A Normative Knowledge Management Model for School Development

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***Abstract*—This paper discusses the application of Knowledge Management (KM) strategies in a school context with a view to bridging the knowledge gaps that exist between the strategic plan for school development and its implementation. Cheng's normative model for implementation was adopted as the theoretical framework for the study [1]. A case study was developed using data collected from the school by means of group interviews and documentary reviews. The results show that the role of the school leadership in formulating people-based and information-based knowledge strategies and a supportive working culture are critical for the effective implementation of Knowledge Management.**

***Index Terms*—knowledge management, record management, knowledge leadership, knowledge strategies**

I. Introduction

The introduction of a quality assurance policy to education have created many challenges to the sustainable improvement of schools. Schools have to meet key performance indicators of the quality assurance policy and formulate a strategic plan for their sustainable development [2]-[4]. Helping school leaders and teachers to work efficiently and effectively in formulating and implementing a school strategic plan has become a crucial issue if schools are to make progress. How the school's capacity for strategic planning can be enhanced to enable them to meet these challenges has become a significant question in the research into school improvement and the underlying problem of this study.

This study applies the subject of Knowledge Management (KM) to the study of school improvement. KM is related to strategic management that makes use of information and knowledge as organisational resources for improving management processes to enhance organisational performance. Institutionalising a knowledge management mechanism in schools may support schools to improve the strategic management capacity so as to cope with the rapid changes generated from the complex and challenging policy environment. Cheng proposes a normative Knowledge Management (KM) model to guide school leaders in their efforts to improve their strategic planning [5]. The model emphasises the importance of mapping the knowledge domains and the aims of the school plan, and the alignment of the KM strategies with the school improvement strategies. This study examines the normative KM model using a case study approach. The boundaries of the case are a secondary school in Hong Kong which participated in a KM project and fully implementing KM. This case study focused on experience of implementing KM in the school.

II. Literature Review

Knowledge Management (KM) in schools can be conceptualised as strategic management activities that support the school's leaders and teachers by collecting information or making use of the organisation's own knowledge resources to enable them to plan and carry out their teaching tasks effectively [6]-[9]. These knowledge management practices can help to capture, codify and diffuse knowledge in a school for improving school planning and management, either through the use of information and communication technologies or by human interaction so that the knowledge acquired can be shared with all teachers. KM can contribute to school success in the context of educational reforms by retaining and sharing the best practices of experienced teachers, by improving the effectiveness of the teaching and the performance of learning and by supporting the development of a knowledge community and a learning culture [10]. Cheng illustrated the positive effect of knowledge management on the learning capacity of both individual teachers and school organisations to enable them to achieve sustainable development in a reform context [11].

The application of KM in schools is not yet very popular, as compared with other business, government and non-profit organisations in spite of many appeals for the application of KM in order to improve the organisation of education. [12]. The growing literature has stress the lack of model as a problem in knowledge management, thus making it a field for exploration and deliberation in the literature. The normative KM model

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provides a tangible starting point for a KM initiative and its implementation by utilising existing information and knowledge to support the continuing improvement of professional practice and for strengthening the school strategic planning capacity. Fig. 1 illustrates the normative KM model. The model is developed using a strategic management approach that could be effectively followed for school improvement, using some supporting factors such as knowledge leadership, a knowledge sharing culture, KM strategies and information technology support. These supporting factors were identified by the exploratory factor analysis as predictive factors for strategic planning capacity [13].

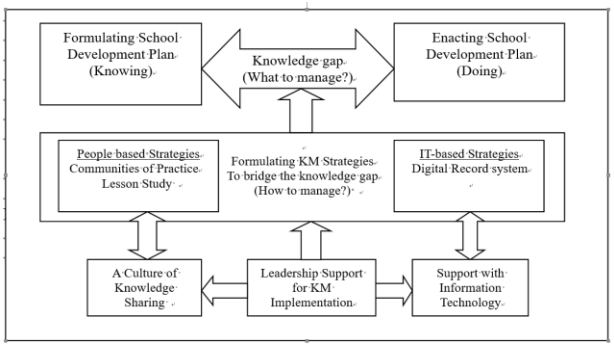

Figure 1. Visualising normative knowledge management model cheng's (2015)

