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Applying Multiple Behavioral Pattern Analyses to Online Knowledge Management Environments for Teachers' Professional Development

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1. Introduction

Given the trend toward digitalized knowledge management and the highly interactive Internet environments of Web 2.0, the digitalization of teaching resources and teachers' knowledge management have become important issues. In the field of digital learning, a growing number of studies are focusing on applying Web 2.0 technologies (e.g., blogs and social community software) to teaching (e.g., Fessakis et al., 2008; Kabilan et al., 2010; Mazman & Usluel, 2010). With diversified digital teaching contents, these technologies extend and integrate current teaching modes and help create many new online instructional strategies. In the future, teachers may need to use these growing and complex digital teaching materials, digital learning contents, and instructional strategies. To be utilizes by teachers, these resources must be efficiently and effectively integrated. From the perspective of knowledge management, teachers must also be able to share and integrate their teaching knowledge efficiently within their communities of professional development and, more importantly, effectively externalize and combine knowledge.

Many studies have investigated issues of teacher community and teacher knowledge management (Barab, et al., 2001; Carroll et al., 2003; Hou et al., 2009a, 2009b; Hsu, 2004; Snow-Gerono, 2005; Stigler & Hiebert, 1999), including the application of new technologies to teacher knowledge management (Carroll et al., 2003; Lee et al., 2010). Many studies have also pointed out the necessity of schools adopting knowledge management (Hargreaves, 1999; Kuo, 2003; McKenzie et al., 2001; Richard, 2001). Most teacher knowledge is tacit, and the goal of knowledge sharing is not definite (Carroll et al., 2003); thus, teachers require more assistance and guidance when sharing knowledge. There also exist differences in knowledge sharing behaviors in different types of organizations (Bock et al., 2005; Yang, 2007; Yang & Chen, 2007); therefore, knowledge management strategies should be customized based on teachers' organizations and teaching contexts so as to facilitate teaching knowledge sharing and management of teacher communities. Professional development knowledge sharing is increasingly important for teachers because the digitization of teaching contents has resulted in knowledge content becoming more diverse,

including multimedia, learning objects, digital teaching materials edited by teachers, and teaching plans aided by digital technology. These materials are abundant and fast-emerging, adding complexity and difficulty to the process of internalizing teaching knowledge and leading to cognitive load for teachers as they search and combine various types of Internet information.

To meet the demands of knowledge management for teacher communities in the Web 2.0 environment, management strategy becomes a key topic of research because it controls the quality and effectiveness of teachers' professional development. Regarding current knowledge sharing limitations for teachers, Carroll et al. (2003) make several knowledge management suggestions: (1) establishing practice community, (2) building knowledge storage reservoirs, (3) establishing expert guiding mechanisms, (4) promoting peer-supporting mechanisms, and (5) practicing case sharing. Hansen et al. (1999) divides the knowledge sharing strategies of knowledge management systems into two dimensions, specifically, individual and file, and states that each should formulate its own strategies. Given the isolated nature of teaching and the tacit nature of teaching knowledge as well as the diverse and complex nature of knowledge files (digital content of teaching resources) and developing trends in new interactive technologies, the formulation of strategies should not refer solely to the current literature. This issue involves multi-aspect consideration and more precise analyses of knowledge sharing behaviors as aids and foundations to formulate knowledge management strategies effectively that are compatible with teaching practices, allowing for further development of proper knowledge management platforms for teacher communities. Though studies of teacher knowledge management (Carroll et al., 2003; Lee et al., 2010; Plass & Salisbury, 2002; Spector, 2002;) and analyses of teacher knowledge sharing behaviors (Hou et al., 2009a, 2009b) have been conducted, these studies are few in number, and a comprehensive discussion about integrating multiple analytical methods to analyze community behaviors is lacking.

Therefore, this research attempts to apply theories of knowledge transfer and creation to investigate possible phenomena of teaching knowledge transfer in the area of e-Learning. This study employs frequently used behavioral analysis techniques to propose an analytical and detecting framework for integrating different analysis techniques of teachers' professional development and knowledge transfer. By proposing this framework and model, this study expects to aid the development and management of teachers' professional development communities in the Web 2.0 environment.

