

Research Paper

Towards a cultural framework to understand teachers' ICT adoption: a case study

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Contextualization

Along with the rapid development of information and communication technology (ICT), wide-ranging pedagogical innovations through the use of ICT have been taking place in many Asian countries. A common situation characterizing these reforms is that the 'foreign' pedagogies that were mainly 'imported' from the West, often met with resistance from the local community in their actual implementation. The 'non-acclimatization' of innovative technologies and pedagogies has become a common phenomenon that transcends national boundaries and has sparked global concerns from researchers who face the same problem in different countries and regions, such as Singapore, India, Taiwan and Hong Kong. The present study is situated within such a context in China's higher education, in which the pedagogical adoption of ICT is generally featured as 'wearing new shoes to walk on old roads'. To understand the inefficient use of ICT, the present study focuses on the institutional culture, which is largely unseen but deemed to have a pervasive impact on individuals' adoption of innovative agendas. By developing a multi-dimensional cultural framework, this study aims to establish a new research agenda and generate new research questions for a deeper understanding of teachers' ICT adoption and pedagogical change in higher education.

Abstract: *This study examines the impact of culture on teachers' pedagogical adoption of ICT, in order to gain a deeper understanding of the current development of ICT implementation in China's higher education. The data presented and discussed in this paper comes from a two-month case study conducted in a university in southern China. The findings indicate that several culturally-anchored factors play a significant role in how teachers perceive, perform and persist in ICT-supported teaching activities. The addressed teachers' ICT-related beliefs and behaviours are further justified as the visible symptoms of a deeply rooted cultural impact, which eventually hindered the university's efforts to change. The cultural barriers to ICT integration identified in this study calls for a reformulation of the institutional culture into one that fosters teachers' ICT adoption and exploration of innovative pedagogies. This study also contributes to the current knowledge base by grounding a cultural framework that enables researchers and practitioners in other countries to diagnose culturally anchored characteristics that impede teachers' adoption of technologies, so as to manage more efficient change.*

Moving forward requires some sign posts along the way and measuring culture climate must be one of the beacons of educational reform.

Jerome Freiberg (1998, p. 1)

Introduction

Preparing young adults to meet future challenges is a major mission of higher education. In recent years, China's higher educational system has been in a transition period, targeting an innovative modelling of talent cultivation for the new demands of an emerging knowledge society. This reform is faced with an array of challenges that have long been existing in the higher educational system: the hierarchical nature of institutional structures, which has constrained the dynamics of pedagogical innovations; large blended classrooms, which have suffered from a lack of interactivity; the teacher-dominated pedagogy which reinforces the negative effects of passive non-participatory learning; and the examination-oriented knowledge transformation model, which fails to cultivate students' critical thinking and problem solving skills (Cai & Guo, 2006; Gu & Shi, 2010; Wang, Shen, Novak, & Pan, 2009). Based on these considerations, wide-ranging pedagogical changes have been taking place since the late 1990s, targeting a fundamental shift in the pedagogical philosophy from a traditional teacher-dominated knowledge transition mode to a more learner-centred, experience-based and interactive one (see, Ministry of Education, China, 1999, 2002, 2007, 2010). To facilitate this project, and with the growing interest in using technologies as a 'revolutionary tool' to support innovative teaching, the Chinese government has initiated a significant investment in the provision of information and communication technologies (ICT) in higher education. The purpose of this policy agenda has been the cultivation of an ICT-facilitated more democratic and creative atmosphere in which active knowledge construction can be achieved (Gu & Shi, 2010). Nevertheless, despite a sound grounding in national policy and theoretical assumptions, a series of wrongheaded adoptions have emerged in the actual implementation. As observed by some scholars, the use of technology was often ritualized as surface procedures or transformed into pedagogically familiar approaches by educational practitioners (Chung, 2005; Earle, 2002; Zhang, 2009). Therefore, critical investigations on the inefficient ICT usage are needed, so as to give meanings and directions to the future efforts in implementing ICT adoption and change.

