Research Journal of

Information Technology

ISSN 1815-7432

Academic Journals Inc.

www.academicjournals.com

Research Journal of Information Technology 2 (2): 66-80, 2010
ISSN 1815-7432

Critical Factors of Implementing Knowledge Management in School Environment: A Qualitative Study in Hong Kong

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Abstract: This study presents results and findings from a qualitative study on the application of knowledge management in schools of Hong Kong. The aim of the study was to find out whether knowledge management could be implemented successfully in primary and secondary schools in Hong Kong and what problems were encountered. This study will explain and discuss in detail why particular factors are important to the educational knowledge management practices and also suggest some ways to overcome the encountered barriers to knowledge management in schools. Today, knowledge management systems have been widely implemented in organizations like enterprises, government departments and universities, yet the application of knowledge management in the primary and secondary education sector is not yet popular. A total of 65 teachers from 23 schools were invited for interview. It was found that leadership and change management, strategy and goal, organizational learning, technical support, school culture and trust among teachers are the critical factors affecting knowledge management in school contexts. This study concluded that successful knowledge management in a school involves different aspects such as accessibility of information technology, strong leadership, cultural influences, organizational structure and human characteristics (e.g., trust, learning behaviours and habits).

Key words: Knowledge management, educational environment, qualitative study, social and cultural aspects, technological aspects

INTRODUCTION

Knowledge management system is a synergy between the technology and social-structural mechanism (Becerra-Fernandez *et al*., 2004) in which social or structural tools are used to support knowledge management and the information and communication technologies are employed to assist in the knowledge management mechanism. By implementing knowledge management, an organization enjoys various benefits brought by sharing and leveraging on the knowledge exists among organization members. In fact, we now live in the knowledge society (Drucker, 1993) where knowledge is considered an essential resource contributing to the success of an organization and knowledge generation and sharing is a valued part of the organizational culture (Santo, 2005).

One of the primary functions of education is to convey knowledge to people in society. According to Jones and Sallis (2002) education is about the creation and application of knowledge. Teachers should not only educate their students but also share their knowledge with each other. An experienced teacher accumulates a lot of knowledge, but after he/she has left the school, the relevant expertise may also go with him/her. Also, it is difficult to access tacit knowledge that carried in the mind of individual teachers. Therefore, knowledge management is equally important in schools as in other organizations. However, to implement a successful knowledge management system in school environment is never easier than other kinds of organizations. Different subjects may be associated with various pedagogical practices and knowledge. In addition, teachers not only need to learn new knowledge that emerges continuously but also adapt to a lot of educational reforms in society. A teacher may need to manage content knowledge, pedagogical knowledge, as well as knowledge on education context and research methodologies at the same time.

Since 1998, the Hong Kong Special Administrative Region (HKSAR) Government continues to put efforts on a shift from the teacher-centered paradigm to the student-centered paradigm by introducing information and communication technologies into education and emphasize that schools should become a knowledge-creating environment for both learning and teaching (Education and Manpower Bureau, 1998, 2004, 2005a). In such a rapidly reforming environment, teachers' personal knowledge should be made available to other members within their community (Nonaka and Konno, 1998). Motivated by such need, we therefore, performed a qualitative study on schools in Hong Kong to identify critical factors affecting the implementation of knowledge management in school environment. The study investigated whether knowledge management could be implemented successfully in schools of Hong Kong and what problems were encountered. We also provide recommendations for knowledge management in schools based on our research findings.

The aim of knowledge management is to organize and make available knowledge out of resources when it is needed. As we are living in the age of knowledge and there are supports for the increased use of knowledge management in education, it is essential to actively deal with the enormous amount of human knowledge present in education. Education cannot function without intellectual capital. Drucker (1994) stated that acquiring and applying knowledge is the key competitive factor in an organization. In fact, education is one of the oldest knowledge management professions in our history (Galbreath, 2000).

