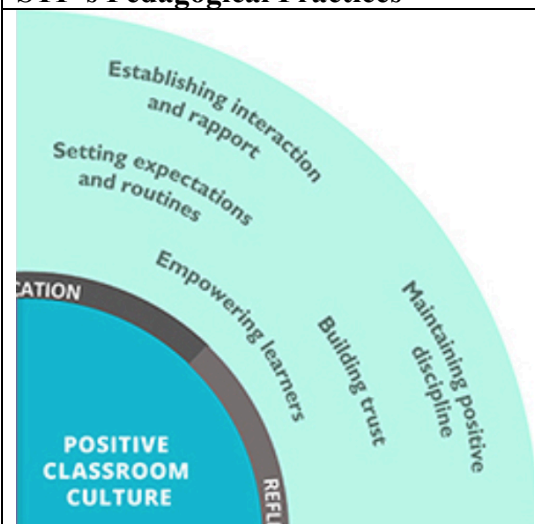
This survey has 24 questions. It provides you an opportunity for you to reflect on your own teaching practices.

1= Strongly Disagree 2= Disagree 3= Neutral 4= Agree 5= Strongly Agree

Section 1: Knowledge of Teaching

I am aware of the strengths in my teaching.	1 2 3 4 5
I am aware of the areas for improvement in my teaching.	1 2 3 4 5
I use my strengths to compensate for my areas for improvement when I teach.	1 2 3 4 5
I use pedagogies that have worked well for me in the past.	1 2 3 4 5
I am aware when each pedagogy I use will be most effective.	1 2 3 4 5

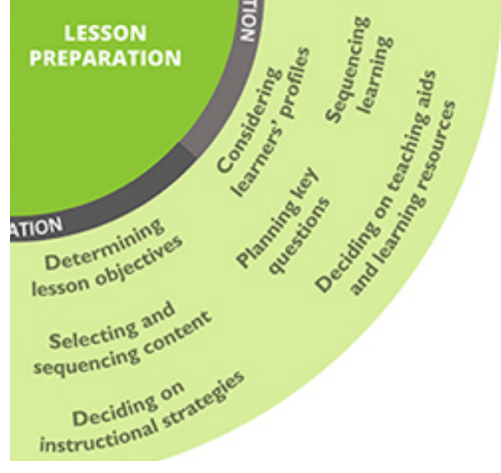
Section 2: Positive Classroom Culture

STP's Pedagogical Practices	Indicators for Lesson Observation
	Establishes interaction and rapport
	Sets expectations and routines
	Enforces expectations and routines effectively
	Maintains positive discipline
	Creates a secure environment which encourages trust and respect
Empowers learners <i>(Encourage students to take ownership of personal learning e.g. through self and peer assessments and other SDL strategies, to view mistakes as learning opportunities)</i>	

Create a secure environment which encourages trust and respect and Empowers learners: I am able to create a safe learning environment where mistakes are seen as opportunities for learning.	1 2 3 4 5
Empowers learners: I create opportunities for students to lead in their own learning.	1 2 3 4 5
Empowers learners: I create opportunities for self-assessment when I teach.	1 2 3 4 5

Empowers learners: I create opportunities for peer assessment when I teach.	1 2 3 4 5
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Section 3: Lesson Preparation

STP's Pedagogical Practices	Indicators for Lesson Observation
	Determines appropriate learning objectives & success criteria (<i>which are specific, attainable, explicitly explained</i>)
	Selects appropriate sequence and content
	Decides on appropriate instructional strategies
	Decides on teaching aids and learning resources
	Plans key questions to ask
	Considers learner's profiles

Determining lesson objectives: I set specific learning outcomes/objectives and success criteria for my lessons when I teach.	1 2 3 4 5
Deciding on instructional strategies: I have a rationale for the pedagogies that I select.	1 2 3 4 5
Deciding on instructional strategies: I explain the mental processes that are needed to answer inferential questions.	1 2 3 4 5
Deciding on instructional strategies: I spend more time on problem solving activities than giving time for students to talk about the way they solved an activity.	1 2 3 4 5
Sequencing learning: I assess my own pedagogies as I am teaching.	1 2 3 4 5
Considering learners' profile: I ask myself whether the teaching resources/materials that I will use will support my students' learning needs.	1 2 3 4 5

