

An empirical review on knowledge sharing model: Objective, practice-based and mixed perspectives

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Abstract

The purpose of this concept paper is to have a better understand on knowledge sharing literature in general and subsequently will focus on the process and the model of knowledge sharing. Knowledge or knowing is personal, and thus is impossible to totally disembodify from people into a fully explicit form. Here, knowledge is culturally surrounded within the organization as it is never totally neutral and unbiased and to some extent; it is inseparable from the values of those who produced it. Learning, face-to-face communication, meetings, forums, knowledge sharing and mentoring systems are examples of socially constructed knowledge intensive organization activities. Since the practices-based epistemology conceptualizes knowledge as embodied in action, which is highly contextual and socially constructed, it is easy to sum-up this terminology into one concept called knowledge sharing. Indeed, knowledge sharing practices are always based on practices, for example, practices of interviewing, practices aimed at building commitment and practices of communication. Finally, knowledge sharing has been allocated in three different perspectives named objectives perspectives, practice-based perspectives and mixed perspectives (the later combining the two former perspectives).

Keywords: *Knowledge Sharing, Objectives Perspectives, Practice-Based Perspectives And Mixed Perspectives*

Introduction to knowledge sharing

The increasing recognition of the important of knowledge in an organization, the different types of knowledge, the tacitness and explicitness of knowledge, and the distinction perspectives of knowledge (objectivist and practices-based) found in the literature show the influence and importance of knowledge and how it is shared within an the organization.

Knowledge sharing has been identified as a major focus area for how organizations manage knowledge. The relevance of this theme derives, particularly, from the fact that it provides a link between the level of the individual knowledge workers, where knowledge resides and the level of the organization, where knowledge attains its (economic and competitive) value (Hendriks, 1999). Indeed the following organizations have already achieve significant benefits through knowledge sharing activities, including Toyota, Texas Instruments (TI), Dow Chemical and Ford (Dyer & Nobeoka, 2000; Shin, 2004; O'Dell, Wigg & Odem, 1999; McDermoot & O'Dell, 2001 as cited in Yang & Chen, 2007).

Importantly, knowledge sharing can be defined as an activity through which knowledge is exchanged among people, friends, or members of a family, a community or an organization. Szulanski's (2000) definition of knowledge-sharing was based on the "transmitter-receiver" model. He suggested that knowledge sharing should involve the exchange of organizational knowledge between a source and a recipient. While Ipe (2003a) defined knowledge sharing as a complex process, driven by the power equation within the organization (informally) and the process (which is highly dependent on the culture of the work environment). Yang and Cheng (2007) and Søndergaard, Kerr and Clegg (2007) defined and described knowledge sharing as a set of behaviours about knowledge exchange which involve the actors, the knowledge content, the appropriate media and the societal environment. Additionally, it is not a free-floating phenomenon but arises in a strategic way within the organizational operational context. A definition by Huysman and de Wit (2002), depicts that knowledge sharing as the structured support and guidance of (condition for) acquiring knowledge, exchanging knowledge and using knowledge to support business processes within an organization. From these definitions of knowledge sharing, it can be seen that knowledge sharing is so important to an organization. Understanding why this is so is thus also important.

Indeed knowledge sharing topic has sparked and become a theoretical and practical problem requiring study because knowledge sharing contributes significantly to the performance achievement, competitive advantage and increased value of an organization. It also encourages knowledge exchange, provides opportunities for mutual learning, stimulates the creation of new knowledge, and helps the management system and the development of organization's members in term of their skills and competences (Argote, Ingram, Levine, & Moreland, 2000b; Bartol & Srivastava, 2002; Grant, 1996; Lee & Ahn, 2007; Liao, Fei, & Chen, 2007; Marouf, 2007; Matzler, Renzl, Müller, Herting, & Mooradian, 2008; Mei, Lee, & Al-Hawamdeh, 2004; Scholl, König, Meyer, & Heisig, 2004; Smith, 2000; Spender, 1996; Yang & Chen, 2007). A meeting becomes an arena for experience sharing; they are important

