Making Science *Youyisi*: A Science Teacher's Reflections on the Changes of Teaching Practice

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Abstract: This case study explores a science teacher's changes of teaching practice in three subsequent years and his reflections on them. Interaction analysis revealed changes of teaching practice in lesson structures, participation framework, and teacher feedback. Video-cued interviews further unfolded the cultural and political aspects of teaching: the teacher used a local concept, *youyisi*, to emphasize the dual meanings of fun and meaningfulness and links teaching and learning science in a holistic, dialogic, and emotional way.

Introduction

Changing teaching practice is a primary goal of teacher learning and professional development. Many studies documented how teachers change their teaching practice in response to curriculum reforms (e.g., McNeill et al., 2017), yet their foci were often on how teachers aligned with such external forces as curriculum reforms (e.g., Davis, 2003). As teachers' decision-making is context-bounded, how, and why, do they spontaneously change their teaching practice? This case study addresses this problem by looking into a middle school science teacher's change of teaching practice in three subsequent years and his reflections on such change. Two research questions guided our analysis. First, what characterizes this teacher's change of teaching practice over the years? Second, how does this teacher interpret the characteristics of such change?

Methods

This study took place in a public middle school in Shanghai, China. From 2017 to 2019, we worked closely with a science teacher, Mr. Li (male, 23 years of teaching experience), in this school, to document his argument-oriented teaching. The first data source of this poster is videos of three lessons about Linnaeus's Binomial nomenclature (a.k.a. two-term naming system) taught by him in 2017, 2018, and 2019. Each lesson lasted about 40 minutes. We conducted interaction analysis on this set of videos (Jordan & Henderson, 1995). The second data source is a video-cued interview with Mr. Li. For each change of teaching practices we identified, we excerpted a short clip (2-3 minutes long) from each year, and watched and talked about these clips with Mr. Li, who would notice something in the video and started to make comments or explain his ideas. We videotaped the entire interview, which lasted 2 hours. The video was then transcribed and analyzed in an interpretive way.

Findings and discussion

Changes of teaching practice in three years

The first kind of change we identified is how Mr. Li organized his lessons. Although all the lessons were based mainly upon whole-class discussions, time was distributed differently. In 2017, Mr. Li used 8 leading questions that covered all content knowledge about the topic, and time was distributed relatively equally to each question. In contrast, he covered only 4 questions in 2018 and 2019. The major difference between 2018 and 2019 is that 75% of the lesson time in 2018 was used to discuss how to establish a standard naming system, while in 2019 half of the lesson time was used to discuss whether a standard name for a living thing is necessary. Mr. Li slowed his teaching down and spent more time on each question, instead of endeavored to cover as much content as possible. This observation is consistent with Chen's (2015) discussions about how Chinese teachers appreciate "non-action" and the empty space they provide to students.

In the same leading question, the participation frameworks were also changed. In 2017, students pondered individually and spontaneously voiced out their ideas. Mr. Li picked up and revoiced some ideas. In this way, Mr. Li was a "hub" that receive and deliver individual thoughts, while students barely conversed among themselves. More important, it was impossible to trace a particular idea back to the student who offered it. In 2018, Mr. Li divided the class into 7 groups. Each group had about 5 minutes to discuss a question, and one student was then selected as a representative to share the ideas of the group in front of the classroom. In 2019, students raised their hands and waited for Mr. Li to pick them up. Those who were picked up then shared their ideas to the rest of the

classroom one by one. Students thus had the opportunity to not only elaborate on their ideas but to respond to some particular peer. An idea was also traceable—not just to a group of students, but to an individual student.

Mr. Li's Reflections on the changes of teaching practice

Youyisi (有意思) is a Chinese phrase (adjective) that has two meanings: The first, literal meaning is "having (有) meanings (意思)," and the second is "fun" or "interesting." This is an expression Mr. Li frequently used when talking about why he changed his practice. For example, he told us that before 2013 or 2014, he did not touch on the Latin language in this lesson because it was not included in the textbook. Around 2015, he began to include this information, but only through lecturing. Later in 2016 or 2017, he started to organize discussions about the Latin as standard language for naming in his lesson. He explained why he made these changes as follows.

> I think this is a very youyisi question [to address in my class]. And I think that what is youyisi is not just the answer per se, but why the Latin language played this role in science—there were scientific deliberations. It is really youyisi because scientific ways of thinking are embedded. … And the key point is, it is not just that the question itself is youyisi, but you need to also consider how to teach it in a youyisi way so that students not only know it is a youyisi thing, but they will learn it in a youyisi way. So that is the rationale of my changes here.

From this excerpt, we see how the two meanings of *youyisi* are embedded in Mr. Li's explanation. On the one hand, he thought that using Latin as a standard language is a fun fact in the history of science, thus he modified the structure of his lesson to involve the knowledge. On the other hand, Mr. Li recognized the underlying reason why the science community chose Latin and thought it was a meaningful way in which students learned the "scientific ways of thinking." *Youyisi*, a local concept, thus nicely niches the dual meanings of fun and meaningfulness and links teaching and learning science in a holistic, dialogic, and emotional way. This finding expands on Ritchie and colleagues' (2011) analysis of positive emotional interactions in science classrooms.

Another recurring theme we identified is that, when explaining why making teaching *youyisi* was important, Mr. Li referred to himself as a person who benefited from fun/meaningful teaching.

> Frankly, this is for my own health. If I feel unhappy every day, every lesson, that's too awful. So I started to think about how to make myself less unhappy, about how to make myself less painful after each lesson. So since then I have been considering how to teach kids in middle school so that I can be healthy. I don't want to be that painful.

We find de Certeau's (1984) notion of *tactics* helpful to understand Mr. Li's ideas here. The pedagogical approach he develops is to create fun experience for students but more importantly, pleasure for himself, who, although a veteran teacher, still finds teaching difficult and emotionally complicated.

We have shown only some brief descriptions and examples to illustrate the main points of our arguments. Our analysis suggests that a teacher's changes of practice are not necessarily a response to external forces such as curriculum reforms or new standards, as previous studies show (e.g., McNeill et al., 2017), but a reflection on, and a productive means to his own standard about what counts as good teaching and his own emotional needs. Understanding why teachers change their teaching practice sheds critical light on the work of teacher learning.

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