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An Arduous but Hopeful Journey: Implementing Project-Based Learning in a Middle School of China

Abstract The main purpose of this study is to investigate the lived experience of teachers from one middle school in East China who implemented project-based learning (PBL) in their classes. A sample of 22 grade 6 and 7 teachers participated in this research between September 2008 and June 2010. Data were collected from multiple sources including field notes of classroom observation, transcripts of semi-structural interviews and workshop audiotapes. It reveals that teachers were struggling with the roles they should play and in particular with how to effectively facilitate students' project work. However, they also creatively reconceptualized the new curriculum from their own perspectives and brought their students unique and diverse learning experiences. These struggles and reconceptualizations are believed to be the result of teachers' evaluative, identifying and pedagogical culture-cognitions.

Keywords project-based learning (PBL), curriculum implementation, culture-cognition

Introduction

Almost one century ago, John Dewey (1902) advocated a “child-centered” pedagogy declaring that it was the child and “not the subject-matter that determines both the quality and the quantity of learning” (p. 9), and that children’s experience should be “an integral, a total one” (p. 5). Under the influence of such progressive educational creeds, project-based learning (PBL) came into being whereby students are engaged in a problem-solving process structured around issues that are real and relevant to their lives, and where they collaborate to make sense of what is going on and culminate in a final product or debriefing event, where a broad, interdisciplinary focus rather than a narrow, discipline-based focus is underlined (Clark, 2006; Howard, 2002; Wurdinger,

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Haar, Hugg, & Bezon, 2007; Markham, Larmer, & Ravitz, 2003). Although sharing common fundamentals and often practiced in combination, PBL and problem-based learning should not be understood as two identical approaches. The organizing center of PBL is a project that may or may not address a specific problem, and is typically manifested in the format of an end product, a research report, a presentation, a performance or an exhibition. By contrast, problem-based learning, as the name suggests, usually begins with a clearly described problem or series of problems, and finishes with some corresponding conclusions or solutions.

Despite its popularity among global educational reformers, PBL in China has undergone a flexuous developmental course in the past century. In the early 1920s with the discovery of childhood in most social sections and the frequent visits of John Dewey and William H. Kilpatrick, PBL was first introduced and then incorporated into primary and secondary educational systems. But after the 1950s when Dewey's philosophy was severely repudiated by "new" educationalists in reference to the theory of class struggle (Du, 1955; Zhang, 1955; Wang, 1955; Zhang, 1956; Che, 1956), PBL was deliberately erased from the curriculum of compulsory education. It was not until the beginning of the 21st century that the Ministry of Education in China decided to include PBL into a brand new curriculum referred to as "integrated practical activity" resulting from the eighth nationwide educational reform.

However, the gap between the curriculum reform in theory and its implementation in schools still remains a major concern. As to PBL, many articles from newspapers, websites, journals, and books have disclosed how large this gap is in both rural and urban school contexts. Typically, barriers impeding the faithful implementation of PBL include, but are not limited to, the lack of supportive hard (e.g., labs, computers, and libraries) and soft resources (e.g., assessment system for students and schools, news media), the resistance of teachers, the ill management of school leaders and sometimes students' habitual ways of learning (Fan, 2008; Hu, 2008; Liu, 2008; Ge, 2007; Song & Fang, 2004; Jia, 2003). Among them, teachers are believed unanimously to be the foremost factor, because every educational change depends on what teachers do and think (Fullan, 2001, p. 115); without their endorsement, enacting any innovative approach in the classroom like PBL will be "dead in the water" (Wurdinger, Haar, Hugg, & Bezon, 2007, p. 158).

In the Chinese educational arena, macro studies surveying teachers' general attitudes about PBL across schools and provinces through questionnaires prevail (Zhao, Fang & Wang, 2004; He, 2005; Ke, 2008; Qiao, Liu & Jia, 2010), but micro research conducted in sampled schools to investigate how PBL is actually enacted in classrooms is still scant and less comprehensive. Meanwhile, the

terrible quality of some PBL courses currently implemented in some schools result in teachers often bearing the blame; they are seen as the main stakeholders who have unsuccessfully performed their new role. In fact, there is a strong tendency among scholars that positions teachers as just deliverers of PBL rather than as the agents of change or as active developers. To fill gaps in the literature, this paper attempts to address the following four questions, through a thick description of the execution of PBL in one middle school (comprising students usually aged 13–16) in Shanghai:

- What difficulties do teachers confront when implementing PBL as a planned curriculum?
- What resistance do they meet in this process?
- What are the cultural, cognitive, and systematic factors underlying or leading to this resistance?
- In which way do the teachers manifest their reshaping and personalized adaptations of PBL?

Background

As the largest city in the Mainland of China, Shanghai has been given the privilege of designing and experimenting with its own curriculum reform without being impeded by the general framework of the nationwide curriculum reform. Starting in 1998, Shanghai has entered its second wave of curriculum reforms, and the city's new curriculum system featuring local characteristics is firmly in place. Within this system, the new curriculum in basic education has three components: the basic curriculum, composed of all subjects and experienced by every student; the enriched curriculum, which aims to develop students' potential and schools' uniqueness, and is mainly implemented through elective courses like community service, social practice and other learning activities related to the basic curriculum; and inquiry-based curriculum, which includes independent course PBL, and other inquiry activities within the above two curricula.

PBL, according to the definition in the *Curriculum Guide of Inquiry-based Curriculum in Primary and Secondary Education in Shanghai* (Committee of the Reforms of Curriculum and Textbook for Primary and Secondary Education in Shanghai, 2002), is a learning activity where students, backed up by guidance and supports from their teachers, acquire and apply subject knowledge and skills, identify and raise questions, engage in an inquiry process and find solutions to these questions. It confronts the whole life world of students, and includes five core attributes: inquiry-based, open, practical, integrated, and emerging activities. It is anticipated that through this new course students will improve their ways of learning, increase their abilities to think critically and creatively and participate

in social life, and develop multi-intelligence and personality. In the minds of the research team, however, the official description appears to overemphasize the centrality of problems and ignore essential attributes of PBL. In practice, the focus of PBL should not be restricted in the problems it centers around, no matter how real and close to children's lives they are; students should also be given the opportunity to get involved in oral presentation, product-making, report-writing and even performance, rather than the more restricted arena of resolving questions. The authors believe that a more broad-based approach would produce more opportunities to increase students' enjoyment and participation in the inquiry process.

