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IMPEDIMENTS TO SHARING KNOWLEDGE OUTSIDE THE SCHOOL: LESSONS LEARNT FROM THE DEVELOPMENT OF A TAXONOMIC E-LEARNING PORTAL

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Abstract

Despite knowledge sharing tools, lack of motivation is one of the primary reasons why organizational knowledge-sharing initiatives fail. In this interpretive case study, we look at knowledge sharing not within an organization, but in the context of schoolteachers and students in Singapore secondary schools. Through interviews with teachers and students, we investigate the reasons behind the reluctance of teachers/students to share educational content outside the school through an e-learning digital repository, and ways to address these. It was found that very real human reasons of fear and trust stand in the way of knowledge sharing. An important contribution of this study is a set of impediments concerning schoolteachers (and students), and potential solutions to these impediments. Despite apparent difference in motivation/time-constraints between organizational employees and schoolteachers/students, the findings support Husted and Michailova's model of organizational knowledge sharing hostility, and should be useful for application in similar e-learning knowledge-sharing initiatives.

Keywords: Knowledge Sharing, Knowledge Sharing Hostilities, Case Study, Educational Content, Learning Objects, E-Learning, Singapore Schools, Fear, Trust

Introduction

Knowledge sharing may be described as the expression of knowledge (externalization) by the person who knows (*transmitter*), and making sense (internalization) of this externalized knowledge by the *receiver* of knowledge. With more than 40,000 Internet pages, 300 books and thousands of articles on Knowledge Management (KM) (Husted and Mihailova 2002), knowledge sharing is recognized as one of the most important aspects of KM. However, in practice, knowledge sharing is a huge challenge. People are not very forthcoming when it comes to sharing information they know. This may be due to inadequate organizational structures, sharing-unfriendly organizational cultures, denominational segregation, etc. (Davenport and Prusak 1998; Tissen *et al.* 1998) (Hendriks 1999).

Information and communication technologies (ICTs) are introduced to support knowledge sharing with the motivation that they may empower the knowledge worker by removing the barriers to sharing knowledge, but they do not always work (Hendriks 1999). "If individuals are not motivated to share knowledge, it is not likely that they are motivated to use tools facilitating knowledge sharing" (Hendriks 1999 p.91).

In this interpretive case study, we look at knowledge sharing not within an organization, but in the context of schoolteachers and students in Singapore secondary schools. While an employee in an organization would be reluctant to share knowledge so that s/he can consolidate his/her position (quest to make himself/herself indispensable – "knowledge is power"), a teacher is expected to have much less to lose by sharing knowledge with a teacher from another school (no direct competition). Also, a schoolteacher may not have the same time constraints (lack of time to share knowledge) as a busy employee in an organization. Of course, as would apply to an organizational employee as well, a teacher might have lack of motivation/interest in sharing knowledge or might not

realize the importance of sharing. Apart from teachers, we also seek to study what would stop a student in a school in Singapore from sharing his knowledge with a student from another school.

Through interviews with 12 teachers from 9 Singapore schools, and 108 male students from a single school, we examine the impediments to sharing knowledge across schoolteachers (or across students) of different schools, and ways to address these. For this, we investigate the reasons behind the reluctance of schoolteachers (and students) to put educational content or *learning objects* (such as web pages, documents, images, video or audio files, etc.) in an e-learning digital repository (which may be used by students and teachers from other schools).

E-learning involves using technologies to create, distribute and deliver valuable data, information, learning and knowledge (Dublin, 2003). Duncan (2001) describes digital repositories as stores of digital material. He calls such material, when applied in the context of e-learning, learning objects.

The digital repository under development is the Educational Taxonomy Portal (ETaP). The project was initiated in 2004 at the School of Computing, National University of Singapore (NUS) (see Agarwal, Poo and Goh 2005). ETaP is a repository of learning objects aimed for use by Singapore schoolteachers and students. ETaP uses a dedicated server located at the School of Computing to store digital content. The system is offered free of charge. ETaP offers an environment where a teacher or a student from a particular school can be a contributor as well as a searcher of learning objects (i.e. web links, documents, PowerPoint presentations, PDF files, etc.)

