TEACHERS' USE OF CURRICULUM: A REVIEW OF LITERATURE

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Abstract: The purpose of this article is to provide a broader and more updated review of the research literature on teachers' curriculum use. Seventy-five articles including thesis, conference papers and research articles on teachers' interaction with the curriculum and curriculum materials were reviewed. The four perspectives on teachers' curriculum use arecurriculum use as following the text, curriculum use as drawing on the text, curriculum use as interpretation of the text and curriculum use as participating with the text were used as the primary lenses to review the literature. Key features and examples of research related to each perspective and a number of practical implications are discussed, particularly from vantage point of designing the curriculum.

Keywords: *curriculum use, conceptual perspectives, curriculum*

INTRODUCTION

Over the past 30 years, there has been extensive research on how teachers use curriculum tools. However, Remillard (2005, 2019) argued that "curriculum use" has not been well conceptualized and lacks overall conceptual coherence. Remillard's (2005) conceptual reframing of "curriculum use" was adopted in this review as a framework to analyse teachers' curriculum use in the selected research. This reframing conceptualises curriculum use into four perspectives- curriculum use as following or subverting the text, curriculum use as drawing on the text, curriculum use as interpretation of the text, and curriculum use as participating with the text (a summary discussion is provided below).

While, Remillard (2005) grounds much of her discussion in the context of mathematics, this review extends to other subjects including Science, English and Social Studies. Therefore, the purpose of this literature review is to provide a broader and a more updated discussion regarding research on curriculum use by teachers. This paper will also provide practical implications for curriculum designers as well as implementers. In addition, this literature review can also be a starting point for researchers studying curriculum use in various subject areas.

METHODS

Work on this review began with the gathering of research articles on teachers' use of textbooks, curriculum and curriculum materials. Peer-reviewed journals were primarily used as the main source of studies. The integrated electronic database of University Malaya online library was used as a major search tool. This provided access to more than 50 online data bases including ERIC, ProQuest, EBSCOhost, JSTOR, Web of Science, SCOPUS, PsycINFO and Google Scholar. So the whole process yielded more than 150 research studies and 15 online books, book chapters, dissertations, and conference papers in the field of Mathematics, English, Social Studies and Science.

The key word searched included *curriculum, teachers' use of textbook, curriculum use,* and *teachers' use of curriculum materials.* The first and second term resulted in the highest yield but included articles which were too broad. Publications that were not directly about teachers' use of curriculum were excluded. As such, the initial collection of articles was shortlisted to 75 articles that covered 1989-2019 periods. This paper reviewed literature specifically related to how teachers use, interact and relate to curriculum resources (such as textbooks, syllabus materials, teachers' guides) prepared to guide instruction at classroom level.

In order to analyse the collected articles, studies were grouped in a table by publication date, and the subject. For each study, key features of the study (e.g., authors, focus, research question, number of teachers), methods used (e.g., data collected, analytical methods), and findings were recorded and analysed. After that, the conceptual perspectives that underlie these researches were analysed based on Remillard's (2005) four perspectives on curriculum use.

The following discussion first highlights a summary of the four perspectives on curriculum use. It then explains the four perspectives in detail, providing examples of empirical research related to each perspective. Finally, the implication of this multiple perspectives on curriculum design are discussed.

A Summary Discussion of the Four Conceptual Perspectives on Curriculum Use

As stated above, Remillard (2005) categorised curriculum use into four conceptual perspectives. The first perspective is curriculum use as following or subverting the text which intends to measure or evaluate how faithful the teacher is to the curriculum. The studies which evaluated the curriculum reform efforts in the 1990s have used this perspective and identified how much teachers faithfully implemented the proposed textbooks. In these contexts, teachers were viewed as conduits that have only one option to follow, use and implement the given curriculum materials.

However, researchers such as Berman and McLaughlin (1978) challenged this conventional assumption of faithfulness or fidelity to characterize the nature of the teachers' relationship with the curriculum. Teachers were seen to be more faithful to the curriculum and therefore more advantageous if they merely followed the curriculum materials. However, a number of researchers have argued that following materials alone could not represent effective classroom teaching (Brown, 2009).