In the studies of educational change, there has been revived interest in understanding how cultural context mediates individuals' adoption of innovations since the late 1980s. Central to this line of research is the assumption that the deeply-seated values, beliefs and ideologies shared by members in a academic community function as 'interpretive schemes' that shape how they perceive, think and act (B. R. Clark, 1980; M. Clark, 1988; Tierney, 1988). Through the perspective of culture, therefore, researchers are able to go beyond the external 'demand' and move into the internal logics of the institutional responses to change. They can address the further questions, such as 'what is the response to a particular change in external conditions?' and 'as a "demand" flows into the system, who supports it, who resists it, and how is it organizationally implemented and thereby shaped?' (M. Clark, 1988, p.107)

In the field of educational technology, however, most of the studies carried out so far to understand teachers' ICT adoption are premised on a poststructuralist view, which claims that teachers' ICT usage is often challenged because of their pedagogical, technical, biological and sexual backgrounds (Chung, 2005, p. e.g., ; Hu & Webb, 2009; Yu & Zhang, 2001); the impact of a larger cultural context on teachers' ICT adoption has not been received much attention until recently (e.g., Wang, 2007; Zhang, 2009). The present study, which investigates how a series of cultural elements shape the teachers' interpretations and implementations of the ICT agenda in a university department in China, seeks to contribute to this small body of research. Through a small-scale case study, it aims to explore what the

teachers believe and perceive in a certain culture, and how the beliefs and perceptions influence their development of ICT-supported innovative pedagogies.

A cultural framework to understand teachers' ICT adoption

In the field of education, the concept of culture is generally described as a set of deeply-seated values, beliefs and ideologies that are shared by the members in an academic community (B. R. Clark, 1980). This term has been consistently refined and applied to a wide range of disciplines in education, such as academic management (Allen, 2003; Sporn, 1996; Tierney, 1988), professional identity (Bebeau & Brabeck, 1987) and pedagogical change (D. Hargreaves, 1995; Kezar & Eckel, 2002). The various conceptualisations have rendered the notion of culture multi-faced and prone to a variety of interpretations. Based on the research context of the present study, this section identifies the essential and operative cultural elements to teachers' ICT usage.

Epistemologies

When discussing educational reform from knowledge transmission to active learning, a dialogue is required indeed on the aspect of teachers' epistemologies (Baxter-Magolda, 1992). The concept of epistemology generally refers to "individuals' beliefs about the nature of knowledge and the process of knowing" (Hofer & Pintrich, 1997; Prawat & Floden, 1994). Previous studies have uncovered that teachers with different epistemologies (e.g., objectivist and constructivist) have different interpretations of educational values and aims, curricula, pedagogy, assessment, the role of teacher, student and the relationships between them (Buchanan, Burts, Bidner, White, & Charlesworth, 1998; Lee & Tsai, 2012; Schraw & Olafson, 2003; Scott, 2008). A consensus raised in this line of research is that teachers bring into teaching with pre-existing beliefs about the structure of knowledge and perceptions of pedagogy, which form an 'intuitive screen', through which instruction is interpreted and implemented (Buchanan et al., 1998; Ertmer, 2005; Niederhauser & Stoddart, 2001).

So how are teachers' epistemologies related to their ICT adoption? Computer technology, in itself, does not embody a specific pedagogical orientation but incorporates a spectrum of possible approaches to teaching and learning based on different pedagogical orientations (Niederhauser & Stoddart, 2001; Salomon, 1993). The educational adoption of technology, therefore, requires not only teachers' understanding of *what* functions technology has for education, but also of *how and why* technology is applied. This encourages a careful examination of teachers' epistemological beliefs, as these influence their reasoning and judgements on the kinds of knowledge to be taught, the approaches of pedagogies to be conducted, and, thus, possibly shaping the ways technologies are understood and employed. Based on the analysis, this study attempts to cast light in the research question:

- 1) In what ways and to what extent do teachers' epistemological beliefs influence their interpretation and implementation of educational technologies?

Professional values

Professional values are defined by Levinson (1996) as the intrinsic incentives and associated extrinsic benefits that are highly valued by an academic community. Within educational research, professional values have become the most important predictors of achievement, since they directly reflect the 'beliefs and motivation' of teachers about 'what is worth doing and how hard to work to accomplish a goal' (Maehr & Braskamp, 1986, p. 110). This encourages the attempt to assess teachers' *technology judgment* through their *value judgment*. Specifically, the ICT-supported constructivist pedagogies require a huge amount of preparatory work from teachers: it requires sophisticated pedagogical planning, diverse

teaching resources and creative assignment design (Becker & Ravitz, 1999). Without a value which works as a motivation for this innovative work, it does not seem likely that many teachers would make the heavy investments in time and energy that are required. Motivation theories and evidence from the existing research on teachers' performativity have emphasized the importance of the *practical* issues to teachers' work, such as career development, salary, teacher-student relationship and working environment (Houston, Meyer, & Paewai, 2006). Therefore, in order to explain the degree of teachers' commitment and engagement to ICT-supported pedagogical change, it is necessary to understand their general interest and motivational factors as a collective group in a given academic community. In particular, this study asks:

- 2) In what ways and to what extent do teachers' professional values influence their incentives to develop ICT-supported innovative pedagogies?