ETaP implementation can be expected to face several types of issues:

1. Knowledge sharing hostility, as documented by Husted and Michailova (2002)/Cabrera and Cabrera (2002)
2. Practical issues faced by digital repository implementation (Sokvitne and Lavelle 2004)
3. Metadata issues (Anuradha 2005; Sokvitne 2000, 2001; Sokvitne and Lavelle 2004)
4. Gathering feedback from actual students about ETaP, that might result in insights that defy adult common sense (e.g. Druin 2005; Hutchinson *et al.* 2004)

As the primary goal of ETaP is sharing learning objects, the first issue of understanding knowledge sharing hostility is of paramount importance, and is the focus of this paper.

The process of getting people to contribute digital content to the portal is not expected to be smooth. It will involve many “human” issues concerning both teachers and students. Learning of these issues was important to produce a list of considerations that implementers of ETaP, as well as those of similar digital repository implementations in other countries, would find useful.

Too much energy has been devoted to technological improvements when it comes to e-learning and too little to the human factor: getting people to actually use what is already available and getting organizations to integrate existing technology (Dublin, 2003). So what are the human issues? In the early stages of this study, the initial plan was to have actual schoolteachers contribute content and populate ETaP. But due to poor response, this initial goal was soon abandoned. However, the responses are interesting and are presented in this study.

Our study focuses on the questions: *Why are schoolteachers (and students) averse to sharing knowledge and learning objects with their peers from other schools? How can schoolteachers (and students) be encouraged to share learning objects?*

We adopt the interpretive case research methodology to study the reluctance of teachers (and students) towards sharing content across schools through a digital e-learning portal. The case study method is an important and frequently adopted research method in IS research. Its appropriateness is well documented by researchers such as Markus (1983), Benbasat *et al.* (1987), Orlikowski (1993), Myers (1994) and Cavaye (1996). The case method can generate rich and meaningful data and is helpful in making sense of otherwise complex social events (Yin 2003); in our case, this event is the sharing of learning objects between teachers (and students) of Singapore schools for the development of the Education Taxonomy Portal.

An important contribution of this study is a set of impediments concerning schoolteachers, as well as students, and potential solutions to these impediments. Despite apparent difference in motivation and time-constraints between organizational employees and schoolteachers/students, the findings support Husted and Michailova’s model of organizational knowledge sharing hostility. As it does in an organizational/employees’ context, the findings show that the model applies to a schoolteachers’/students’ context as well, and should be useful for application in similar

e-learning knowledge-sharing initiatives. This is because the same human reasons of fear and trust stand in the way of sharing knowledge in organizational employees as well as in schoolteachers and students.

The rest of the paper is organized as follows: We first review the existing literature on knowledge sharing. This is followed by the research methodology and a description of the case. Along with data analysis, the case findings are then discussed and presented. Finally, we present the conclusions, and highlight the managerial and theoretical implications, and discuss future research.

Literature Review

Studies on Knowledge Management (KM) focus extensively on the classification of knowledge under the tacit/explicit and personal/collective dimensions and with issues of converting one type of knowledge to another (Nonaka and Takeuchi, 1995; Spender, 1998). An important pillar of KM is sharing. A number of theories relate to the sharing of knowledge, such as knowledge culture in organizations (Jans and Prasarnphanich 2003), social networks/organizational learning (Borgatti and Cross 2003), communities of practice (Lesser and Everest 2001), knowledge as a source of competence and as a competitive resource (Huang, Newell and Pan 2001), the knowledge-based view of the firm (Grant 1996), knowledge networks, that is based on a joint consideration of relatedness in knowledge content for effective knowledge sharing (Hansen 2002), etc.

In our study, we are looking at knowledge sharing not within an organization (as is the focus of most KM studies), but rather between the teachers (students) of one school with those from other schools in an e-learning context. We are interested in knowing some of the reasons why knowledge sharing doesn't always work, and the areas where it fails.

While ETaP aims at having users share learning objects, Anuradha (2005) describes the steps taken in the development of an institutional repository for sharing papers, reports, etc. She notes the fear of researchers when it comes to publishing or non-peer-reviewed preprints, and how humanity scholars are wary of plagiarism. She also emphasizes on the necessity of a large number of contributors in the repository and the need for cross-organizational coordination.