2. Teaching knowledge transfer in the web 2.0 environment

Knowledge transfer and creation are key to knowledge growth in community organizations. According to widely discussed knowledge creation and transfer model (Nonaksa & Takeuchi, 1995), the transfer of knowledge can be divided into four processes: socialization, externalization, internalization, and combination. This study discusses the traits of these processes of teachers' organization of transferred knowledge below.

1. Socialization: Socialization refers to the process of transferring implicit knowledge to implicit knowledge. This process occurs when individuals transfer knowledge by conveying and sharing experiences in the organization mentally (as opposed to written texts). Knowledge senders and receivers learn knowledge sharing through observation, imitation, and practice. However, given the previously mentioned isolating nature of teachers' knowledge sharing, teachers may find it difficult to proactively share and

observe. In online communities that lack physical interaction, the process of building a socialization community environment requires further research and discussion. Some recent studies have used blogs to build environments for teachers to share knowledge and to observe (Hou et al., 2009b), but the limitation of diversity in social knowledge construction remains. Conducting real and timely empirical behavior analysis can help teacher educators understand the potential reasons for this limitation and formulate appropriate strategies for facilitating socialization. It is also worth applying empirical behavior analysis to analyze and understand the impacts of increasingly favored social network services (SNS) software (e.g., Facebook, Google +) on the socialization of teachers' communities.

2. Externalization: Externalization refers to the process of transferring implicit knowledge to explicit knowledge. This process occurs through mutual dialogues and documentation to initiate knowledge transfer. For example, individuals can communicate their ideas or opinions through language and writing. This process is crucial for teachers' professional development, particularly in building online teacher communities. The question of how to facilitate documentation and digitalization of teaching methods and materials for these busy teachers is an important issue. Several studies have emphasized employing reward mechanisms to increase sharing performance. However, it is important to consider if by applying a reward mechanism (e.g., monetary prize for competition or certification mechanism), the effects of sharing will be long-lasting. Also important to consider is if there is a mechanism to increase teachers' internal motivations to share and produce digital teaching materials and cases. Many studies have mentioned the limitations of online teachers' communities (Barab et al., 2001; Carroll et al., 2003) with the topic of motivation also being discussed. It is worth discussing the question of how to help the members of teacher communities understand precisely how they can benefit the community and themselves by externalizing their knowledge. When teachers find motivations to externalize their knowledge, their capabilities for conducting this externalization must also be evaluated. Many studies have mentioned that some teachers do not have sufficient knowledge of information technology (Leu et al., 1998). Thus, studies need to be conducted that examine how to ensure that teachers have sufficient capabilities for externalizing their knowledge as well as whether the externalized knowledge (e.g., multimedia teaching materials, teaching cases) is precise, of sufficient quality and is not repetitive. Behavioral analyses of the processes of teachers' externalization will allow us to better understand the continuity, depth of contents, and obstacles of externalization.

3. Internalization: Internalization refers to the process of transferring explicit knowledge to implicit knowledge. Internalization occurs through the integration of explicit files and photos such that individuals may absorb and internalize them as tacit knowledge. For example, individuals can learn a specific skill by reading Internet files. For teacher professional development, increasing professional knowledge depends on internalizing and absorbing explicit teaching knowledge. The process of internalization is similar to cognitive process of concept understanding in which knowledge is divided into declarative knowledge (e.g., disciplinary knowledge) and procedural knowledge (e.g., teaching process). To help teachers efficiently absorb sufficient teaching knowledge, the question of how to facilitate teachers' learning motivations in online communities becomes important. Increasing the depth of internalization by designing professional

development activities that assist meaningful learning and deepen cognitive levels may prove helpful. Many recent studies have investigated the knowledge construction phases of online learning communities (Hou et al., 2009a, 2009b), using various analysis methods (e.g., integrating lag sequential analysis, quantitative content analysis) to discuss cognitive characteristics and limitations. Applying different teaching strategies, such as role playing (Hou, 2011a) and problem solving (Hou et al., 2008, 2009a), also helps increase the cognitive diversity and depth of the internalization process. For teachers' professional development, applying these strategies may help teachers internalize professional knowledge, which may result in better professional development effects.