Consequently, this gave rise to the second perspective - curriculum use as drawing on the text. These researchers regard classroom teaching as the main focus of their studies and described how teachers use the text to deliver and construct their lessons (Remillard, 1999). In this perspective, curriculum materials are considered as tools that support teachers (Wertsch, 1991), but unlike the fourth perspective (to be discussed below), they do not have the power to shape teachers' instruction. Hence, researchers argued that this perspective delimits the skills and creativity of the teachers and inhibits its responsiveness to students' needs and learning contexts (McLaughlin, 1976; Berman & McLaughlin, 1978).

As a result, a third perspective is curriculum use as the interpretation of text which focuses on the larger agendas of teachers was formed. In this perspective, researchers examined how teachers read, decode and make meaning from the text (Remillard, 2005). This group of researchers' viewed teachers as active interpreters and explained how they read and comprehend the materials and the factors that influenced their reading (Merco-Bujosa et al 2017; Nicol & Crespo, 2005). In this perspective the nature of relationship is one-sided or unilateral, as it focuses only on the teacher and the teacher-related factors that shape the teacher's curriculum use.

Thus, this gave rise to the fourth perspective which are curriculum use as participation with the text which focuses on possible factors which may shape the teachers' curriculum use. The fourth perspective on curriculum use focuses on the "relationship" teachers forge with curriculum, the factors affecting the relationship and the effect it has on the curriculum implementation (Remillard, 2005; Brown, 2009). In this perspective, the curriculum is seen as an artefact or a cultural tool (Wertsch, 1991), which has the ability to shape the teachers' actions. Hence, this perspective not only focuses on the teacher, but also on the tool, and identifies how both the characteristics of the tool and the teacher shape classroom teaching (Remillard, 2005; Wadheefa & Tee, 2020).

In general, research on these four perspectives promote two broad trends. The earlier studies focused on fidelity of curriculum use or teacher-text relationship, while more recent research have focused on a more nuanced view of the curriculum or the teacher-curriculum relationship (Remillard, 2019). In the following section, various studies grounded in the assumptions of one of the four perspectives on curriculum use are discussed, focusing on the foundation, contribution, strengths, and weaknesses of each cluster.

Curriculum use as following or subverting the text

Historically, the concept of fidelity in curriculum implementation was developed from Rogers' Diffusion of Innovation Theory and the Research, Development and Diffusion model (Bumen, Cakar, & Yildiz, 2014). The studies done by Blakely et al. (1987), Schumacher (1972) and Gottschalk et al. (1981) are some studies that are based on this theory.

The studies which assumed the fidelity perspective determined how well a curriculum was implemented in comparison to the intended curriculum (Remillard, 2018). In doing so, teachers were assumed as faithful implementers having no other choice, or they have to subvert the materials given (O'Donnell, 2008; Remillard, 2018). According to Snyder, Bolin and Zumwalt (1992), the fidelity perspective is the ideal model if the curricula are to be implemented in direct accordance with the intentions of the developers. Researchers commonly associated terms such as integrity or

adherences with fidelity and examined the extent to which teachers follow the guidelines, procedures and use the visual aids prescribed in the curriculum (O'Donnell, 2008).

A number of studies in the fields of mathematics, science, social studies and English curriculum used fidelity perspective adopting various methodological principles. While some researchers have used quantitative survey and experiments (Benner, et al, 2011; Pence, et al 2008; O'Donnell, 2007; Munter et al, 2014; Songer, & Gotwals, 2005) the others have used qualitative and mixed methods (Freeman & Porter, 1989; Manouchehri & Goodman, 1998). For example, Troyer (2017) examined teacher implementation of an adolescent literacy intervention with a coaching component, guided by questions about fidelity of implementation (FoI) and curriculum adaptation. Troyer (2017) used data from observations of teachers (n=17) in nine schools during the 2013-14 school year to conduct a more nuanced descriptive analysis of FoI. She found that few teachers followed the curriculum as given and a vast majority of time spent in implementing the curriculum included adaptations, and that each teacher's adaptations were different.

