Investigating Chinese Tertiary EFL Teachers’ Beliefs and Practices in the Application of Learning Management Systems Using Q Methodology

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Abstract
The purpose of this study is to explore Chinese tertiary EFL teachers’ beliefs and practices as well as the relationships between them in the application of Learning Management Systems (LMS in short). By reviewing relevant literature, previous studies either carried out research on teachers’ beliefs and practices in the training of basic English learning skills or compared them between novice and experienced teachers. This study fills the gap of research on teachers’ beliefs and practices from the perspective of technology integration, specifically LMS application. By using the Q methodology, 38 EFL teachers teaching the same EFL course to undergraduate students at F University in mainland China were selected as research participants. After collecting research data through open-ended questionnaires and semi-structured interviews, four different types of teachers’ LMS beliefs and three different levels of teachers’ LMS practices were identified by employing Q Methodology software-PQMethod and a web application Ken-Q analysis. Through comparing each participant’s corresponding beliefs and practices, both consistent and inconsistent relationships are found. The research findings not only prove the definite connection between teachers’ LMS beliefs and practices but also reveal the discrepancies between what teachers believe and do while using LMS. In general, The research can not only offer a new methodological solution for further research on cognitive factors like teachers’ beliefs but also provide pedagogical implications to EFL teachers to promote their career development.

Keywords: Chinese tertiary EFL teachers, Learning Management System, Q methodology, teachers’ beliefs, teachers’ practices

Introduction

English as a Foreign Language (EFL) courses are widely taught to students from all majors in Chinese tertiary schools. As an essential part of China’s higher education system, the teaching quality of EFL courses directly affects the overall level of China’s higher education. Chinese EFL courses have entered a fast-developing period since 2012 after having gone through several critical periods of development (Wen, 2019; Hu & Hu, 2020). In recent years, with the growing popularity of online learning, EFL courses in China have accelerated their speed to incorporate new educational technologies. Learning Management Systems (LMS) are designed as a comprehensive online learning management platform to meet the need. However, as a newborn medium of teaching, it has received quite different feedback from Chinese EFL teachers. Some teachers think they have significantly benefited from applying LMS; others doubt or even reject it (Huang, 2004; Li & Zhou, 2018).

Among all the possible factors that may influence teachers’ LMS practices, teachers’ LMS beliefs are well worth the attention. Because teachers’ beliefs, as the cognitive basis of teachers’ practice, have long been considered a decisive factor in teaching, even the learning process (Nespor, 1987; Arnett & Turnbull, 2008; Borg, 2011). Previous research on teachers’ beliefs and practices either targeted a specific language teaching and learning skill, such as reading, writing, learner autonomy, grammar, etc., or compared pre-service and in-service teachers (Borg, 2015). Little is known about how Chinese tertiary EFL teachers infuse their beliefs of LMS into English Language Teaching (ELT hereafter) and how their LMS practices transform their beliefs in return. Therefore, this study set out to explore Chinese tertiary EFL teachers’ beliefs and practices as well as their relationships in the application of LMS. It can fill the gap in research endeavors on teachers’ beliefs and practices in response to new trends of technology integration in ELT. With Chinese tertiary EFL teachers as the main research subjects, this study attempts to answer the following three research questions:

1) What are Chinese tertiary EFL teachers’ beliefs about LMS in ELT?
2) How do Chinese tertiary EFL teachers implement LMS in ELT?
3) What are the relationships between Chinese tertiary EFL teachers’ LMS beliefs and practices?

This paper will first review studies on teachers’ beliefs and practices and the development and functions of LMS. Next, it will elaborate on the research methodology employed in the study. The research findings, discussion, and conclusion will be presented in later sections.

Literature Review

Teacher’s Belief
Beliefs are the best indicators of the decisions individuals make throughout their lives. Although often stated by people as a cognitive concept, “belief” has challenged researchers a lot to reach a consensus on its definition, and so has “teacher’s belief”. Porter and Freeman (1986) think teachers’ beliefs are beliefs about the teaching orientation, which includes the role of students, the
learning process, the role of the school in society, the teachers themselves, the curriculum, teaching methods, and so on. Kagan (1992) defines teacher beliefs as “implicit assumptions about students, learning, classroom and subject content held by pre-service or in-service teachers.” Calderhead (1996) thinks teachers’ beliefs usually refer to the teacher’s teaching beliefs, that is, the opinions held and firmly believed by teachers about relevant concepts such as teaching, learning, learners, curriculum, teacher themselves or their role in the setting and whole process of teaching and learning. Wang (2008) classifies teachers’ educational beliefs from a psychological perspective. They are teacher efficacy, the nature of knowledge, causes motivating teacher’s certain behavior, self-awareness and self-value, self-efficacy, and beliefs about certain subjects. Borg (2011) suggests that beliefs are propositions individuals consider to be true and which are often tacit, have a strong evaluative and affective component, provide a basis for action, and are resistant to change. These studies have different focuses, but their definitions of teacher beliefs show more similarities than differences. To sum up, teachers’ beliefs refer to the ideas or propositions that teachers are self-convinced and pursue when they carry out teaching behaviors in the teaching process.