4. Combination: Combination refers to the process of transferring explicit knowledge to explicit knowledge. This process occurs through such modes as storage, addition, sequencing, categorizing, and reorganizing so as to systematize current explicit knowledge. For example, an organization can exchange information through files and the Internet or through databases that integrate and process different knowledge and incorporate it into the organization's knowledge. This process is key to teacher professional development community's production of new knowledge. After observing and internalizing teaching knowledge, teachers must optimize the combination of shared knowledge according to practical teaching contexts so that they may apply the learned knowledge. This process is logistically difficult because teachers should have the capability, time, and motivation to combine and share knowledge. The development of cross-disciplinary teaching knowledge, which has received increasing attention in particular, requires colleagues' cooperation on knowledge combination. As for difficulties in integrating and developing teaching materials, recent studies have found that material designers have difficulties in project control and have little interaction with cross-disciplinary colleagues when collaborating on the development of teaching materials (Albers, 1996; Plass & Salisbury, 2002). However, in the growing Web 2.0 environment, highly interactive Internet behaviors and the concept of collective intelligence are gaining attention (Musser et al, 2006). Cross-disciplinary knowledge integration and social knowledge construction may improve when teachers are more familiar with common social networking software and use it more frequently. Researchers conducted sequential analysis of the behavior of teacher communities using blogs to construct social knowledge (Hou et al., 2009b). The results show that the articles that teachers posted on blogs consisted primarily of sharing their feelings, experiences, or teaching information with limited social knowledge construction. Thus, the process of choosing and developing social software that meets teachers' communities' needs is a challenging topic for research, as is determining how to assist with proper strategies of facilitating teachers' observation (socialization and internalization), sharing (externalization), and combining innovative knowledge. In this way, teachers can achieve the goal of knowledge creation by accumulating knowledge through the cycle of socialization, externalization, internalization, and combination (Nonaksa & Takeuchi, 1995).

In conclusion, this study discusses the management of teacher professional knowledge and the limitations of current research by applying knowledge innovation and transferring model (Nonaksa & Takeuchi, 1995). As the results show, to facilitate professional knowledge transferring and innovation for teacher online community, besides the four essential tool categories in teaching knowledge management system (Spector, 2002) (i.e., communication,

coordination, collaboration, and control), the design of assistance mechanism and functional module is also needed for the transferring process (i.e. socialization, externalization, internalization, and combination). We can embed the tools/modules that facilitate knowledge transfer into original digital teacher knowledge management systems. A related behavioral index (e.g., determining what kind of knowledge transferring is present when a teacher conducts a specific operation and browses a specific webpage) must then be set to implement a behavioral analysis of the transferred category's process. Thus, the point of restriction in teachers' interactions can be quickly diagnosed, allowing for direction in knowledge management strategy formulations and revision to platforms for teachers' professional development.

3. Frequently used behavioral analysis techniques for online communities

To implement behavioral analysis techniques in the teacher knowledge transferring process, we need a deeper understanding and discussion of current frequently used behavioral analysis techniques in online communities and of how to apply these techniques to knowledge management platforms for teachers' professional development.

Recent studies have used various techniques to analyze interaction in online communities. These techniques include the following:

1. Behavioral Frequency Analysis: This technique automatically records frequency/log of user operations in the system and performs an analysis. For example, analysis can be conducted on the percentages of all learners' operational behaviors and frequency in online game communities (Hou, 2011a).

2. Quantitative Content Analysis: With specific coding schemes, this technique encodes users' posted contents on knowledge management platforms and analyzes each code's frequency and percentage. For example, with knowledge construction coding schemes (Gunawardena et al., 1997) or with the cognitive processing dimension of the revised Bloom's taxonomy (Anderson & Krathwohl, 2001), analysis of discussions on discussion boards or blogs can be performed to understand the phenomena of discussions (Hou et al., 2009a, 2009b; Hou, 2011b).