Knowledge is a kind of intellectual capital and is the most important resource of any organization today. Such an intellectual capital is deep in the minds of the staff in an organization. The advantages of knowledge management therefore include enhancing competencies, improving decision making, strengthening commitment of an organization and establishing sustainable competitive advantage (Davenport and Prusak, 1998). Teachers of a school comprise experience, skills and knowledge. Capabilities and behaviors of teachers cannot be ignored in formulating the strategies of a school. Human resource is a kind of the key assets for the school. In the knowledge management context, teachers have tacit knowledge that is unarticulated ability necessary to perform their work and explicit knowledge that is more measurable and tangible. It is difficult to characterize tacit knowledge but it is valuable knowledge. At the personal level, human resource can be considered the combination of talent, education, experience and attitudes towards work and life (Hudson, 1993). At the school level, the strategy and polices should encourage teachers to use their knowledge and insights to solve the problems. Thus, it is critical to attract and keep good teachers in schools and this is why the hidden knowledge in teachers is so important to success of a school. Human resource is also the source of innovation. To help teachers to grow and develop their skills is important for the long-term benefit. Most learning originates from experience that is the way teachers deal with the work in reality.

We summarize the threefold reason for adopting knowledge management in education. Firstly, it retains expertise of experienced teachers and shares it the others, especially the new teachers. Best practices can thus be captured and shared among teachers. Secondly, it increases the effectiveness in terms of teaching and learning performance of a school. It provides project workspace and delivers competitive intelligence to teachers in the school. For education, the vital competitive factors are to achieve learning outcomes and improve learning results of students. In all developed countries education has developed faster than other knowledge-based industries such as management consulting, architecture, software and pharmaceuticals (Drucker, 1993). Thirdly, knowledge management supports the development of knowledge community in a school and fosters the culture of learning organization. It enhances E-learning and manages legal and intellectual property of a school.

Knowledge management is not a product that can be purchased or used at once. It is a dynamic and continuous process implemented over a period of time and linked with human relationships and capabilities (Benjamins *et al*., 1998). Based on Santo (2005), it is possible to study knowledge management in schools with three perspectives: (1) information technology, (2) human resources and (3) integrated perspectives. The last one is the combination of the previous two perspectives and we will adopt this view in our study.

Recently, there are driving forces of knowledge management in Hong Kong schools. First, complexity of subject knowledge is increasing. For example, there is the introduction of paradigm shift from teacher-centre education model into the student-centre education model, the structural reform from the 4-year senior secondary and 3-year undergraduate academic system into the 3-year new senior secondary and 3-year undergraduate academic system (the 3+3+4 reform) (Education and Manpower Bureau, 2005b) as well as the introduction of General Education as a brand new subject for every student in Hong Kong (Eduction Bureau, HKSAR, 2007). Under the rapid curriculum change, teachers have to manage knowledge of different domains and often need to spend a lot of time to collect and manipulate data and information for preparing lessons. Teachers' workload can be reduced if they can share knowledge among themselves through a knowledge management system. Second, the time allowed to respond to changes in society is decreasing. Teachers and principals have to make decisions rapidly to react to demands of society. A knowledge management system supported with advanced information technology infrastructure is necessary for practitioners to adapt to this environment. For example, there will be a switch of the medium of instruction (from English to Chinese or vice versa) in a number of local schools very soon (Eduction Bureau, HKSAR, 2008). Teachers will be busy for preparing teaching materials in another new teaching medium. Such a kind of burden can be alleviated if the teaching materials can be shared among different teachers in a school or even different schools.

