
Title	Design-based research approach for teacher learning: A case study from Singapore
Author(s)	Fei Victor Lim and Thi Thu Ha Nguyen

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Design-based research approach for teacher learning: a case study from Singapore

Fei Victor Lim
Assistant Professor
National Institute of Education
Nanyang Technological University
Singapore
Victor.lim@nie.edu.sg

Thi Thu Ha Nguyen
Research Fellow
National Institute of Education
Nanyang Technological University
Singapore
nguyen.thuha@nie.edu.sg

Abstract

In this article, we describe how a design-based research approach brought about teacher learning in terms of both confidence and competence to design and enact a multiliteracies lesson package. This study is situated within the efforts to grow a community of practice comprising teacher champions across schools as they work closely with researchers. Based on a single case-study of a teacher, the article discusses her discernible trajectory of growth as evident from her reflections collected after each of the lesson co-design sessions, the lesson plans that she designed, and her actual classroom practices. The findings from the study suggest that the design-based research approach, given its features, can be productive in bringing about a deeper and more reflective teacher learning and as a platform to strengthen the nexus between research and practice.

Introduction

Teacher change is one of the greatest challenges in improving teaching and learning in schools. Familiar approaches for teacher change and learning centre around professional development workshops conducted by experts. However, their efficacy has been increasingly questioned as these trainings offer limited opportunities for teachers to reflect, practise, and refine their pedagogies (Kennedy, 2005; Pedder & Opfer, 2011). In this article, we report on a design-based research approach to bring about teacher change, specifically, in terms of confidence and competence to design and enact a multiliteracies lesson package.

The study reported in this paper is part of a larger educational research project on integrating multiliteracies in the English Language classroom, where an objective is to grow teacher leaders towards championing the teaching and learning of multiliteracies in their schools. Our project is implemented in tandem with the roll-out of the new English Language syllabus 2020¹, where multiliteracies (New London Group, 1996) has been identified as one of the focus areas in literacy learning across primary and secondary schools in Singapore.

The confluence of changes in curricular policy and the outcomes from exploratory work in the educational research on multiliteracies has paved the way forward for the pedagogic shifts expected of the teachers on the ground. A key question is how best to bring about the teacher change required. Approaches to support the teachers include the familiar professional training workshops on the new syllabus, and on specific skills in the teaching of viewing and representing of multimodal texts, as well as having the curriculum development team at the Ministry of Education prepare exemplar lesson packages and resources for the teachers. While these approaches are helpful, the translation of learning from workshops to classroom practices can be uncertain. Also, the provision of exemplar lesson packages for the teachers,

while certainly welcomed in the short-run, may not equip teachers with the reflective understanding and ability to design these lessons for themselves in the long-run.

In addition to the approaches undertaken, another approach towards teacher learning is to grow a community of practice (Wenger, 1998) amongst teachers in each school for the teaching of multiliteracies. This can be initiated by identifying teacher champions in each school, and having them work closely with the educational researchers over a period of time as they are guided in co-designing a lesson package on multiliteracies. The goal is for the teachers in the communities of practice (Lim, Kwan & Poh, 2019) to develop confidence and competence through the co-design and enactment process so that they can mentor and guide, as well as role-model for, the other teachers in the school on the teaching of multiliteracies.

In what follows, we describe the design-based research approach adopted in our project towards teacher learning. While the project involves ten participating teachers across five schools in Singapore, we illustrate the teacher change through the design-based research process with a case-study of one teacher – Anja (pseudonym). Anja has 15 years of experience teaching in a public secondary school and has been identified by the school to participate in this project as they see in her the potential to lead a community of practice on multiliteracies in her school. She is hard-working, cooperative, and eager to learn. However, she appeared to lack confidence in delivering the new content of multiliteracies. In this project, she participated with two of her secondary one classes of 24 students each, aged 13. Both of her classes were on the Express course, who would undergo a 4-year curriculum that leads to the Singapore-Cambridge O-Level Examinations. Anja's school is among the mainstream government funded schools, located in a central part of Singapore. We describe the design-based research activities undertaken with Anja and discuss the evidence of her gradual growth and learning through her written reflections after each of the four lesson co-design sessions, her lesson implementation, and her sharing after the lessons.