3. Lag sequential analysis: This technique examines the sequential correlation of all behaviors during a specific period, either among the entire group or between users (Bakeman & Gottman, 1997, Hou, 2010). For example, this technique can investigate what behaviors users normally perform after a specific behavior to find if the sequence has reached statistical significance. To apply this analysis, behaviors must be encoded, arranged and analyzed according to time sequence, followed by the operations of sequential behavioral frequency transition matrixes. Calculations for these matrixes include calculating sequential transition frequency matrixes followed by the sequential transition conditional probability and expected values of the transition process between all codes, resulting in an adjusted residuals table and a visual behavioral frequency transition diagram. This technique is increasingly applied to behavioral analysis of online learning (e.g., Duran & Monereo, 2005; Hou et al., 2008, 2009a; Jeong, 2003). To investigate sequential transition changes in different time phases more deeply, Hou (2010) proposed progressive sequential analysis to reflect changes of behavioral sequences.

4. Time series analysis: This technique uses historical accumulated behavioral frequency during a specific period to establish proper time series models and to forecast

behavioral frequency for a future period. For example, Box and Jenkins's Autoregressive-Moving Average Models (ARMA) (Box et al., 1994) uses historical data to establish candidate time series models to forecast possible future behavioral trends. Indexes such as mean absolute deviation (MAD) and root mean square error (RMSE) are also used to calculate mean forecasting errors. This technique emphasizes forecasting future behavioral trends. Some researchers have applied this technique to student levels of discussion participation on blogs, finding that certain characteristics of student participation can be predicted (Hou & Ho, 2011).

5. Social network analysis: This technique finds various centrality coefficients centers by analyzing social interaction between members. This technique includes examples, such as degree centrality, betweenness centrality, and closeness centrality. Additionally, social network analysis can calculate the density and clusters of whole social network interaction. It helps significantly in understanding a community's interaction details, while also aiding community managers in better defining members with a high influence and members with low levels of interaction.

6. Cluster analysis: Cluster analysis helps investigate potential behavioral clusters of all behavioral categories for all members. For example, by using two-stage cluster analysis (Ward Method with K-mean method), researchers can investigate possible behavioral modes for members in a community as well as their behavioral characteristics (Hou, 2011a).

By reviewing the above-mentioned analysis techniques, we have found that all techniques have their own analytical dimensions, characteristics, and limitations. Increasing numbers of researchers are combining two or more techniques to increase the validity of their research. For example, by combining quantitative content analysis and lag sequential analysis (Hou et al., 2009a, 2009b), researchers can simultaneously investigate the interaction content and interaction behavior sequential patterns for community members.

4. Online Knowledge Transfer Analysis (OKTA) that integrates social network analysis and lag sequential analysis

Since the teachers' knowledge transfer is restricted by their organizational culture, based on the needs of teachers' online professional development communities, this study attempts to propose and integrate (1) lag sequential analysis to reflect the knowledge transfer behavioral patterns of the entire community and (2) social network analysis to reflect whole social interaction dynamics. The combination of these two techniques may help solve restrictions met when applying lag sequential analysis to detect the behavioral patterns of teachers' knowledge transfer. With social network analysis, it is possible to find influential teachers, formulate and revise strategies, and arrange interaction facilitators so as to effectively make progress in knowledge transfer.

This study proposes the Online Knowledge Transfer Analysis Framework (OKTA), which integrates social network analysis and lag sequential analysis as shown in the figure below.

Figure 1 shows the three analysis phases from top to bottom: (1) "constructing knowledge base of teacher professional development", (2) "lag sequential analysis of teaching knowledge transfer", and (3) "social interaction network analysis of knowledge transfer." The details of each phase are described below.