for participants to gain insights into whether their own individual efforts are still broadly in line with those of others. Sometimes there is a need for face-to-face-based knowledge exchange and problem solving that allows for dealing with unexpected and extraordinary events (Enberg, Lindkvist, & Tell, 2006). Olivera (2000) noted that sharing knowledge among members can effectively buffer the organization from the disruptive effects of turnover, facilitate co-ordination, contribute to the development of innovative products, and may even serve to rebuild an organization. Strategically, knowledge sharing involves giving systematic thought to the long term implications of knowledge in realizing the organization's objectives. Only when managed knowledge sharing contributes to organizational objectives can it be considered successful (Huysman & de Wit, 2002). Nonaka and Takeuchi (1995) have strengthened this idea by suggesting that a firm will achieve success if they create new knowledge, spread it all over the firm and incorporate it into new technologies and products. They also add that sharing tacit knowledge between individuals through communication is an analog process that requires a kind of "simultaneous processing" to overcome the complexities of issues shared by the individuals.

However, the ability to share knowledge depends on the properties of knowledge, which influence how easily knowledge can be shared and accumulated, how much and where it is retained and stored, and how easily it flows within and across an organization (Argote, McEvily, & Reagans, 2003b). For organizations to act collectively, then, not only must mutual knowledge be made available to individuals, but this availability must be on-going. Therefore, collective action in organizations necessitates knowledge sharing among individuals within the organization (Chong, 2007). There are challenges on the positivist perspective of knowledge sharing. Further this sharing of knowledge constitutes a major challenge because some employees tend to resist sharing their knowledge with the rest of the members from either inside or outside of the organization (Bock & Kim, 2002; Ciborra & Patriotta, 1998). Kalling and Styhre (2003) approached their study of knowledge sharing from two different perspectives. On the one hand, all knowledge sharing occurs as practice, in conversations, operations, discussions and practical undertakings in everyday working life. On the other hand, knowledge sharing is a strategic management issue, aimed at creating sustainable competitive advantages. This dual nature of knowledge sharing is important to maintain, especially since it is now being acknowledged that, even under the best of circumstances, knowledge sharing within organization is a multifaceted and complex process (Hendriks, 1999; Lessard & Zaheer, 1996). However, this idea is not supported by Chakravarthy, Zaheer and Zaheer (1999); they have assumed that individuals in organizations have always created and shared knowledge and, therefore, knowledge sharing can be a natural function of workplaces, an activity that takes place automatically. Chakravarthy et al., (1999), however, concurred with Hendrik (1999) and Kalling and Styhre (2003). Thus for the current study knowledge sharing is identified as being more than the instrumental documentation of knowledge or a self-organizing process. Indeed many arise through the carefully monitoring of the performance of the sharing knowledge activity within an organization.

Knowledge Sharing Factors

Scholars have addressed the question: What factors could inhibit or foster knowledge sharing between individuals and groups? Kalling (2003) noted that there are few theories aimed at outlining the finer causal structures that exist between knowledge and successful knowledge transfer. Some have tried explaining the behaviour of knowledge sharing by personality traits rather than by situational constraints (Hendriks, 1999). Others have focused on interrelationship; they have adopted a social network perspective where knowledge sharing is explained largely by attributing behaviour to the social context in which the actors are embedded (Lang, 2004; Reagans & McEvily, 2003; Yang & Chen, 2007). Numbers of the discussion addresses the factors that influence knowledge sharing by Szulaski (2000), Goh (2002), Ipe (2003a), Kalling and Styhre (2003), Mei, Lee and Al-Hawamdeh (2004), Alavi and Tiwana (2005), Yang and Chen (2007), Liao, Fei and Chen (2007) Sondergaard et al., (2007).

The discussion added that multiple factors can impact on knowledge sharing. The study categorized these factors into the three dimensions, based on Yang and Chen (2007) work, and four sub-dimensions at the organizational level based on the socio-technical view (Lee & Choi, 2003; Pan & Scarbrough, 1998). The socio-technical view considers the organizational interrelatedness of the social and technological subsystems (Pan & Scarbrough, 1998). Normally, the social dimension emphasizes the importance of culture, structure, people, tasks, and the environment; the technical dimension is based on information technology infrastructure (Yang & Chen, 2007). Figure 2, illustrates the factors that impact on knowledge sharing generally, while Figure 3 show the analysis of the factors into three dimensions: organizational level, individual level and knowledge level.