Section 4: Lesson Enactment

STP's Pedagogical Practices	Indicators for Lesson Observation
	Introduces the lesson appropriately
	Arouses & sustains learner interest (<i>Activates student learning</i>)
	Encourages learner engagement
	Provides clear explanations
	Facilitates demonstration of learning

	<i>(Uses questions to deepen learning)</i>
	Facilitates collaborative and self-directed learning effectively
	Differentiates learning strategies for pupils of different abilities
	Paces lesson appropriately
	Concludes the lesson appropriately

Exercising flexibility: I ask myself how useful my selected pedagogies are as I am teaching.	1 2 3 4 5
Using questions to deepen learning: I use questions that promote cognition/metacognition in the classroom.	1 2 3 4 5
Using questions to deepen learning: I allow students to generate questions regarding content.	1 2 3 4 5
Encouraging learner engagement: I allow students to explain how they came up with the answers.	1 2 3 4 5
Facilitating collaborative learning: I ask myself if I have effectively addressed my students' questions.	1 2 3 4 5
Facilitating collaborative learning: I ask myself if I have effectively addressed my students' learning needs.	1 2 3 4 5
Concluding the lesson: I review the thinking processes that helped my students learn the content.	1 2 3 4 5

Section 5: Assessment and Feedback

STP's Pedagogical Practices	Indicators for Lesson Observation
	Checks for understanding and provides feedback
	Monitors and addresses understanding

	<p>Sets meaningful tasks</p>
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<p>Checking for understanding and providing feedback: I check to what extent my students understand the topic/ task as I am teaching.</p>	<p>1 2 3 4 5</p>
<p>Supporting self-directed learning: I use strategies/ pedagogies that help my students to further explore/ deepen/ clarify their understanding about the topic/ task.</p>	<p>1 2 3 4 5</p>

Appendix B: Proposed Metacognitive Questions for Classroom Use

Activate Learning

Questions that promote cognition	Questions that promote metacognition
<ul style="list-style-type: none"> • Tell me what you know about _____ (a new concept) • What is your opinion about _____ • Describe an experience you have had relating to _____ • Explain how _____ plays a part in your life • Summarise what you have learnt so far about _____ 	<ul style="list-style-type: none"> • Is this task/ challenge/ assignment similar to something you have seen before? • How will you begin this task? <p>Collaborative Inquiry:</p> <ul style="list-style-type: none"> • We know that ...however, we still do not have a good explanation for...
<ul style="list-style-type: none"> • Deeper Thinking: • How do you think _____ relates to _____ • List 1 to 3 questions about _____ 	<ul style="list-style-type: none"> • Did the strategy that you took the last time when you _____ in order to _____ work? • We need more data on _____

Promote Thinking and Discussion

Questions that promote cognition	Questions that promote metacognition
<ul style="list-style-type: none"> • Write a question you have about anything we have discussed so far 	<ul style="list-style-type: none"> • Are you on the right track so far or are you stuck? Why? • What extra information would be useful for you? • What other resources would be useful to help you? Who could you ask for help? • Based on what we have discussed so far, how do you feel about this issue now? <p>Collaborative Inquiry:</p> <ul style="list-style-type: none"> • We now understand...but we still need to understand...

Facilitate Demonstration of Learning

Questions that promote cognition	Questions that promote metacognition
<ul style="list-style-type: none"> • What strategy did you use? 	<ul style="list-style-type: none"> • How effective was it? • What will you do differently the next time? • How has your thinking changed?