Design-based Research

The design-based research approach to teacher learning involves the researchers working closely with the teacher-participants in the co-design of lesson packages. The goal of design-based research is to develop contextually-sensitive pedagogical practices and instructional strategies with a focus on the teacher-participant's professional learning and growth in the process.

Design-based research was developed in the early 1990s with the pioneering works of Brown (1992) and Collins (1992). With an increasing recognition of the influence of contextual variables in different educational settings, the assumption that a pedagogical innovation that has worked well in one school can therefore easily be replicated in other schools, is flawed. As such, educational research in recent years, particularly in the scaling up of innovations, has turned towards design-based research, which accounts for the role of teacher's agency and the differences in student profiles (Anderson & Shattuck, 2012).

Wang and Hannafin (2005: 6) describe design-based research as a "systematic but flexible methodology, aimed to improve educational practices through iterative analysis, design development, and implementation, based on collaboration among researchers and practitioners in real-world settings, and leading to contextually-sensitive design principles and theories". Based on the review of work on design-based research in education, (for example, Cobb, Confrey, diSessa, Lehrer & Schauble, 2003; Anderson & Shattuck, 2012), we describe three characteristics of design-based research that make it an approach of choice for teacher learning in our project. The characteristics of design-based research are that it is (1) pragmatic, (2) iterative, and (3) contextual.

First, a design-based research project is pragmatic in that it aims to solve real-world problems by designing and implementing interventions alongside refining design principles and extending theories (Brown & Campione, 1996). In our project, the challenge is how to bring

about the pedagogic shifts required for the curricular changes as we respond to the literacy demands in today's communication environment. While informing practice, the reflexive process of working with the teacher-participant also serves to refine the educational researchers' theoretical understandings of linguistics and conceptions in multimodality, particularly of its value, productivity, and adequacy for educational translational research.

Next, design-based research is iterative. This involves several rounds of working with the teacher to bring about the change we hope to see. In our project, we began with the principle of meeting the teachers where they were. The first phase of the project involved us going into the teacher's lessons to observe and understand the way she was interpreting and teaching multiliteracies. With these understandings, the research team moved into the second phase of the project where we co-designed the lessons for the next iteration with her. The co-design work took place over four sessions, when the teacher charted her experience through a short-written reflection after each session. Following that were two other phases where the teacher enacted the lessons, reflected on the lesson implementation, and made further refinement of the lesson package together with the research team. Lesson package enactment and guided reflection will be repeated in the following year of implementation.

Finally, design-based research is contextual in that the outcomes are nuanced to the influence of the participants and setting of the research (Wang & Hannafin, 2005). This is not to say that the findings cannot be applied to other settings. They could, but what is crucial in design-based research is the recognition that the teacher's agency, and the learning ecology, both the students' profiles and the classroom environment, are influential in shaping the nature and outcome of the study. Ultimately, the output of the project in the form of learning design principles, instructional strategies, and lesson packages, are to be disseminated to other schools. However, they are made available to teachers from other schools for adaptation to their contexts, rather than to adopt with fidelity.

Design-based Research Activities

This section reports on the design-based research activities we had with Anja over the 18-month period (Phase 0 to 3) in Table 1.

Table 1: Research activities with the teacher

Phase	Duration	Activities	Data
Phase 0	1 month	Explanation of project and design-based research approach	-
Phase 1	2 months	Two Lesson Experiences	Pre and Post Lesson Interviews with Anja Lesson experience field notes Students' survey with class Focus Group Discussion with eight students
Phase 2	8 months	Two workshops on multiliteracies conducted for Anja and her colleagues Four lesson co-design sessions with Anja Feedback on the lesson package	Anja's post co-design session reflections Iterations of the co-designed lesson package
Phase 3	4 months	Implementation of lesson package	Post Lesson Interviews with Anja Lesson experience field notes Students' Artefacts Focus Group Discussion with eight students
Phase 4	4 months	Iteration of lesson package	Post Lesson Interviews with Anja Lesson experience field notes Students' Artefacts Focus Group Discussion with eight students

Following ethics approval from the university institutional review board and consent from the participants, we attended Anja's two lessons on teaching the visual texts (advertisements and posters) to her 2019 class of secondary one (13-year-old) students in Phase 1. After the lessons, we had discussions with her and collected data which gave us insights into Anja's beliefs and tacit design principles in her lesson plans and enactment. We also collected the views of the students through surveys and focus group discussions because we wanted to understand the needs of the students and to have their voices represented.