Leadership is the primary determinative factor for the success of KM implementation in a school organisation. Leadership support has been identified as a significant requirement in organizations for sustainable competitive advantage [14] and the core factor in the relationship between knowledge management and organizational effectiveness [15]. School leaders initiate KM implementation by nurturing supporting conditions that will enable and facilitate KM as an ongoing process leading to desired outcomes [16]. For examples, the leaders can cultivate a knowledge sharing culture by encourage organizational communication [17] and provide IT supports to enable effective KM practice for improvement management efficient [18]. A culture of trust, collaboration and organisational learning are identified as enablers of knowledge sharing [19]. IT support is recognised as one of the key CSFs to enable knowledge sharing and to eliminate distance, time barriers and improve accessibility to relevant knowledge in the minimum amount of time [20]. Another important task for leadership to promote knowledge management for organization improvement is to formulate KM strategies. Without supports and consent from the leaders, it will not be possible to formulate appropriate KM strategies and the KM implementation will not be effective.

The model proposed two guiding questions to school leaders with respect to the implementation of knowledge management. These are, "*what to manage*?" and "*how to manage*?" The *"what"* question guides school leaders to identify the knowledge gaps between the intended objectives and actual implemented of school development plan, while the *"how"* question provokes them to determine appropriate KM strategies to bridge the knowledge gaps. A KM strategy can be classified as people based and information based [21]. School leaders can utilise information technologies and non-technological, i.e. people-based, approaches to retain the knowledge held and communicated by the stakeholders [22].

People-based KM strategy and practices

A people-based KM strategy emphasises the use of dialogue through social networks, including occupational groups and teams, and using the knowledge that can be obtained from experienced and skilled people for professional development [23]. Communities of Practice (CoP) and Lesson Study are KM tools commonly used to leverage knowledge in school organisations. Communities of Practice (CoP) is a KM tool used in the people-based strategy. CoP consists of "groups of people who share a concern or passion for something they do and learn how to do it better as they interact regularly" (p. 4). CoP is also an interpersonal interactive knowledge strategy that supports face-to-face exchange of tacit knowledge and expertise sharing, thus creating not only a collective intelligence for judicious decision-making but also a collective intuition [24]. The tacit knowledge leveraged from the CoPs will then be codified in a repertoire of resources, then an information-based KM strategy for knowledge diffusion in schools for widen application should be formulated.

Information-based KM strategy and practices

The information-based KM strategy is a system-oriented approach for managing knowledge, which focuses on the use of information technology for codifying, storing and formally sharing knowledge [25]. The IT-based KM strategy emphasises on the storing, sharing and use of an organisation's explicitly documented knowledge. Individuals strive to explicitly encode their knowledge into a shared knowledge repository, such as a database, as well as retrieving the knowledge that other individuals have input to the repository. A knowledge management system (KMS) can be established by an organisation in which the organisational knowledge is stored, organised, and shared as reusable assets for problem solving and decision making [26]. A KMS is generally a class of information systems (including both physical and virtual) designed for the creation, collection, storage and dissemination of knowledge over time in organisations, and ensuring that the knowledge is distributed through and accessible by the broader organisation for use and reuse.

Record management (RM) in KMS can be used to maintain organisational documents related to the history, experience and expertise accumulated. It also allows employees free and easy access and helps them and their successors to run the organisation sustainably [27]. It provides an essential function and is a critical regime within all organisations that control records through their life cycle, including the process of record creation, organising, retrieval, retention as well as record disposal or storage in archives [28].

III. Research Method

A single case study [29] was chosen as the research method for this study. A case school - which had conducted KM for supporting strategic planning for a long time - was selected from a KM project for the case study. The school was selected because it represented the application of KM strategies for tackling the problems it encountered in the education reforms. In-depth semi-structured interviews and documentary analysis were utilised in this study to collect and triangulate data. Three group interviews with four teachers, four middle managers and three vice-principals were conducted respectively to investigate the background and the supporting factors for KM implementation, the KM strategies and KM tools adopted and the achievements and benefits obtained as a result of the KM implementation. The interview questions included: (1) Do you think there are any discrepancies between what is intended and what is implemented in the school development plan? If any, what are they and how they are bridged? (2) Do you think the CoPs and the record management (RM) system in your school could bridge the said discrepancies and resulted as improving teaching and learning as well as management efficiency? (3) Do you recognise any supporting factors for operating the CoPs and the RM system? The interviews were taped and then transcribed. Documentary analysis was conducted to analyse the school plans and procedure manual used in the school, specifically to explore how the school developed and fostered the supporting factors needed for the success of the KM implementation. The narrative patterns identified in the transcripts were labelled with codes that linked the deployment of knowledge management practices to support school improvement and the context of the narrative patterns in relation to the supporting factors for KM implementation. For the document review, the alignment of the school plans and reports of practice in the school were verified. The KM practices identified in the document review were triangulated with the narrative patterns.