Over the past years, the application of knowledge management in school sector in Hong Kong is mainly promoted by the Education Bureau of the HKSAR Government in a centralized manner. For example, a centralized portal that includes a searchable resources depository for all primary and secondary school subjects is maintained at the Hong Kong Education City (HKedCity, 2008) a centralized portal for Hong Kong school sector supported by a subsidiary wholly owned by the HKSAR Government since 2002. All primary and secondary school teachers in Hong Kong are provided with accesses to the HKedCity resources depository where they can search, upload and download digital teaching resources contributed by the peer teachers. A Teacher Net is also established for online communications and sharing among school teachers. Another organization, the Hong Kong School Net founded by a group of local university professors also offers a repository for teachers to upload and share their teaching resources. Knowledge Community, a knowledge management system developed to support knowledge building and sharing, has also been adopted by the 3-I Project Learning (Tan and Chan, 2008) that attracted the participation of over 70 primary and secondary schools in Hong Kong for collaborative project-based learning activities with schools around the world. Disperse endeavors of knowledge management implementation by individual schools also exist. For example, knowledge management has been applied to school administration in a hospital school (schools that run within a hospital for patient pupils) operated under the Hong Kong Red Cross (Chan *et al*., 2005). Chan and Leung (2005) also presented how a Hong Kong secondary school applied knowledge management and data mining techniques to identify students with learning difficulties at early stage.

Despite the above cases, very often, knowledge management implementations in schools of Hong Kong are limited and preliminary without a rigorous integration between the technology and human resources perspectives. Eventually, knowledge management practices turns out to be a resources repository or archive with little searching and indexing functionality. Without a formal treatment on the perceptions and attitudes of the organization members (that is the teachers and principals in schools), it is difficult for knowledge management to develop into its full potential in Hong Kong school sector.

MATERIALS AND METHODS

Qualitative approach was used in this research. A total of 65 voluntary participants were invited to attend the interview individually. Each interview was unstructured and about 30 to 45 min long. The participants were teachers working in 11 secondary schools and 12 primary schools respectively in Hong Kong. The interview data were collected in 2008. These conversational data were transcribed and analyzed following regular qualitative coding principals (Dey, 1993). Responses from each participant were analyzed in detail and in isolation from those of other participants. There were multiple passes in the analysis of these responses and the keywords were identified. The keywords were classified into broader categories that might be refined and challenged until all the keywords were classified reasonably. The following are the major open-ended questions in the interviews.

- Is there any knowledge management practice in your school
- What are the critical success factors of knowledge management
- What are barriers, if any, to knowledge management in your school
- Do you have any suggestion of getting rid of these barriers

The aim of interviews was to collect information about personal and professional aspects of the teachers. Interview is proper to explore the beliefs and perspective of teachers and was selected to collect data in this research (Drew *et al*., 1996; Frankel and Devers, 2000; Miles and Huberman, 1994). Teachers used natural language to express their thoughts and in-depth information could be obtained from them directly (Burns, 2000; Cohen *et al*., 2000; Johnson and Christensen, 2000).

RESULTS

In this study, 45% of participants did not completely understand the concept of knowledge management and 30% did not come across the term knowledge management before. They tried to understand the meaning of the term by combining the concepts of knowledge and management together. After explaining the definitions and common practices of knowledge management to them in interviews, they realized that some of knowledge management practices already existed in their schools. These practices are mainly social

Table 1: Barriers to knowledge management in schools

Significance	Proportion (%)	Barriers
1	75	Unable to relate a knowledge repository to goals of the school
2	68	Unable to focus on the vital areas of goals of the school
3	65	Consider knowledge management as an optional development only
4	60	No knowledge management specialists
5	54	Depend too much on technology
6	50	Unwilling to share knowledge
7	46	No measurement of knowledge management plan
8	32	Consider knowledge management as a replacement for human

Table 2: Critical success factors of knowledge management in schools

Significance	Proportion (%)	Critical success factors	Details
1	72	Leadership	Leadership can initiate the process of knowledge sharing in the school. The integration of leadership, organization, learning and technology are required for knowledge management
2	57	Strategy and goal	Clear goals of knowledge management should be consistent with the strategy of the school
3	53	Learning organization	A learning organization can encourage knowledge sharing
4	48	Technical support	Technical problems hinder teachers from using IT to facilitate knowledge sharing
5	43	School culture	Cultural climate may affect the willingness of sharing. Culture, organization and management process are more important than the technology
6	40	Trust	Trust and fairness should be necessary conditions for knowledge management

processes in nature (e.g. regular meeting and chatting with other teachers). Knowledge and learning are social in nature. Knowledge comes with every conversation that is an experiment in knowledge creation to test ideas and try out words and concepts (Allee, 2000). In any organization, by conversation people make decisions and get real work done (Brown and Isaacs, 1999). In schools, work translates into the teaching and learning practices.