Figure 1: Summary of knowledge sharing factors

Author/Years	Research Goal	Factors influence knowledge sharing	Research Findings
Szulanski (2000)	To identify stages of transfer and factors that are expected to correlate with difficulty at different stages of the transfer	The source of knowledge The recipient The context The knowledge	Factors that affect the opportunity to transfer are more likely to predict difficulty during the initiation phase, whereas factors that affect the execution of the transfer are more likely to predict difficulty during subsequent implementation phases.
Goh (2002)	To explores the key factors that have been cited as significant influences on the ability to transfer knowledge	Leadership Problem-solving/seeking behaviours Support structures Absorptive and retentive capacity Types of knowledge	Highlight seven practice implications to consider by managerial in order for sharing knowledge effectively.
Ipe (2003)	To examines knowledge sharing at the most basic level; namely individuals in organizations	The nature of knowledge The motivation to share The opportunities to share The culture of the work environment	All four factors are interrelated and if each of them is favourable, together they create an optimal environment for knowledge sharing within an organization.
Kalling and Styhre (2003)	To explore how knowledge can be shared within and between organizations	Cognitive factors Organizational context Motivation	Knowledge sharing always takes place within social communities and it highly context-dependent.
Mei et al. (2004)	To identify an effective communication strategy at the onset of the implementation process	The stakeholder The format of the message The communication vehicles	The communication strategy was formulated using input collected from focus group discussion.
Yang and Chen (2007)	To investigate the relationship between organizational knowledge capabilities and	Culture Structure	(1) Organizational knowledge capabilities have a positive association with knowledge

Author/Years	Research Goal	Factors influence knowledge sharing	Research Findings
	knowledge sharing	Human/people Technology capabilities	sharing. (2) Structure, human and technical capabilities are significant for organizational knowledge sharing. (3) The effects of implementing knowledge management on organizational knowledge capabilities and knowledge sharing are also significant.
Liao et al. (2007)	To investigate the relationships between knowledge sharing, absorptive capacity and innovation capability in knowledge-intensive industries	Knowledge sharing Absorptive capacity Innovation capability	(1) Absorptive capacity in the intervening factors between knowledge sharing and innovation capability. (2) Knowledge sharing has a positive effect on absorptive capacity.
Søndergaard et al. (2007)	To present the empirical findings from case study in knowledge sharing with the aim of understanding knowledge sharing in a strategic context through a socio-technical approach	Organizational Individual and leadership Sub-factors: geographical location, individual motivation and trust	Factors that have been highlighted impact on knowledge sharing and may act as both barriers and enablers.

Source: Compiled by Azizan (2009)

Figure 2: Summary of knowledge sharing factors into three dimensions

Dimension	Subdimension	Factors	Authors / Years
Organizational level	Culture	The context	Szulanski (2000)
		Sharing culture	Ipe (2003a) Kalling and Styhre (2003) Søndergaard et al. (2007)
	Structure	Problem-solving/seeking behaviours	Goh (2002)
		Opportunity to share	Ipe (2003a)
The format of the message		Mei et al. (2004)	
People	Procedure and management innovation	Geographical location of team	Liao et el. (2007)
		The stakeholder	Søndergaard et al. (2007)
		Interpersonal Relationships	Mei et al. (2004)
Technology	Professional background	Support structure	Søndergaard et al. (2007)
		The communication vehicles	Mei et al. (2004)
Individual level		The source	Goh (2002)
		The recipient	Szulanski (2000)
		Leadership	Goh (2002)
		Absorptive capacity and retentive capacity (cognitive)	Ipe (2003a)
		Motivation	Kalling and Styhre (2003)
Knowledge level			Liao et el. (2007)
			Søndergaard et al. (2007)
Knowledge level		Types of knowledge	Szulanski (2000)
		The nature of knowledge	Goh (2002)
			Ipe (2003a)

Source: Compiled by Azizan (2009)

Knowledge Sharing Models

A variety of knowledge sharing models has been developed by scholars to gain a better understanding of the field. The following discussion addresses an analysis of the knowledge sharing models.