While the value potential of knowledge-sharing has been long recognized, many organizations trying to get people to share knowledge have failed miserably (Husted and Michailova 2002; Malhotra 2004; Storey and Barnett 2005). In our context of trying to get schoolteachers and students to share educational content, we faced an initial defeat too. Husted and Michailova (2002) point out that the most pervasive explanation for such failure has been that the organizations in question fail to align their incentive systems with their ambition of creating corporate value through knowledge-sharing. While sophisticated technology is available, "knowledge-sharing still depends on people".

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- 1. The persons who possesses knowledge (the transmitter), who hoard knowledge because they:**
 - a. Fear loss of value and bargaining power of individual competitive advantages
 - b. Are reluctant to spend time on sharing
 - c. Fear parasites who only absorb knowledge and share nothing in return
 - d. Wish to avoid external parties from assessing the quality of their knowledge
 - e. Wish to prevent misunderstandings and complications
 - f. Wish to avoid appearing too eager/knowledgeable to their (potentially jealous) superiors and wish to hoard knowledge so as to protect their present power

 - 2. The persons who needs knowledge (the receiver), who reject knowledge because they:**
 - a. Prefer their own ideas
 - b. Doubt validity and reliability of any received knowledge
 - c. Have strong group affiliations and would prefer interaction within this group
 - d. Are too proud to accept knowledge from others

 - 3. Both the transmitter and the receiver with respect to their attitude towards mistakes. They:**
 - a. Are uncertain about reactions to any mistakes in knowledge they may share
 - b. Desire to avoid anyone catching mistakes in their knowledge
 - c. Operate in an environments where failures are punished
 - d. Lack initiative arising from belief that not acting means no chance of failing
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Figure 1. Assessing Knowledge-sharing Hostility by evaluating different parameters (Husted and Michailova 2002)

Husted and Michailova go on to note that even providing right incentives, goals and technology for knowledge sharing to flourish may not work because people are inherently *hostile* to knowledge-sharing. Figure 1 lists the model of Husted and Michailova where they examine reasons for this hostility. Depending on the level of knowledge sharing hostility, some of the ways in which they believe managers can fight knowledge-sharing hostility are through maintenance of trust, providing incentives/rewards for sharing, promoting positive attitude towards mistakes, sharing to set an example, and communicating overall sharing goals. Apart from encouragement, Husted and Michailova (2002) also provide recommendations for managers to *force* employees into sharing knowledge (during times when hostility levels are high). However, the steps are intended for managers and may not be applicable to third parties (our case). Michailova and Husted (2003) discuss their attempt to diagnose knowledge sharing hostility in Russian firms using the model in Husted and Michailova (2002). Their reasons and recommendations for the hostility largely conform to their 2002 model.

Cabrera and Cabrera (2002) also wrote on similar hostilities. They noted that it was not technological issues that hinder knowledge sharing over electronic mediums, but human issues. Some reasons put forward for this hostility are: lack of incentives, the difficulty in integrating sharing tasks into daily work, lack of time and lack of support from management. Cabrera and Cabrera also suggested reducing perceived costs and increasing perceived benefits of sharing, making contributors believe that their contributions are useful, establishing group identity within the organization, and promoting responsibility. However, each of the above studies is intended for managers. In our case, the equivalent role would be the Education Ministry or the School administration. The ETaP team did not have the required authority.

Jarvenpaa and Staples (2000) hypothesized from their findings that the higher the interdependence of the respondents' tasks, the more they used electronic media to share information. A second finding was that having adequate computer skills is important to facilitate information sharing and communication in an electronic media environment. Thirdly, the use of electronic media for communicating and sharing was strongly associated with the belief that computer-based information systems provide valuable information in an effective way.

Riege (2005) looks at three dozen knowledge-sharing barriers that managers must consider.