In Phase 2, we conducted two workshops for the teachers in the school. The first was on introducing the tenets of multiliteracies and the focus was on shaping teachers' beliefs and

conceptions of the importance of developing multiliteracies in students. The second was on sharing the pedagogies of multiliteracies, both from work done internationally and in Singapore. The focus was on equipping teachers with practical ideas and strategies on how multiliteracies can be taught. While the workshops presented key principles and inspired discussions amongst the teachers, the focal activity in Phase 2 was the intensive lesson co-design sessions, each lasting for more than an hour, which the research team had with Anja.

Lesson Co-Design

During the lesson co-design sessions, we worked collaboratively with Anja to re-design her lesson package on the visual text which she implemented during the lessons that we observed in Phase 1. Her goal was to develop and implement a multiliteracies lesson package, of six lessons, on the teaching of the viewing and representing skills for print advertisements. We introduced a framework to explore the meanings in visual texts (Kress & van Leeuwen, 2021; Lim & Tan, 2018), which she could use to organise her lessons. As the framework needs to be translated to the profiles and needs of her students, we discussed the age-appropriate learning objectives and activities for the lesson package, as well as how it could be integrated into the teaching and learning year plan in the school. We also discussed the application of the multiliteracies pedagogy (Cope & Kalantzis, 2015), specifically how the knowledge processes of (1) experiencing (the known and the new), (2) conceptualising (by naming and with theory), (3) analysing (functionally and critically), and (4) applying (appropriately and creatively) could be expressed in the lesson package. The points of focus for each of the co-design sessions were:

Session 1: Discussion of how the visual text framework and the multiliteracies pedagogy could be translated in the lessons

Session 2: Deliberation on the learning objectives and activities for each lesson

Session 3: Consolidation of the lesson package with activities and teaching resources

Session 4: Review and revision of the lesson package

In Phase 3, Anja conducted the lesson package on the visual text with her 2020 class of secondary one students. The researchers observed two of her lessons, one of which was focused on guided viewing of posters and the other on students' designing their own posters. We took observation notes and interviewed Anja after the lessons, with the aim of her reflecting on her classroom practices and discussing possible changes for the next round of implementation. We also conducted a focus group discussion with eight students to get their feedback on the lessons.

Anja's lesson package

The learning objectives of the first four lessons were on introducing the visual and linguistic features of the advertisement as a multimodal text (Figure 1), how the text engages the audience (Figure 2), as well as the aspects of the message in the text (Figure 3), based on the framework.