Power structure

In the past decade, power structure has become one of the most pervasive and influential concepts in studies on the management of educational change. As Sarason (1990) asserted, schools and school systems are political organizations in which power is an organizing feature; the management of educational change cannot be understood without an insight into the ways power is allocated and used (Sarason, 1990). For most of the 20th century, school management was dominated by a 'control paradigm', which was grounded in the view that educational institutions are bureaucracies run by carefully-specified procedures to produce qualified students as their standard products (Darling-Hammond, 2007; Hollingsworth & Sockett, 1994). Since the late 1980s, however, a new wave of research into management has emerged, strongly motivated by the desire to restructure power relations along democratic lines (Fullan & Hargreaves, 1991; Fullan, 1993; A. Hargreaves, 1994a, 1994b; Sarason, 1990). The accompanying concepts, such as 'shared governance', 'participatory decision-making' and 'empowerment', have denoted a shift away from the top-down managerial culture to a bottom-up, decentralized one. A key element of this intellectual movement has been the challenge to the managerialism and accountability that characterise the way traditional managerial culture regulates change (e.g., Bailey, 2000; Darling-Hammond, 2007; Earl & Katz, 2000; Hargreaves, 1994a). This body of research was largely inspired by an emerging conception of teaching as complex *intellectual* work, that requires professional judgement, expertise, reflection, research and continuous learning from teachers (e.g., Day, 2002; Fullan, 1999; Giroux, 1988). In light of this understanding, the traditional approach of bureaucratic intervention, which aims to direct change by imposing standards, effectiveness and accountability, has been criticized on the ground of creating inflexibility among teachers and stifling their freedom and intelligence in exploring creative pedagogies (Bailey, 2000; A. Hargreaves, 1994a, 1994b). These insights are inspiring to the focal issue of this study. Teaching with technology today has been increasingly regarded as a 'pedagogical adventure' that involves teachers in a creative process of imagining, experimenting with and evaluating innovative approaches with technologies (Somekh, 2007). Different power structure embedded in the managerial approaches can either encourage or stifle teachers' pedagogical adventure to change. An analysis of the power structure in the selected institutional context, therefore, would bring forth some fundamental understandings of the ways teachers process and respond to the university's ICT agenda at the institutional level. Accordingly, this study poses the question:

- 3) In what ways and to what extent does the power structure of the institution influence teachers' initiation of ICT-supported pedagogical change?

Research methods

For the investigation of these research questions, a single-site case study over two months was conducted. This study was carried out in a university in southern China, which is a pioneer institution for initiating ICT-supported pedagogical innovations. The advanced instructional facilities in this university, such as the adequate provision of Internet-enabled PCs on campus, related digital equipment and a well-designed Web 2.0-based intranet, rendered it an ideal setting for the purpose of this study. Regarding the selection of teacher participants, six teachers were recruited from three departments on the basis that their lectures are likely to be supported by information technologies. From much pertinent literature, a series of personal characteristics have been defined as factors that influence teachers' use of ICT (Hu & Webb, 2009; Schneckenberg, 2009). Accordingly, additional efforts in sampling have been made to reflect a good distribution of age, gender, status and length of employment amongst the six selected teachers.

The data collection procedure encompasses two sequential phases. In the first phase, the six teachers were interviewed in order to garner the data regarding their ICT-related beliefs, values and opinions that they held under the institutional cultural context. In the subsequent phase, participant observations were conducted in both classrooms and online class communities to obtain a nuanced picture of teachers' ICT usage. A combination of the two data sources, namely the interview and observation, reinforces the picture of how culture works.