Teaching this brand new curriculum presents a challenge for local teachers, as they have to update their educational philosophy, ways of teaching and models of interaction with students (Li, 2003, p. 79). School-based training (SBT) is thus officially recommended as the main method to acquaint teachers with any aspect of PBL they may wish to know, and prompt their professional development. Such training is requested by and takes place in certain schools which have special needs, is jointly planned and carried out by both outside trainers and inside trainees, and involves regular group meetings as well as individual consultations. Furthermore, to facilitate this transitional process, numerous theoretical books, teacher manuals and collections of PBL cases have also been published, and many supportive websites have been created to provide teaching materials and platforms for the on-line experience of sharing and communication among school teachers (see Zhong & An, 2003; Zhang & Li, 2004; Wu & Yang, 2004; Wang, 2003).¹

The local project "Theory and Experiment for the Reconstruction of Classroom Pedagogy" (TERCP) is a school-based professional development project directed by Professor Zhang Hua from East China Normal University. Teachers from three secondary and five primary schools voluntarily participate in this project and work in partnership with academic associates from the university. The project aims for the fundamental transformation of school teaching from being examination-orientated to being inquiry-based while also empowering teachers as the agents of curriculum planning and decision-making. Specifically, teachers are expected to implement PBL at least once per week, to develop inquiry-based teaching in their own subject areas and to use action research to resolve practical problems in classrooms. The study presented in this article was part of this innovative project but mainly attended to the issues related to the implementation of PBL.

¹ See also supportive websites, both local and nation-wide; the following three might be the most influential ones: www.jggz.net/menu/menu1/yanjiu/inquirylearning/yjindex.htm, www.yj.ptc.sh.cn, and www.chinazhsj.com.

Research Method

A qualitative case study approach was found to best suit the purposes of this research, because such an approach investigates the complex dynamics and uniqueness of certain context, and is concerned with “thick description” of participants’ lived experiences of, thoughts about and personal feelings for relevant events (Cohen, Manion, & Morrison, 2007, pp. 253–254). It is believed that looking at a single case, namely a middle school in Shanghai, can help us understand better the complicated nature of one phenomenon, in this case the challenges of implementing PBL.

Research Setting and Participants

The case study school was an experimental middle school (EMS) located in Pudong New District of Shanghai where the majority of students were born to migrant workers from outside Shanghai and often labeled as economically and educationally disadvantaged. The school’s teachers, more than 90% of whom were Shanghainese, complained about the “terrible qualities” of students enrolled and that most of their time at school was spent helping students improve their academic record. It was also reported that the teachers held on to the traditional methods of teaching and were resistant to the curriculum reform. Despite these issues, school leadership was eager to raise the overall level of teaching and improve the learning outcomes for all of its students. They therefore decided to incorporate PBL in all of the nine classes from grade six to seven as an experimental base for further change.

Participants in this study were 22 teachers (four males and 18 females) from each subject area in grades six and seven. No recruitment procedure was actually adopted for the selection of participants as all teachers in these two grades had been required by the school heads to attend the project TERCP before the researchers entered the field. Theoretically, participation could be considered voluntary since the principal stated early on that anyone who felt uncomfortable teaching PBL in his/her classroom had the freedom to withdraw or end their participation at any time. However, no one actually tried for fear of losing “face” and straining their relationship with the school heads. Despite the above out of hand concern, this study itself follows basic ethical principles. Before this study was formally initiated all participants were informed of the purposes of the study, what they had to do in the process, and the potential benefits to them. Each one was given an opportunity to ask questions in the initial meeting before signing a consent form. They were also informed that all the data collected would be kept strictly confidential and only used for this study, and that all participations’ names appearing in the published article would be substituted with pseudonyms.

Data Collection

From September 2008 to June 2010, research data was collected from multiple channels as a technique of triangulation to increase the trustworthiness of the study. To begin with, all workshops, 30 in total, lasting from 30 to 40 minutes per time, were audio-taped and subsequently transcribed verbatim. Since the participants had absolutely no teaching experience in PBL (although some relevant resources had been supplied such as the collection of representative PBL cases), the school heads expected the researchers to provide a series of introductory trainings showing teachers what PBL theoretically is and how to put it into practice. Hence, the introduction of PBL itself had become the central portion in most of the workshops, especially in the first academic year, though always combined with concrete cases and linked to the problems participants faced in their practices. Some training programs were also designed to enlarge teachers' horizons beyond the boundaries of PBL, by stimulating them to reflect on the inter-relationships and mutual effects between PBL and other curricula, and on the necessity and possibility of teachers doing research. The workshops also served as a learning community whereby participants were encouraged to have conversations about their experiences facilitating PBL, on their understanding of the relationship between PBL and other subjects and on the research in general, and eventually build on each others' ideas. All these vital conversations in fact constituted the main part of the data recorded from the workshops.

Research data was also collected through participatory observation with field notes in almost 40 PBL sessions. Since the leaders of EMS demanded that teachers lead their PBL sessions simultaneously from 1:10 to 1:50 P.M. on the same day (usually Monday or Tuesday), the researchers had to randomly distribute the observation mission in order to document as many inquiry moments as possible. The third channel was semi-structured interviews conducted with the principal and vice principal and then transcribed from voice recorders with their permission. They were asked to share with the researchers their impressions and comments regarding the whole experimental situation of PBL on campus, as in most workshops they were present and sometimes joined in our observation. The question researchers were particularly concerned with was aspects in which gaps existed between the principals' original intentions and teachers' actual practices.

Data Analysis

After all of the research data was recorded and transcribed, the author divided them into meaningful analytic segments and coded them. At the beginning, two pre-determined categories were identified as general indicators, namely the

implementation of PBL and teachers' culture-cognitions. In the later stage of analysis, the first label was divided into three concrete themes: project motif and driving questions, data collection and analysis, and finally data recording and evaluation. They constituted the basic phases of PBL implementation, as well as the main areas in which the participants had debates and challenges. In the process of summarizing the frequency of different codes, there was a lot more data going towards the terrain of "project motif and driving questions" than towards the other two, as its importance for the quality and the sustainability of a project was stressed highly among teachers, and many student groups had in fact spent nearly half of their inquiry time in deciding which phenomenon or question to investigate.