Figure 1: Anja's Slide on the aspects of Form in the Advertisement

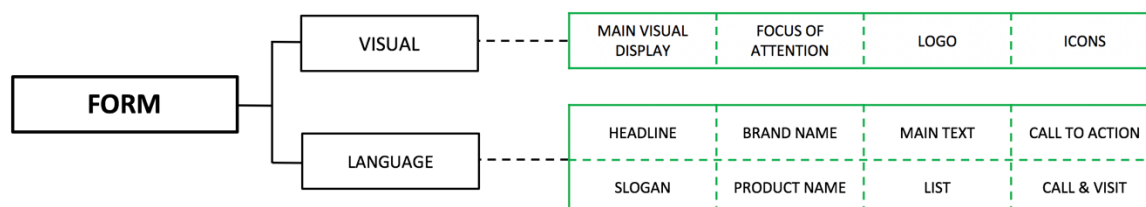


Figure 2: Anja's Slide on How the Advertisement Engages the Audience

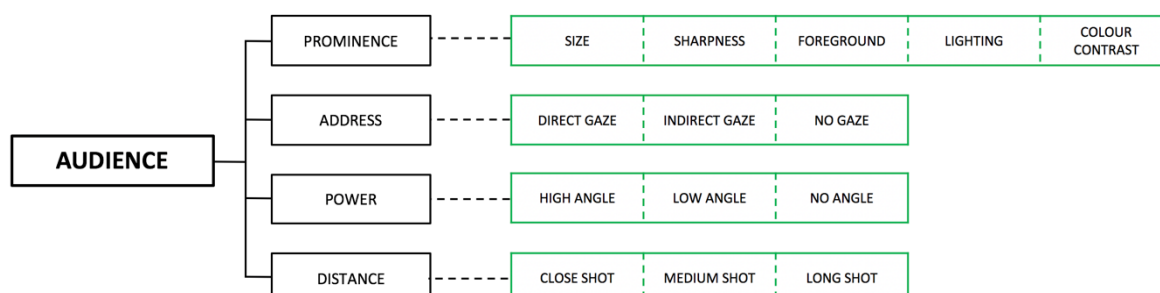
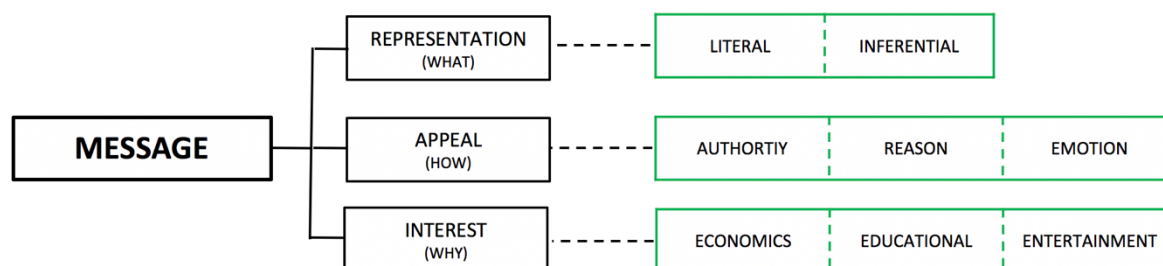


Figure 3: Anja's Slide on Aspects of Message in the Advertisement



The learning activities began with students bringing to class print advertisements which appealed to them for discussion, followed by teacher-guided analysis and leading to group discussions of the multimodal texts. For the last two lessons, students were to apply their learning to design a print advertisement on a theme, and to present their posters to their peers by explaining the multimodal choices made to communicate the message.

The quality of the content in the lesson package was discernibly improved as compared to what she had for print advertisements and posters in Phase 1, which mostly emphasised the use of typographical features and colors in the multimodal text. The lesson package re-designed in Phase 2 was structured with clearly expressed objectives on developing specific knowledge and skills for viewing and representing in each lesson. For example, one of the objectives was for students to identify the elements of the message in the visual text and to explain the effect of these elements.

The learning activities were also more varied as compared to the previous lessons she had where there was mostly teacher-directed learning. In the new lesson package, Anja has included both collaborative and inductive learning activities, in which students will have opportunities for joint meaning-making through text analysis, and co-construction of knowledge and skills through artefact-making. The activities were also designed to bridge

students' lifeworlds and classroom learning by engaging students' interests and experiences with different multimodal texts from their daily encounters.

During the post-lesson interviews, when asked to compare the current lesson package with the version from the year before, Anja opined that the previous lesson package was "not so systematic" and "not so comprehensive", and the current lesson package was "more selective in resources". She also reflected that:

...the last time when I tried to put together something, it was...quite messy... and [we put in] whatever I thought was relevant... But this time round, I [was] more selective in the resources... to be as rich as possible... it must be something that they can relate to also, so they are able to understand the concepts.

The noticeable improvements in Anja's lesson package design point to a certain level of competence and familiarity with multiliteracies pedagogy which she has cultivated. Her lesson package included aspects of the explicit teaching of systematic multimodal knowledge, harnessing relatable and authentic learning experiences, and fostering students' agency through collaborative meaning-making and co-construction of knowledge (Cope & Kalantzis, 2015). These understandings were also demonstrated in Anja's classroom practices.

Anja's classroom practices

The researchers observed the 2nd lesson of the lesson package where the learning objective was on critical viewing, and the 5th lesson of the lesson package where the learning objective was on guided representing. The lessons were conducted in a computer lab, where Anja used an online student learning platform to support the teaching. The four knowledge processes of multiliteracies pedagogies – experiencing, conceptualising, analysing, and applying - (Cope & Kalantzis, 2015) were evident from Anja's classroom practices.