McAdam and McCreedy (1999) critically evaluated existing knowledge management models that represented a wide spectrum of views within the field. They focused on three dimensions (knowledge category, intellectual capital and socially constructed). The model emphasises the construction of knowledge within the organization, then assumes that the construction of knowledge is embodied within the organization, not just through explicit programs but through a process of social interchange. Following this embodiment there is a process of dissemination of the espoused knowledge throughout the organization and its environs. Ultimately the knowledge is seen as being of economic use in regard to an organization's outputs. During the study, McAdam and McCreedy modified Demerest's (1997) model to address both the social and scientific paradigm of knowledge construction. The model also extended the use element to cover both business and employee benefits. The authors concluded that the model is a useful tool to allow knowledge to be associated with the emerging social paradigm, while at the same time contributing to the current paradigm.

Argote and Ingram (2000a) developed the reservoirs knowledge transfer model. The term 'reservoir' was used as it connotes that the knowledge can be used again in the future. The authors combined behavioural evidence on knowledge transfer to understand the differential performance of an organization. In addition, they developed a proposition of interaction among members, tasks and tools of knowledge sharing in a new context, as well as identified the most difficult media to use in transferring knowledge. From the model, the authors noted that knowledge can be, firstly, with the organization's tool and technology. Secondly, knowledge is also embedded in an organization's task and their interrelationship since the task network is the sequence of the routines and standard operating procedures the organization uses. Finally, knowledge can be embedded in the various networks formed by combining members, tools and tasks. From the research, they found knowledge transfer that involves members through sub-networks is difficult. However, the effective way to transfer knowledge is through the task-tool network. Thus, people are able to transfer tacit and explicit knowledge when they move and adapt to a new environment. Knowledge transfer is more consistent if it is moving through tool-tool network compared to the task-task network. Another successful method for knowledge transfer is through communication and training because knowledge is embedded in the interactions of people, tools and tasks; it also provides a basis for competitive advantage in firms.

Szulanski's (2000) model identified different stages of the transfer process and possible predictors of difficulty for each stage. Szulanski developed the measurement of the stickiness for

each stage of the transfer to explore the predictive power of different factors at different stages of the process. The model suggested four distinct stages in a transfer of knowledge. The first stage is the initial stage, followed by the implementation stage, the ramp-up stage and finally the integration stage. A distinction was usually made between the initiation and the implementation stages of a transfer. Initial implementation of a new practice and the subsequent ramp-up to satisfactory performance involves a two-step sequence: 'learning before doing' either by planning or by experimenting before knowledge is actually put to use by the recipient. The follow through efforts typically aim at maintaining and improving the outcome of the transfer after satisfactory results are initially obtained. The result showed that factors affected the perception of an opportunity to transfer knowledge, such as the reliability of the source, predicted difficulty of transfer during the early initiation stage. Other factors affected the execution of transfer, such as the recipient's ability to absorb knowledge, which affected difficulty during the implementation phases. The 'causal ambiguity' of the knowledge or the extent to which it was not well understood predicted the difficulty of the transfer throughout all phases of the transfer process. Szulanski proposed the model to provide a constructive way through which to incorporate difficulty in the analysis of knowledge transfer. By distinguishing between 'Initiation Stickiness', 'Implementation Stickiness', 'Ramp-up Stickiness' and 'Integration Stickiness', the model provides a way to describe and to examine, empirically, the evolution of difficulties.

Olivera (2000) in his research examined the concept of the organizational memory system in the context of multi-unit organizations. He developed a framework for understanding and analysing the memory systems which had been used in a particular organization. The system was developed so that knowledge sharing could be more effective when the organizational knowledge was stored and used among the members. The research showed that the memory systems were not independent of each other, but rather is connected in two ways. First, there is an overlap in content among the systems. This overlap suggests that it is possible for an individual to access similar knowledge through different systems. Second, the memory systems were not connected to each other through pointers to the location of knowledge in other systems; it appears that systems can be complementary. Olivera added that one system can be used to access some experiential knowledge that can be complemented by what is obtained from another system.

Ipe (2003a) then, examined a model that identifies factors that most significantly influence knowledge sharing between individuals. The study reviewed an article on knowledge concepts, and how knowledge exists within the organization. The concept was narrowed down to the movement of knowledge within the organization; it focused on the dominant ideas related to knowledge sharing. The author claimed that knowledge sharing is thus a complex process, which is and driven by the power equation within the organization. More knowledge is shared informally than through formal channels. Indeed much of the process is dependent on the culture of the work environment. All four factors are interrelated, and, if each of them is favourable, together they create an optimal environment for knowledge sharing within an organization.