1. Constructing Knowledge Base of Teacher Professional Development

To analyze teachers' knowledge transfer, supporting function modules must be designed for each knowledge transfer phase (i.e., socialization, externalization, internalization, and combination). To aid analysis, a related behavioral index must be formulated (e.g., what type of knowledge transfer category is present when teachers conduct a specific operation or browse a specific webpage in the KM system?). When teachers conduct a specific operation in the KM system, the system can determine the category of knowledge transfer for that operation and record it in the knowledge base as shown in the top frame of Figure 1. The knowledge base will not only store the transferred contents (e.g., files, multimedia) but will also store the processes of the transfer (e.g., transfer category, operators, list of individuals who may be involved). These data are stored via proper and flexible relational databases. This study defines such databases as an *Interaction Tagged Knowledge Base* (ITKB); they are not only able to index the knowledge content and members but also serve as a dynamic behavioral analysis and index for knowledge transfer and social interaction.

2. Lag Sequential Analysis of Teaching Knowledge Transfer

After completing the construction of ITKB, the system can conduct lag sequential analysis on ITKB. Through serial calculation of behavioral transition matrixes (Bakeman & Gottman, 1997), the system can quickly monitor and analyze the retrieved knowledge transition data in chronological order. The result of this analysis is shown as the example in the middle frame of Figure 1. This allows us to quickly understand the percentage and frequency in a specific period between the four knowledge transition behaviors of the entire community or of a group of members and to understand the sequential relationship between these behaviors (e.g., in Figure 1, most members practice knowledge transfer of combination after knowledge externalization).

These behavioral patterns can be derived by automatic calculation and analysis and are helpful in discovering infrequent knowledge transfer behaviors and limitations of knowledge transfer behavioral patterns, thereby serving as references for formulators of knowledge management strategies.

For example, formulators of knowledge management strategies can understand if teachers are following the rational knowledge transfer process of socialization, externalization, internalization, and combination in a sequential order (Nonaksa & Takeuchi, 1995); they may also discover possible characteristics and limitations of knowledge transfer behaviors and thus design responsive interaction mechanisms and strategies to facilitate deeper teaching knowledge transfer.