Based on the participants' responses, Table 1 shows the common barriers to knowledge management and their significance in their schools. It is found that a lack of goal is the most significant barrier. Teachers may not be aware of the importance of knowledge management and how it relates to their work and effectiveness of their schools. Other barriers (e.g., sharing willingness and over dependency of technology) reflect the problem in striking a balance between technologies and social/human structure in a school.

Based on the responses of the participants, Table 2 shows the critical success factors affecting success of knowledge management. These findings are consistent with the previous research (Al-Hawamdeh, 2003; Chin, 2005; Handzic, 2005; Hasanali, 2002; Park *et al*., 2004; Rollett, 2003; Stankosky, 2005). Leadership, strategy and goal are the most important factors. They can set a clear picture of what knowledge management should achieve and how it relates to teachers' work in a school. Other factors such as learning organization, school culture and trust are mainly linked with the human issues and social interactions. This is consistent with the thought that knowledge management can be studied with the integrated perspectives in which both information technology and human resources are both important (Becerra-Fernandez *et al*., 2004; Santo, 2005).

Most teachers were aware of the barriers to knowledge management in their own schools and suggested some ways to attempt to solve the problems although some of participants thought that it might not be easy to implement them. Table 3 is the summary of the respondents' suggestions. To most teachers, leadership is the most significant suggestion and it is coherent with findings in Table 1 and 2. Also, participants expected a

Table 3: Participants' suggestions of solving problem in knowledge management in schools

Significance	Proportion (%)	Suggestions
1	85	Develop supportive leadership for sharing the best practices and experience
2	78	Establish knowledge repository and a system to evaluate, renew, eliminate, classify and store knowledge
3	70	Extend the libraries to be the knowledge centers
4	66	Establish training procedures and motivational system of knowledge management
5	54	Establish knowledge community/learning organization
6	43	Establish the chief knowledge officer
7	42	Evaluate performance of knowledge management and benchmark learning

functional system (e.g., a knowledge repository, a library with extended functions and training procedures) to implement the knowledge management practically.

DISCUSSION

Based on the research findings mentioned above, the following paragraphs will further discuss and elaborate some major issues that are relevant to knowledge management in the school context.

Leadership is found to be an important factor affecting the knowledge management in schools. Most teachers agreed that if there is no strong leadership in schools, it is not easy to perform knowledge management practices. In the context of schools, principals are the important leaders and they often act as change agents (David, 1989). The principal should show clear goals of knowledge management and convince his/her staff of its importance. For the long-term benefits of the school, the principal should inspire teachers to exceed their self-interest and enhance their motivation and confidence. Transformational leadership is often required in such a situation in which the principal instills pride, confidence and value and convey a sense of mission to teachers (Hay, 2007). The principal should stimulate experience in knowledge sharing and provide training to teacher when necessary. Most importantly, the principal should arouse teachers to think in a new way and stress on how knowledge management can solve the previous and current problems in schools.

In adoption to knowledge management practices, principals may take the roles of catalyst, process helper and resource linker (Havelock and Zlotolow, 1995; West-Burnham and O'Sullivan, 1998). As a catalyst, a principal initiates a change in which knowledge management practices are introduced to schools. The principal should know whether teachers' attitudes and school culture facilitate or hinder such a change. As a resource linker, the principal should reallocate the available resources to accomplish the expected changes. Some personnel roles may be redefined to facilitate the adoption process and provide both technical and pedagogical support. As a process helper, the principal should help his/her staff when they get problems in the knowledge management practices. The principals should motivate teachers and establish a working environment favorable for the new practices. As an organizational learning leader, the principal should encourage a learning process within the school to improve performance. The principal may establish a learning culture in which teachers can adapt to the change and get familiar with the knowledge management practices gradually. The principal can establish emotional connections with teachers (Beatty, 2005) to establish clear worthy goals and define the expectation clearly and provide positive feedback to teachers and foster effective communication.