Studies that adopted this perspective not only identified if teachers faithfully adhered to the curriculum, but they also examined the relationship between curriculum fidelity and students' achievement. Songer and Gotwals (2005), measured the fidelity of implementation in three units of a science curriculum using a quasi-experimental method. The teachers involved in the study were divided into two groups—a high fidelity group and low fidelity group—and measured the differences in the pre-test and post-test scores of the two groups. The researchers found that high-fidelity classrooms made larger gains than their peers in low-fidelity classrooms.

Even though the studies found that only few teachers followed exactly the materials as proposed, these studies offer some insights for the curriculum designers. The findings help curriculum designers to get an overall view of how the text is used by the teachers, thereby getting an understanding of the changes that could be brought in to improve the designing process (Weiss, 1998).

However, the term fidelity of implementation has some conflicts and overlaps with other educational constructs such as teaching, curriculum in use and adaptation (O'Donnell 2008). For instance, teaching and curriculum are considered as opposites; therefore, it is difficult to distinguish between good teaching and fidelity of curriculum implementation to good teaching practices prompted by the curriculum materials Shulman (1990).

In addition, many of the research grounded in this perspective found that very few teachers followed the curriculum as given (Freeman, 1979; Sarason, 1983; Freeman & Porter 1989), making the assumption that curriculum reform as a predominantly a linear process inadequate (Carless, 2001). Many of the teachers in the studies used their creativity and skills to adapt the materials and selectively used the text provided (Carless, 2001; Kuhs & Freeman, 1979; Sarason, 1983). The researchers attributed various factors such as the subject knowledge, teachers' experience, professional guidance and the teaching environment. Most importantly, many of the studies that viewed curriculum use as following or subverting identified the shortcomings of the materials and suggested that in order to achieve greater fidelity, the materials or context needs to be improved (Freeman & Porter 1989). Researchers attempting to study how teachers used the text gave rise to the second perspective – curriculum use as drawing on the text.

Curriculum use as drawing on the text

Another group of researchers used the second conceptual perspective – curriculum use as drawing on the text. This group of researchers focused on teachers and how they drew on the text, with the assumption that the curriculum tools were fixed and cannot be changed (Remillard, 2005). The basis of this perspective in curriculum use is that "curriculum is something experienced in situations and that curriculum materials are resources that teachers use in the process of enacting these experiences" (Remillard, 2005, p. 219).

According to Moulton (1994) research on textbook was dominated by the production-function model. According to this model of learning, or student achievement, the focus is on the "output" of a system after "inputs" such as teachers, textbooks, and school facilities go through the process in that system (Moulton, 1994). The texts in this sense are considered as one of the many resources that are utilized by teachers in constructing the output in classroom. However, most of the researchers who used this perspective did not assume that fidelity of tools was possible as their focus was on how it was used.

The studies which adopted this perspective regarded text as the most possible influences on teaching (Freeman & Porter, 1989; Kuhs & Freeman, 1979; McCutcheon, 1981; Smith, 2000). The studies therefore examined how textbooks influenced teaching and how they were used in planning and determining the content (Floden, Porter, Freeman, Schmidt,

& Schwille, 1981; Freeman & Porter, 1989; Kuhs & Freeman, 1979; McCutcheon, 1981; Smith, 2000; Sosniak & Stodolsky, 1993). The findings of these research indicated that there was no specific pattern of textbook use. They also found that while some teachers used the textbook for selecting content, planning and teaching, the others did not use them. There were inconsistencies among teachers and across school subjects in the way textbook was used (Wadheefa & Tee, 2020).

Stodolsky (1989) for instance, examined how fifth grade teachers differed in their use of social studies and mathematics textbooks. They observed nine teachers for two consecutive weeks and studied how teachers actually used the textbook and the rationale behind their use of those textbooks. Teachers covered only the topics in the books, though not necessary all of those topics or in the order presented. Unlike in mathematics, teachers in social studies drew on topics not covered by the textbook, related or unrelated to its curriculum content. They found wide variation in the extent to which teachers used the content in both social studies and mathematics. These findings suggest that rather than considering the textbook as a blueprint, teachers used the textbook for selective purposes such as a resource to support their teaching.