Based upon the formulated theoretical framework, the interviews were conducted to elicit three perspectives of information from the teachers, namely, their epistemologies, professional values and perceived power structure in the institution. To learn teachers' epistemological beliefs, they were asked about their perceived best ways of teaching and learning. In regards to their professional values, the questions included their professional goals and the meanings they attached to teaching. In the last section, regarding the power structure, questions were designed to learn what the university's ICT agenda really looked and felt like to the teachers, how they translated the paper policies into practical ideas, how they found ways to fit them into their teaching, what kinds of support sustained them and what obstacles got in their way. The focus of the participant observation was designed into three dimensions: 1) how the online discussions were organized by teachers, 2) the extent to which the teachers were engaged in ICT-supported teaching activities, and 3) the means by which knowledge transmission and acceptance were achieved.

In regards to the ethical issue, the British Educational Research Association (BERA, 2004) defines the basic ethical guidelines and I adhered to these at all times. Before beginning the interviews, I informed the respondents fully about the purpose of my research and the protection of their privacy and anonymity. In this report, all the interviewees were discussed by referring to a pseudonym instead of the full name. Concerns about ethical issues were also incorporated into the conduct of research process. The nature of the research questions requires eliciting the private details of participants' hidden attitudes and motivations, such as the extent to which teachers perceive or feel comfortable with a dominant role in teaching and whether there is a predominant focus on research outcomes in their career values and a subsequent marginalization of teaching quality. These topics may have rendered the conversations sensitive and participants may have been embroiled in some uncomfortable contradictions. To address this potential issue, questions that embody sensitive topics were dealt with in the most careful way. Also, participants were fully informed of their right not to answer any questions that they were not comfortable with.

The interview and observation data were analysed inductively with the assistance of the program NVivo. The data were extracted electronically, read, marked, coded and grouped

into increasingly larger themes, ensuring all identified pieces of data were accounted for and included in the framework. A noteworthy issue is that participants' native languages mark different systems of perception in which different cultural behaviours are communicated and codified (Sapir, 1921, discussed in Moore, 2004). The whole process of data analysis was therefore conducted within the Chinese language context so as to make sure participants' voices were interpreted without misleading and disturbing factors relating to secondary explanation. Only those quotations which were inserted into the thesis were translated into English. In regards to the data translation, I invited a translator, who had no connection to this research, to translate the selected quotations. The purpose of this design was to remove any potential bias that may occur in my personal interpretation of interviewee's opinions. The analysis of the research findings, as documented below, is structured around the three dimensions of the conceptual framework. Within each dimension, the important findings are elaborated and supported by testimonies from interviewees and examples from observational records. These two data resources establish a 'chain of evidence' to provide a coherent and consistent report. There then follows a discussion of the findings in which the arguments of the paper are put and rationalized with reference to the literature, so as to address the research questions thoroughly.

Results and discussions

An Ambivalent Attitude towards the Use of ICT

A frequent explanation of instructors' low ICT adoption rate has been their insufficient technological skills (Baylor & Ritchie, 2002; Loveless & Ellis, 2001) and their partial awareness of the educational value of ICT (Chung, 2005; Hu & Webb, 2009). Notably, the data collected in this study suggests a new explanation that teachers in general have an ambivalent attitude to the introduction of ICT into teaching and learning activities. This sense was initially addressed through recognizing an objectivist stance in their epistemological beliefs of teaching.

Though the teachers strongly argued that the aim of teaching should be the cultivation of students' ability, rather than simply transmitting knowledge; when asked about their underlying philosophy of good teaching and efficient learning, the majority of their responses still reflected a 'turn-in' modality in teaching, for instance:

The classroom is the source of knowledge, and is therefore a centre for students to learn... the main duty of instructors is to transmit as much updated knowledge as possible to students. If a student cannot learn well, I would consider it to be the teacher's fault for not presenting the material clearly enough. Matt

Compared with spending much time on personal study, concentrating on classroom instruction is more important... I hope they can listen carefully enough to grasp the major insights of my lecture. Dave