It may be unrealistic to create positive relationships with all teachers but to achieve change. Teachers may be placed in uncomfortable positions. Management of a school should be able to interact with different teachers in a range of situations. Clarke (2001) stated that a lever is means of influence that applies minimal force to achieve a significant outcome. Principals should use suitable points of leverage to promote the knowledge management outcomes expected by the school. Staff development in the form of training, mentoring or participation is important to influence the behavior of teachers. Staff development should be based on a process that is agreed by the teachers in advance. To the principal, it is necessary to be patient for establishing trust, confidence and support. In addition, it may be suitable to reallocate teacher to different roles, regroup staff and assign teachers with advanced skills responsibilities for mentoring and helping inexperienced teachers.

To most schools in Hong Kong, knowledge management can be considered a change of working practices in schools. According to Deal and Peterson (1999), the human factors of change are usually overlooked. In the change process, old ways of doing things are lost and teachers should break long-standing habits. If the management of a school neglects human consequences of change, it will create resistance. People are usually resistant to change. If people can express their views in the change process, they will be likely to accept such changes. Change is an uncertain journey but not blueprint. Problems are inevitable and it is necessary for learning something new. Adoption of knowledge management should be connected with the wider environment and everyone in the organization is a change agent.

The knowledge management strategy should be transparent and teachers should understand the overall goals of the knowledge management practices. Questioning of knowledge management practices may force the management to rethink such a change. Teachers should feel that change is not externally imposed and change process is theirs and visibly support changes. The values of teachers provide a context for the change. The decision of knowledge management activities should be made by the consensual group. Teachers should have supportive, trusting and confident relations with one another. Base on the previous change experience, the change process should be revised and reconsidered from time to time.

Culture is known to be one of the major barriers to knowledge management (Fullan, 2007). The culture of a school is formidable and invisible but it is the context in which teaching and learning processes are performed. Culture refers to a set of shared values, norm, beliefs, expectations and assumptions. Schein (1996) stated that culture is the result of an organization adapting to external environment while managing the internal environment at the same time. Members of an organization get an agreement on the important values and missions of the organization when adapting externally. They developed common values and practices that form the unique culture of an organization.

Each school has its unique culture that represents the common values and the shared goals of the school. A strong culture is the strength of a school and it is necessary for development and transformation of the school. Culture can foster school effectiveness and productivity (Deal and Peterson, 1999). Culture is created when people come and work together. However, there are different teachers with different backgrounds and values in the school. The problem is how to make them act and think in the same way for the common goals of the school. In the case of knowledge management, teachers may have different views on it. Some may think it is important for the long-term development for a school while some think it is an optional task in their routine work.

There are several important steps in successful culture development. The first step to create a sharable culture is communication. Teachers should know what they are going to do and the reasons behind. For example, a participant in the research stated that initially he reluctantly shared the teaching materials on the Intranet of his school because he did not know the actual purpose. He thought these materials would be examined by someone such as the principal to evaluate his performance. But when he recognized that the practice was just for sharing the efforts among his colleagues, he became willing to do so.

The second step is to make the goal clear and show the ways to achieve the goal. Such a goal should be visible and recognizable. Obviously, the aim of knowledge management in schools is to share knowledge and create new knowledge among teachers. A participant in the research stated that teachers of his school listened to their principal to enhance the knowledge management practices in school. But most of them did not know how to do it actually and they just shared their teaching materials in hardcopy format as usual. As a result, no obvious improvement could be observed. Finally, some experienced teachers demonstrated how to use IT facilities to share teaching and learning materials online. Then, other teachers could follow to improve the knowledge management practices.