A number of studies have also focused on Asian/Chinese culture and compared its knowledge sharing issues with other cultures. While comparing China and Russia, Michailova and Hutchings (2006) claim that vertical collectivism and particularistic social relations in China and Russia lead to intensive social relations among organizational members, which facilitate knowledge sharing between in-group members in organizations in both countries. However, difference in the essence and extent of collectivism in both countries lead to different intensities of knowledge sharing in these organizations. While studying business managers in USA and China, Chow *et al.* (2000) found that compared to their American counterparts, the Chinese respondents were more willing to share knowledge for the collective good, and put the interests of the collective ahead of their own. However, the Chinese respondents were less willing to share information files with other employees not considered to be part of their immediate group. Holden and Tansley (2007) compare the knowledge-sharing cultural ethos of Japan, Germany and Russia, attributing the peculiarities to historical factors in each country. Weir and Hutchings (2005) look at knowledge sharing in Chinese and Arab cultures. Voelpel and Han (2005), in their study of knowledge sharing in China using Siemens ShareNet, found that 'concern for face' (i.e. what other people think of one) and 'ingroup/outgroup distinction' are the two cultural aspects that negatively influence Chinese employee's knowledge-sharing behavior. The Chinese culture strongly emphasizes 'face saving', thus employees who are insecure (in their case, primarily due to their poor command in English) will be reluctant to make contributions, in order to save face. Also, while relationships tend to be very supportive and intimate within group (leading to 'ingroup' knowledge sharing), there is little trust and often hostility toward outgroup members (Voelpel and Han 2005). Singapore schoolteachers and students, with Singapore's predominantly Chinese cultural ethos, can be expected to be impacted by these cultural barriers as well.

In this study, we adopt the lens of Husted and Michailova (2002), and apply it to the context of sharing learning objects between schoolteachers (students) of different Singapore schools for the development of ETaP.

Methodology

This study adopts a case research method for gathering evidence, which allows exploring unforeseen relationships and offers better insights into the inter-dependencies among the factors captured in the study (Benbasat *et al.* 1987).

Interviews, focus groups and researcher's impressions and observations were used as the primary means of data collection.

We adopt the interpretive way of conducting qualitative research (as opposed to a positivist or a critical perspective; see Myers 1997). With its philosophical base as hermeneutics and phenomenology, interpretive researchers start with the assumption that access to reality (given or socially constructed) is only through social constructions such as language, consciousness and shared meanings (Myers 1997). Interpretive research does not predefine dependent and independent variables, but focuses on the full complexity of human sense-making as the situation emerges (Kaplan and Maxwell 1994).

The research questions that this qualitative case study (Crabtree and Miller 2000) attempted to address is "Why are schoolteachers (and students) averse to sharing knowledge and learning objects with their peers from other schools? How can schoolteachers (and students) be encouraged to share learning objects?" The unit of analysis is schoolteachers (and students).

Study of Knowledge-sharing Hostility of Schoolteachers

In order to gain insight into the reasons for the knowledge-sharing hostility of schoolteachers, in-depth, face-to-face interviews were conducted with 12 individual teachers from 9 different schools in Singapore, which were all current users of commercial, paid-for, Learning Management Systems bought by their schools. The interviews revealed the teachers' attitudes towards a portal such as ETaP. It is to be noted that the interviewer was also actively getting the teachers to contribute content. In the process of persuading the teachers, an attempt was made to see if Husted and Michailova (2002)'s model of organizational knowledge sharing hostility applies in the case of schoolteachers (Figure 1). Cabrera and Cabrera (2002) also provide a similar list of reasons and solutions. If the reasons for Knowledge Sharing Hostility match those of the model, and depending on the level of hostility observed (mild to high), the solutions offered could potentially be used to fight knowledge sharing hostility.

Most of the teachers requested anonymity due to the nature of their responses, so no names will be used. 8 teachers interviewed were the Heads of Departments (HOD) of Information Technology. 4 were not. The interviews were often held in the respective teacher's general office or the HOD's office. Each interview ranged between 30-45 minutes, and were mostly one-to-one, and in two cases, 2 teachers together. The interviews were conducted by one of the authors. While having more than one teacher interview together could potentially influence the responses, the interviewing author was not always informed of the inclusion of the second teacher. Also, it was felt that having more teacher-responses would mean more views, and would be beneficial to the study. During such times, responses from 2 teachers were counted as two separate responses. Before asking questions, a short demonstration of ETaP would be given. No attempt was made to quantify the findings.

**Are your schools using an E-Learning System now? Are you paying for it?
Do you find it useful?
What do you think about a free system like ETaP?
Are you willing to contribute content to ETaP? Why? (Why not?)
What can we do about that? (Reasons behind unwillingness to contribute)
Can you suggest improvements to ETaP?**

Figure 2. Interview Questions

The questions of Figure 2 served as a guide for the interviews, but the exact wordings differed from interview to interview. Follow-up, probing questions were also used liberally, but they vary greatly from one another. Permission to talk to teachers was sought through emails and through telephone calls directly to the teacher concerned. Most schools approached through email didn't reply. One reason could be that the sessions would take up time that the schools might use for lessons. Phone calls were far more effective. Interviewee-by-interviewee summaries will not be made available to prevent the possibility of identifying individuals.