In the first lesson, Anja had invited students to bring in a print advertisement or poster that they liked and explained why they found it appealing. Through the process of *experiencing*, Anja engaged the students with the use of authentic texts from the students' lifeworlds. When Anja introduced the features and semiotic choices in the print advertisements, the students appeared interested and seemed to enjoy the teacher's discussion of the various multimodal texts used. Anja guided the students through *conceptualising* where she introduced and explained the concepts to the students with examples.

Through questioning, Anja scaffolded their viewing process and supported the students with the critical tools and language, that is *analysing* the multimodal texts (See Figure 4). While this was initially designed to be a group activity, Anja had to make adjustments to the learning activities due to the social distancing measures imposed in response to the COVID-19 pandemic. As such, instead of having group work, Anja's students discussed in pairs and presented their responses on worksheets given before a class discussion ensued.

In the lesson on guided representing, Anja focused on *applying* by first reviewing the knowledge learnt in the earlier lessons, focusing on the semiotic choices and features of multimodal texts. She then modelled an example of a print advertisement she created and explained the design choices she made (see Figure 5). Thereafter, students were tasked to plan their design and consider the semiotic choices they would make in their creation of their own print advertisement text (see Figure 6). The students were given a choice of topics for their design: food, sportswear, or electronic gadgets. This gave the students a sense of agency and ownership over the representing assignment and the researchers observed that students appeared interested, were on task, and were engaged in their creation and presentation of the print advertisement (see Figure 7).