The above quotations suggest that teachers appeared to consider the entire learning process as comprising the instructors' 'duty' to 'present the material clearly'; while concerns regarding the cognitive learning, critical thinking and knowledge construction on the students' side were greatly neglected in their discourses. This finding is in line with an 'objectivist epistemology', which believes that knowledge is an entity that can be transferred directly from instructors to students. In addition, the statements also reflect the teachers' perceived authority as the main providers of knowledge. From the collected data, the vast majority of teachers particularly emphasized the value of 'classrooms' and 'lectures' as the 'source of knowledge transmission' and reveal their expectations that students should 'grasp the insights' as they have designed them. This epistemological assumption can be attributed to the Confucian

tradition, in which there is a more authoritative view of knowledge than in the West. Chinese students and educators are both more likely to treat texts and instructors as highly authoritative sources of knowledge (Hu & Webb, 2009; Webb, 2002). Such an assumption appeared to be a contributing factor in the cultivation of instructors' belief that they are the 'fount of all knowledge' (Webb, 2002) to be poured into their students, rather than a guide supporting students properly in their own exploration of knowledge.

This issue was further probed in the interviews by a follow-up question regarding instructors' perceived role in ICT-rich teaching environments. Most of the teachers appeared to hold a contradictory belief about their role in ICT-supported teaching. On the one hand, teachers generally agreed that ICT provides great benefits to both teaching and learning:

Technology assists teachers to transmit knowledge to students much more effectively and promotes greater interest in learning. Lilian

ICT provides students with great access to knowledge; in other words, it causes knowledge to permeate every area of life. Dave

On the other hand, it was seen from the teachers' responses that there was a concern related to the possibility of losing their authority as the main knowledge provider. They persisted with their opinion that ICT should be viewed only as a supplementary tool for teaching; for example:

The online learning resources can only be treated as supplementary information to the knowledge delivered through lectures. If students learn all by themselves through the Internet, they don't need to go to my class. Who can guarantee whether they can learn the required knowledge to pass the exams? Mary

For teachers, transmitting advanced knowledge to students is their very duty. How could a teacher give up this intrinsic job and ask the students to construct knowledge by themselves? Students come to the university to be taught not to talk. Before they have learnt anything, what could they discuss and what could they construct? The young age of undergraduates has constrained the level of their intellectual capability and ways of thinking. They need teachers to guide every step of the learning process... The university-pursued constructivist teaching, which is imported from the West, is indeed theoretically sound; but I am afraid it is too idealistic to be achieved in China's universities. Jim

With regards to the records garnered through observing lectures and online communities, the data analysis revealed congruence between teachers' ICT teaching activities and their shared epistemological assumptions. Figure 3 contains the coded pedagogical categories, which suggest that, however students access to learning resources, they are always restricted by the scope of the instructors' knowledge system (see Figure 1).