**Teacher’s Beliefs and Practices**

According to American psychologist Ajzen’s Theory of Planned Behavior (TPB), all beliefs link a given behavior with a characteristic of some kind, such as a consequence or outcome (behavioral belief), a normative expectation (normative belief), or opportunities and resources needed to perform the behavior (control belief). Therefore, teachers’ beliefs are also correlated with, aligned to, or reflected in their practice. Yang (2010) carried out a longitudinal qualitative case study on three EFL teachers selected from keynote universities in China to investigate their beliefs and practices in teaching writing. Through analysis of data, consistencies of beliefs and practices can be found in all of the three teachers. Similarly, Othman (2019) also finds a positive relationship between teachers’ beliefs about School Based Assessment (SBA) and their classroom practices among teachers in Malaysian government-funded schools. To focus the review scope on teachers’ beliefs and practices concerning technology integration, consistent relationships can also be found. Kim, Kim, Lee, Spector and DeMeester (2013) conducted an exploratory mixed methods study among twenty-two teachers who have participated in a four-year professional development project funded by the U.S. Department of Education. They proved that teachers’ beliefs about effective ways of teaching were related to their technology integration practices.

Findings from other studies have led researchers to conclude that teachers’ beliefs are not related or are disconnected, misaligned, or inconsistent with classroom practices. Gao and Liu (2013) focus their research on college English teachers’ beliefs in teaching listening and the relationships between their beliefs and practices. The results demonstrate that college English teachers could not follow their beliefs faithfully in their teaching practices, and accordingly, the disjuncture between teaching beliefs and practices sometimes occurs. Huang (2018) also finds inconsistency between college English teachers’ beliefs and practices in cultivating student’s autonomous learning abilities. Wang, Lee & Park (2020) identify salient belief-practice
discrepancies from a survey of 136 Chinese university EFL teachers about classroom writing assessment. In terms of technology integration, Nugroho & Mutiaraningrum (2020) reveal that EFL teachers in their research were well equipped with the importance and objective of teaching English using digital devices, but appeared hesitant and lacked preparation in their teaching practices.

More relevant articles examining the relationship between beliefs and practices (Sadaf & Johnson, 2017; Zhou, 2018; Tian & Feng, 2019; Li & Yu, 2019; Kartchava, Gatbonton, Ammar & Trofimovich, 2020; Gao & Cui, 2022;) show that there is no linear causal relationship between the two. It is a highly complex, dynamic, and dialectical one and could be influenced by many contextual factors, both internal and external to the teachers. In all the studies, the strength of the relationship varies across individuals and contexts, as well as the type of beliefs and practices being assessed (Buehl & Beck, 2015). There is never a perfect correspondence between beliefs and practices, nor a complete lack of relationship. As stated by Fives and Buehl (2012), the degree of congruence and incongruence between beliefs and practices matters. In the face of this complexity, this study proceeds to investigate the relationship between EFL teachers’ beliefs and practices during the process of incorporating LMS technology which has not yet been delved into.

**Learning Management System**

Learning Management System (LMS) is an online system that allows users to share information and collaborate online (Lonn & Teasley, 2009). The Open University in the UK conducts online education in Europe using FirstClass, developed by SoftArc, and it is often defined as the first modern LMS. The mainstream global LMS include Blackboard, Moodle, Canvas, Sakai, etc. LMS entered China in the 2000s with Blackboard and Moodle as two representatives. In later years, many Chinese universities have tried various kinds of open-source LMS successively. From 2015 to 2016, many LMSs that enabled interactive classroom teaching emerged in China (Chen, Ye, Liu, Xie, Zheng & Ji, 2019). Previous studies also contribute a lot to categorizing different functions of LMS. Hannafin (1999) puts forward the classification framework based on the functions of other LMS modules. The framework consists of two major categories: resources and tools. The category of tools is further divided into resource acquisition, organizational, integrated operation, communication, and scaffolding tools. Dabbagh and Bannanritland Pearson (2004) prefer a four-category division: content construction tools, management tools, evaluation tools, and communication and collaboration tools. After that, Jurado (2014) and others proposed a more comprehensive and widely used framework based on two typical LMS platforms, WebCT and Pigpang. This framework is comprised of four types of tools: distribution tools, communication tools, interaction tools, and management tools.