The term culture-cognition comes from the neo-institutionalism theory of W. Richard Scott. In the past decade, scholars have respectively identified the cultural and cognitive perceptions of teachers to explain why teachers fail to implement the PBL curriculum using a fidelity approach (Li, 2011; Ke, 2011; Shen, 2008; Wang, 2007; Jia, 2003; Kratochvílová, 2010). But the interconnectedness of culture and cognition has been intentionally split up. Scott's (2008) concept "cultural-cognition," however, is used to specifically highlight "that internal interpretive processes are shaped by external cultural framework" (p. 57). This article adopted Scott's category and further developed it into three conceptual themes driven by the emerging data and insights: evaluative, identifying, and pedagogical culture-cognitions. Here the evaluative culture-cognition referred to the teachers' perceptions on the whole evaluation system for students and themselves, while the identifying culture-cognition denoted their reflection as to the differences between the role played in traditional teaching contexts and that in PBL course. In addition, how participant teachers reacted to the pressure of transforming their subject teaching into inquiry-based teaching was the nuclear concern of the third theme, the pedagogical culture-cognition. These three codes shared a similar prevalence. After the whole coding procedure was completed, the author compared the relationship between two or more codes, and wrote up all the analysis into a report.

Findings and Discussion

Challenges Associated with Enacting PBL

The role of the teacher in PBL is not about being an information provider but rather an inquiry facilitator. This is generally acknowledged by PBL advocates throughout the world. In this new role, the teacher is not expected to strictly control students' learning process with traditional methods such as direct

instruction, nor to relinquish classroom management by leaving students completely alone, but to stimulate their inquiry mainly through framing meaningful topics and driving questions, developing an atmosphere of shared responsibility and critical thinking, regulating groups' success intermittently with transitional goals, offering immediate on-site feedback and assessing what students have learned from their experience (Zhang & Zhong, 2004; Lam, Cheng, & Ma, 2009; Wurdinger et al., 2007). These general characteristics of PBL are also endorsed by the Chinese Ministry of Education, which highlights the point that the only way of enacting PBL is "to combine teacher's effective guidance and students' freedom of choice and active practice" (Ministry of Education of the People's Republic of China, 2003, section 6, para. 2). However, it is always easier said than done and participant teachers of EMS had undergone many "curved roads" on their way to implementing such a newly emerged comprehensive curriculum.

Project Motif and Driving Questions

The William H. Kilpatrick, one of the forerunners of PBL, kept stressing almost one century ago the critical importance of allowing students to choose their own projects so they could learn to think and plan for themselves (Wolk, 1994, p. 42). Such a principle was also confirmed by the *Curriculum Guide of Inquiry-based Curriculum in Primary and Secondary Education in Shanghai*, and pursued unswervingly in this research project at the beginning. All participant teachers were asked to give students full freedom and responsibility to make up their own research motifs and questions, as it was expected from teachers to find out and trust students' agency, and thus to alter the authoritarian characteristic of classroom culture. Without any experience and knowledge of teaching PBL, all teachers had to follow this instruction, allowing students to select whatever research topics wished. This initial trial, however, turned out to be problematic and ineffective, as indicated by both teachers and the school heads. They realized students' lack of question-forming skills and content knowledge had made most topics difficult to initiate, either too distant from students' real lives, or too big and sweeping to result in easy answers. The computer teacher Fang complained:

First we asked them [students] to write down whatever topics they had interest in exploring. After receiving their replies, another teacher and I found most of them were broad questions about life, such as 'which comes first the chicken or the egg?'; the other questions were too grand and vague such as inquiring about the universe, Mars, Earth and the human body.... if such a method continues, our students will easily get stuck. (Workshop, October 14, 2008)

Once this issue became apparent, teachers were aware of the necessity of intervention in order to facilitate a “proper” inquiry-based approach. They assumed the only way to make such intervention possible and effective was to choose motifs that they were familiar with as teachers and had adequate knowledge about. The mathematics teacher Zhuo indicated that:

[If all of the topics were decided by the teachers], we could make best use of our specialties and talents.... this PBL is supposed to be undertaken by both teachers and students, teachers should therefore have the authority to supervise students, otherwise, students may have difficulties in doing the work well. (Workshop, March 9, 2009)

As time went by, this voice grew so strong that the research team had to adjust the training strategy: When the student-dominated model remained, teachers were permitted to make decision with students on the issue of project motif. The drawbacks to this was that school teachers were professional only in their own subject areas, the general themes the teachers proposed often had too much emphasis on single subjects instead of multiple disciplines, and did not incorporate students’ real-life challenges “where the focus is on authentic (not simulated) problems or questions and where solutions have the potential to be implemented” (Thomas, 2000, p. 4). For instance, one teacher of Chinese language, Zhu, created the theme “Reading classic literary works” for her students. Students under the supervision of another Chinese language teacher, Tang, decided to compare “Traditional and simplified Chinese characters.” Other similar topics included a “Comparison of costumes between the Tang and Qing dynasties,” “Famous wars in the Warring States Period,” and “The human eyeball.” Several teachers did, however, successfully develop wonderful PBL topics based on the integration of their specialties or interests with their students’ own voices. The political science teacher, Hong, listed three general motifs (the school uniform, the shoe and the Shanghai Expo) on the blackboard, and gave students the time and autonomy to discuss and select one from among three. Through a voting mechanism, students finally decided to study the school uniform (observation, March 22, 2010). One physical education teacher, Jin, proposed to explore the history and practical techniques of football, which was welcomed by the majority of the students (Observation, December 21, 2009).