3. Social Interaction Network Analysis of Knowledge Transition

Following lag sequential analysis, to better understand teachers' possible social interaction status in the four transfer-behavior process (e.g., what is the pattern of teachers' interaction in the process of knowledge externalization? Which teachers are more influential in this process?), this study conducts social network analysis (Scott, 2000) of the stored operators by ITKB in a specific knowledge transfer behavior and of individuals who may be involved. An example of the result is presented in the bottom frame of Figure 1. The social network map is produced along with all types of *centrality data* for each teacher (including *Degree centrality, Betweenness centrality, and Closeness centrality*). The sorting of the data helps operators of knowledge management strategies find the most influential members (e.g., t5 in Figure 1 may have higher *Degree centrality or Betweenness centrality*). When the crucial facilitators are located, proper knowledge management strategies can be formulated to improve teaching knowledge management.
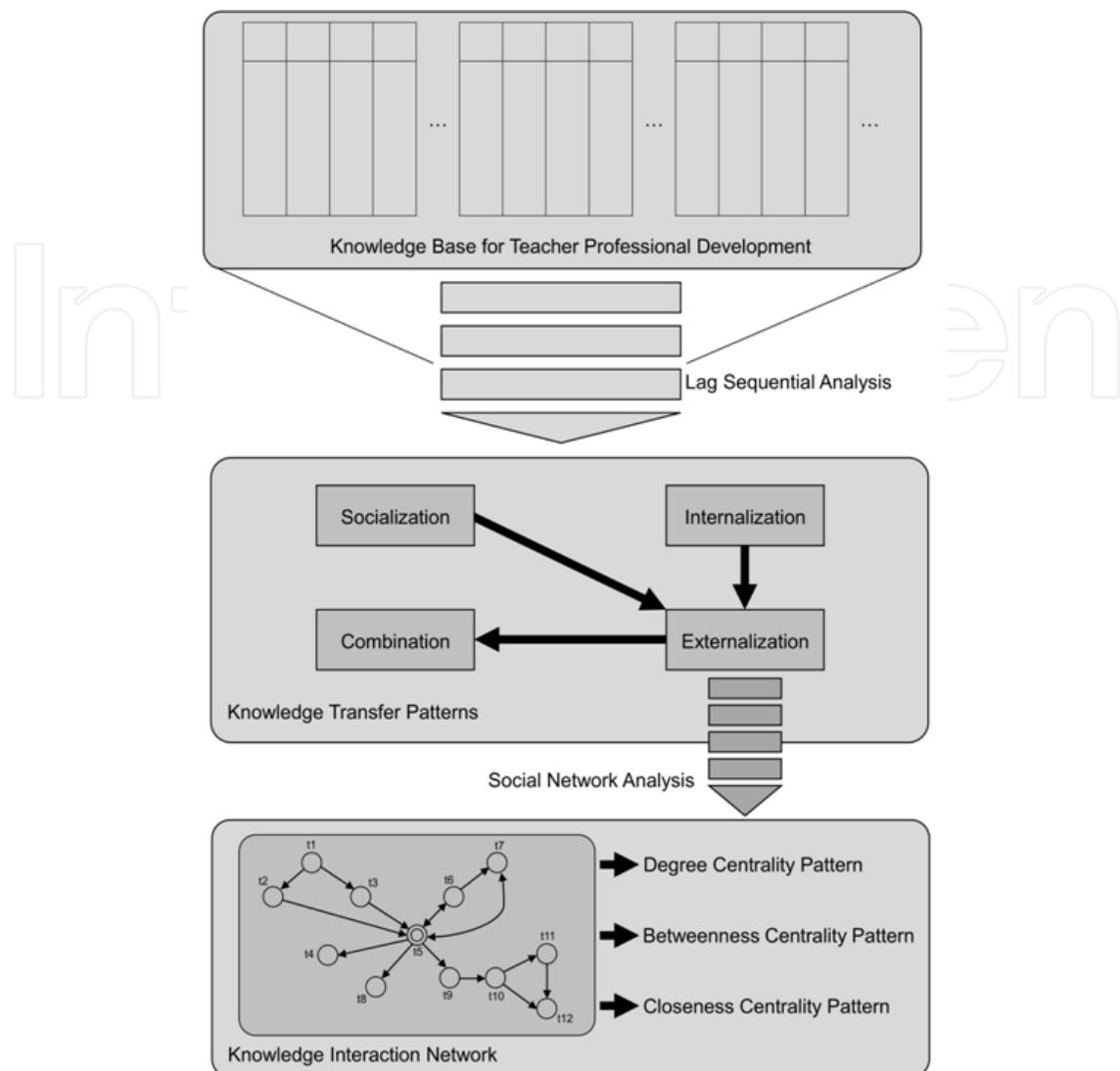
Fig. 1. Online Knowledge Transfer Analysis (OKTA) that Integrates Social Network Analysis and Lag Sequential Analysis

5. Conclusion

The importance of knowledge management in schools has been receiving increasing attention (Hargreaves, 1999; Kuo, 2003; Lee et al., 2010; McKenzie et al., 2001; Richard, 2001). This study attempts to apply knowledge creation and transfer theory (Nonaksa & Takeuchi, 1995) to investigate possible phenomena of teachers' teaching knowledge transfer in digital learning environments and proposes Online Knowledge Transfer Analysis (OKTA) that integrates social network analysis and lag sequential analysis. The behavior analysis framework proposed here will be helpful for investigating teaching knowledge transfer and multi-dimensional behavior patterns of social interaction in teacher communities in Web 2.0 environments. This study intends for this technique to allow for further researches into lack of knowledge sharing and teachers' online professional development. Additionally, through the automatic analysis mechanism of OKTA, this study hopes to visualize different types of behavioral patterns of knowledge transfer processes to allow for more efficient and crucial references for formulators of knowledge management strategies.

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7. References

Alber, A. F. (1996). *Multimedia: A management Perspective.* California, USA: Wadsworth Publishing Company.

Anderson, W., & Krathwohl, D. R. (Eds.). (2001). *A taxonomy for learning, teaching, and assessing: A revision of Bloom's educational objectives*, NY: Longman.