	<ul style="list-style-type: none"> • Has your position on an issue changed / Has the way you solved the problem or the way you explained something changed after discussion with your friends? If yes, why? If no, why not? What did you realise about the way you learnt/ solved a problem? <p>Collaborative Inquiry:</p> <ul style="list-style-type: none"> • This data/ analysis cannot explain ...
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Monitor and Provide Feedback

Questions that promote cognition	Questions that promote metacognition
<ul style="list-style-type: none"> • Write a revised definition of _____ • Write a question you still have about _____ • Explain how _____ relates to _____ • What went wrong/ went well about today's lesson? 	<ul style="list-style-type: none"> • How did the task/ practical work help you to learn today? How does [verb and task eg: observing, completing the experiment, writing a draft paragraph, solving the math problem] help you to learn? • How did help you learn about.....? If your prediction/ assumption/ perspective is different/ incorrect, does this matter? • I used to think that... Now I think that... • Is there anything you didn't understand? Any gaps in my knowledge? / What was difficult for you this time? • Do you need to go back and fill in any gaps in my understanding? • What material do you need to spend more time reviewing? • What should you do differently the next time you revise? • What new goals can I set because of my work in this assignment/ What would you like to know more about? • Did you learn anything that you can share with/ will help others? • How could what you have learnt be useful elsewhere? • Where/ How can you use what you have learnt now/ today in the future?

Appendix C: ChatGPT Prompt Sheet

Recipe Name		Provision of Feedback on Students' Work (Template)	Example of an English prompt
Recipe ID		01	01
Description		Template for Teacher's Use to Provide SRF	English Lesson (Sec 3)
Task category/domain		Education	Education
Creation date		1-Oct-23	1-Oct-23
Last modified date		1-Oct-23	1-Oct-23
Author/creator		Faith Ong, Ee Noch Ng	Faith Ong
Version number		v1	v1
Ai Model		ChatGPT 3.5 (Free)	ChatGPT 3.5 (Free)
Purpose	(Note: this will not be included in the prompt copied into ChatGPT)	<i>I want to provide more self regulatory feedback of my students' work in the form of metacognitive questions</i>	<i>I want to provide more self regulatory feedback of my students' work in the form of metacognitive questions</i>
Task	Role	You must act as a master teacher teaching in Singapore . I will provide you with details about my lesson, and it will be your job to think deeply and write a detailed lesson plan.	You must act as a master teacher teaching in Singapore . I will provide you with details about my lesson, and it will be your job to think deeply and write a detailed lesson plan.
	Topic/ Skills	The topic is on <i>insert your topic/ skill</i>	The focus and skill is on <i>persuading others on why youths should play an active role in environmental conservation</i>

	Request	I want you to provide me feedback in the form of metacognitive questions to help my students <i>insert the chosen focus area/ SSAB from ELS 2020</i> . Ask me any questions that you need so that you are able to provide the most suitable metacognitive questions that I can use to give feedback to my student's draft based on the following task.	I want you to provide me feedback in the form of metacognitive questions to help my student <i>revise his/her draft based on the ability to persuade others to hold a particular point of view or act a certain way</i> . Ask me any questions that you need so that you are able to provide the most suitable metacognitive questions that I can use to give feedback to my student's draft based on the following task.
Instructions	Output - Format, Structure	Organise the information in a table with 4 columns. "Column #1 - Student's draft work as follows <i>[insert student's work here]</i> Column #2 - Specific sentences from student's work requiring revision Column #3 - Metacognitive questions to ask to promote revision Column #4- Explain the reasons why these metacognitive questions were selected"	Organise the information in a table with 4 columns. "Column #1 - Student's draft work as follows <i>[insert student's work here]</i> Column #2 - Specific sentences from student's work requiring revision Column #3 - Metacognitive questions to ask to promote revision Column #4- Explain the reasons why these metacognitive questions were selected"
	Qualities of the output	The metacognitive questions should be age-appropriate so that students are able to revise their drafts.	The metacognitive questions should be age-appropriate so that students are able to revise their drafts.
Context	Grade level	My students are in <i>grade level</i>	My students are in <i>Secondary 3</i>
	SSABs (ELS 2020)	The key skill for this lesson is <i>insert relevant SSAB from ELS 2020 Syllabus document</i>	The key skill for this lesson is <i>Students will be able to use appeal to shared beliefs or values or reader's emotions, expert opinions or evidence to develop their view.</i>
	Student ability (Optional)	My student has <i>insert any learning needs</i>	My student has no learning needs.