Two other non-trivial problems concerning the quality of projects should be mentioned here as well. First of all, through several workshops each semester, the researchers advised teachers with examples to help their students divide the main themes into several different and operable sub-themes affiliated with concrete driving questions, so that students could have clear-cut directions for inquiry. Although it was widely acknowledged that the sub-themes needed to be developed, in practice, teachers disagreed with each other on how to balance the

power of students and of themselves on this issue. Thus two extremes tended to emerge. At one extreme, students were fully empowered to concretize the same topic on their own but failed to make the inquiry mission for each group heterogeneous. For example, four groups in one class all discussed which perspective they should adopt in order to study the topic “How ‘far’ are the young people from their parents?,” but the driving questions they listed on their sheets had in fact no marked difference with each other (Observation, October 19, 2009). At the other extreme, some teachers maintained their power as the authority to have all sub-themes determined without any consultation with students. For instance teacher Zhu declared in one class that her students were going to explore the historical background and purpose, author and storyline of a famous piece of Chinese literature, *The True Story of Ah Q*, after everyone of them finished reading this book (Observation, October 26, 2009).

In the next place, projects should be orchestrated in the service of conceptual knowledge and principles of one or more disciplines (Barron et al., 1998; Blumenfeld et al., 1991), which differentiates PBL as a curriculum from that of an after-school activity. From the on-site observation, most projects student group inquiries did have an apparent characteristic of one or more subject areas, but many of them were poorly designed in so much that students would not be intellectually challenged. “The four great inventions in ancient China,” “The first emperor in Chinese history,” “The mysterious events on Earth,” and “Great poets in Chinese history” were all those randomly selected based on students’ personal interests without any awareness that all of the information linked to them could be easily found from rote type resources such as the internet or encyclopedias. On other occasions, teachers failed to lead students to an in-depth investigation, and as a consequence, students may not have taken PBL seriously as a precious learning opportunity, but rather as an extracurricular activity in which they could play around or take a rest. For example, members of one group took on the project, “Discovering the games of childhood” and were playing games like “rubber-band skipping.” When asked about what the purposes behind such an activity were, and what exact questions they were studying, teacher Lei answered hesitantly that the “students may gain some feelings via such an activity” (Observation, November 18, 2008).

Data Collection and Analysis

After the topics and driving questions were identified, theory suggests that students should be taught to collect any data contributing to the solution of their questions using a variety of means. According to my observation, however, student groups showed too much dependence on internet searches, some

persistently employed search as the only way to gather information they needed. A typical case was the group studying “The human eyeball,” in which two members were responsible for locating data with the help of Baidu search engine, while others took notes from the information found and presented to them by way of a projection screen (Observation, November 18, 2008). But this sort of data was mostly filled with theoretical terminologies beyond the understanding of young adolescents, and partly because of this it appeared that students blindly believed their results to be absolute truths and without any need for further reflection. As a consequence, the problem-solving process had been reduced to a series of hands-on activities and each group could be “confident” enough to finish several projects one after another in one term. Sometimes students were inclined to be inefficient and go off track when working with computers, by pursuing questions that were peripheral or even irrelevant to the subject matter involved. Having decided to study the human body, one group was found looking for some video games on line, and one member even asked the researchers how many games they knew and how best to play them (Observation, December 2, 2008).

Studies have disclosed that the failure of enacting PBL in some schools is partly attributable to the shortage of hard curriculum resources like modern library, computer, and laboratory (Fan, 2008; Liu, 2008). Several groups with the same or different research intentions had to make do with sharing a single computer in the same classroom. The process of data-collection was always far more time-consuming than originally imagined for the whole class. As EMS was equipped with a modern computer room comprising of dozens of computers, the researchers advised school leaders to make this room accessible to every student doing projects. This was approved and some teachers indeed brought their students to this room at the outset. Nevertheless, they gave up the opportunity soon afterward to avoid relational conflicts with the computer teacher who had taken over the room for her inquiry groups and did not wish to expose her classroom teaching to uninvited colleagues. Due to such a dilemma, many groups had to seek for answers by simply brainstorming among themselves without using any data-collection method, as their teacher might not provide positive interventions in time. For example, the group dealing with the topic “Korean and Japanese characters” was trying to identify the differences between the two writing systems, but they did not bring any reference materials to their inquiry and most of them had no idea of how the two writing systems looked. Teacher Wang looked satisfied with their inquiry and did not appear to notice any potential problem with the group (Observation, October 14, 2008).

Through the workshop training and some published guidebooks, participants should have known how many inquiry methods there were and how each method could be carried out, but for one reason or another the data-gathering process in

most cases did not go smoothly. Some teachers proclaimed to have no adequate knowledge of the topics students were studying and thus refused to provide any helpful suggestions at this stage. Teacher Qi was a representative participant who was always sitting near the speaking platform and reading his own books, showing no concern at what was going on in each group. Some teachers conveyed general instructions to students by lecturing, but failed to give specific and effective advice regarding the projects students were working on. Consequently, students had to go on struggling for data in their own ways. For example, aiming to investigate how the internet would affect students' lives, a group of students decided to design a questionnaire, but due to the lack of teacher Zhuo's supervision, they simply duplicated the question items from a websites with no critical consideration (Observation, November 11, 2008). On most occasions one particular method took precedence over others or became the sole method, severely truncating the data-collection procedure. The group researching "The human hand" was a case in point. By doing one simple experiment and observation, they claimed to have identified all of the features on the surface of the human hand in one class, and rashly ran to the next stage: data analysis and summarization (Observation, November 18, 2008).

Fortunately, the above deficiencies of implementation did not take place in every PBL group. Some of our participants had clearly realized the necessity of gathering data in several ways and of making the best use of the available equipment and environment. For instance, teachers Cai, Pang, and Chun had taken their students to observe the plants and small animals on campus. Teacher Hong advised her students to look into the question "How 'far' are the young people from their parents" through surveying and interviewing classmates in the same grade as well as some of the students' parents. Some teachers had creatively developed inquiry activities with their own characteristics. Teacher Li motivated her students to design many short situational English sketches to learn terminology related to the Shanghai Expo 2010. Teacher Liu encouraged students to draw fingerprint paintings in watercolors to understand better the special functions of the human hand. Students in teacher Tang's class were engaged in exploring the secrets of the twelve Chinese animal characters by painting, paper-cutting, seal-engraving, cross-stitch and pottery-making. To the researchers' surprise, a few innovative teachers were "brave" enough to leave the school campus in order to gather data from further afield. For example, teacher Cai led his students to take pictures of different advertisement slogans concerning Expo in various locations outside the campus; a group of students were accompanied by teacher Li to interview foreigners in downtown Shanghai with regard to their local living conditions in Shanghai.