“SuperStar” is the LMS being dealt with in this research. It comprises one platform and three terminals. The three terminals are the classroom terminal, the mobile terminal (a smartphone application), and the administration terminal. The “one platform, three terminals” teaching system
realizes in-time data collection, cloud analysis, processing, and immediate feedback for online and offline integrated teaching. It also promotes teaching reform and helps build a complete teaching ecosystem under the “Internet+” model. With more similarities than differences with other types of LMS, “SuperStar” comprises four functional modules: course construction; course management; teacher-student interaction or communication, and course evaluation. (“SuperStar” Teacher’s Guide Book, 2020)

The focus of previous LMS-related research is either on investigating teachers’ acceptance of online teaching platforms (Cigdem & Topcu, 2015; Motaghian, Hassanzadeh, & Moghadam, 2013) or exploring teachers’ LMS use only through the frequency of login (Hu & Wang, 2011; Zhang, Wang & Zeng, 2014). Although there is some research investigating external factors that influence teachers’ LMS practices (Kamla & Hafedh, 2010), little is known about the cognitive factors behind teachers’ LMS use. This study aims to fill in the gap by investigating teachers’ LMS practices from the perspective of their relationships with teachers’ beliefs.

Method

This study focuses on Chinese tertiary EFL teachers’ beliefs and practices from the perspective of their LMS use. Based on this objective, the researcher adopts the Q methodology to collect and analyze the research data. Q methodology, or Q-sorting, created by British physicist and psychologist William Stephenson, is a complete research methodology involving technique (sorting), method (factor analysis), philosophy, ontology, and epistemology. The design of Q sorting is based on “dynamic psychology”, aiming to elucidate links between knowledge and action (Lo Bianco, 2015). Q sorting classifies the subjects instead of the characteristics of the subjects. It combines the advantages of using both quantitative and qualitative studies (Brown, 1996). It is good at probing into its participants’ subjective or first-person viewpoints (Stephenson, 1953, 1982). With teachers’ beliefs as one of the significant research constructs, applying Q sorting can best serve the research objective of this study.

Participants

Alltogether 38 EFL teachers at F University were selected as the research participants. Specialized in Finance and Economics, F University aims to cultivate talented students with comprehensive competencies, including technology literacy. By adopting purposeful sampling, 38 EFL teachers were selected because they all teach the same EFL course College English to undergraduate non-English major students. The selection criteria set on the course and target students is to limit the influence of external factors on teachers’ LMS beliefs and practices.

Research Instruments

According to the standard rules of conducting Q sorting, there are three sequential stages. Firstly, in the pre-sorting stage, a questionnaire with open-ended questions is used to collect teachers’ natural statements about teachers’ beliefs and practices concerning LMS use. This is
followed by focus group interviews. An interview protocol is designed by the questions in the questionnaire to further collect teachers’ statements. Secondly, during the sorting stage, a grading grid is designed for participants to sort different statements with the necessary guidance. Thirdly, in the post-sorting stage, the software named “PQMethod (2014)” and a desktop web application Ken-Q analysis, specially designed for Q sorting statistical analysis, are adopted for this study.

**Research Procedures**

There are five key phases to conducting Q sorting (Brown, 2008). Each of them will be explained in detail in this section.

**Generation of the Concourse**

“Concourse” refers to the collection of views, opinions, and problems related to a topic. The concourse can be drawn from different sources: the reviewed literature, literary and popular texts, formal interviews, informal discussions, and pilot studies (Brown, 1993). The researcher used ready-made statements from the literature review and naturalistic statements from focus group interviews as references to develop the belief concourse and the practice concourse, respectively. According to the Theory of Planned Behavior, people hold three different beliefs about their specific behavior; thus, the “belief” concourse was made up of three parts, each of which represented one of the three beliefs: behavioral beliefs, normative beliefs, and control beliefs. Accordingly, the “practice” concourse statements mainly stated the four major LMS functions: a tool for course construction, course management, course interaction, and course evaluation.

**Construction of the Q-set**

When the two concourses were formulated, it was time to construct the respective Q-sets. According to Simon and Paul (2005), the exact size of the final Q-set will largely be dictated by the subject matter itself. A sampling approach was used to sort all the statements in the concourses into categories based on the three types of beliefs and four functions of LMS. Finally, there were 34 statements in the belief Q-set (See Appendix A) and 18 in the practice Q-set (See Appendix B). When the Q-sets were constructed, it was time to design the grading grid. This was based on the number of Q statements and the nature of the subject under study. In general, odd grades are selected, and grades 7 (1-7 or -3+3), 9 (1-9 or -4+4), and 11 (1-11 or -5+5) are the most common ones. No matter which grading system is employed, the arrangement of different levels should be from “the most disagree” to “the most agree” from left to right. Under each level of grade, there are a certain number of statements. The number of statements should follow the principle of normal distribution or approximate normal distribution. The whole Q-sorting design is in the shape of an inverted pyramid. Based on the above, the grading grid for the belief Q-set is designed as follows:
Table 1. The grading grid for the belief Q-set