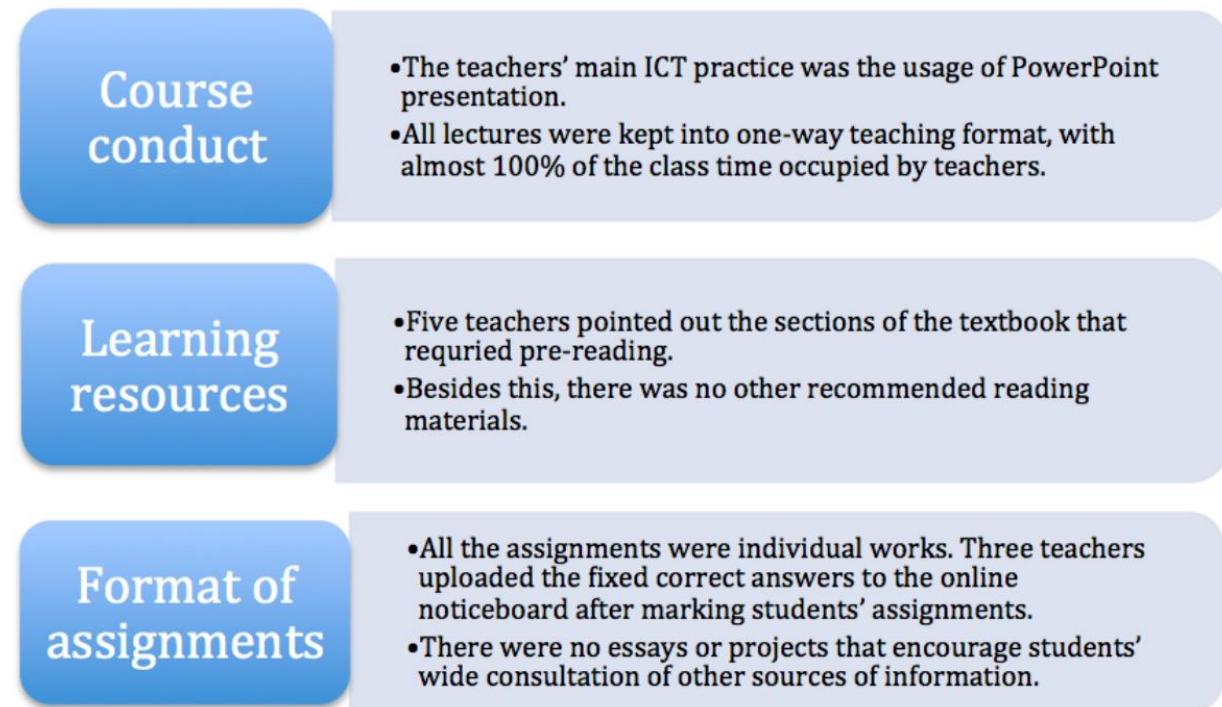


Figure 1. Coded teachers' ICT usage

Taking the 'Format of Assignments' for example, teachers' posting of 'right' answers contributes to and perpetuates the notion of them as 'expert' and also the notion that there is one 'right' answer. Given this, it is possible to argue that teachers in general hold an ambivalent attitude to inviting technology into their teaching. An objectivist belief about the nature of knowledge and their perception of themselves as sources of knowledge have rendered them with a distorted belief that ICT offers students full access to information while threatening their authority as knowledge providers. The observational records suggest that this assumption has deflected teachers' ICT usage in terms of constraining them from encouraging student exploration of the wealth of online learning resources. It has further constrained the realization of ICT-supported constructivist learning, since the traditional teacher-centred approach has just moved in parallel from offline to online without any changes in its nature.

However, this argument so far is still inconclusive. There are ample indicators in the literature demonstrating that just as books did not get rid of teachers; the boundless information available on the Internet can by no means replace the role of teaching (Guri-Rosenblit, 2005; Njenga & Fourie, 2001). This argument encourages further and sober consideration concerning the updated role of instructors in today's ICT-rich teaching environment. In the context of ICT in education, there has been a widespread misconception that 'more is better' (Njenga & Fourie; 2010), while people have generally blurred the distinction between information and knowledge. Njenga and Fourie (2010) argued that accessible information does not automatically turn into meaningful knowledge without the assistance of teachers. Rather, the transformation of information into knowledge requires teachers to facilitate students' engagement with such information by adapting it to their particular context (Guri-Rosenblit, 2005). As such, the integration of ICT into education does not actually result in a dichotomously black and white situation that leaves teachers with no place to teach. Namely, the ICT-enabled learner autonomy is not another extreme opposed to the teacher-centred approach. The role of the teacher in the ICT-supported learning environment remains necessary and rather more important. Teachers are required to balance the tension between teacher- and student-centred approaches. They should, on one hand, encourage students to

act as explorers of wide range of possibilities and options, and on the other hand themselves act as facilitators supporting students' own explorations towards meaning-making and knowledge generation.

Professional Values: the Predominant Interest in Research

Another significant component that influences teachers' creative use of ICT is the core interests and motivational factors that are underpinned by their professional values. When asked about their professional values, teachers demonstrated their target setting and work processes, often in accordance with the appraisal system in the university. Concern about research and publications was displayed again and again by teachers, for example:

Research definitely occupies the majority of my working time. The existing appraisal system defines your [the teacher's] professional standards exclusively based on your academic achievement; for instance, how many papers you have published, whether you are engaged in any national level scientific projects, how much funding you have received for your research group. Without the input of a great amount of time, these cannot be achieved...So now, although I am already a professor, I need to work desperately to publish the required number of papers.
Matt

From a general view of higher education, I think teaching and research should be equally weighted. However, a person's energy is limited... In this university, some teachers have excellence in scholarship, but cannot invest any additional time in teaching. You just need to complete the required number of lectures and there is no supervision of the quality of teaching.
Dave

The teachers' words reflect that the current appraisal system in this university clearly favours research outcomes, while teaching quality is seldom assessed. It is evident from teachers' responses that such a system has directly resulted in an imbalance between their values of research and teaching performance. The marginalization of teaching is also addressed through observing teachers' teaching activities, which reflected the ritualistic nature of their willingness and commitment to drive forward ICT-supported pedagogical innovation (see Figure 2).

