Enhancing school learning capacity by conducting knowledge management

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Abstract
This paper explores the predictive relationship between knowledge management and school capacity. A cross-sectional quantitative survey was designed to collect data from 427 teachers at 15 secondary schools in Hong Kong. A structural equation model was applied to explore the factor structure of the latent variables and their relationships. The results showed that knowledge accessibility, application and sharing were identified as the predictive factors for teacher learning capacity and organizational learning capacity.

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1. Introduction

School education is expected to develop human capital for the knowledge society within the competitive global economy, to interact with its policy environment, and know how to manage pedagogical knowledge. Following the impacts and challenges of curriculum delivery and the rapid emergence of knowledge resulting from curriculum reform, school leaders are expected to strengthen school capacity by managing knowledge; teachers are required to develop their learning competency for acquiring subject knowledge and pedagogical knowledge when implementing the new curriculum. Knowledge is a general resource of the human condition and is closely linked to the learning process. In tackling this challenge, schools would be looking at how to enhance school learning capacity for managing and processing the new information and knowledge.

Knowledge management (KM) aims to support organisations in creating a mechanism that measures, stores and transforms knowledge into intellectual capital. It increases problem-solving capability and the ability to make improvements (Sallis, & Jones, 2002). KM in schools can be seen as an approach that enables teachers within schools to develop a set of practices or knowledge processes to collect information and share what they know, leading to action that improves teaching and learning outcomes and school capacity. KM not only provides a platform for teachers to discuss different ideas for teaching and posting resources for student learning, but also retains the expertise of experienced teachers, increases their effectiveness in terms of teaching and learning performance, supports the development of a knowledge community in schools, and fosters the culture of learning (Leung, 2010). Little research has been carried out on how KM serves as a central condition for school capacity. This study will explore the KM processes that will enhance school capacity in Hong Kong.

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2. Literature review

Knowledge management is defined as a systematic and integrative process of coordinating organisation-wide activities of acquiring, creating, storing, sharing, developing, and deploying knowledge, value information, and expertise by individuals and groups in pursuit of organisational goals (Rastogi, 2000). It involves the knowledge processes of accessibility, sharing and application (Tannenbaum and Alliger, 2000). Knowledge accessibility refers to the collection of information and knowledge for planning, decision-making and problem-solving. It involves the process of capturing existing knowledge through knowledge formalised representation and acquiring needed knowledge and information (Rastogi, 2000). Knowledge sharing refers to the extent to which people share their knowledge and experience (Tannenbaum & Alliger, 2000). It involves the process of knowledge flow from one party to another and the process of transmitting organisational knowledge to everyone who needs it (Helmi, 2002). Knowledge application refers to the extent to which people apply or use knowledge for making decisions, taking informed actions and modifying behaviours in order to achieve goals or potentially change organisational patterns of practice (Tannenbaum & Alliger, 2000). It is the process of assimilation of acquired knowledge into the organisation.

School capacity is the ability to increase the teaching competency of teachers or improve models of school management, which enables a school to be more responsive and flexible as an organisation (Hargreaves et al, 1998). School capacity is determined by how a school applies knowledge processes to manage information, and to capture and leverage knowledge for sustainable development. School capacity consists of teacher and organisational learning capacity. Teacher learning capacity is the ability of teachers to enhance student learning. It is about teachers’ capacity to continually focus their energy on understanding the reality of the work, and a continual willingness to examine and re-examine the relevance and usefulness of one’s mental models concerning the work in general and/or the particular area of one’s own work (Senge, 1990). Organisational learning capacity is the ability to transfer knowledge effectively within the organisation (Goh, 1998) and to learn continuously by progressing through the stages of the organisational learning cycle (Dixon, 2000). It is the continual enhancement of collective capacities and the improvement of organisational effectiveness (Senge, 1990). The building of organisational capacity involves the disposition of knowledge through organisation communication system (King & Newmann, 2001). Organisational learning capacity is enhanced as teacher knowledge strategies improve, so knowledge can be shared more quickly through the learning cycle (Dixon, 2000).