<table>
<thead>
<tr>
<th></th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
<th>Level 5</th>
<th>Level 6</th>
<th>Level 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most disagree</td>
<td>2</td>
<td>4</td>
<td>7</td>
<td>8</td>
<td>7</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Most agree</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
</tbody>
</table>

Accordingly, the practice Q-set is also formulated. (See below)

Table 2. The grading grid for the practice Q-set

<table>
<thead>
<tr>
<th></th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
<th>Level 5</th>
<th>Level 6</th>
<th>Level 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most disagree</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>6</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Most agree</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
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</tbody>
</table>

Selection of P-set

In Q methodology, the group of participants performing Q sorting is called P-set. As Q methodology is a research method with a small sample size, it believes that the representative views of a particular issue are limited, and the views reflected in a small number of people will also exist in a larger group. Hence, the sample size of participants is usually small. But this doesn’t mean participants are randomly selected. They are expected to have a clear and distinct view of the problem and to define a factor in nature. The selection of participants, like the selection of the Q statements, requires both breadth and inclusiveness to ensure major factors discussed in this study have been fully represented. Hence, a purposeful and strategic sampling strategy was adopted to select reliable participants. The researcher maintained a balanced P-set regarding age, gender, length of teaching, professional titles, and degree. Finally, as mentioned above, 38 EFL teachers teaching the same EFL course to undergraduate students were selected as the P-set of this research.
Operation of Q sorting
The operation of Q sorting refers to the process in which participants grade the statements of Q statements according to a certain scale. This study chose forced distribution with a 7 (-3 to 3) grade scale. In the pre-sorting stage, the Q-set items were numbered and printed on a single sheet. A blank grid in the form of an inverted “pyramid” was printed on another score sheet. The researcher presented some pilot Q sorts as examples to ensure the participants accomplished the sorting efficiently. Each participant first sorted the “belief” Q-set. After that, they continued to sort the “practice” Q-set. After sorting, the researcher conducted follow-up interviews with the participants to detect a more detailed understanding of their Q sorting. This was because the Q-set might not encompass all possible topics. Other themes and topics needed to be explored by asking open-ended questions about the placement of items, especially those at the extreme ends of the grid (-3 and +3 columns). After all these were done, the Q sorting data collection phase was accomplished.

Analysis of the Results
After all the participants completed the Q sorting, data analysis was conducted jointly using PQMethod(2014) and Ken-Q analysis. There were six sequential steps (See Figure Two). The first step was to type in Q statements. After completion, the second step was to input the Q-set by entering the number of Q statements. The third step was factor analysis, principal components analysis (PCA) is performed on the correlation matrix to reveal groupings or patterns in the data. Then, in the fourth step, varimax rotation was selected to improve the interpretability of the results and maximize high correlations so that patterns differentiating participants could be explored further. Once factors had been extracted and rotated, the fifth step was the final Q analysis of the rotated factors by “QANALYZE”. This can generate a report of all the previous steps. Finally, in the sixth step, the researcher assessed factor loadings. Participants whose Q-sorts loaded significantly with the same factor were assumed to have similar views (McKeown & Thomas,1988).

Before conducting the factor analysis, it was necessary to check the Q sorting quality of each participant to ensure the validity of each sorting grid. After careful examination, the researcher found that some participants put the same numbers in two blanks. Those problematic sorts were then identified and revised by the participants in time. Besides, after factor loading, the researcher found that the correlation scores of the three Q-sorts were the same. It rarely happens unless they have replicated each other’s results. To protect the participants’ dignity, the researcher eliminated two of the three subjects instead of asking them to repeat the sorting process. After that, there were 36 participants left for further analysis. According to the principles of simplicity, clarity, specificity, and stability, four belief factors and three practice factors were kept with certain numbers of participants loaded on them. The researcher mainly examined the extreme statements and identified the top six highest approval statements (scores of +3 and +2) and the top six
disapproval statements (scores of -3 and -2) for each factor. So far, the whole procedure of Q sorting has come to an end.

**Results**

After detecting Q factors for each group of Q-sorts, based on the significant statements of beliefs and practices factors, follow-up interviews were conducted with representative participants loaded on each factor to collect further data about their sorting choice. Finally, major types of beliefs and practices, as well as different relationships between them, were defined to respond to the three research questions of this study.

**Major Types of Teachers’ LMS Beliefs**

The identification codes for each participant assigned to belief factors can be found in Table Three. Out of the total of 38 P-set Q-sorts, four participants had significant loadings on Factor One, nine had significant loadings on Factor Two, ten loaded significantly on Factor Three, and five loaded significantly on Factor Four. Two participants were eliminated from Factor One. A total of 8 participants were not assigned to any factor in the four-factor solution based on their statistical disqualification.