Studies have also revealed that PBL can train and increase a student's critical and creative thinking skills and meta-cognitive strategies (Liu & Hsiao, 2002, p. 335), not only in the phase of conceptualizing research topics, but also in the stage of data analysis. At EMS, suggestions as to how to integrate, analyze and

summarize data collected from different channels were articulated in workshops, which, unfortunately, had never been taken seriously and translated into classroom practices. Some participants (such as teachers Cai, Fang, and Hong) did realize the fact that students were not equipped with enough knowledge and skills for the data selection and analysis, but they took little account of it and even gave up their attempt of facilitation owing to, as they admitted, the insufficiency of teaching experience and expertise. Take internet searching for example, two points had been emphasized: one was that all references should be from relatively authoritative websites with traceable authors and responsible institutes; the other was to write down original URL addresses affiliated to all on-line information gathered, both aimed at stimulating students to critically select and creatively interpret their data. Seen from observation, however, students maintained a sense of satisfaction with data from non-authoritative websites (such as Baidu Post Bar and Yahoo Answers) and left them as they were without input from their own research. Two other factors might have added to teachers' non-involvement: for one thing, data collected in some groups was meager and too simplistic, thus teachers may have thought that it was unnecessary to organize systematic analysis; for another, training provided may have been insufficient, as the time spent on data analysis was comparatively little, leading to a possible impression that this stage was not as important as the others. Generally speaking, to a large extent teachers did not seize the opportunity of analyzing data to develop their students' high-order thinking skills.

Data Recording and Evaluation

PBL asks teachers to combine both formative and summative evaluation to assess actual progress and output of the project, and the personal contributions of each student. To make this combination possible, a portfolio has generally been employed among practitioners as "a purposeful collection of students' work that tells the story of student's efforts, progress, or achievement in given areas" (Arter & Spandel, 1992, p. 36). At EMS, an inquiry portfolio had been designed from the outset and distributed to every student group. It was composed of member introductions, project motif and driving questions, the journey of data collection, division of work, some final conclusions and personal experiences. The application of this portfolio, however, turned out not as successful as first hoped. Not all of the students in each group were willing to or capable of documenting all the moments they had gone through, and thus the task of data recording often rested on the shoulders of some responsible subjects, such as the group leaders. The group dealing with the topic of "The fish pond" was a representative case where only a few students were writing down their observations, whereas the majority of the others were playing around with nothing to do (Observation, June

8, 2009). What is more, despite all the recording items being printed on the sheets, students either had no idea of what to say or were reluctant to write something more. The suggestion a few facilitators might have given to them had little positive effect on the process. Teacher Chun once confessed to the researchers her misgivings about one group researching on how the kingdom of Qin destroyed the other six kingdoms during Warring States Period (475–221 BCE): “I found their information recorded was always meager and scanty, far less than the amount I anticipated. During this semester I have been advising them to seek and supplement their research with more data, but ultimately they remained the same” (Workshop, June 8, 2009).

Resistance also came from participant teachers. In each semester the researchers provided reflection sheets helping participants capture their thinking and experiences in different phases and situations, including lesson planning, the facilitation process in and out of the classroom, the debriefing in workshops and the improvement phase. It was quickly realized, nevertheless, that most of the teachers were keen to reflect through group dialogue but did not want to formalize their thinking in writing. It was generally agreed that recording personal thoughts in the whole process was a particularly valuable activity but teachers tended to regard it as an additional workload and a barrier hindering them from focusing on the improvement of their teaching practices and students’ development. In consequence, each time a submission of their reflection sheets was requested, there were always some teachers empty-handed. Through this phenomenon it could be deducted that teachers might have not devoted their full energy to the encouragement of students’ portfolio making, and their low intrinsic motivation may have prevented students from recording whole-heartedly. In the case of “The fish pond,” teacher Dong was not aware of the problem that the majority of students did not record any of their inquiry experiences. Only after hearing the researchers’ advice that every member should bring his/her recording sheet and have their observation written down, did he begin to assemble his students and repeat what was said to them (Observation, May 25, 2009).

The public exhibition of portfolios can serve as a good evaluative instrument that invites a larger group of evaluators (students, teachers, school leaders, and outside experts), of whom each party is able to provide constructive suggestions for further improvement. More importantly, with this opportunity students had been given the opportunity to reveal their wonderful ideas and experiences in the inquiry process, increasing their sense of ownership of the project per se and their enthusiasm for doing projects. At EMS, besides conventional products like artifacts and recording sheets, students were encouraged to develop a supplementary e-version of their inquiry portfolio so that information could be more easily stored, accessed, updated and presented in various electronic formats (Tubaishat, Lansari, & Al-Rawi, 2009, p. 44). After a long preparation and

coordination period, an inner-school exhibition was eventually established at the end of this research study, involving all teachers and students who participated in the PBL classes, as well as the heads of school and the research team. Due to restrictions in time and space, this exhibition centered on the presentation of all products the students had made, without employing any evaluation procedure for attendees. To the researchers' delight, however, a few teachers (such as Hu and Liu) had already strived to evaluate their students' research products presented in their own classrooms or to even collaboratively design an evaluation standard with the students.

Unveiling the Mysterious Mask: Teachers' Culture-Cognitions about PBL

Evaluative Culture-Cognition

China, in similarity with other East Asia countries, has a long tradition of examination orientation which has infiltrated into every aspect of schooling and family education. In middle school, the High School Entrance Examination (HSEE) is widely regarded as the cornerstone of each student's education, and comes to be a critical transitional moment in every adolescent's life. Hence to a middle school teacher, his/her top priority is inevitably preparing students for such crucial examination. To extend the preparation time, grade six which used to be part of elementary education has now become a preparatory grade of secondary education in respect to the requirement of Shanghai educational reform of 2004. Teachers in EMS were facing the same but greater pressure, because on the one hand, most of their students came from migrant workers' families whose academic records were generally poor; on the other, the competitiveness of EMS was much lower than other schools in the same district. Given these adverse conditions, the teachers were driven to center their attention and energy on improving their teaching practice and student learning outcomes.