In this study, knowledge management was conceptualised and examined as knowledge processes of accessibility, sharing and application. The assumption of this paper is that knowledge processes are predictive factors of school capacity at both the organisation and teacher level. The research question of this study is as follows: Do those knowledge management processes contribute to learning capacities at the school and teacher level?

3. Research methods

A cross-sectional predictive quantitative survey was designed to collect data from secondary school teachers in Hong Kong. A structural equation model (SEM) was applied to examine the factor structures and the paths among the variables using Lisrel 8.3 (Joreskog & Sorbom, 1999). The SEM is a collection of statistical techniques that allows the examination of a set of relationships between exogenous variables and endogenous variables. The instrument was adopted from Cheng (2011) and Sallis and Jones (2002). The questionnaire items were further developed to investigate teacher perceptions of their learning capacity and the knowledge process and organisational learning capacity of their service schools. The instrument consists of two sections. Section one consists of nine items for measuring the three knowledge processes—knowledge accessibility, knowledge sharing and knowledge application—in the school. Section two consists of six items for measuring the learning capacities at both the teacher and organisation level. The statement representing knowledge strategies was adopted from Sallis and Jones (2002). The statements representing learning capacity at both the teacher and organisation level were adapted from Cheng (2011). The research questions theorise some notion of distance and often assume equal spacing of the interval scale. The data was treated as an interval scale. All items in sections one and two were measured using a six-point Likert-type scale ranging from one (strongly disagree) to five (strongly agree). Teachers were asked to indicate how they perceive their learning behaviour in regard to the 15 items. The subjects in the study were 427 teachers from 15 secondary schools in Hong Kong.
4. Findings

The structural and measurement coefficients from the completely standardised solution under maximum likelihood are presented in Figure 1. The goodness-of-fit statistics are shown in Table 1. All the paths in the model were significant at the 0.05 level according to the Z statistics.

<table>
<thead>
<tr>
<th>$\chi^2$</th>
<th>df</th>
<th>p-value</th>
<th>PGFI</th>
<th>RMSEA</th>
<th>SRMR</th>
<th>CFI</th>
<th>NNFI</th>
<th>IFI</th>
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<tbody>
<tr>
<td>79.47</td>
<td>64</td>
<td>0.092</td>
<td>0.59</td>
<td>0.024</td>
<td>0.024</td>
<td>1.00</td>
<td>0.99</td>
<td>1.00</td>
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The hypothesised model is a good fit to the data. The results of the LISREL based on 427 participants showed that the chi-square value was not significant for the overall model, $\chi^2 (N=427) = 79.47$, $P = 0.092$. As an absolute fit index, the chi-square assesses the discrepancy between the sample covariance matrix and the implied covariance matrix based on the hypothesised model. A non-significant chi-square suggests that the model may be a reasonable representation of the data. However, the assessment of fit using the chi-square test is confounded by sample size. When the sample size is large, the small difference between the sample covariance matrix and the reproduction covariance may be found to be significant. The Parsimony Goodness-of-Fit index (PGFI) takes into account the complexity of the hypothesised model in the assessment of overall model fit for addressing the issue of parsimony in SEM. The PGFI should be larger than 0.5, with higher values indicating a more parsimonious fit (Mulaik et al, 1989). Relative fit indices and residual-based indices are two types of additional fit indices widely used to complement chi-square. Relative fit indices include comparative fit index (CFI), non-normed fit index (NNFI) and incremental fit index (IFI). These indices measure the relative improvement in fit by comparing a hypothesised model with a base-line model. The base-line model is an independent model in which all variables are expected to be uncorrelated. These indices range from zero to one, with larger values indicating a better fit. They should be at least larger than 0.9 for reasonable goodness-of-fit. In the present study, the indices are PGFI = 0.59, CFI = 1.00, NNFI = 0.99, and IFI = 1.00, suggesting a reasonable fit between the data and the hypothesised model. In addition to relative-fit indices, residual-based indices can also be used. Standardised root mean square residual (SRMR) measures the average value across all standardised residuals between the elements of the observed and implied covariance matrices. Root mean square error of approximation (RMSEA) assesses the absence of fit owing to model misspecification and provides a measure of discrepancy per degree of freedom. SRMR ranges from zero to one and there is no upper limit for RMSEA, with smaller values indicating a better model fit. A value of 0.08 or less for SRMR and a value of 0.06 or less for RMSEA indicate an adequate fit. In this study, SRMR = 0.024, whereas RMSEA = 0.024 (90% CI. 0.0; 0.039). Given that this is a very stringent model, these fit statistics indices show that the model fits the data fairly well.
5. Discussion