	Success Criteria	At the end of the lesson, students will be able to <i>insert success criteria here</i>	At the end of the lesson, students will be able to <i>use at least of 1 of the 3 appeals meaningfully in their draft paragraph.</i>
	KAT	Integrate technology where necessary and meaningfully to <i>develop Metacognition</i>	Integrate technology where necessary and meaningfully to <i>develop Metacognition</i>
	21CC	The lesson should also help students achieve the following skills: <i>insert 21CC skills</i>	The lesson should also help students achieve the following skills: <i>Critical, adaptive and inventive thinking.</i>
	Evidence of Learning	I want my students to show me evidence of their learning using <i>insert evidence of learning (e.g. draft paragraphs, group discussion)</i>	Students will demonstrate their understanding by <i>writing a draft paragraph either individually or in groups to be submitted electronically.</i>
	Prerequisite knowledge	My students already know <i>insert any prerequisite knowledge here</i>	My students know <i>how to write a thesis statement and provide supporting evidence to support their views.</i>
Input			
Prompt (Part 1)	Copy and paste this part into ChatGPT first.	You are a master teacher teaching English in Singapore for Secondary 3 Express students. I will provide you with details about my task, and it will be your job to respond with feedback to my student's draft/ answer. I want you to provide me feedback in the form of metacognitive questions to help my students <i>[insert skill to be assessed]</i> . Ask me any questions that you need so that you are able to provide the most suitable metacognitive questions that I can use to give feedback to my student's draft based on the following task.	You are a master teacher teaching English in Singapore for Secondary 3 Express students. I will provide you with details about my task, and it will be your job to respond with feedback to my student's draft/ answer. I want you to provide me feedback in the form of metacognitive questions to <i>help my student revise his draft based on the ability to persuade others to hold a particular point of view or act a certain way.</i> Ask me any questions that you need so that you are able to provide the most suitable metacognitive questions that I can use to give feedback to my student's draft based on the following task.

<p>Prompt (Part 2)</p>	<p>Copy and paste this into ChatGPT next</p>	<p>The topic is: Insert topic here Please present the information in a table with 4 columns. "Column #1 - Student's draft work as follows <i>[insert student's work here]</i> Column #2 - Specific sentences from student's work requiring revision Column #3 - Metacognitive questions to ask to promote revision Column #4- Explain the reasons why these metacognitive questions were selected"</p> <p>The metacognitive questions should be age-appropriate so that students are able to revise their drafts.</p> <p>My student is in <i>insert grade level and stream</i> [Optional] My student has <i>insert if appropriate any learning needs that the student has</i>. The key concepts/ skills for this lesson are <i>insert concept/ skill(s) here</i> At the end of the lesson, students will be able to <i>insert success criteria here</i></p> <p>The lesson should also help students achieve the following skills: <i>insert 2ICC skills</i> Students will demonstrate evidence of their learning using <i>insert evidence of learning (e.g. draft paragraphs, group discussions points)</i> My students know how to <i>insert prior knowledge or skill(s)</i></p>	<p>The topic and skill is on persuading others about ageing gracefully in Singapore. Please present the information in a table using 4 columns "Column #1 - Student's draft work as follows <i>"insert paragraph as shown in the sample below"</i> Column #2 - Specific sentences from student's work requiring revision Column #3 - Metacognitive questions to ask to promote revision Column #4- Explain the reasons why these metacognitive questions were selected"</p> <p>The metacognitive questions should be age-appropriate so that students are able to revise their drafts.</p> <p>My student is in Secondary 3 Express. The key skill for this lesson is that <i>students will be able to use appeal to shared beliefs or values or reader's emotions, expert opinions or evidence to develop their view</i>. At the end of the lesson, students will be able to <i>use at least of 1 of the 3 appeals meaningfully in their draft paragraph</i>.</p> <p>The lesson should also help students achieve the following skills: <i>Critical, adaptive and inventive thinking</i>.</p> <p>Students will demonstrate their understanding by writing a draft paragraph either individually or in</p>
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			<p>groups to be submitted electronically. My students know how to write a thesis statement and provide supporting evidence to support their views.</p>
<p>Student's Work [Sample Paragraph]</p>	<p>Copy and paste this part into Part 2 of ChatGPT</p>	<p>Though there are still affairs which affect the elderly adversely, the Singaporean government is also inclining towards what can be done in the long run which aids in the years or even decades to come. One example based on my observations from google maps is the amount of nursing homes are evenly spread across Singapore, though this may lead you into thinking that the nursing homes are evenly spread for all the elderly. What about those elderly living in certain areas with a nursing home within a 1km radius but they have mobility issues such as Parkinson's disease (PD), it would be a huge trouble to travel. So let's think about how. What should be enforced, and why is it important!</p>	