The third step is to manage culture when teachers, the principal and the school may have different sets of values. These values sometimes may be contrary to each other. The best way to solve this problem is to develop mutual values that will be comfortable to everyone. To get mutual values, all the members in an organization should understand the value of each other. There must be an agreement between what members value and what the organization value (Boylan, 1993). For example, a teacher in the interview complained that some knowledge management practices created lots of troubles to her. She needed to upload files to the Intranet and created indexes for retrieving. She just wanted to spend her time for teaching directly and thought this extra task did not help too much. But after a year, she gradually discovered that the established database by colleagues were really helpful to teaching and she changed her mind and accepted knowledge management practices. This example shows that there is mutual value between this teacher and the school. This is to enhance teaching and increase effectiveness of the school. But this teacher could not notice it initially. Thus, the principal should explain to teachers what the mutual values are and create a vision and direction that can be followed by them. One more example, in an interview a participant mentioned that in his school, the principal required each teacher to write a report after attending a seminar and workshop. This practice discouraged teachers to attend such a kind of meeting. After the principal listened to the comments from teachers, the report was simplified to a form on which teachers only need to fill in a small number of items to express their feedbacks. This practice can encourage the participation of teachers.

Traditionally school cultures are likely to be professional cultures isolated from each other. Teachers are working individually on their own in the context of a school. This culture is not responsive to change and the school becomes a loosely-coupled organization. In reality teachers are seldom working alone and their collaboration occurs within groups. For example, teachers responsible for the same subject may form a group. But there may be little collaboration between different groups (Kanter, 1985). These are segmented cultures. Teachers of one group may not be familiar with those of other groups. When teachers are isolated, the school cannot manage problems affecting the entire school.

Collaborative culture is important for implementing knowledge management successfully. Such a culture is adaptive to meet the challenges from time to time. The management of a school can achieve a collaborative culture by sharing values and consensus regarding the way knowledge management practices are performed and creating opportunities for collaboration (e.g., planning and scheduling). The management is encouraged to share power and responsibility with teachers and foster staff development. For example, if there is teachers' achievement towards school improvement, it may be celebrated and recognized publicly. This can establish a clear illustration of what teachers are supposed to behave and follow in the collaborative culture.

The school itself represents structural knowledge. There are mechanisms and structures that support teachers to achieve optimum teaching performance. A teacher may have a lot of experience and knowledge but if the school does not have suitable system and procedure for sharing, the overall knowledge of the school cannot be fully utilized. The structure of a school includes its routine activities, procedure and information technology infrastructure. If these factors can be managed effectively, the embedded knowledge can be obtained from these routines and procedure.

The structure actually links the personnel resource of a school together into the routines and procedures to create values for the school. A learning organization is, in fact, a result of effective knowledge management. Teachers can communicate within the context of the structure and the school can benefit from their capabilities that maximize the overall performance of the school. A learning organization is able to leverage human resources for efficient knowledge sharing and reduce lead times for information and knowledge transmission.

The major aim of knowledge management is to share knowledge with other and create new knowledge in such a process. This concept is consistent with learning organization where people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free and where people are continually learning how to learn together (Senge *et al*., 1994). Garvin (1993) also provided a similar definition of learning organization that can create, acquire and transfer knowledge and modify its behavior to reflect new knowledge and insights.

Knowledge management is relatively new in the area of education in Hong Kong. Teachers have to learn these new practices in their teaching and administrative work. Transformation can provide a way of taking a new look at what a school can do and how to re-organize to meet the challenges in a new way (Davis, 1997). It stresses on the workflow of the process and leads to a new perspective for exploring the effectiveness of the school. Senge *et al*. (1994) suggested five disciplines for transforming a school into a learning organization. The first discipline is systems thinking that is a conceptual framework helping people to see how the overall change is implemented. The aim of knowledge management and how it affects the school should be conveyed to teachers. This can relate the individual values to the school's values. The second discipline is personal mastery that is to clarify and deepen individual personal vision and create commitment to the truth. Teachers with different personal mastery should be encouraged to expand their abilities and contribute to the organizational learning. The third discipline is mental models that affect how people comprehend the world and how they respond. The mental model provides teachers a tool to share a new knowledge management practices and communicate with colleagues about the new common values and beliefs. The fourth discipline is shared vision that is the common identify and sense of density. Shared vision is the heart of a learning organization. The fifth discipline is team learning through which the intelligence of the team exceeds that of the individuals in the team.