IV. Finding and Discussion

An analysis of the school annual reports and the public examination results within these ten years show that the case school has been an effective school in terms of student achievement. The track record of the students' academic performance, the results in public examinations, the proportion of students entering universities and other achievements are outstanding. Many exceptional students have been nurtured by the school. However, in recent years, the principal and teachers have noticed that the diversity in the academic ability, self-discipline and other personality traits of their students had increased. They were keen to develop knowledge to help them manage such diversities and to handle the students who had learning difficulties. Traditionally the teachers work independently and seldom collaborate in teaching and thus the culture for knowledge sharing is not strong enough to co-construct of knowledge. Moreover, a substantial portion of the teachers would be retiring in the next 10 years. The school stands to risk losing the tacit knowledge in teaching and pastoral care of these experienced teachers. Furthermore, there was no digital storage and network to keep and diffuse the teaching materials and codified knowledge.

The principal aware of the problem of knowledge loss, need of knowledge and weak knowledge sharing culture and IT support may lead to failure in achieving the school gaols. He defined these problems as strategic management issues which should be addressed in the school plan. He brought these problems in to the school planning process and addressed them in the KM plans. He considers the know-how as a resource in strategic planning. He initiates KM to tackle the issue of knowledge loss due to teacher retirement and the need for knowledge acquisition to improve both teaching and learning. His KM approach aims to support the strategic management of the school, which involves a planning, implementation and evaluation cycle for school improvement. An analysis of the school documents found that the school plan (2013-2015) stated that the major concerns to address and the challenges faced were "improving teaching and learning" and to "cultivate a knowledge sharing culture". To enact these major concern, the principal has formulated people-based and IT-based knowledge strategies to fill the knowledge gaps and to improve the teaching and learning so as to address the identified diversity. In an interview, one VP stated that

> "…… *The principal discusses with teachers to identify students' needs by analysing the data of student academic and non-academic achievement to formulate programmes, strategies, the annual program plan and the school improvement plan……*" (VPW)

He aims to promote a vision of knowledge management to enhance the school's improvement and he believes that the teachers' knowledge is the intellectual capital of the school and should be treasured.

The discussion enables the school leaders to clarify the domains of knowledge to be acquired, shared, applied and stored in their schools and explain how they are related to the major concerns in their school development plans. Similar to Suchman's study for promoting KM, the school leaders want to promote communication as a means of transferring knowledge [30]. Eventually, the school has applied "people-based" and "information technology-based" knowledge strategies to capture knowledge from the teachers, and to organise knowledge sharing among the teachers in the school. The KM tools including Communities of Practice (CoP) and Knowledge Management systems were applied in the school. These findings echo Amidon and Macnamara's study on knowledge leaders who tend to utilise both technological and non-technical approaches to retain the knowledge that is held and communicated by the stakeholders [31].

The school leaders cultivate Communities of Practice (CoPs) for knowledge transfer to enhance the knowledge sharing culture. They encouraged teachers to participate in CoPs in which they share their experience, not only in

teaching but also related to other school activities. In fact, at the beginning the CoP was led and supported by the senior teachers, but gradually the CoPs flourished and dealt with different topics. In an interview, one teacher stated that:

My colleagues gradually feel that they can risk sharing something with each other in the CoP. (TT)

An analysis of the school plan and the teacher interviews showed that the school leaders exercised their strategic leadership who consider knowledge as a resource and they supported KM in the school and that there was wide acceptance of KM among the teachers. Similar to the findings in McFarlane's study who stresses the importance of a leadership role for improving organization capability with KM, the school leaders played a primary role in develop KM to help teachers to communicate their knowledge [32]. Teachers are the core factor in knowledge flow, and knowledge flow helps determine the degree to which school leaders can effectively mold knowledge inputs into coupling a collaborative strategy for school improvement.