Study of Knowledge-sharing Hostility of Students

Through the help of one of the teachers interviewed, the interviewer was able to talk to 108 male students from a single local all-boys Secondary school (in 6 batches of 15-23 respondents). While permission was sought from more than one school of both genders, only one all-boys school followed through to the end of the interviews. Of the other

schools requested, the few that expressed initial interest quickly stopped replying or declined with no reason given. Thus, due to the unenthusiastic response from the schools contacted, the views of female students could not be included in the study. All 6 sessions at the all-boys school were semi-structured. Questions asked included how they currently use e-learning, their attitudes towards e-learning, what they thought of ETaP (based on a presentation of printouts, as computers were not available), their attitudes towards sharing content and the features they would expect. The sessions were all held in a closed room in their school, and lasted between 45-55 minutes. The authors would have liked more focused groups of smaller numbers, and for more than just 45-55 minutes. However, discussions with the IT in-charge led to interviews of students as whole or half class-groups. Students in such groups share the same timetable, and the same recess or free periods. Thus, the 45-55 minutes awarded for the focused groups sessions were the recess/free periods of the students. The closed-door interviews were conducted on schooldays (weekdays) in a meeting room and students returned to class after the interviews. The teacher in-charge was also not comfortable with the interviewer's request to interview students after school. Students in each batch were all in the same class. Their educational levels ranged from Secondary 1-4 (equivalent to USA Grade 7-10).

One major issue faced was that the students were not very articulate and spoke using short, broken phrases. To help in transcribing, pen and paper notes were taken during the interviews. Also, video recordings were made to help in the process (which cannot be released, as per the teacher's request). Questions were directed to the class as a whole. All responses were recorded, though not all students chose to speak. Some were more enthusiastic than others. When it was felt that certain students were beginning to dominate the discussion, a request would be made to let the other students have their say. During such times, one or more among the quieter students would be picked and asked to respond.

Case Description

Current search engines cater to a *one-size-fits-all* model. The education-related information that you get off the web may be US-centric or Europe-centric and not necessarily relevant from a Singapore student's perspective. It will be some time before locally relevant data can be easily available. Teachers looking in the Internet for information relevant to their courses are almost always presented with a huge amount of data. Gathering required information is a long-drawn and time-consuming process running into hours. Students who want to search for information for project work or to supplement their course materials are similarly presented with a huge array of non-relevant data (Agarwal, Poo and Goh 2005).

To shorten this gap by providing a localized learning object repository for Singapore schoolteachers and students, the *Educational Taxonomy Portal (ETaP)* project was initiated at the School of Computing, National University of Singapore in 2004. ETaP was targeted at the Singapore Education Community, with the aim of providing free-of-charge services to facilitate schoolteachers and students to contribute, search, navigate and retrieve education-related content effectively. A taxonomy based on the prescribed education curriculum would help in easy browsing. Improved navigation and search quality should give rise to more innovation and effectiveness, and enhance the efficacy of Knowledge Management in Singapore (Agarwal, Poo and Goh 2005).



Figure 3. Snapshot of the Educational Taxonomy Portal (ETaP)

ETaP aims to reduce the overload for local students via provision of (see Agarwal, Poo and Goh 2005):

- ❑ Content localized to a limited geographical context – only Singapore Primary, Secondary and Junior College syllabi are considered
- ❑ Specialty search – educational content based on the Singapore Ministry of Education (MOE) syllabus
- ❑ Taxonomy-based presentation and classification in ETaP (explained below)

Digital repositories have four uses – locate, preview, borrow and publish. Two obvious ways to *locate* would be through *searching* (which is based on keywords), and *browsing*, which is an exploration through categories in order to discover what can be uncovered in the categories (Duncan 2001). ETaP satisfies both. Along with search, it also allows navigable browsing through a taxonomic tree built using the syllabus prescribed by the Singapore education council (Agarwal, Poo and Goh 2005). As shown in Figure 4, the levels/grades of study are on top – primary, lower secondary, upper secondary or junior college (not shown in the Figure). The subsequent branches of the taxonomy cover the subjects, followed by the individual learning objects covered in the subjects.