The knowledge sharing model developed by Kalling and Styhre (2003), was drawn from the perennial actor-structure discussion in social theory; strategy represents the structure-practices the actor. The authors assumed that knowledge sharing takes place between the firm level perspectives (top management priority); treating it as a strategic matter that aims at creating sustainable competitive advantages; and the shop-floor perspectives (bottom-up perspectives), where knowledge sharing is achieved as practice, in conversations, operations, discussion and practical undertakings in everyday working life. The framework recognize that knowledge sharing is a strategic matter embedded in day-to day practices; and addresses three aspects that need to be taken into account when running knowledge facilitation program: (1) organizational context, (2) cognitive factors, and (3) norms, institutions and incentives. Therefore, the developed knowledge sharing framework can be regarded as a mapping of what is inherently evolving and changing in organizations.

Widen-Wulff and Ginman (2004) studied knowledge sharing by using a social capital paradigm. They defined social capital was defined by its function; it is not a single entity, but a variety of different entities having characteristics in common. They all consist of some aspect of a social structure, and they facilitate certain actions of individuals who are within the structure. The research focused on a three-dimensional model of social capital (structural, communicative and relational dimensions). A structure dimension appears to be necessary for the development and utilization of social capital; it is concerned with access to other actors, individuals and the corporate. From the information science paradigm, the structure dimension involves the traditional information science concept, for example availability, reference and time. From the perspective of information science, trust also is an important aspect to consider. However trust is a challenge in the virtual environment since the representation of trust and trustworthiness may enrich the design of a system for computer-mediated transactions. Widen-Wulff and Ginman concluded that studies of social capital differ in the way in which they have addressed the issues of network and trust. Nevertheless, the best approach is to combine these assessments. Consequently, the tool for measuring social capital must provide a common conceptual framework that helps unify the different dimensions of social capital.

Alan (2006) explored managers' knowledge sharing strategies through the learning style of experiential learning theory. The study offered a framework named 'Experiential Learning Theory (ELT), for describing the connecting between learning, learning styles, knowledge and knowledge sharing to problem-solving, and for the process of knowledge sharing at the individual level. The model defined learning as a four-stage cycle; learners' preferences in the cycle represent four individual learning styles consisting of divergent, assimilative, convergent and accommodation. These learning styles identified preferences for types of knowledge and for processing knowledge and experiences. The model also defined knowledge as either personal or social. Knowledge and experience are processed through either action or reflection. Through the four stages of the learning style, learners involve themselves in new experiences, observe and reflect on these experiences from multiple perspectives, integrate their observations and reflections into theories and apply their theories in solving problems and making decisions. The

four stages of the learning cycle were derived from two adaptive dimensions of perceiving and processing new experiences and knowledge. The investigation showed that managers clearly have a preference for the types of knowledge they share, which interestingly, was not always the type they shared most frequently. The managers interviewed identified and described two types of knowledge, personal and social, and four aspects of knowledge sharing, methods, audience, purpose and affect, regardless of their learning styles.

The analysis and evaluation by Guzman and Trivelato (2008) of the transfer process of codified knowledge was performed under two different approaches, namely the "socio-technical" and the "top down". The social-technical approach supports the transfer of codified knowledge better than does the top down approach. The framework followed the developed standards work as being evidence of a successful transfer of codified knowledge. The model used the idea of codified-oriented knowledge, divided into three stages (knowledge codification, mechanism used to transfer knowledge and knowledge assimilation and application). The study's result showed that the socio-technical approach supports the process of codified knowledge transfer better than the top-down view. It also showed that codified knowledge is a dynamic concept that may need varying amounts and kinds of tacit knowledge to enable knowledge codification and assimilation. Finally, the result highlighted the need for an examination of the degree of context and task similarity between the sender and receiver units to be detailed, since small variations in organizational processes might imply significant alterations on informal work practices.

Wang et al.'s (2008) knowledge sharing model is one example of knowledge sharing from the objectivist perspective. Their model of knowledge sharing, called "KTella", enables a community's members to voluntarily share and retrieve knowledge more effectively. The authors examined the knowledge sharing characteristics and roles of communities of practice and developed a peer-to-peer knowledge sharing architecture that matches the behavioural characteristics of the member on the communities of practices. These communities of practice are an informal group of people who create, share, and leverage their knowledge and experience. Additionally, the model also provides basic knowledge sharing functions and mechanisms to make knowledge sharing effective and efficient, involving contributing, searching, companion finding and information filtering. It also appears that the model promotes knowledge sharing in the form of document sharing, idea and experience sharing, and professional judgement sharing; it also provides powerful tools to support and boost more knowledge sharing activities.