Figure 4: Language to Analyse Multimodal Texts

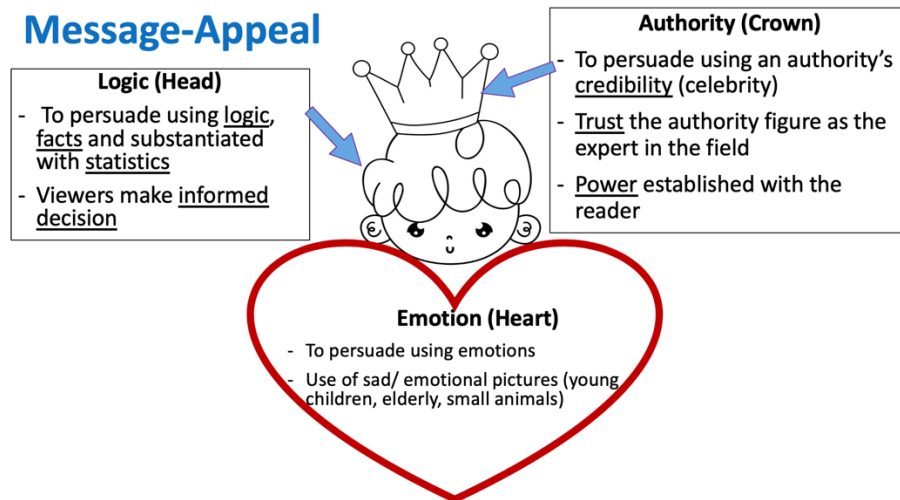


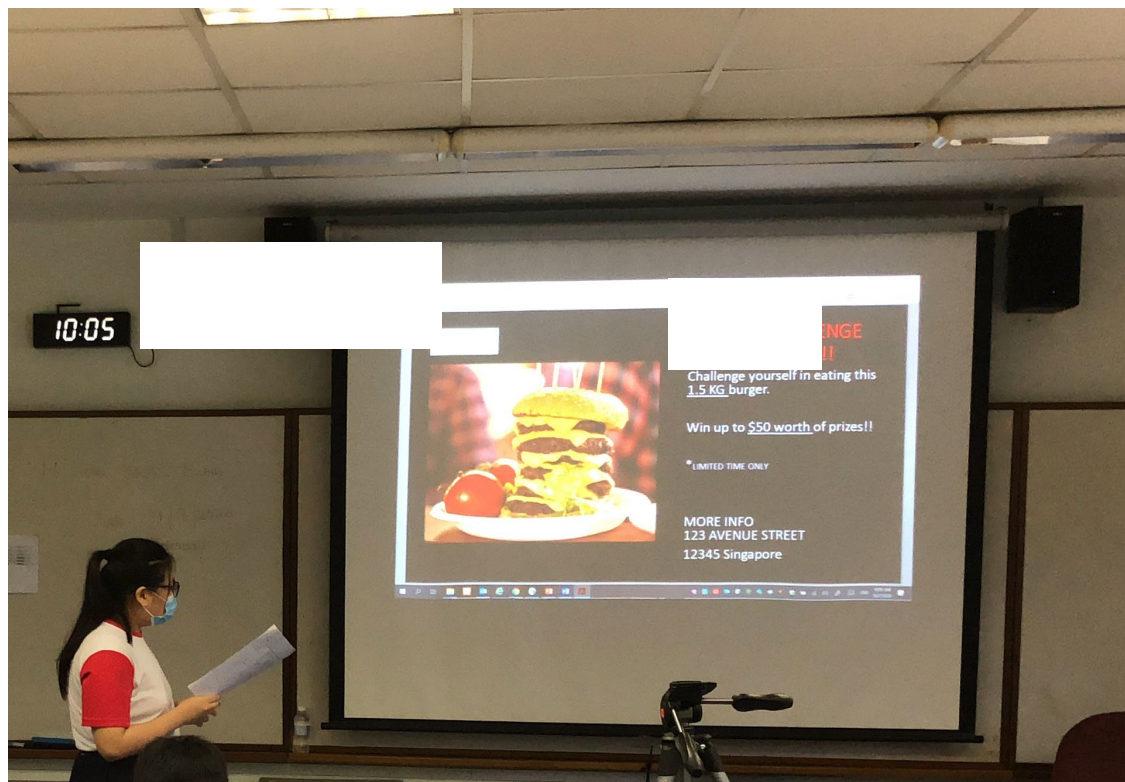
Figure 5: Anja's Modelling of a Multimodal Text



Figure 6: Examples of Students' Creations



Figure 7: Students at Work



Teacher Learning

Through the process, the researchers observed a growth in Anja's confidence and competence, demonstrated in her co-designed lesson package and her classroom practices as observed by us. Her growing confidence and competence were also evident from her reflections, post-lesson interviews, and her students' feedback.

Anja's Reflections

After the first lesson co-design session, Anja shared that while "insights" on multiliteracies pedagogies were gleaned from the introduction of the framework and knowledge processes on multiliteracies learning, she felt that there were many "areas of improvement" for herself compared to how she used to teach multiliteracies. For example, Anja reflected that it would not be adequate if she were to continue focusing only on the choice in typography and colours, as she did in previous years, because there were more aspects in multimodal meaning-making. The need to make changes to what she used to do may be why Anja felt "the pressure to be able to produce a comprehensive, appropriate package integrating the various components and teaching strategies".

After recognising the potential of how the lessons could be developed, in the second co-design session, Anja was determined to design multiliteracies lessons that were "relevant and meaningful for the students". In her reflections, Anja expressed an openness to explore "perspectives and possibilities" offered by the research team and was prompted to "think more deeply" about her lesson planning. Nonetheless, she acknowledged that there were "many considerations and factors to take into account" in the design of the lesson package. For example, she was concerned about how she could balance between guiding students with *conceptualising* and providing them the time and space for students' own *analysing* of the visual texts. A sense of uncertainty was also evident in her conclusion, "the journey will definitely be challenging and *hopefully* it will be worthwhile".

After the third co-design session, there was greater positivity in Anja's reflections when she stated that, "There is further clarity on how to structure the lessons". This could allude to the progress made in the development of the lesson package where she has applied the framework introduced to her earlier to plan the learning activities. Her reflection also indicated her interest to "consolidate" and develop a coherent lesson package that could bring together both her ideas and those offered to her by the research team. For example, Anja felt strongly that more support, such as the provision of worksheets for students to plan for the representing activities, was necessary to help the students. Anja's reflection from the session expressed a meeting of minds and mutual regard through the lesson co-design, rather than the dominance of the researchers' ideas over the teacher's perspective.

After the final co-design session, Anja's reflection indicated a sense of "greater clarity in how and what" she would like the students to learn. At this stage, Anja had completed the development of the lesson package, which received positive feedback from the research team. In this light, she concluded that "I am more confident that my students will greatly benefit from the learning of the various lessons and activities" and that "personally, [the co-design process] enriched my knowledge in this aspect too".