A knowledge sharing culture has been developed by cultivating CoPs. Several CoPs were initiated by the school leaders and sustained by the Staff Development Committee of the school. The knowledge domains of these CoPs covered both student pastoral care and teaching and learning. In an interview with a teacher, she said that:

We have established a culture of knowledge sharing through cultivating the use of a CoP which can help different departments to set their own development directions, This is a very good platform for knowledge sharing. (TR)

An analysis of the teacher interviews supported this view that the teachers are delighted to participate in CoP to learn how to address student diversity encountered in their teaching and work. They come together to learn and share because they have common problems to solve and could participate in joint enterprises. They could learn what they needed to learn from each other and the CoP constituted a knowledge repertoire for the school. An analysis of the teacher interviews indicated that CoP were supported, the knowledge domains of the CoPs were developed on the basis of the interests of the colleagues and were more practical than theoretical.

The topics such as the effective learning strategy to use Excel for statistical analysis, since it is very important for us to input information on grades and conduct for assessing student learning through data analysis. (TRC)

Leveraging knowledge in assessment for learning. This finding is consistent with Wenger assertion that when the knowledge domains of CoP related to the teachers' teaching practices common problems encountered, and they have been able to create joint enterprises [33]. Analysis from information of the interviews from the vice-principals showed that the teachers are mutually engaged in the CoP activities. They are willing to share not for the any incentives. They did not compel colleagues to attend, but rather encouraged them to attend. They apply the knowledge they have gained in their practical work, because they think the things they gain from sharing can help them. When they find that their acquired knowledge does in fact make students more attentive in class, they will be more accepting of other new approaches that had been shared on other ways to make students more attentive in the class.

Many colleagues want to attend the CoPs activities because they can communicate with their colleagues and apply the skills learnt from them. (VPT)

The assessment for learning skills shared in the CoPs can help teachers to engage students in class activities…. they are now seeking new approaches to engage students actively participation in the class activities. (VPF)

Wenger argues that it is only through the improvement of these characteristics in parallel that one can cultivate a community of practice which allows for the co-construction of knowledge [34]. This finding is similar to Lin & Lee's study on the effect of CoP to improve learning and knowledge sharing in organizations, which support the claim that a people-based KM strategy can be implemented by means of CoPs, and that this is an effective tool for organizations to use to establish a culture of knowledge sharing. Wenger proposes the cultivation of CoPs as the core knowledge sharing strategy of an organization. A knowledge sharing culture can be developed and enhanced in organisations when members are willing to share their tacit knowledge with other CoPs. Therefore CoPs could be instituted as a knowledge management strategy for the development of a sharing culture in schools.

People-based KM strategies facilitate the transfer of tacit knowledge in the context of the school organisation. Jordan and Jones's study [35] claim that CoP help teachers to acquire both internal and opportunistic knowledge and to share it informally. Teachers can share with their colleagues the insights they have gained through a CoP. The CoP empower teachers to act and communicate effectively by equipping them with the required tacit knowledge. However, the diffusion of knowledge was limited by the number of teachers participate in the CoP if the school want to diffuse the knowledge

To address the problem of knowledge diffusion, he school has developed a Record Management (RM) system to manage explicit knowledge. This RM system integrates the essential school records, files and student data to provide necessary information for the teachers. RM system was designed to manage this kind of student information. This approach emphasizes explicit knowledge over tacit and favours the externalization process by establishing an electronic platform [36] for knowledge codification, storage, retrieval, presentation, sharing and updating, and also other KM processes and activities as well.

An analysis of the teacher interviews has shown that the RM systems has improved the efficiency of the information retrieval and the administrative work of the teachers by actively providing them with the essential

information to assist them in their decision making. The IT committee has designed a very user friendly platform RM system.

RM system is very convenient for us when we have to search for information. (CTL)

RM system improves the transparency of our school. I can see what is being copied and stored in other committees or departments. (TM)

The school has invested heavily in financial and human resources to build a RM system, including the search for specialised knowledge and communication among its members [37]. These IT tools and the RM system helps teachers to codify what they have learnt from their school activities and to make their knowledge accessible to the entire organisation. It is not enough if teachers only share their knowledge with a RM system and do not talk to each other, or if they only talk to each other and do not capture and codify some of their knowledge within the RM system. Teachers can take advantage of the existing information and communication technologies to codify and store their knowledge in the RM system, and such knowledge can be reused in a "people-to-document" manner [38].