A longitudinal study was done by Valencia et al (2006) on the use of English reading curriculum materials by four beginning teachers in four different settings and how the curriculum shaped the teachers thinking and practice. Similar to the previous studies, the results showed that beginning teachers teaching were deeply influenced by the materials provided to them. The teachers with the most restrictive materials and environment or weak knowledge mostly drew on the given reading materials and had fewer opportunities to use other materials. The findings suggested that although beginning teachers largely drew on the materials, other factors contributed to the extent to which they used the materials.

Kon (1994) also studied 5th-grade teachers who had just received a new social studies textbook and were beginning to use it with their students. Through the analysis of the seven teachers on their use of the textbook, she found that the textbook did not play a key role in their teaching, but the teacher played the central role in the enacted curriculum and various factors influenced how the teacher used the textbook. The study concluded that teacher characteristics such as their view and perception about the textbook played a significant role in how they received and drew on the new textbook. These findings suggested the need to focus more on the teachers, to identify the role teachers' play in shaping the teacher-tool relationship.

The researchers who assumed the aforementioned two perspectives tended to overemphasize the roles textbooks played in shaping teaching (Remillard, 1999). They generally agreed that textbooks play an important role in shaping teaching. In many schools around the world, textbooks act as a de facto syllabus and institutional education structures and national exams are partly constructed around it (Garton & Graves, 2014; Tyson & Woodward, 1989).

However, textbooks have been widely criticised for their content, their biases and their implicit view of teaching and learning. Researchers argued that textbooks do not have as much a direct influence on the effective implementation of the curriculum as originally believed (Ball & Feiman-Nemser, 1988; Sosniak & Stodolsky, 1993). The researchers found that though teachers regularly use the textbook, they tend to ignore many of the content and teaching suggestions (Kon, 1994; Stodolsky, 1989; Valencia et al 2006). Therefore, one of the key conclusions drawn by these groups of researchers was that textbooks alone would not guarantee that learning in the classroom will improve.

In addition, the researchers who assumed the two afore discussed perspectives argued that the studies which focused on teacher-text relationship usually oversimplified the teacher's curricular decision. Generally, teachers viewed textbook as a resource or an instructional tool and following a textbook is an undesirable way of teaching (Garton & Graves, 2014; Tyson &Woodward, 1989). These findings suggested a need for understanding teachers' larger curricular agendas in order to capture the role of the text in relation to teachers' varied responsibilities. Therefore, to address these weaknesses, the third perspective emerged – curriculum use as interpretation of text. Research on this view focused less on the teacher-text relationship, but more on the teacher-curriculum relationship (Remillard, 2005) - the larger agendas of the teachers, by focusing on how teachers interpreted and enacted the curriculum materials and the factors which shaped their interpretation.

Curriculum use as interpretation of text

The third group of research looked at the teachers as agents or interpreters of the text in the curriculum process (Lloyd, 2008; Ramillard, 2005). Studies that have assumed this perspective have documented teachers' different interpretations of the curriculum tools and its impact on classroom instruction (Lloyd, 2008; Collopy, 2003; Mailloux, 1982). This perspective was founded on the reader-response literary theory, which holds the "phenomenological assumption that it is impossible to separate perceiver from perceived, subject from object" (Mailloux, 1982, p. 20). According to this

thinking, the output of reading a text is facilitated by active and meaningful reading. Therefore, as teachers interpret authors' intentions in their own ways; they create meanings which could be different from what the authors intended to produce (Mailloux, 1982).