Anja's reflections revealed a discernible shift from "trepidation" and "pressure" about the lessons to a sense of confidence. This process was also punctuated with some uncertainties and "concerns" expressed after sessions two and three, which contrasted with her reflections after session four where she expressed a strong optimism and confidence. This change could be attributed to the hard work and "thought" she had invested in preparing the lesson package. There appeared a sense of pride and ownership expressed in the final reflection over the lesson package developed. We opined that this sense of accomplishment might be lost if the teacher had been given a set of lesson packages developed by the curriculum developers to be enacted. As such, the lesson co-design experience, while perceived initially to be

“challenging”, was crucial towards developing teacher learning, both in confidence and competence.

Anja’s Post-Lesson Interviews

During the post-lesson interviews, Anja shared that she was satisfied with the lessons, partly because she felt more prepared. She also shared the adaptations she made in her lesson implementation which differed from the plan when she sensed that her students experienced difficulties to “come up with those ideas” and “they are quite lost” in exploring the visual text. Such adaptability to respond to the immediate needs of the students was an indication of her confidence and competence in guiding students effectively in multiliteracies learning.

From the final post-lesson interview, Anja reflected on her experience in designing and implementing a multiliteracies learning package. She opined that the experience led her to reflect on how best to meet the literacy needs of her students in today’s digital and multimodal age. She added that “it’s quite fun actually to teach... and you can get the students very excited”. Anja concluded that the experience has led to her “personal growth... in terms of the pedagogies” for multiliteracies learning.

Students’ Feedback

The students provided positive feedback on their experience of the lessons during the focus group discussion. The students reported that it was “more interesting than most lessons” because it was more “hands-on” and that they felt that they were learning “life skills”. The students also enjoyed Anja’s teaching and described it as “detailed”. They also appreciated the “worksheets [Anja prepared because] if we forget, we can just refer to them”. The students’ comments affirmed the researcher’s observations of Anja’s competency in designing engaging multiliteracies learning.

Discussion

A design-based research approach, given its characteristics of being pragmatic, iterative, and contextual, can be productive in bringing about teacher learning. These premises guided our journey towards teacher learning with Anja. We met the teacher where she was to help her grow in a contextually nuanced and personal manner. The researchers got to know Anja, her beliefs about multiliteracies, and how she had been teaching multiliteracies. During the lesson co-design, there was much negotiation between the researchers and Anja as we made practical decisions, guided by theories, on how best to develop the lesson package for the students. The follow-up discussions with Anja after the lessons and the refinement of the lesson package for the next enactment supported a gradual iteration and improvement of the plans and resources, and facilitated Anja's reflections and growth in her confidence and competence.

The design-based approach presents an opportunity for researchers and teachers to come together in collaboration and equality, drawing on the expertise and experience of each party, to improve teaching and learning and to advance pedagogic shifts. The approach to teacher learning described in this article is complemented with other more familiar approaches such as teacher training workshops and the provision of exemplar lesson packages that the Ministry of Education has prepared in tandem with the new syllabus implementation. While the other approaches focus on training en-masse, the design-based approach caters to the nurturing of a teacher-catalyst to lead a community of practice for scalable pedagogic shifts in a school.

The value of a design-based approach is to bring about a deeper, more reflective, and hopefully sustained, teacher learning. However, the apparent limitation of this approach is that it takes a lot of effort to train very few teachers. As such, it is a costly approach from the policy perspective. Notwithstanding, the privilege of participating in a design-based research can be given to teacher leaders identified with high potential, who can, in turn, mentor the other teachers in the school. In our project, the goal is eventually to have Anja lead a community of

practice on multiliteracies, where she can mentor other teachers in her school, and in time, work with other schools.

¹ Singapore Ministry of Education English Language Syllabus 2020

https://www.moe.gov.sg/docs/default-source/document/education/syllabuses/english-language-and-literature/files/sec_exp-na_els-2020_syllabus.pdf

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Bio

Fei Victor Lim is Assistant Professor at the National Institute of Education, Nanyang Technological University, Singapore. He researches and teaches on multiliteracies, multimodal discourse analyses, and digital learning. He is editor of *Multimodality and Society* and author of the book *Designing Learning with Embodied Teaching: Perspectives from Multimodality*. Email: victor.lim@nie.edu.sg

Thi Thu Ha Nguyen is a research fellow at the National Institute of Education, Nanyang Technological University in Singapore. She obtained her PhD in English Language from the National University of Singapore. Her research interests include general linguistics, language education and gender and language.