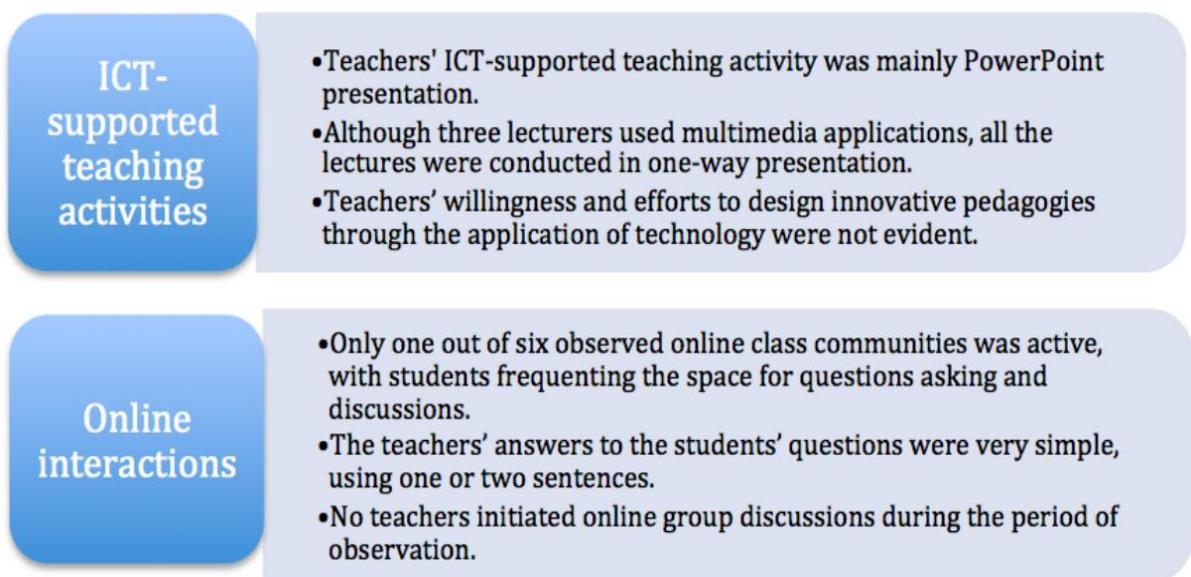


Figure 2. Coded teachers' ICT-supported teaching practice

To push this understanding a bit further, Matt pointed out that 'the existing appraisal system was established based on the assumption that once a teacher's own academic qualifications have arrived at a certain level, his or her teaching capability can be enhanced accordingly'. However, based on the data collected, I would argue that such an assumption is rather distorted, since teachers' predominant values have actually been shaped in terms of research merits, and their teaching motivation has been downgraded. As such, tensions between the general motivational factors underpinned by teachers' professional values and the efforts required in driving ICT-supported pedagogical innovation can be clearly seen. Accordingly, the existing incentive system in the university should be critically questioned, and there is a need for the re-establishment of a normative value system in the academic community which pays equal attention to teaching merit so as to motivate academic staff to engage actively in the ICT-rich teaching environment.

Insignificant Power Constraint on Teachers' ICT-supported Pedagogical Innovation

Opposed to the dominant argument put forward in previous literature, data collected in this study indicated an insignificant power constraint to teachers' use of ICT. The increasing freedom in teachers' choice and design of pedagogies was clearly addressed.

Recently, teachers have greater discretion about what and how to teach in higher education. Though we still need to teach by following the scope of the authorized teaching outline, there is an issue of degree. In other words, I can teach each detail presented in the textbook, but I can also only highlight the key points and release more time and space in the lectures for students' own discussions and self-reflections. Lilian

There is flexibility in pedagogical selection. For instance, I showed students my self-created animations; though it takes some time to prepare, it is worthwhile since it could help students to understand the core knowledge of my lecture. Dave

The evidence garnered through observation reflects teachers' attempts to orientate their pedagogical activities towards ICT-supported diverse ways, though there was still little venue for two-way interaction (see Figure 3).