**Table 3. P-set Loadings on belief factors**

<table>
<thead>
<tr>
<th>Factors</th>
<th>Number of participants</th>
<th>Participant Codes (S stands for the subject)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>S37, S30, S22, S23</td>
</tr>
<tr>
<td>2</td>
<td>9</td>
<td>S28, S15, S27, S12, S34, S06, S13, S19, S25</td>
</tr>
<tr>
<td>3</td>
<td>10</td>
<td>S35, S01, S09, S38, S33, S10, S20, S14, S02, S21</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>S32, S31, S17, S04, S11</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Participants eliminated S29, S36</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>Participants missed out</td>
</tr>
<tr>
<td>Total</td>
<td>38</td>
<td></td>
</tr>
</tbody>
</table>

**Belief Factor 1. Practical Behavioural Type**

A total of 4 out of 38 teacher participants were loaded on Factor One. Among the statements stating the basic function of LMS, Factor One participants believed LMS could promote teacher-student interaction (Statement No.5). They also believed using LMS can facilitate their teaching and innovate their teaching methods (Statements No. 8 and 2). When considering the advantages LMS can bring to their students, they believed LMS was a way of acquiring knowledge for the students (Statement No.24). In addition, they believed it was better to turn to their colleagues and customer service of the LMS company when they came across problems while using LMS (Statements No.16 and 15). The statements they disagreed with the most show that they didn’t think LMS-based teaching can guarantee “student-centered” teaching (Statement No.1). There was no link between specific theories with their LMS practice (Statement No.12). They also didn’t believe their LMS use was controlled by their previous learning experiences or
their pedagogical knowledge (statements No.32 and 31). Evaluation of teachers’ LMS use can have little impact on their actual use of it (statement No.13). Last but not least, they believed LMS isn’t a good choice to do scientific research (statement No.11). By re-examining the list, all the top 6 agreement statements are behavioral beliefs. Therefore, a primary conclusion can be made that Factor One participants held practical behavioral beliefs about LMS. They only acknowledge the practical use of LMS in their teaching and students’ learning, and they deny the connection of their LMS use with their prior knowledge and the potential to conduct scientific research.

Belief Factor 2: Normative Type

There were altogether nine teacher participants loaded on Factor Two. It was obvious that participants in Factor Two put all four normative beliefs in the top agreement list. They believed all the required competence by the school or educational ministries must be acquired, including pedagogical and technical knowledge about LMS. They also thought they needed to make full use of all the functions of LMS (Statements No. 26, 27, 28, and 29). Additionally, they believed LMS enabled them to give better teaching feedback to their students (Statement No.7). In contrast with participants in Factor One, those in Factor Two disbelieved in LMS’s function of promoting teacher-student interaction (Statement No. 5). They also did not believe students’ interpersonal, critical and creative thinking abilities could be cultivated through their use of LMS (Statements No. 19, 21, 22, 23). There was only one similarity with Factor One, participants in Factor Two also disbelieved their pedagogical knowledge controlled their LMS practice (Statement No.31). In conclusion, participants in Factor Two were strong supporters of LMS. They were advocates of national and school policies on LMS development. They were also very optimistic about its future development. However, at the same time, they had not explored LMS functions deeply enough to cultivate the higher-level abilities of students.

Belief Factor 3: Cognitive Behavioural Type

As the largest group of participants, ten teachers were loaded on Factor Three. The statements ranked top three were all behavioral beliefs about the course management, construction, and evaluation of LMS (Statements No. 4, 3, 6). It showed that this group of teachers had acknowledged the major functions of LMS. Besides, they also believed LMS could promote the innovation of teaching methods and improve teaching feedback (Statement No. 2,7). Last but not least, they firmly believed in the future development of LMS. The top six disagreement statements fell into two categories: one was the control beliefs, and the other was the students’ skills. They did not believe their pedagogical knowledge, professional efficacy, responsibility, or previous learning experiences could control their LMS practice (Statements No. 31, 34, 32). They also did not believe LMS could cultivate students’ interpersonal, critical thinking, and creative learning abilities (statements No. 19, 22, 23). From the above analysis, a conclusion can be drawn about the participants in Factor Three: similar to teachers in Factor Two. They welcomed the incorporation of LMS in their teaching process. However, comparatively, they were more
affirmative about various LMS functions and their future development. Their LMS beliefs were much more profound and broader, so defining them as cognitive behavioral beliefs was appropriate.

**Belief Factor 4: Integrated Type**

A total of five out of 38 participants were loaded on Factor Four. As evidenced by the characteristic statements associated with factor Four, teachers assigned to this belief category believe LMS-based teaching is the inevitable trend of college English teaching reform in China (Statement No.9). They tended to focus on the relevant knowledge and technology they needed to acquire about LMS (statements No.16, 27, 29). They believed the use of LMS can benefit the students in mastering knowledge (Statement No.24). On the contrary, they believed the use of LMS did not relieve their workload (statement No.8), nor did it strengthen the connection between theory and practice (Statement No.12). Similar to participants in Factors One, Two and Three, they also did not believe the use of LMS can cultivate students’ higher-level abilities (statements No.19, 21, 22). Last but not least, they thought LMS-based teaching could not improve the quality and efficiency of teaching feedback. The top six agreement statements were both behavioral and normative beliefs. None of the six top agreement statements was about LMS functions. That meant these teachers had formed their principles of using LMS and were also influenced by external rules or requirements. Overall, characteristic beliefs in Factor Four centered partially on how teachers should teach and partially on what students can learn. On the one hand, they thought they needed to master this new technology. On the other hand, they harbored some doubts about its benefits. In summary, they held integrated beliefs about LMS.