Bakeman, R., & Gottman, J. M. (1997). *Observing interaction: An introduction to sequential analysis.* (2nd ed.). UK: Cambridge University Press.

Barab, S. A., MaKinster, J. G., Moore, J. A., Cunningham, D. J., & The ILF Design Team (2001). Designing and building an on-line Community: The struggle to support sociability in the inquiry learning forum. *Educational Technology Research and Development, 49*(4), 71-96.

Bock, G. W., Zmud, R. W., Kim, Y., & Lee, J. (2005). Behavioral intention formation knowledge sharing: Examining roles of extrinsic motivators, social-psychological forces, and organizational climate. *MIS Quarterly, 29*(1), 87-111.

Box, G. E. P., Jenkins, G. M., & Reinsel, G. C. (1994). *Time series analysis: Forecasting and control*. Englewood Cliffs, NJ: Prentice Hall.

Carroll, J. M., Choo, C. W., Dunlap, D. R., Isenhour, P. L., Kerr, S. T., MacLean, A., & Rosson, M. B. (2003). Knowledge management support for teachers. *Educational Technology, Research & Development, 51*(4), 42-64.

Duran, D., & Monereo, C. (2005). Styles and sequences of cooperative interaction in fixed and reciprocal peer tutoring. *Learning and Instruction, 15*(3), 179-199.

Fessakis, G., Tatsis, K., & Dimitracopoulou, A. (2008). Supporting "learning by design" activities using group blogs. *Educational Technology & Society, 11*(4), 199-212.

Gunawardena, C., Lowe, C., & Anderson, T. (1997). Analysis of global online debate and the development of an interaction analysis model for examining social construction of knowledge in computer conferencing. *Journal of Educational Computing Research, 17*(4), 397–431.

Hansen, M. T., Nohria, N., & Tiemey, T. (1999). What's your strategy for managing knowledge? *Harvard Business Review, March-April*, 106-116.

Hargreaves, D. H. (1999). The knowledge-creating school, *British Journal of Educational Studies, 47*(2), 122-144.

Hsu, S. (2004). Using case discussion on the web to develop student teacher problem solving skills. *Teaching and Teacher Education, 20*(7), 681-692.

Hou, H. T., Chang, K. E., & Sung, Y. T. (2008). Analysis of Problem-Solving Based Online Asynchronous Discussion Pattern. *Educational Technology & Society,* 11, 1, 17-28.

Hou, H. T., Sung, Y. T., & Chang, K. E. (2009a). Exploring the behavioral patterns of an online knowledge sharing discussion activity among teachers with problem-solving strategy. *Teaching and Teacher Education*, 25, 1, 101-108.

Hou, H. T., Chang, K. E., & Sung, Y. T. (2009b). Using Blogs as a Professional Development Tool for Teachers: Analysis of Interaction Behavioral Patterns, *Interactive Learning Environments*, 17, 4, 325-340.

Hou, H. T. (2011a). Learning English with online game: a preliminary analysis of the status of learners' learning, playing and interaction, paper presented at the Sixth

International Conference on E-Learning and Games (Edutainment 2011), September 7-9, 2011, Taipei, Taiwan.

Hou, H. T. (2010) Exploring the Behavioural Patterns in Project-Based Learning with Online Discussion: Quantitative Content Analysis and Progressive Sequential Analysis, *Turkish Online Journal of Educational Technology*, 9, 3, 52-60.

Hou, H. T. (2011b). A case study of online instructional collaborative discussion activities for problem solving using situated scenarios: an examination of content and behavior cluster analysis, *Computers and Education, 56*, 3, 712-719.

Hou, H. T., & Ho, C. C. (2011). Applying time series analysis to forecast learners' participation patterns in blog instructional activities: A preliminary study. *British Journal of Educational Technology*, 42, 5, e91-93.

Jeong, A. C. (2003). The sequential analysis of group interaction and critical thinking in online threaded discussions. *American Journal of Distance Education, 17*(1), 25–43.