Figure 4 tabulate the literature on the knowledge sharing model and its component in table form. The links between the factors and the models shows in Figures 3 and 4. The factors are the major components that enforce and influence the successfulness of knowledge sharing, providing the greatest contribution elements to the development of knowledge sharing models or frameworks in organizations.

Figure 3: Knowledge sharing model / framework

Author/s (year)	Variables	Components of Model / Framework
McAdam and McCreedy (1999)	Old and new knowledge management paradigm	Knowledge category Intellectual capital Socially constructed
Argote and Ingram (2000a)	Social subnetworks (members, tasks and tools)	The member-member network The task-task network The tool-tool network The member-task network The member tool network The task-tool network The member-task-tool network
Szulanski (2000)	The source The recipient The context Type of knowledge	Initial stage Implementation stage Ramp-up stage Integration stage
Olivera (2000)	Content Structure Operating processes	Social networks Knowledge intranet Electronic bulletin boards Knowledge centers
Principe and Tell (2001)	Experience accumulation Knowledge articulation Knowledge codification	The explorer landscape (L-shaped) The navigator landscape (T-shaped) The exploiter landscape (staircase)
Hansen (2002)	<i>Dependent variables</i> Project completion time Amount acquired knowledge <i>Independent variables</i> Path lengths in a knowledge network Direct relations with	Indirect relations Direct relations

Author/s (year)	Variables	Components of Model / Framework
	divisions in a knowledge network Noncodified knowledge Alternative explanation <i>Control variables</i> Betweenness centrality Project attribute controls	
Ipe (2003)	Individual	The nature of knowledge The motivation to share The opportunities to share The culture of the work environment
Kalling and Styhre (2003)	Strategy level Practices level	Organizational context Cognitive factors Norm, institutions and incentives
Widen-Wulff and Ginman (2004)	Dimension of social capital The concept of each dimension Information behaviour research Possible measures Context formal/informal	A structural A content (communicative) A relational
Enberg et al. (2006)	Project organization Project goals Project work Individual routine work Interactive problem solving Informative meetings	Instances of interacting (face-to face meeting) Instances of acting (individual work alone)
Alan (2006)	Learning style of experiential learning theory	Divergent Assimilative Convergent Accommodation

Author/s (year)	Variables	Components of Model / Framework
Guzman and Trivelato (2008)	The socio-technical approach The top-down approach	Knowledge codification Mechanism to transfer knowledge Knowledge assimilation Knowledge application
Wang et al (2008)	Communities of practices peer-to-peer technology	System concept KTella algorithms KTella network protocol System architecture User interface module Search module Publishing module Forwarding module Rating module Sharable knowledge object exchange module Instant message module Peer clustering module

Source: Compiled by Azizan (2009)

The literature review reveals that the models by different scholars have developed from different perspectives. Figure 5 illustrates this variety in the models from objectivist perspectives, practice-based perspectives and mixed perspectives (the later combining the two earlier perspectives).

Figure 4: Knowledge sharing model / framework from different perspectives

Objective perspective	Mixed perspectives	Practice-based perspective
Wang et al., (2008) Alavi & Tiwana (2005)	Szulanski (2000) Olivera (2000) Principe and Tell (2001) Hansen (2000)	McAdam and McCreedy (1999) Argote and Ingram (2000a) Ipe (2003) Kalling and Styhre (2003) Widen-Wulff and Ginman (2004) Enberg et al. (2006) Alan (2006) Guzman and Trivelato (2008)

Source: Compiled by Azizan (2009)

Conclusion

The models of knowledge sharing described above highlights the lack of agreement into the key aspects of the pattern of sharing practical knowledge. Guzman (2008) emphasized the need to focus on sharing practical knowledge and its importance since previous research has mainly focused on the organization in which the consensus and participation were either implicitly or explicitly assumed. As this present research has chosen knowledge intensive organizations which involve elements of knowledge and practice, it is necessary to investigate how the experienced lecturers and nurses share their practical knowledge with inexperienced lecturers and nurses at their workplace.

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