Appendix D: Teacher-Workshop Facilitation Plan

Workshop Title (Maximum 65 characters, including spaces)	The Metacognitive Teacher-Learner: Questioning as Thinking
Name and School of Main Facilitator	Faith Kaylie Ong, Manjusri Secondary School
Workshop Objectives	<p>By the end of the workshop, secondary school (Sec 1-4) English language teachers should be able to</p> <ul style="list-style-type: none"> • personally reflect on their own metacognitive awareness for lesson planning and instruction using a Teachers' Metacognitive Practices Survey • learn how to use questions to encourage metacognition • use ChatGPT to provide self-regulated feedback to students' writing drafts

Proposed Mode (*Delete whichever is inapplicable)	Face to Face or Online Video Conferencing *preference for face to face
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Facilitation Plan

Duration	Activities / Tasks	Rationale	Resources
25mins	<p>Introduction</p> <p>Facilitator will introduce herself, the session overview, background on the genesis of this sharing and the research questions that will underpin this sharing session. To set the context, the facilitator will invite the group to take part in a group poll on Mentimeter.</p> <p><u>Research Question:</u></p>	<p>Facilitator will provide some context and outline the different information packets that participants will use.</p> <p>(a) Presentation slides (b) Padlet Resource Page: (i) Google Drive Resources that are created by the Facilitator (ii) Additional useful resources found by the Facilitator during her time</p>	<p>Presentation by Facilitator Padlet Page (Resource Centre) Pre Workshop Instructions to Participants:</p> <ol style="list-style-type: none"> 1. Bring along some samples of students' work (digitised- from SLS or Google Classroom) 2. Complete Metacognition Is and Metacognition Is Not Graphic Organiser 3. Bring along a lesson plan