The basic research question is: To what extent and how does the normative KM model support the strategic management for school improvement? The major concern of the school plan was to create a knowledge culture and to improve the teaching and learning in order to manage student diversity. On reviewing school documents, the KM as implemented in recent years provides colleagues with more opportunities to communicate, and facilitates the sharing of teaching materials. For example, the Academic Affairs section had cultivate a CoP in formative learning impressionable practices to address the problem in student learning diversity. The CoP have been trying out for several years, and the CoP could offer a data driven approach to help the departments, working committees and influence other colleagues to inform student learning. An analysis of the teacher interviews scripts shows that the teachers consider that the KM activities are relevant to the major concerns of the school, and in particular to the major concern of developing a knowledge sharing culture. The CoP domains are aligned with the major concerns.

KM activities was able to meet the major concerns during the past three years regarding the collaboration of colleagues and a sharing culture.

In the Chinese department I can see colleagues communicating and sharing the teaching material they have individually designed. There is an increasing trend for everyone to discuss with each other on the student performance or the individually designed teaching material. (CPT)

The assessment for learning is aligning the KM domain with the school development domains. (VPT)

The above comments reflect the institutionalization of the normative KM model in the school. Most colleagues participate in the KM activities with a positive attitude, and that its use in practice will provide opportunities for the school to improve. Capturing the knowledge of experienced teachers and managing student diversity are the triggers for the school's KM initiative. The KM activities plan would also serve as a framework to evaluate the effectiveness of the plans in the school's annual report. The plan for KM activities to bridge the knowledge gaps is aligned with the major concerns of the school development plan. The normative KM model could serve as a guiding framework for school leaders to implementing knowledge management for bridging the knowledge gaps of the school plans.

V. Conclusions and Implications

This study concludes that the normative KM model can be applied effectively in schools by emphasising the role of knowledge leadership and adopting people-based and IT-based KM strategies. The supporting factors identified for successful KM implementation are leadership support, nurturing a knowledge sharing culture and developing a RM system for knowledge retrieval and storage and data mining. Despite that schools are complex to be capable of analysis through a single dimension, the model could reflect the beliefs about the nature of knowledge management in school and behaviour of teachers regarding knowledge sharing. School leaders may promote the application of both people-based and IT-based KM strategies to achieve the expected outcomes of the school development plans more effectively.

A people based KM strategy can be implemented by cultivating a community of practice (CoP). The CoP is an effective tool that organisations can use to establish a culture of knowledge sharing. Such a knowledge sharing culture can be developed and enhanced in organisations when members share their tacit knowledge within the CoP. The organisational structure of the school should include a reward system as a way of encouraging staff to share their knowledge. An IT based KM strategy for knowledge storing and retrieval is usually implemented by building a school-based taxonomy in the record management system.

It would be best for schools to have a healthy mix of the two strategies, with the balance leaning to one side. However, the choice of a knowledge strategy depends on the specific organisation [39]. This depends on whether the knowledge will be codified and stored in databases, in which case the RM system would be used to help people communicate, or whether the knowledge will be shared with other people within or related to the organisation. If the school leaders plan to adopt an IT-based strategy, they should be prepared to invest heavily in information technology as the whole strategy is dependent on the information technology infrastructure. This would include mobile devices, data warehouses, and applications to access the data, networks and servers. If the school leaders adopt a strategy of personalisation for KM, they would probably have to invest less in IT but more in the people within their organisation, namely the "knowledge carriers". Although IT is needed to capture information on who knows what and how information systems can connect people, it is the people in the

organisation who are the more important. They would also have to incentivise the knowledge carriers to share their knowledge by talking to and assisting other teachers rather than simply entering their knowledge into some IT system (Hansen, et al., 1999, pp. 113-114).

Schools have long been threatened by competition, largely generated by the quality assurance policy and marketisation. It is necessary for the schools to recognise knowledge as a resource for school improvement. Schools need to understand that KM is an essential strategy for resolving school issues efficiently. Government should provide support to schools to enable them to adopt the appropriate strategy for successful KM implementation. By helping schools to effectively address these issues, KM can enhance the effectiveness and performance of schools in administration, management, teaching and learning and student support. This can eventually help schools to achieve sustainable improvement during educational reforms. Hence, schools should introduce and implement KM by adopting strategies that would cultivate and foster the factors that would support it, taking into account their own particular condition.

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