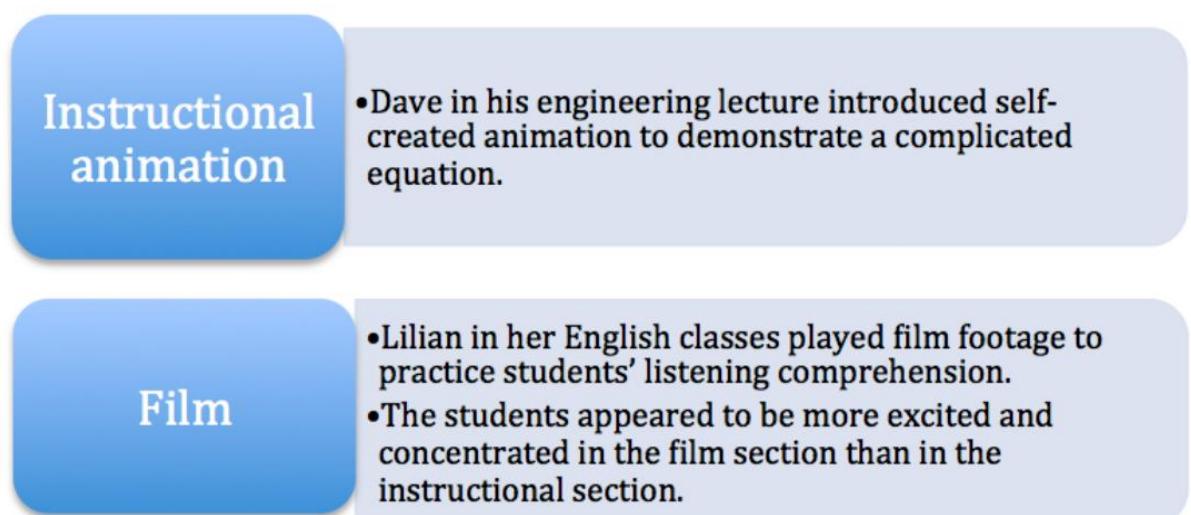


Figure 3. Teachers' employment of multimedia in teaching

Unlike being restricted or confined by what needs and has to be taught, as documented in prior studies, the collected data reflect a consistent trend that teachers today in China's higher education have increased freedom to interpret national endorsed curricula in their own ways. Such increasingly distributed power is significant, as the enhanced flexibility encourages teachers' wide experimentation and exploration of ICT-pedagogies. However, it is worth noting that, from the observation, it appears that young teachers were obviously leading the way in the use of ICT.

Conclusion

To sum up, the findings reflect that the addressed teachers' ICT-related perceptions and performances are visible symptoms of the deeply rooted cultural beliefs and practices that have hindered the university's efforts to change. Given this, the new technology, which was conceived as an agent of change, has failed to cause change to the pedagogical culture but has instead been domesticated by the cultural traits that had long been existing in the institution. A critical review of the culture in this paper encourages the further consideration that, for China's universities, ICT integrated with new learning approaches (e.g. student-centred or participatory learning) represents a brand new culture which is often 'imported' from Western countries, together with the different epistemic beliefs and social values in which it is rooted (Zhang, 2009). As aforementioned, ICT as a tool is neither good nor bad in itself; the potential meaning that ICT contains can only be actualized and contextualized by the members of a given academic community. Accordingly, the cultural barriers to ICT integration identified in this study call for a reformulation of the institutional culture into one that fosters teachers' ICT adoption and development of change.

Although the formative cultural framework in this paper is developed within the Chinese context, 'it opens the door for researchers in other nations to begin to explore a similar phenomenon in their cultural contexts' (Clandinin & Hamilton, 2010, pp. 1115–1116). Meanwhile, there are many possible avenues in the cultural studies on ICT integration awaiting investigations through the collaborative efforts of researchers.

First, this conceptual framework cannot be an umbrella term for capturing all forms of cultural components, since they are formulated merely based on the context of one higher education institution in China. The refinement and extension of this framework is an iterative process that should benefit from the insights of further research endeavours in other contexts and countries. Also, it would be interesting and fruitful to carry out studies which draw comparisons among the cultures of different countries.

Second, a further issue which deserves research attention is the extent to which the different cultural indicators are interrelated. As Geertz (1973) described, culture, as an interconnected web of relationship, consists of interlinked components. Investigating the interrelation and interplay among the different cultural components would offer us a systematic and, thus, more fundamental understanding of how culture works in teachers' pedagogical adoption of ICT.

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