PBL is generally believed to have a positive impact on student's all-round development, especially with regard to problem-solving skills, meta-cognitive strategies, self-esteem and attitudes towards learning (Cognitive and Technology Group at Vanderbilt University, 1992; Tretten & Zachariou, 1995; Bartscher, Gould, & Nutter, 1995). But the evidence of its contribution to students' learning achievements is still sparse, particularly in China. Such a dilemma was realized by the school heads in EMS who constantly mentioned the necessity of providing scientific evidence that PBL was beneficial for students as well as the whole school. In one interview, the principal Ren stated:

I'm particularly interested in PISA [Program for International Student Assessment], why?

I want to use it as a reference to assess the extent to which our students who take part in PBL have improved their skills.... We have already accumulated practical experience, and honestly speaking the idea of the “Theory and Experiment for the Reconstruction of Classroom Pedagogy” [TERCP] is fantastic, but if we remain in this state in the years to come, there would be no change at the level of students and of the school. During the past year, what have we improved? The theory of Prof. Zhang [the project leader] is developed, and the PBL has become a regular curriculum in the school, but what else? (Interview, June 8, 2009)

Participants were less convinced that a better result would occur for students who were involved in PBL, and hence tended to withdraw the time that had been allocated to PBL in order to speed up the process of regular subject teaching (such as teachers Tang and Dong). There was also one occasion that all PBL sessions in grade seven were cancelled simply because the researchers were unable to give teachers a workshop (Observation, April 26, 2010).

Teachers admitted their negative attitude of PBL had been significantly linked to the contemporary evaluation system for middle school which is centered on the HSEE and achievement of high scores. No matter how well students performed in PBL classes, it had a trifling visible connection with their record in HSEE, since the HSEE had never addressed any skills which students learned from PBL such as “inquiry competences and problem-solving skills” (One teacher, workshop, May 25, 2009). Therefore the only way to “recapture the attention of different social sections (including schools) is to formulate policy acknowledging the contribution of PBL to students’ ‘further education’ or *shengxue*” (Zhao, workshop, May, 25, 2009).

It has been stipulated by the Chinese Ministry of Education since the end of 2008 that every compulsory school should enact a merit-based pay system through which teachers are stimulated to perform their jobs as effectively as possible (Ministry of Education of the People’s Republic of China, 2008). However, paying salaries according to teachers’ routine and basically indefinable performance is problematic. As a result, the general level of students’ achievements in each examination and the proportion of students admitted by high schools (especially by those with excellent reputations) becomes the uppermost, if not the only, measurable criterion (Wu & Ma, 2010; Yang, 2011). Seeing PBL as a time-consuming curriculum without obvious effect on their pecuniary benefits, participants had strong feeling of unfairness and disappointment. As a result, it was not strange that the full presence of team members had never been achieved. One each occasion, one or more participants were absent, or arrived late or left early in order to fulfill other commitments. Even in the workshop, teachers were listless with little enthusiasm for the provided training. PBL is widely believed to have potential advantages for

teachers, such as developing their practical and propositional knowledge through persistent reflection and collaboration, and renovating classroom instruction in their own subject areas by the customization of curriculum to students' varying interests and needs, etc. (Glaser, 2000, p. 341). Participatory teachers, however, argued that these advantages "are not the patents of PBL and are attainable from other channels"; as a matter of fact, "fundamental philosophies behind PBL, like inquiry, active listening and dialogue are not strange to us at all, because they have been advocated for many years as basic principles of the second-wave curriculum reform in Shanghai" (Min, workshop, May 18, 2009).

A national survey has shown that despite the fact that almost all of the teachers and school heads clearly understand the meaningfulness of "integrated practical activity" which includes PBL, only one third of the sample schools from 12 provinces have implemented this approach according to the mandated requirement (Feng & Wang, 2009, p. 18). This is also the case in Shanghai. Thus to most participants PBL was regarded more as an administrative burden imposed by school leaders than as a pedagogical obligation they had to fulfill. In order to set up a supportive network among all of the schools which participated in TERCP, cross-school seminars were held each semester in which every school presented their own representative PBL case and had the opportunity to enter dialogue on issues raised. Partly because of this, participating teachers were inclined to perceive PBL as "a 'wedding garment' made for people from the top" or "a decoration for school gates" (Workshop, May 25, 2009). Their reaction can be seen "normal" if the centralized culture of curriculum management in school is kept in mind. Traditionally, teachers have no voice in curriculum reforms, rather, these reforms are always initiated by outside experts, policy-makers and inside principals (Huang, Wang, & Zhao, 2011). By being denied the freedom to choose what curriculum to teach, and how to teach and assess it, teachers are relegated to the role of "technician," consumer and dispenser of other people's knowledge (Wang, 2007). It has thus led to a harmful mindset of overdependence and passive resistance among all teachers, and participants of this study are undoubtedly not an exception.

To inspire morale and motivation amongst teachers, principals tried to openly tempt teachers with more tangible incentives. According to their statements, the city of Shanghai had many prizes and awards for encouraging teachers to conduct educational research in their own fields. If teachers were proactively engaged in PBL, they would have more channels for reflecting on their lived experiences and collecting research data for academic papers, and thus were more likely to win the above stated honors. At the same time, the author and other researchers from East China Normal University could be deemed as an interpersonal resource enriching teachers' social networks. The principal said straightforwardly in one workshop:

When you have trouble, it's very convenient for you to communicate and help each other; let's say, if you want to submit your paper to some journal, these researchers are able to assist you with editing, or supplementing, so it will be easier for you. Without them, where would you find such a fitting resource? (Workshop, May 11, 2009)

However, these incentives had never been taken into account, as teachers had already felt "saturated" with their regular classroom teaching and student management, and were unwilling to shoulder the burden of doing complicated tasks such as designing research studies. Just as teacher Wang noted, educating "is only one sixth of my life [but she did not explain what the other five parts of her life were].... in some simple and easy ways, let us finish our duties, I think that's enough" (Workshop, June 8, 2009).