Researchers who view curriculum use as interpretations of texts consider curriculum materials to be educative and teachers to be learners (Sherin & Drake, 2009). On one hand, the materials should allow teachers to reconstruct the ideas and translate them into classrooms (Collopy, 2003; Sherin & Drake, 2009). On the other hand, interpretation of the texts requires teachers to understand the content and learn from the materials to adapt and create learning opportunities for students (Remillard, 1999; Collopy, 2003). Researchers with this interpretive perspective assumes that fidelity between written scripts in curriculum guides and classroom actions is impossible as teachers bring in their beliefs and experiences in their encounters with the curriculum (Lloyd, 2008). In other words, this perspective holds that teacher' experiences, beliefs and knowledge are key factors in influencing teacher actions.

A number of studies have adopted this perspective. They found that teachers' interpretations vary significantly depending on factors such as teacher's content knowledge, belief and how they read the text (Collopy, 2003; Chavez, 2003; Remillard, 1992; Merco-Bujosa et al 2017). For example, Nicol and Crespo (2005) studied how four training teachers interpreted and used Mathematics curriculum in their practicum. They found a lot of variations in the teachers' teaching in relation to the same curriculum, ranging from adherence, elaboration and creation. Factors such as how teachers engaged with the text, their knowledge of mathematics and the classroom setting influenced how the teachers interpreted the curriculum.

Utilizing a similar interpretive stance, Merco-Bujosa et al (2017) also explored the differences in teacher interpretation of the science curriculum in learning about argumentation. They employed a multiple case-study design and included teachers who varied in their teaching experience, exposure to the materials and the teaching context. The researchers found significant variation in their use of the curriculum. When some teachers used the curriculum solely to support student learning, other teachers actively engaged in their own learning and adapted the curriculum to their context. Overall, teachers' personal characteristics such as beliefs and knowledge significantly shaped the way they used the curriculum. Their goals in using the curriculum also varied, and this too had a great impact on teacher sense making and learning in relation to curriculum used, even when compared to organizational factors.

The studies that assumed the interpretive perspective considered teachers' greater responsibility by focusing on how teachers enacted curriculum in their teaching. This lens allowed insights into how the teachers were flexible in their interactions with the curriculum, depending on the teachers' proficiency and content knowledge – in the case of this research, the teachers' use of educative mathematics curriculum (Collopy, 2003). However, the meaning teachers made through reading the text reflected their beliefs, teacher's knowledge, experiences, personal goals and how they engaged in the reading process (Collopy, 2003; Chavez, 2003; Remillard, 1992; Merco-Bujosa et al 2017; Nicol & Crespo, 2005).

In the last decade, a number of researchers began to argue that studies on curriculum use were too unilateral or one-sided. Many of the studies discussed above assumed that teachers' curriculum use is influenced by what the teachers brought into the reading of the curriculum, but ignored to the possibility that the tools and context may simultaneously play a significant role in shaping the instruction as well (Brown, 2009; Remillard, 2011). Since the process of curriculum use involves the interaction of teachers and the tool (Rezat, & Sträßer, 2012; Brown, 2009; Remillard, 2011), researchers argued that the characteristics of the tools could also significantly shape how teachers use the curriculum (Brown, 2009; Remillard, 2011). This gave rise to a more bilateral lens to the study of curriculum use – the teacher-tool relationship. This perspective not only focused on the teacher but also other factors that would have shaped the teachers' interaction with the tool.

Curriculum use as participation with the text

The fourth perspective can also be referred to as participation with the texts or the activity of using the text (Remillard, 2019; Brown, 2009). The studies that assumed this perspective dealt with how teachers interacted with the students and used the curriculum contents and materials in the particular school and classroom situation (Wang, 2006). Significant to this perspective is the view that teachers and curriculum tools are involved in a dynamic interrelationship that involves participation on the parts of both the teacher and the text (Brown & Edelson, 2003; Wadheefa & Tee, 2020).