The findings of the four different types of teachers suggest that participant teachers held more behavioral and normative beliefs about LMS use in their teaching process. Apart from this commonality, they differed in their distinctive belief characteristics. With these differences in their LMS beliefs, the research continued to explore whether there were differences in their LMS practices.

**Major Types of Teachers’ LMS Practices**

The identification codes for each participant assigned to practice factors can be found in Table Four. Out of the 38 participants, nine had significant loadings on Factor One. Eight had significant loadings on Factor Two. By eliminating S29 and S36, there were six participants left. Twelve were loaded significantly on Factor Three. Five participants were not assigned to any factor based on their statistical disqualification.

Table 4. *P*-set loadings on practice factors

<table>
<thead>
<tr>
<th>Factors</th>
<th>Number of Participants</th>
<th>Participant Codes (S stands for subject)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>9</td>
<td>S05, S21, S09, S06, S33, S14, S25, S31, S30</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
<td>S37, S32, S01, S26, S34, S02</td>
</tr>
<tr>
<td>3</td>
<td>12</td>
<td>S18, S10, S17, S13, S19, S12, S03, S16, S11, S08, S04, S22</td>
</tr>
</tbody>
</table>
Practice Factor 1: Elementary Users
A total of nine out of 38 participants were loaded on Factor One. It was worth noting that the top three agreement statements chosen by this group were all course construction functions of LMS. The top four to top six agreement statements were all course management functions. It demonstrated that teachers in this group used these two fundamental functions more than the other two: teacher-student interaction and course evaluation. Based on the statements distinguishing Factor 1 from all other factors, teachers who ascribed to it appear to be facilitators of basic LMS functions. They set up online courses and managed them well (Statements No.1 and 3). They submitted various teaching materials and used the “Sign in” function (Statement No.4) in class and the “Assignment” function (Statement No.6) after class. However, they did not use other diversified functions often. Therefore, it was appropriate to call them “elementary users”.

Practice Factor 2: Intermediate Users
There were six participants loaded on Factor Two. Notably, teachers in this group also put the first three-course construction functions on the top list of agreement. Besides, they used “peer rating” (Statement No.11) and “Exam” or “Quiz” (Statement No.16) functions more than participants in Factor One. As for the disagreement statement list, they had chosen “Sign in” (Statement No.4) and “Group Task” (Statement No.7), contrary to that of Factor One. They also put “Timer” (Statement No.10) and “Notice” (Statement No.5) functions in this list. Moreover, although they used evaluation functions often, they did not set grading methods and evaluation scales for each assignment or task in detail (Statement 17). Teachers in Factor Two employed more course evaluation methods than their colleagues in Factor One, but no evidence showed they were good at using interaction functions. So, it was still possible for them to explore more diversified use of LMS. They were more suitable to be defined as intermediate users.

Practice Factor 3: Advanced Users
A total of 12 out of 38 participants were loaded on Factor Three. As the biggest group in the three practice categories, teachers in this group exhibited more differences than similarities compared to Factor Two. Based on their distinguishing belief statements, they put one interaction function (Statement No. 13) and two-course evaluation functions (Statement No.16 and 18) on their top 6 agreement list. It was striking to see statement No.3 on the disagreement list. They thought their LMS page design was not good enough. In addition, they seldom used course management functions like “Timer” and “Voting” (statements No.10 and 8). Similar to Factor Two, they also did not set up a grading method and evaluation scale for each assignment or task in detail (Statement No.17), nor did they use the “Group Discussion” function to guide group tasks (Statement No.14). From the findings above, the teachers defining Factor Three had a strong belief...
that the selection of LMS functions should be based on students’ learning habits and class effectiveness. Based on follow-up interviews, it was evident that this group of P-set participants made stronger efforts to interact with and evaluate their students to facilitate class participation and the learning outcome. To conclude, although they were not experts in using LMS, they put students at the center of their LMS design. Therefore, they were more advanced users of it.

By locating the three different types of teachers according to their LMS use, it is evident that these teacher participants exhibited quite different applications of LMS functions. Are their LMS practices consistent or inconsistent with their beliefs? The answer can be found in the following section.

**Relationships between Teachers’ LMS Beliefs and Practices**

By generalizing participants who loaded on significant belief and practice types, 20 of them were left. As shown in Appendix A, these participants have demonstrated a wide range of differences not only in their LMS beliefs but also in their LMS practices. Diversified collocations can be found by matching specific belief and practice types to each teacher participant.