Figure 4. ETaP's Taxonomy

The effective population of these topics under appropriate levels/grades requires contribution of learning objects by teachers/students of that particular level. There are many schoolteachers who, in the past couple of years, have compiled their own frequently-used education material, as well as useful links gathered while browsing. Different organizations/individuals have their own small repositories. ETaP aimed to provide a country-wide repository for gathering such material (websites, images, audio, video, journals, etc) and classifying it in different categories for quality search (Agarwal, Poo and Goh 2005).

Along with technical issues, ETaP implementation faced its own share of *human* issues. Teachers were reluctant to share their compiled educational materials. The initial plan was to have actual schoolteachers contribute content and populate ETaP. But due to poor response, this initial goal was soon abandoned. However, the responses are interesting and are presented in this study.

This study was then undertaken to come up with a list of considerations that implementers of ETaP, as well as those of similar digital repository implementations in other countries, would find useful in getting people to share knowledge.

Case Analysis and Findings

'Qualitative research may be conducted in dozens of ways, many with long traditions behind them' (Miles and Huberman 1994, p.5). Data analysis is the least codified and perhaps the most difficult process of the case study. Depending on the underlying epistemology, data analysis can be different for different types of qualitative research. In a positivist case study, there is evidence of formal propositions, quantifiable measures of variables, hypothesis testing, and the drawing of inferences about a phenomenon from the sample to a stated population (Myers 1997). To

analyze a positivist case study, Yin (2003) puts forth specific techniques such as pattern matching, explanation building, time-series analysis, logic models and cross-case synthesis (when more than one case is studied).

However, unlike positivist studies, interpretive studies generally attempt to understand phenomena through the meanings that people assign to them and interpretive methods of research in IS are 'aimed at producing an understanding of the context of the information system, and the process whereby the information system influences and is influenced by the context' (Walsham 1993, p.4-5; Myers 1997). It is difficult to make a clear distinction between data gathering and data analysis in qualitative research (Myers 1997). This is because the data gathered is influenced by the researcher's presuppositions i.e. the questions posed by the researcher will determine the data that will be gathered. Thus, the analysis affects the data as much as the data affects the analysis. Thus, simultaneous data collection and analysis were carried out. There exist different approaches for gathering, analyzing and interpreting qualitative data – e.g. hermeneutics, semiotics, and approaches which focus on narrative and metaphor etc., where all of them are concerned primarily with textual analysis – both verbal and/or written (Myers 1997).

This research adopted a hermeneutics mode of analysis, which involves understanding the meaning of the text as a whole and/or interpretation of its parts (Gadamer 1976), which will ultimately converge in an underlying coherence or sense (Taylor 1976). 'It is a circular relationship. . . The anticipation of meaning in which the whole is envisaged becomes explicit understanding in that the parts, that are determined by the whole, themselves also determine this whole' (Gadamer 1976, p.117). Myers (1997) explains that 'if hermeneutic analysis is used in an information systems study, the object of the interpretive effort becomes one of attempting to make sense of the organization as a text-analogue. In an organization, people (e.g. different stakeholders) can have confused, incomplete, cloudy and contradictory views on many issues. The aim of the hermeneutic analysis becomes one of trying to make sense of the whole, and the relationship between people, the organization, and information technology'. In our case, the different stakeholders are the schoolteachers and students. We attempt to make sense of the impediments to sharing knowledge using ETaP, the relationships between the teachers/students and their respective schools and with other schools as well as their attitudes towards using ETaP. In our analysis, Klein and Myers (1999)'s 7 principles on conducting interpretive studies were also followed.

The conceptual steps of analysis involved keeping in mind the objectives and research questions, assumptions and design choices, the specific data uncovered, as well as the results and conclusions. We started off with looking for the story line – the main argument, which was 'the impediments to sharing knowledge by schoolteachers and students'. Based on Husted and Michailova (2002)'s model, four main themes (with one sub-theme) were identified:

- 1) The contributor's reasons for hoarding knowledge
 - a. Reasons specific to knowledge sharing through ICTs
- 2) The receiver's reasons for rejecting knowledge
- 3) Attitudes towards mistakes and failures
- 4) Ways to fight knowledge sharing hostility

The same outline was used for the analysis of interview data of schoolteachers, as well as students. The interview responses were organized and put together as per these themes, and the findings arrived at. Responses pertaining to specific areas within these major themes were clubbed together. As per the hermeneutics mode of analysis, the process was repeated several times to understand the meaning of the whole (impediments to sharing knowledge using ETaP), through an interpretation of the interview responses of schoolteachers and students. Care was taken to ensure that a common thread exists between the research questions, the interview questions, the case description, and the findings and contributions, with Husted and Michailova's (2002) model providing the theoretical framework.