Researchers with this perspective assume a constructivist approach and focused on the relationship teachers forge with the curriculum tools, how teachers react to and use these tools, factors that influence this reaction, and the effect that

this relationship has on the teacher and on the implemented curriculum (Remillard 2005, p.16). Derived from Vygotsky's notion of tool and mediation, this perspective emphasised the use of tools as a sociocultural product in all human activities as they react to one another (Remillard, 2018). Supporting this idea, Lloyd (2008) suggested that this perspective on curriculum use draws upon theoretical ideas about people's use of tools and focuses on interaction between agents and cultural tools or artefacts. The distinguishing characteristic of participatory perspective is the use of tool by the teachers (Werstch, 1991). The focus lies on the relationship between teacher and the artefact (curriculum) and, how and why teachers use and participate with the curriculum resource (Wadheefa & Tee, 2020). This is because the curriculum resources as cultural artefacts are supposed to have the potential to enable, extend, or constrain human activity (Remillard, 2018).

Research done by LIoyd (2008), Remillard (1999, 2005), Sherin and Drake (2009), Wadheefa & Tee, (2020) and Brown (2009) have focused on this participatory approach in curriculum use, and they have examined teachers' participation with the text. Using multiple data collection methods, these researchers concluded that teaching involves a dynamic interchange between teacher and curriculum, agent and tool.

Researchers not only studied teachers from various subjects but they have also done research on teachers from different teaching experiences. For example, Remillard and Brayern's (2004) as well as Sherin and Drake's (2009) studies examined how novice teachers and experienced teachers approached the curriculum tools. They found that the different teachers read different parts of the curriculum for different purposes and that numerous factors contributed the way they interacted with the curriculum tools. For example, some teachers read the guide to get the general view of the lesson and others read supplementary materials to seek possible exercises for students. The researchers identified that this bilateral relationship was shaped by factors such as teacher's knowledge about students, their teaching experience and the instructional guidelines provided in the curriculum materials.

Another study by Chong (2016) on an English teacher in Hong Kong also used this perspective. In this study, the researcher explored how the teacher perceived and mobilized curriculum materials to teach reading comprehension to secondary one student in two stages of implementation. The teacher mobilized the curriculum through a series of additions and modifications. She perceived the difficulty and suitability of the given tasks and modified them before giving it to her students. The researcher concluded that teacher's knowledge not only operated as discrete variables in affecting a teacher's PDC (Pedagogical Design Capacity) but also interacted to contribute to her use of curriculum materials, which was shaped by various factors such as knowledge of curriculum materials, personal practical knowledge, and knowledge of learners.

In another example, Forbes (2011) studied pre-service elementary teachers' adaptation of the inquiry-based elementary science curriculum. This study found that the pre-service teachers consistently adapted the given science curriculum to better promote the five essential features of inquiry. The teachers included anchoring questions, elicitations and tasks which drew upon students exiting knowledge and explanations to engage the students more in the inquiry process. This type of teacher–curriculum relationship was shaped by teachers' personal characteristics, the curriculum materials they used, features of their professional contexts, and outcomes of the curriculum design process.

Over the last decade or so, this perspective has become influential in the field of research on curriculum use. As researchers realised the dynamic interplay between teachers and the curriculum, their focus has moved into this complex interaction between the teacher and the tool. The researchers have found multiple factors related to the teacher, curriculum and the teaching context that helps shape the teacher-tool relationship. However, research which focused how the broader context (e.g. institutional, locational or national) beyond the classroom affects the teacher-tool relationship is limited and hence needs more research.

Implication for curriculum design and teacher training

The review of the research and conceptual literature discussed above suggest that the teacher-tool relationship is diverse and is shaped by various factors. The significance of the curriculum and teachers, and their influence in shaping the teacher-tool relationship has gained significant traction. This would have important implications on how the curriculum is designed and how teachers are trained, to promote better implementation. Two major implications are discussed – one from the perspective of curriculum design and the other from the perspective of teacher training.

Firstly, the participatory view of curriculum use discussed above identified that characteristics of the curriculum including the concepts it represents, the physical features it demonstrates and the procedures it suggests seemed to play an influential role in shaping the teacher-tool relationship. Moreover, Remillard (2011) suggested that the voice of the

text and how teachers subjectively perceive this may significantly shape how teachers use the curriculum. Since the curriculum can communicate and address teachers in different ways through the design of the curriculum materials, it is important to consider how they expect the teacher to respond to their suggestions, and how they represent what it means to use the resources (Davis & Krajcik, 2005). Teachers who teach in different context should be able to use the affordances of the curriculum and deconstruct them or adapt them in order to suit the learning needs of the students.