**Discussion**

By using the Q methodology, four different types of teachers’ LMS beliefs and three different levels of teachers’ LMS practices are revealed. Comparative analysis of the research data proves that inconsistencies do exist between teachers’ beliefs and practices. This section will present further discussions by referring to relevant studies following the three research questions.

**RQ 1 What are Chinese tertiary EFL teachers’ beliefs about LMS in ELT?**

Teacher participants in this study held more behavioral and normative beliefs than control beliefs. According to Ajzen (1991), each behavioral belief first links the behavior to a certain outcome or some other attribute, such as the cost incurred by performing the behavior. Teachers who held behavioral beliefs in this study were quite concerned about the outcome of their LMS practices, especially the learning outcomes of their students. Secondly, Ajzen (1991) thinks normative beliefs are concerned with the likelihood that important referent individuals or groups approve or disapprove of performing a given behavior. As shown in this study, the normative type of teachers agreed with all four normative beliefs and thought they needed to implement LMS-based teaching. These findings resemble that of the study conducted by Sadaf and Johnson (2017). They reveal teachers’ integration of digital literacy was related to their behavioral beliefs, normative beliefs, and control beliefs. However, they give no comparison of the three beliefs embedded within the research participants like this research.

**RQ 2 How do Chinese tertiary EFL teachers implement LMS in ELT?**

In reviewing teachers’ LMS practices, although advanced users comprise the largest group of teachers among the three types, they only account for 32% of the research population. That
shows more teacher participants stay at the elementary or intermediate level of LMS use. These teachers used course construction and management functions more than interaction and evaluation functions. It may result from internal factors such as teachers’ beliefs, knowledge, or past learning or teaching experiences. They could also be influenced by external factors such as students’ online learning attitudes or competency, the school’s or LMS companies’ technological support, etc. The research of Kamla and Hafedh (2010) explored this issue in depth and found three critical factors that influence the instructors’ actual use of LMS. These critical factors are related to the instructor, organization, and technology.

**RQ 3 What are the relationships between Chinese tertiary EFL teachers’ LMS beliefs and practices?**

Consistent and inconsistent relationships have been found between teacher participants’ LMS beliefs and practices. On the one hand, some of their beliefs align with their practices. Some with practical behavioral or integrated beliefs only use elementary functions like uploading teaching materials and releasing online assignments; Some others with normative or cognitive behavioral beliefs can apply intermediate or advanced functions like organizing online quizzes or exams and initiating online discussions. This finding concurs with that of Othman (2019), which attempted to examine teachers’ beliefs and practices about School Based Assessment (SBA) in Malaysian schools. By adopting Pearson correlation analysis, the research yielded a significant relationship between teachers’ beliefs and their assessment practices.

On the other hand, some teachers’ practices did not follow their beliefs. For instance, the majority of elementary users held cognitive behavioral beliefs. On the contrary, some advanced users had integrated beliefs. Similar results can be found in Gao and Liu’s study (2013), which investigated 325 Chinese college English teachers’ beliefs in listening teaching and the relationships between teaching beliefs and practices through questionnaires and case studies. The results showed that they could not faithfully follow their beliefs in teaching practices, and accordingly, disjunctures between their beliefs and practices sometimes occur. Likewise, the findings of Nugroho & Mutiaraningrum (2020) also revealed that EFL teachers were well equipped with the importance and objective of teaching English using digital devices, but appeared hesitant and lacked preparation in their teaching practices.

**Conclusion**

This study aims to explore Chinese tertiary EFL teachers’ LMS beliefs and practices as well as the relationships between them. By using the Q methodology, four types of teachers’ LMS beliefs and three levels of teachers’ LMS practices were generated. Through comparing each teacher participant’s corresponding beliefs and practices, both consistencies and inconsistencies can be found. These research findings could prove the definite connection between teachers’ beliefs and practices and reveal that sometimes there are discrepancies between what teachers believe and do. From what has been elaborated above, this research fills the gap of research on
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It highlights the importance of teachers’ beliefs in the teaching process. Q sorting offers a new methodological solution for further research on psychological or cognitive factors. It is beneficial to EFL teachers to help them recognize the profound and unheeded influence of their pedagogical beliefs on their teaching practices. The research findings are also valuable for school administrators who advocate technology-education integration and enterprises who developed the LMS products. To improve the effectiveness of EFL teachers’ LMS practices, it is advisable for researchers who have an interest in this field to delve into the factors that have brought the inconsistencies between teachers’ LMS beliefs and practices, thus promoting EFL teachers’ LMS teaching and even their career development.