Studies have also revealed that teaching strategies which support autonomy in the classroom could produce a dramatic increase in students' intrinsic motivation and engagement in learning (Ryan & Grolnick, 1986; Cordova & Lepper, 1996). Intrinsic and extrinsic motivation on the part of teachers may affect pedagogical practices and, in turn, enhance or diminish student motivation, as students are prone to imitate the motivational orientations of their teachers (Lam et al., 2009; Hendy & Raudenbush, 2000). Participant teachers of EMS, seen from the analysis above, did not have strong intrinsic and extrinsic motivation for implementing PBL, and this can partly explain why on many occasions they failed to undertake their responsibilities as mentors, and why many students did not actively join in the community of inquiry and experience its enjoyment and benefits.

Identifying Culture-Cognition

The teacher as the sole knowledge-owner and authority in the classroom is one of the key features of pre-modern education in China (Lu, 2007; Jia, 2003). They are also anticipated as knowledgeable and respectful experts in specific areas and are morally responsible to transmit what they know to students who are in turn expected to learn simply by rote memorization. Regrettably these outmoded cultural features are still retained as the mainstream beliefs among a majority of "modern" rural and urban schools. In PBL, students learn primarily through hands-on experiences and multi-disciplinary inquiries, which remarkably add to the difficulty of instruction for teachers who come from specific areas and thus have narrow knowledge structures (Ge, 2007; Jia, 2003). Most participants in EMS tend to agree that to effectively scaffold students' inquiry the teacher has to act as a knowledgeable expert at different learning domains, which in reality is almost impossible. Therefore it was hardly surprising that some teachers (such as Qi) who kept such belief chose to enact a "laissez-faire" policy and give up any

possible effort of facilitation.

It is true that there are differences in multiple aspects between a PBL facilitator and a traditional subject teacher, but these differences should neither be exaggerated nor viewed as incompatible factors. PBL itself can take different forms, and if students need to be presented with key concepts, procedures and methods at critical junctures during their investigation, content lecturing might be a better option (Ravitz, 2009, p. 7). Apparently, this point had been acknowledged by some participants in EMS (such as Chun and Yong) who were constantly anxious about the chaos students made in the classroom and the dissatisfying quality of the whole inquiry. At the same time, teachers were also stimulated to transfer facilitation strategies of PBL and its progressive ideology into their subject teaching. One teacher, however, revealed to us that she was actually playing two “dissociative” roles in her class.

I used this type of instructional method in my classroom, and was then suddenly asked to apply the inquiry-based method, I think I am acting two roles.... the problem is we are often in such situation: teaching our subjects in traditional manner while teaching PBL in an inquiry-based manner. (Zhao, workshop, May 25, 2009)

But a few others found much less difficulties making this transference happen and eventually integrated the two roles together. A case in point is science teacher Chun who claimed to have transferred the ideas of PBL (such as respecting students’ voices as active listeners) into her science classes (Workshop, February, 17, 2009).

For a long time, there has been an “impassable” chasm between teacher as practitioner, and outside expert as theorist. Teachers across national borders often share an attitude against educational research seeing it as irrelevant to their practices and of little interest (Hammersley, 1993, p. 430). So did teachers of EMS. In workshops the participants were urged to document their “thinking sparks” on two sheets titled “PBL Planning Record” and “Workshop Record.” Both constituted teacher portfolios for the purpose of cultivating self-reflection and other basic qualities required by the research. The teachers questioned why they needed to accept this additional workload in spite of being overburdened with curriculum requirements, accountability requirements and all of the day-to-day pressures of running classrooms. And there seemed to be a lack of sincere intent for cooperation among participants. They even questioned the soundness of advocating teachers as researchers. Teacher Min’s query was quite typical: “Is it necessary for everyone to do research and to be a researcher? Yes, we should regard research as one way of experiencing the world, but there are many other ways. Is doing research an indispensable method?” (Workshop, May 25, 2009).

However, since the early 20th century, the necessity and values of teacher

research has been justified from multiple perspectives. By doing action research and other qualitative research, teachers can increase the quality of their classroom practices that will be built upon a stronger body of research studies (Saba, 2000), affect the politics in schools and become in charge of their own professional lives (Santa & Santa, 1995, p. 446). And in this way curriculum theories could be developed to relate themselves to true practices, and students' lives would be improved with better, more effective ways of learning. Some participants in EMS (such as Pang and Yong) have understood these values and had been conducting some research in their daily lives, but they were afraid that their research studies were far less theoretically supported and methodologically correct than those of academics, since they had never received any rigorous "research education" (Borg, 2003, p. 41) before. Given this concern, a series of programs introducing educational research methodologies (particularly action research and narrative inquiry) was offered in the workshops, illustrated in plain words and with representative cases. Despite the majority's depreciation, a few were further aware of how to conduct a research study, such as teacher Zhuo who claimed as follows: "If you tell us about these methodologies from the beginning of this semester, and let us consciously accumulate some knowledge of them, I shall not be at such a loss when doing my research" (Workshop, December 21, 2009).

As Buckingham once argued, research has no limits other than those of education itself; it is not really a field at all, but a method and a point of view (as cited in Santa & Santa, 1995, p. 447). Participants in EMS also held this perspective and wished to redefine research itself in a broader and closer-to-life light. Such awareness emerged characteristically in teacher Pang's mind who put in efforts to conduct a narrative study titled "A story of one dollar" depicting how the model of her interaction with one student was dynamically adjusted around one Chinese dollar. However, in future training, the word research had better be substituted for teacher inquiry since the latter focuses on providing a process for teachers to gain insight to improve their practices rather than to prepare them to be professional researchers in a traditional sense (Dawson, 2006, p. 269).