According to Meidl and Meidl (2011), one of the reasons for the lack of knowledge and understanding about the curriculum is the teachers' minimal involvement in the curriculum design process. "Teachers who are involved in the curriculum development process tend to show greater understanding of the curriculum and show greater consistency between intended and actual use of a curriculum" (Kimpston, 1985, p. 185). These teachers are able to make professional decisions when they adapt and reconstruct the curriculum. The spontaneous decision that teachers have to make in the classroom becomes effective as it reflects the knowledge and experience gained in the process of curriculum development (Meidl & Meidl, 2011).

Sherin and Drake (2009) suggested that the curriculum should not only provide information about teaching activities, subject contents and concepts, teaching methods or students errors, but it should also present teachers with new insights and experiences. Curriculum design must provide opportunities for teachers to explore curricular contents and should allow having effective dialogic discussion with their peers about how the materials could be used in teaching (Forbes, 2011). Remillard (2000) identified that when teachers read the guide they tend to depend on the information provided and minimal discussion occurs between the teachers. However, when they explored the contents in the students' textbook, they tend to examine the unfamiliar tasks in different ways. These discussions can help teachers engage with the materials and develop new ways of interacting with and using curriculum. This highlights the multiple ways teachers approach and use curriculum in their teaching and suggests the need to produce educative curricular materials as well as policy that create the necessary space for teachers to explore different ways for more effective implementation (Ball & Cohen, 1996; Sherin & Drake, 2009).

Secondly, the literature reviewed also provide important guidance for teacher preparation. A number of studies reviewed in this article suggest that the teachers' understanding of the curriculum largely shapes the teacher-tool relationship (Chong 2016; Forbes, 2011; Remillard & Brayern, 2004; Sherin & Drake 2009). Teachers who have a better understanding of the curriculum tend to be more flexible in adapting the curriculum to suit the learning needs of the students. This is because they will be able to better modify and adapt the scripted curriculum in accordance to the curricular goals to fulfil the curricular demands of the students. Hence, it is important to enhance teachers' content knowledge through pre-service and in-service training to improve curriculum adaptation depending on the needs of the learners.

The findings of the research from the various lenses revealed that different teachers require different learning and teaching materials (Chong 2016; Forbes, 2011; Wadheefa & Tee, 2020). It suggests that it is important to train teachers in ways that promote different types of adaptive and creative curriculum implementation. By describing teaching as a design or a craft, Brown (2009) argued that teachers who can "perceive and interpret existing resources, evaluate the constraints of the setting, balance trade-offs, and devise strategies" (p.18) are more likely to be more effective in helping their students learn. For instance, teachers who teach in rural areas may require different kinds of curricular support and materials including reading and writing materials. The professional development program should provide teachers with the knowledge and skills required to adapt the existing materials to suit the learning needs of the students.

In addition, research from the fourth lens particularly revealed that the professional context plays a crucial role in developing the teacher characteristics, which ultimately influence how teachers' use the curriculum (Remillard, 2018; Wadheefa & Tee, 2020). For instance, the professional guidance from the head teacher or discussions between subject teachers would allow teachers to bring modification to lessons. The professional dialogue between teachers can help them to explore the contents that are familiar to students and come up with new strategies to present new contents to the students. Therefore, this encourages the need to plan and conduct multiple professional development sessions to provide teachers with the opportunity to engage in professional discussions to explore the subject and identify various ways it could be taught to students.

In conclusion, it is not only the curriculum that shapes the teacher-tool relationship, but teachers also play a significant role in shaping the teacher-tool relationship. Therefore, along with the improvement of the curriculum design, the professional development of teachers is also critical in shaping curriculum implementation. Teachers should be provided with trainings and professional development opportunities to facilitate curriculum adaptation depending on the contexts they are teaching in.

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