Our findings are presented below. The findings (in the context of schoolteachers/students sharing knowledge with their peers) concur with Husted and Michailova (2002)'s model of knowledge sharing hostilities between employees working in an organization.

Reasons for Knowledge-sharing Hostility of Schoolteachers

Our primary concern was with getting teachers/students to contribute. Therefore, we will first look at our findings on knowledge-sharing hostility related to the **transmitter/contributor's reasons for hoarding knowledge**:

- **Reluctance to spend time/cost on knowledge-sharing.** Some teachers were skeptical that the time taken to adopt material for online use would put a teacher off contributing “Teachers are very busy people”. One teacher was especially curt, “Not interested in your site. No time.” Some explained that commercial systems would send ‘experts’ over who would help with upload and design of learning objects like multimedia lessons. The take-up for the system would improve if it offered time-saving features to teachers (survey gathering/online tests), instead of requiring their time in uploading.
- **Fear of “knowledge parasites” who only absorb and share nothing in return.** A teacher recounted an incident where a teacher from her school had her work plagiarized, leaving the school unhappy about the incident. Some schools were sharing only uneditable pdf. “Sharing is hard even for hardcopies. You can forget about softcopies.”
- **Fear of breaking the law.** While the teachers claimed they were certainly interested in sharing, most expressed concern over copyrights “We are afraid of infringing copyright laws. As teachers we do not really care about copyright laws when preparing course material. We are afraid that if we share, we would get into trouble because of copyright laws.” One suggestion was to restrict the content within the school. “As long as we can ensure only our own people view those slides, it will be OK” (evidence of ingroup/outgroup distinction, as suggested by Voelpel and Han 2005). However, ETaP aims to have educational content shared across different schools. The ‘restricting’ feature was available in their subscribed e-learning systems. The teachers appeared keen on getting a free version of their subscribed-for service.

While the above reasons for hoarding knowledge relate to Husted and Michailova’s model, we also learnt **reasons specific to knowledge sharing through ICTs** for e-learning:

- **Attitude towards e-learning.** Not all teachers are enthusiastic about e-learning “The younger teachers are generally more receptive to IT. The older ones do not seem as interested.” “Teachers teaching humanities and science seem to be more open to the idea. They can use the Internet to show pictures”. Even within the teaching staff, not all like e-learning, “Certain HODs [Heads of Departments] do not like using IT at all. One has asked me ‘why waste my time?’ This is at the HOD level.” A teacher felt that the only reason staff and students in her school use E-Learning is because they are instructed to by the management.
- **Longevity.** Some teachers were concerned that the system could be cancelled or rolled back sometime in the future. They prefer a system that lasts for a long time. It is only natural that teachers did not want to invest time and effort in a system with a lifetime that could not be guaranteed. While the makers of ETaP were confident of its longevity, the teachers might have been looking for governmental or contractual guarantees. The fact that the system was offered free of cost may also have contributed to their apprehensions.

Through our interviews, we also learnt the **reasons for knowledge-sharing hostility by the receiver/consumer who rejects knowledge** (mostly concur with Husted and Michailova 2002). Let us look at these findings:

- **Lack of Trust.** One teacher suggested that ETaP should start with links prescribed by official textbooks, “If everyone throws things in, it will be no different from the Internet”. Some teachers suggested that a watchdog group should check the content uploaded. A tendency to rely on official sources and official mandates was observed.

On the issue of **attitudes towards mistakes or failures**, the teachers in the transmitter role exhibited fear of mistakes, but showed sensitivity towards potential mistakes made by others.