Learning organization structure should be consistent with the knowledge management practices in schools. Besides social interaction among teachers, it is necessary to facilitate resources management (e.g., time and space for sharing) that contributes to teaching and learning because it provides an environment where knowledge management practices take place. For example, schools need to consider what kinds of IT resources important to develop both physical and online environments for sharing and whether teachers are able to use them effectively.

Individual and repeated interactions between teachers create bonds (Starbuck, 1992). Social interaction among teachers can facilitate coordination and cooperation. The trust, mutual understanding and shared values should be developed to bind the teachers and make cooperative action achievable (Cohen and Prusak, 2001). Trust and friendship are important to develop network ties. Teachers may utilize their networks to access knowledge and information from each other in different parts of a school. A shared focus should be established and teachers are aware of what and why they are performing knowledge management practice. For this reason any educational knowledge management system should contain a social dimension. The foundation of the knowledge management framework of Nonaka *et al.* (2001) is based on the social process of conversion between individuals when knowledge is changed between tacit and explicit knowledge.

The field of education is using sophisticated systems for knowledge management. But their success is limited because of their emphasis on the information or the technology, instead of human and cultural processes that convert the data into knowledge (Woodell, 2001). Social aspects are an important constituent of educational philosophy and instruction. Dewey (1916) asserted that the development of knowledge cannot be isolated from emotions and that the performance of an individual is tied to subjective feelings about the action.

People, technology and information define the context of the educational environment. Knowledge capital combines with the organizational and personnel contributions to the school. One challenge in maintaining knowledge management practices is training and coaching on collaboration (Allee, 2000). It is uncommon for schools to train and coach people to participate in significant dialogue or critically address the challenges of collaborative decision making. Most team works focus on cooperation, not collaboration. People should learn how to cooperate to get the work done that is still fundamentally an individual performance focus. It is challenging to learn real collaboration that can create new knowledge.

Teachers may not trust each other. Some participants in interviews stated that they did not feel confident when they used the teaching and learning materials prepared by others. They do not show trust to materials when their sources are uncertain. The source of knowledge generally is more important than its content. People are likely to accept help, information and ideas from people they know and believe (Fullan, 1991). The perceived credibility of the knowledge is also important. Credibility is often divided into trustworthiness and expertise. Expertise is related to how competent the author is on the topic and trustworthiness is the degree to which the author is honest in the statements made (Marquart *et al.*, 1995). The source credibility is associated with the knowledge users' perceptions of attitude similarity between themselves and the source (Marquart *et al.*, 1995). The perceived quality of knowledge is often judged by the source of the knowledge rather than the content.

A culture of trust is essential. Sharing of knowledge should look upon as expected behaviour and should be rewarded accordingly (Laudon and Laudon, 2001). Teachers need to connect in many ways. All teachers should be involved from the very beginning and they know the aim of knowledge management. There should be open communication between teachers and school-wide feedback should be collected for improvement in the future. But the comments and feedback should be kept secret.

Brown (2001) emphasized a high level of engagement in dialogue and discussion can earn respect and trust. Mutual trust allows people to feel comfortable and safe to speak up (Misanchuk and Anderson, 2001). It, in turn, encourages assistance, promote different opinions and facilitate challenge among learners in this supportive learning environment

(McConnell, 2000). Divergent views, according to Mitchell and Sackney (2001) foster growth in schools. The school culture should communicate to all teachers, administrators and students and anyone in the school who has access to knowledge should be able to share it with anyone else (Schein, 1996).