	<ul style="list-style-type: none"> • How can teachers become more aware of promoting metacognition in the classroom? • How can teachers make use of technology (e.g. AI) to support the provision of metacognitive self-regulated feedback? <p><u>Trigger Activity: Table Top Quick Write:</u></p> <p>Participants will take part in a table-top quick write:</p> <ol style="list-style-type: none"> 1. Write down 2-3 words or phrases that come to mind when you think of the word “<i>Metacognition</i>” 2. Pass the paper to the next participant to add on to the words or phrases listed and continue passing the paper until every participant at the table has had the chance to participate 3. Invite participants to review the definitions slides found in the Activity 1 packet. 4. Invite participants to fill in the table of I Used to Think That... Now I think that.... 5. Invite 2-3 tables to share final work <p>Faciliator will share the proceed to share:</p> <ol style="list-style-type: none"> (a) Research and Literature on Metacogniton (b) Importance of Metacognition for Teachers (c) Metacognitive Self-Perception Reflection Tool for Teachers 	<p>on the US Fulbright programme</p> <p>If conducted over VC, use Google Jamboard to collectively collate the different definitions for the different groups.</p> <ul style="list-style-type: none"> - Use breakout rooms 	<p>Remember to edit Mentimeter and insert updated QR code and PIN just before workshop:</p> <p>https://www.mentimeter.com/app/presentation/al2he274t7easuuyjet3lux1j8dgt4dy/izqawuvmp1zm/edit</p> <p>Google Drive on Metacognition Workshop Look under Introduction 1.1 Quick Write 1.2 Table Top Quick Write Summary [VTR of I Used to Think... Now I think...]</p> <p><u>Youtube Video on Metacognition:</u> https://www.youtube.com/watch?v=HZrUWvfU6VU</p> <p>Google Drive: 1.3.1 MJR Sample LO Form 1.3.2 Teachers’ Metacognitive Practices Survey</p>
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<p>35mins</p>	<p><u>Development 1: Thinking through Questioning</u></p> <p>Facilitator will share about: (a) the place of metacognitive questioning (b) Proposed Question List and adapted version of the Missouri 2020 document on what Teacher/ Student Questioning can look like in practice</p> <p>Main Activity 1: There will be 4 different stations based on the different Active Learning Processes.</p> <p>Resource from VAP Secondary 3 Express (Social Media or Social Causes) will be used as student learning material.</p> <p>Invite participants in each group to focus only on the ALP/ CLEARR aspect assigned to their group and share how they will make use of the questions based on the different aspects of CLEARR and ALP.</p>		<p>Google Drive: 2.1 Group Activity Instructions 2.2 Proposed Question List 2.3 ELS 2020 VAP Unit 1 Materials (MOE) 2.4 ELS 2020 Metacognition PE</p> <table border="1" data-bbox="1507 550 2002 1182"> <thead> <tr> <th>Grp</th> <th>CLEARR</th> <th>ALP</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Contextualisation</td> <td>Activate Learning</td> </tr> <tr> <td>2</td> <td>Learn and Explore</td> <td>Promote Thinking and Discussion</td> </tr> <tr> <td>3</td> <td>Apply and Respond</td> <td>Facilitate demonstration of learning</td> </tr> <tr> <td>4</td> <td>Reinforce</td> <td>Assessment and Learning</td> </tr> </tbody> </table>	Grp	CLEARR	ALP	1	Contextualisation	Activate Learning	2	Learn and Explore	Promote Thinking and Discussion	3	Apply and Respond	Facilitate demonstration of learning	4	Reinforce	Assessment and Learning
Grp	CLEARR	ALP																
1	Contextualisation	Activate Learning																
2	Learn and Explore	Promote Thinking and Discussion																
3	Apply and Respond	Facilitate demonstration of learning																
4	Reinforce	Assessment and Learning																
	<p>Break (15mins)</p>																	

35mins	<p><u>Development 2: Using ChatGPT to generate self-regulated feedback to students' draft paragraphs</u></p> <p>Participants will be given time to set up a ChatGPT account if they have not done so. (2-3mins)</p> <p>Facilitator will share about</p> <ul style="list-style-type: none"> (a) the affordances of harnessing AI and its relationship with SRL based on research. (b) some introductory information on prompt engineering and (c) Proposed ChatGPT Prompt Sheet for Teachers' Use (Writing Focused) <p><u>Main Activity 2</u></p> <p>Participants will use prompt sheet with students' work and provide feedback on</p> <ul style="list-style-type: none"> (a) the accuracy of the information presented, (b) the kind of amendments they will make to the generated ChatGPT SRL with the specific student(s) they have chosen in mind 		<p>Teachers' Laptops 2-3 Samples of Students' Work ChatGPT Prompt Sheet (Excel/ PDF) Padlet</p>
15mins	<p><i>Closure and Consolidation</i></p> <p><u>Closing Activity</u></p> <ol style="list-style-type: none"> 1. On one side, do a 3-2-1 for participants to reflect on what they have learnt for the day 		<p>Google Drive: 3-2-1 Exit Ticket 2 Things to Implement Metacognition Resource Guide</p>

	<p>2. On the flip side, to plan how they will act on that learning (strategies and implementing what they have learnt in a future lesson)</p> <p>Invite some participants to share how they have revised and adjusted their thinking</p> <p>Question and Answer</p>		<p>(adapted from Missouri Dept of Education for Primary and Secondary School) Missouri Practice Profile</p>
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