The results of the structural equation model show that the knowledge processes of sharing ($\beta=0.26$) and application ($\beta=0.62$) are identified as the predictive factors of teacher learning capacity, while accessibility ($\beta=0.14$) and sharing ($\beta=0.47$) are identified as the predictive factors of organisational learning capacity.

Knowledge accessibility is a predictive factor of organisational learning capacity. This knowledge process involves retrieving information and knowledge from the internet, school intranet, seminars and meetings. Organisational learning is the process of gaining knowledge, which empowers members of an organisation to understand and thus to act and communicate effectively (Addleson, 2006). The building of organisational capacity therefore involves dissemination of knowledge (King & Newmann, 2001). The knowledge process of accessing information should promote better organisational communication. Accordingly, it is a predictor of organisational learning capacity. However, knowledge accessibility is not a predictive factor of teacher learning capacity. Accessing knowledge is only part of a teacher’s learning; it requires application to complete the learning process. Therefore, it cannot enhance teacher learning capacity.

Knowledge sharing is a predictive factor of learning capacity at both the teacher and organisation level. This finding suggests that knowledge sharing is the most significant knowledge process for enhancing school learning capacity. This finding is consistent with Gandhi’s (2004) assertion that the most important aspect of knowledge management is to encourage people to share knowledge. Bruner (1996) argues that knowledge can be co-constructed through discussion and collaboration, in which the learning capacity is developed. Building teacher learning capacity involves collaborative learning and practice (McDonald, 2001; Little, 2001). Shulman (2004) also suggests that learning in collaboration provides teachers with opportunities for peer observation and discussion, which helps to prevent a distorted perception of one’s own teaching. The building of organisational learning capacity involves cultivating a professional learning community that provides a shared purpose, collaboration, reflective inquiry and influence, and a coherent programme (King & Newmann, 2001). These views on enhancing learning capacity highlight the situated and social nature of knowledge sharing.

Knowledge application is a predictive factor of teacher learning capacity. This knowledge process involves the application of knowledge to decision-making and problem-solving (Tannenbaum & Alliger, 2000). The process of knowledge application in a school context can be understood as the learning process of knowledge internalisation through teaching practices. Teacher learning involves using teaching knowledge in teaching practices. By using the knowledge obtained from sharing to conduct teaching practices, explicit knowledge is internalised to become implicit knowledge, and is reconstructed through reflection to become personal knowledge (Kolb, 1984). Therefore, teacher learning capacity can be enhanced through knowledge application. Teachers normally use the knowledge for decision-making and problem-solving in classroom teaching rather than in school-wide managerial decision issues (Cheng, 2008). They are interested in using the knowledge for decision-making at the classroom level rather than the school level. In this study, organisational learning capacity is conceptualised as system thinking in school managerial decision issues (Senge, 1990). If teachers show no interest in using knowledge for decision-making on school managerial issues, it is not surprising that knowledge application is not a predictive factor of organisational learning capacity.

6. Conclusion

Knowledge accessibility, sharing and application are applied in the schools in this study as KM processes for enhancing school capacity. This study constructs an empirical model for articulating the predictive relationship between KM and school capacity. This paper makes a theoretical contribution to existing KM literature by providing an empirical model for effective implementation of KM processes, and a practical contribution to schools by providing KM processes for improving learning at the organisation and teacher level. The study provides a framework to support teacher learning and school organisational learning, as a means of tackling the challenge raised by curriculum reform of sustainable school development for the knowledge society.
References