Becerra-Fernandez and Stevenson (2001) stated that learning among teachers and pupils should be developed in the modern school. A school should access and use knowledge at different levels through technology. To manage knowledge effectively nowadays, information technology is necessary. They may be data warehouse, data mining, search engine, portals, multimedia management system, groupware and content management system. Thus, teachers have to learn how to use these technologies. Some teachers, especially the senior ones, felt difficult to catch up with these new skills. They expressed that the routine teaching and administrative workloads in school were already heavy and they did not have time and ability to learn something new. Teachers may simply ignore the knowledge management practices involving technologies. For example, a participant in this research was supposed to upload his PowerPoint files to the Web for downloading by his students. But he just passed hardcopies to them for photocopying.

It is suggested that seminars or workshops should be provided to teachers. Such a kind of training can help teachers to manage the basic skills of different software and hardware. Once they start using them, their resistance will be generally reduced. In addition, teamwork should be emphasized to overcome the technology barrier. For example, teachers responsible for the same subject may form a project team in which teachers who are familiar with technology may work with those who are not.

When teachers do not posses proper IT skills, the school may organize internal training programmes for teachers to acquire new skills and technique when, for example, new software is implemented and used in schools. If there is a lack of IT resource, the school should invest time and money. There should be discipline in the school in which senior teachers and the principal set good examples as role models to use IT to enhance teaching practices and share knowledge with others. Sometimes, metrics may be misused because teachers may think the metrics are used for evaluation and punishment for their performance. It should be clarified that the metrics are used for learning opportunity. To avoid oversimplification, there should be standardized methods supporting alignment and implementation efforts.

Successful knowledge management needs both solutions of technology and people. People can understand knowledge and generate new knowledge. Information technologies are useful in other aspects. For the knowledge capture, conversion and sharing, information technology is more capable than people. Thus, it is necessary to use both humans and information technologies in complementary ways in such a hybrid knowledge management environments (Schoenholtz-Read and Rudestam, 2002).

CONCLUSIONS

From the above findings and discussion, we can conclude that knowledge management in a school involves different aspects such as accessibility of information technology, strong leadership, cultural influences, organizational structure and human characteristics (e.g., trust, learning behaviors and habits). Similarly, Stankosky and Baldanza (2001) identified four pillars of influence affecting enterprise performance and innovation and they include: (1) technology, (2) organization, (3) leadership and (4) learning. Their theory of enterprise innovation and performance is constructed to reflect the needs of engineering and other technical enterprise. While engineering and education are completely different enterprise, there are components of knowledge management that are transferable across disciplines. One area in which there is a light degree of transferability across disciplines is the knowledge management life cycle. The knowledge management life cycle operates in each of four pillars. Knowledge management can be achieved by: (1) activities that support people in managing knowledge by sharing information and (2) activities that are performance-based and turn knowledge into goal oriental actions.

Knowledge management has been put forward as a major survival strategy for organizations including school. It is a means of strengthening their performance. Understanding how knowledge is created and managed is as essential for education as for any other type of organization. Just as business can improve the effectiveness and efficiency of their organizations through sound knowledge management, so can schools realize the potential of knowledge creation and the power of knowledge sharing to enhance the performance of students, teachers and the whole school.

Teachers are knowledge workers bring professional knowledge to classrooms along with personal knowledge and experience (Duffy *et al*., 2000). Teachers often use informal teaching ways to ensure that the learning environment and their schools are supportive of students. The most valuable knowledge often resides where people cannot see or control it. Formal knowledge management system within school systems is one way to collect and store the knowledge work and the spirit of learning community in schools. Occasionally the explicit knowledge of teachers may be shallow and of no value. Tan (2000) suggested that it is because it is the surface manifestations of a body of valuable deep knowledge obtained through long experience that has now become tacit.

Nonaka and Takeuchi (1995) stated that the product of new knowledge involves a process organizationally amplifying the knowledge creation relating to the development of knowledge management systems. The knowledge management is an impact that promotes success. Without it, success is an inconsistent haphazard process that cannot benefit from the past success or failure of others attempting to attain the same goals.

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