Pedagogical Culture-Cognition

"Banking education," a knowledge-transmission pedagogy whereby "the teacher issues communiques and makes deposits which the students patiently receive, memorize, and repeat" (Freire, 2005, p.72), had been believed to be the most effective and efficient model in both pre-modern and modern Chinese society. According to participants' reflection, PBL, despite its transforming relational structure between teacher and student and its ability to endow students with the ownership of knowledge, could not easily take root on Chinese soil. Participants also agreed that, since PBL bore little resemblance to either their current practices or to the methods they had learned and experienced while students

themselves, it would be difficult to adopt PBL (Tse et al, as cited in Lam et al., 2009, p. 566). One teacher captured this problem very well, “it is imaginably hard for us to teach the inquiry-based course which is contradictory to our own educational experiences” (Yao, workshop, May 25, 2009). Such a statement sounds unacceptable when seen in the light of the slogan “Keep Up with the Times” of the current Hu-Wen regime, but seems understandable if one takes into account teachers’ propensity for holding on to a repeated and sealed educational life model (Lu, 2007) and the fact that project-based instruction is much more complex and ambiguous than traditional forms of instruction (Barron & Darling-Hammond, 2008, p. 53).

Participants were emboldened to transfer progressive ideology and operational procedures of PBL to their regular classrooms for the reconstruction of classroom cultures. However, PBL was widely considered as a dispensable workload that was “too far away from our educational life” (teacher Fang, workshop, March 9, 2009), which may have reduced teachers’ intrinsic motivation to fully experience and explore the positive influences of PBL in their regular teaching practice. In consequence, some participants were able to identify certain beneficial aspects of PBL but their understanding was far less comprehensive, such as teacher Dong who admitted that “I have only one harvest [from PBL] that is to listen to what students say, but nothing else” (Workshop, May 18, 2009). Other participants failed to recognize the particularity and uniqueness of PBL and tended to enact it in the same ways as regular subjects. Teacher Hong pointed out that,

... it is more likely to transfer teaching methods often used in my political class to PBL, such as discussion, group cooperation, social practice and hands-on activities. We have been unable to find any new method in PBL to incorporate into our regular teaching. (Workshop, June 8, 2009)

This feedback informed the researchers that in order to utilize PBL as a starting point and a springboard for the reconstruction of the whole classroom culture, teachers might need more external support and time in order to gain deeper reflection on their teaching philosophy and put these reflection into practice.

To the researchers’ delight, however, a few teachers declared themselves to have improved their subject teaching with the effects of PBL. Teacher Qi indicated that PBL left him with a strong impression of letting students speak out; he proposed prompting student participation by introducing students’ life experiences into PBL (Workshop, May 18, 2009). Teacher Long contended that the idea of the student as an agent had been employed in his physical education class and he gave us an example: student ranks had been always out of order, at one time he asked his students to think of resolutions and had each of them discuss its feasibility (Workshop, May 18, 2009). In the meantime, participants

noticed that students may need further systematic training to break the long established learning habits and conditioning before they could take PBL as a way to interpret the world around them. Teacher Yong once stated,

... many students don't like and are unable to inquire and think, they just want others to arrange things for them, they are not used to arguing with each other either, so the first job we should do now is to stimulate their thinking. (Workshop, May 18, 2009)

Conclusion

From the perspective of one particular school in Shanghai, this case study has offered enriched insights into the reality of implementation of PBL. As has been shown in the findings, although the official plan of PBL was presented primarily through a series of school-based training sessions, the teachers in EMS, however, refused to faithfully enact this new curriculum and instead reconceptualized it from their own perspectives. In some cases, the reconceptualization manifested itself as negative resistance, leading to an insufficient facilitation and failure to scaffold students' inquiry processes. Partly because of this, several student groups had dealt with their projects in inappropriate ways, and generally regarded PBL as a recreational or extracurricular activity instead of a valuable learning opportunity. But in other cases, the teacher's reconstruction had resulted in new forms of PBL teaching that had brought their students unique and diverse learning experiences. It confirms that the curriculum implementation could be a process of mutual adaptation where both teachers and students had the ability to create their own curriculum knowledge, no matter how inconsistent it was with that of external theorists and policy-makers.

Participants attributed these redefinitions of PBL to their culture-cognitions and took them for granted. They found it difficult to adapt to become cross-disciplinary mentors because they had long been trained as subject teachers who believed "banking education" was the most workable education model in modern Chinese society. They generally treated PBL as an unwelcome and additional workload imposed by school administrators and had little sense of ownership, since they had always been regarded as "pedagogical technicians" and excluded from the decision-making phase of any curriculum. The unequal power relation between teachers and experts both outside and inside had furthermore made PBL more a threat to participants' "normal" school lives than a golden opportunity for professional development. It also resulted in a misconception among participants that research was not an indispensable responsibility for a teacher. Besides, the whole evaluation system for both teachers and students was considered incompatible with the fundamental ideas behind PBL to a large extent.

During this two-year study, a revolution was “quietly” going on in EMS. After receiving the long-term training and first-handed classroom facilitation experiences, participants had deepened their understandings about PBL and felt increased confidence in interacting positively with “little inquirers.” Although imputing their subjective culture-cognitions to outside objective factors, some of the teachers were disposed to make differences in ways of reconstructing classroom cultures with the philosophy of PBL, promoting the awareness as a reflective practitioner and researcher who focuses more on practical wisdom than theories. Consequently, the whole campus climate became more stimulating, democratic and creative. So it is enough to confirm that the revolutionary contribution of PBL to schooling of China may not be an unrealistic fancy but rather a predictable and likely prospect, if people take a long-term perspective. It also proves the “duality of social structure” in that any institution is both the medium and the outcome of the practices it recursively organizes (Giddens, 1984, p. 25), since individual teachers, though constrained by their schools and the whole society, could exhibit their agency to challenge and alter themselves and the existing system in on-going dialogues with unfolding situations.

All in all, the case study approach has been proved a good way to richly capture teachers’ lived experience of and thoughts about their PBL practices, and their capability of making a difference for school reform. But just like any other case study, the discoveries in this study should not be over-generalized and may not be applicable to all the other schools in Shanghai and the rest of China that embrace PBL as a part of their curriculum system. In addition, since the students, parents and administrators are all stakeholders in school change, their voices about and redefining agencies in this new curriculum should be taken into serious consideration in future research. Moreover, since the aim of TERCP project is to rebuild the school culture as more child- and inquiry-based, how the teaching experience of PBL exactly helped teachers initiate or contribute to the school change program should also be rigorously studied in future.

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