Kabilan, M. K., Ahmad, N., & Abidin, M. J. Z. (2010). Facebook: An online environment for learning of English in institutions of higher education? *Internet and Higher Education, 13*(4), 179-187.

Kuo, Y. F. (2003). A study on service quality of virtual community, *Total Quality Management & Business Excellence*, 14(4), 461-473.

Lee. C. L., Lu, H. P., Yang, C., & Hou, H. T. (2010). A Process-based knowledge management system for schools: a case study in Taiwan, *Turkish Online Journal of Educational Technology*, 9, 4, 10-21.

Leu, D. J., Hillinger, M., Loseby, P., Balcom, M., Dinkin, J., Eckels, M., Johnson, J., Mathews, K., & Raegler, R. (1998). Grounding the design of new technologies for literacy and learning in teachers' instructional needs. In D. Reinking, M. McKenna, L. D. Labbo, & R. Kieffer (Eds.), *Handbook of literacy and technology: Transformations in a post-typographic world* (pp. 203-220). Mahwah, NJ: Erlbaum.

Mazman, S. G., & Usluel, Y. K. (2010). Modeling educational usage of Facebook. *Computers & Education, 55*(2), 444-453.

McKenzie, J., Truc, A., & Winkelen, C. (2001). Winning commitment for knowledge management initiatives. *Journal of Change Management, 2*(2), 115-127.

Musser, J., O'Reilly, T., & the O'Reilly Radar Team (2006). *Web 2.0: Principles and best practices*. CA: O'Reilly Media, Inc.

Nonaksa, I., & Takeuchi, H. (1995). *The knowledge creating company.* NY: Oxford University Press.

Plass, J. L., & Salisbury, M. W. (2002). A living-systems design model for Web-based knowledge management systems. E*ducational Technology, Research and Development, 50*(1), 35-56.

Richard, D. R. (2001). Technology: Where students learn. *American School & University, 47*(3), 360-363.

Scott, J. (2000). *Social network analysis: A handbook.* London: SAGE Publications.

Snow-Gerono, J. L. (2005). Professional development in a culture of inquiry: PDS teachers identify of benefits of *professional learning communities. Teaching and Teacher Education, 21*(3), 241-256.

Spector, J . M. (2002). Knowledge management tools for instructional design. *Educational Technology, Research and Development, 50*(4), 37-47.

Stigler, J. W., & Hiebert, J. (1999). *The teaching gap*. New York: Free Press.

Yang, J. T. (2007). Knowledge sharing: Investigating appropriate leadership roles and collaborative culture. *Tourism Management, 28*(2), 530-543.

Yang, C., & Chen, L. C. (2007). Can organizational knowledge capabilities affect knowledge sharing behavior? *Journal of Informational Science, 33*(1), 95-109.
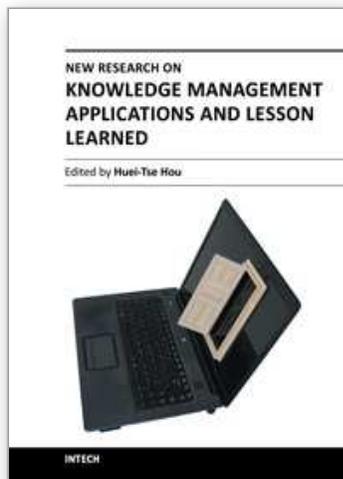
New Research on Knowledge Management Applications and Lesson Learned

Edited by Dr. Huei Tse Hou

Due to the development of mobile and Web 2.0 technology, knowledge transfer, storage and retrieval have become much more rapid. In recent years, there have been more and more new and interesting findings in the research field of knowledge management. This book aims to introduce readers to the recent research topics, it is titled "New Research on Knowledge Management Applications and Lesson Learned" and includes 14 chapters. This book focuses on introducing the applications of KM technologies and methods to various fields. It shares the practical experiences and limitations of those applications. It is expected that this book provides relevant information about new research trends in comprehensive and novel knowledge management studies, and that it serves as an important resource for researchers, teachers and students, and for the development of practices in the knowledge management field.

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