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**Appendices**

**Appendix A**

**Generalization of Teacher Types**

<table>
<thead>
<tr>
<th>Participant</th>
<th>Belief type</th>
<th>Practice Type</th>
<th>Consistency</th>
</tr>
</thead>
<tbody>
<tr>
<td>S30</td>
<td>Practical behavioral</td>
<td>Elementary</td>
<td>consistent</td>
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<tr>
<td>S25</td>
<td>Normative</td>
<td>Elementary</td>
<td>inconsistent</td>
</tr>
<tr>
<td>S06</td>
<td>Normative</td>
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<td>inconsistent</td>
</tr>
<tr>
<td>S33</td>
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<td>Elementary</td>
<td>inconsistent</td>
</tr>
<tr>
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</tr>
<tr>
<td>S14</td>
<td>Cognitive behavioral</td>
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<td>inconsistent</td>
</tr>
<tr>
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</tr>
<tr>
<td>S31</td>
<td>Integrated</td>
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<td>consistent</td>
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<tr>
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</tr>
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<td>S34</td>
<td>Normative</td>
<td>Intermediate</td>
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<tr>
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</tr>
<tr>
<td>S01</td>
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<td>consistent</td>
</tr>
<tr>
<td>S32</td>
<td>Integrated</td>
<td>Intermediate</td>
<td>consistent</td>
</tr>
<tr>
<td>S22</td>
<td>Practical behavioral</td>
<td>Advanced</td>
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</tr>
<tr>
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<td>Normative</td>
<td>Advanced</td>
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</tr>
<tr>
<td>S12</td>
<td>Normative</td>
<td>Advanced</td>
<td>consistent</td>
</tr>
</tbody>
</table>
Appendix B

Questionnaire of LMS Beliefs

Behavioral Beliefs:
1. LMS-based teaching can truly achieve a “student-centered” objective.
2. LMS can promote the innovation of teaching methods.
3. LMS can make course construction more systematic.
4. LMS can realize more effective course management.
5. LMS can promote teacher-student interaction.
6. LMS can make course evaluation more objective and diversified.
7. LMS-based teaching can improve the quality and efficiency of teaching feedback.
8. LMS can help teachers complete teaching tasks more efficiently and reduce workload.
9. LMS-based teaching is the inevitable College English teaching reform trend in China.
10. LMS is an effective way to test students’ learning results.
11. LMS helps teachers to carry out scientific research.
12. LMS strengthens the connection between theory and practice in College English teaching.
13. Evaluation of teachers’ use of LMS can promote teachers’ teaching effectiveness and career development.
14. I use my knowledge of educational technology and pedagogy to solve problems in the process of using LMS.
15. I solve the problems in using LMS through the customer service of Superstar Company.
16. I solve the problems in using LMS with the help of my colleagues.
17. I improve my application ability for LMS by attending relevant training and lectures.
18. I improve my application ability of LMS through self-summary and reflection.
19. LMS-based learning can develop students’ interpersonal skills.
20. LMS-based learning can develop students’ autonomous learning skills.
21. LMS-based learning can develop students’ cooperative learning skills.
22. LMS-based learning can develop students’ critical thinking skills.
23. LMS-based learning can develop students’ creative learning skills.
24. LMS-based learning can help students master knowledge.
25. LMS-based learning can bring students a better learning experience.

Normative Beliefs:
26. I should actively apply new educational technology to my teaching.
27. I should master the knowledge and technology related to LMS.
28. I should make full use of the functions of LMS in my teaching.
29. I should use information technology to make students’ learning more convenient and happier.

Control Beliefs
30. My LMS use is controlled by my ability to use information technology.
31. My LMS use is controlled by my pedagogical knowledge.
32. My LMS use is controlled by my previous learning experience.
33. My LMS use is controlled by my knowledge of educational information technology.
34. My LMS use is controlled by my professional efficacy and responsibility.

Appendix C
Questionnaire of LMS Practices

Course Construction:
1. I use LMS in all the courses and classes I teach.
2. I share different kinds of learning resources in LMS.
3. My page design on the LMS is concise, neat and user-friendly.

Course Management:
4. I use the “Sign in” function to check student attendance.
5. I use the “Notice” function to post online notices.
6. I use the “Assignment” function to assign online assignments.
7. I use the “Group Task” function to assign online group tasks.
8. I use the “Vote” function to initiate online votes.
9. I use the “Questionnaire” function to release online questionnaires.
10. I use the “Timer” function to record students' time to complete in-class tasks.
11. I use the “Rating” function to invite students to do peer ratings.
12. I use the “Manage” function to invite colleagues or students to join the teaching team as course assistants.

Course Interaction:
13. I use the “Manage” function to organize online discussions.
14. I use the “Group Discussion” function to guide group tasks.
15. I use the “Quick Answer” or “Select” function to raise questions in class.

Course Evaluation:
16. I use the “Exam” or “Quiz” functions to compose, test, and mark papers online.
17. I set up the grading method and evaluation scale for each assignment or task in detail.
18. I use the “Statistics” function to view and export students’ grades.