- **Fear of mistakes.** “Personally I would adapt the content for my students...I would scan through and check for any errors...I would not contact the teachers [owner of content] unless I already know them.” Most teachers would not inform the owner of the content of any errors, “Teachers are human. Of course they will change but they rather not be criticized.” So unless it is a close friend, I would not correct any mistakes. Fear of mistakes might also prevent teachers from sharing, “Will teachers dare to submit their content and risk letting everyone know of their mistakes?” (evidence of ‘concern for face’, as suggested by Voelpel and Han 2005)

Apart from addressing the issues discussed above, explicit suggestions were made on **ways to fight knowledge-sharing hostility**. Let us look at these:

- **Need for Rewards and Acknowledgement.** Some teachers wanted a reward system for those who contribute more. They preferred acknowledgement and trust to monetary rewards, “Teachers put time and effort into making these slides. There should be some acknowledgement.”
- **Start from the top.** Since getting teachers to share would be difficult, a teacher suggested starting from the top i.e. sharing University material. This would encourage learners who go faster than the syllabus. There might be a trickle-down effect – Junior College materials for Secondary students, whose secondary-level objects would be enticing for primary-level students.

The responses provide a good indicator of the impediments to sharing knowledge and learning objects across Singapore schoolteachers. Few were interested in the sharing aspect of ETaP. Access restriction within schools has been suggested, but it might work against the goals of ETaP. The responses by schoolteachers show that even though the motivations of schoolteachers are different from those of organizational employees, they conform largely to Husted and Michailova (2002)’s model of organizational knowledge sharing. Column 1 of Table 1 (which includes responses by both teachers and students) summarizes the impediments to knowledge sharing by schoolteachers. Important impediments are *italicized*. Among those listed, the fear of breaking laws and mistakes may prove to be the major impediments to learning-object sharing by teachers.

Reasons for Knowledge-sharing Hostility of Students

We have examined the findings from the responses by schoolteachers. Let us look at findings on knowledge-sharing hostility from the responses by students. It is to be noted that the students were all boys, and all from the same school. We first discuss our findings related to the **transmitter/contributor’s reasons for hoarding knowledge**:

- **Desire to Preserve Competitive Advantage.** Many students said clearly that they wanted to stay competitive: “Why should we share?”; “Won’t share, we *kiasu* (are afraid of losing)”; “People are selfish”. Others said, “If they are from independent schools (a mark of quality), they won’t need our stuff, but if they are from neighborhood schools¹, our stuff will be too *cheem* (difficult)” (they see no point in sharing).
- **Fear of “knowledge parasites” who only absorb and share nothing in return.** The students wanted a system where uploads are rewarded in some way and lack of uploads are punished by “revoking membership”. One student proposed download limits that can be raised by uploading.
- **Fear of getting into trouble because of sharing.** While many students interviewed were willing to share their learning objects, others weren’t because they feared getting into trouble when someone else uses their objects and, understands “wrong stuff, because different teachers teach differently” (concern for face – Voelpel and Han 2005). This fear also relates to the ‘attitudes towards mistakes’ in Husted and Michailova (2002)’s model.

Let us briefly look at the e-learning experiences of the students interviewed. The students used the Internet for their studies. A large number of those interviewed were involved in a school program that required everyone to learn using a laptop computer. All students had a computer period. Many reported that their teachers gave them timed online quizzes that were graded. A few reported that teachers suggested websites that might interest them, though figures of follow-through visits are unavailable. Worksheets are made available for download in the school portal. Most students reported that their schoolteachers make extensive use of Microsoft PowerPoint presentations during class. From the ETaP perspective, these students were in a position to share various forms of knowledge through the Internet. Academically, they could share teaching notes, test papers, multimedia and websites of interest, as well as their opinions and academic knowledge. They could also share non-academic, informal information. Let us look at the **reasons specific to knowledge sharing through ICTs** for e-learning:

- **Attitude towards e-learning.** Students were less likely to use the Internet to learn and more to chat or for entertainment. The students admitted that the use of computers led to distractions like “MSN”, non-schoolwork sites, etc.

¹ The Singaporean term ‘neighborhood school’ may carry a negative connotation. It refers to schools built in the neighborhoods of government-build Housing and Development Board flats, where majority of Singaporeans live. In colloquial use, these schools may not have the pedigree or tag of famous ‘good schools’, many of which consistently ranked high in the official ranking tables, which were an annual feature until recently (2004, as per Tan 2006 p.93).

- **Lack of “human factor”.** “Teachers are here and they can explain. A program cannot explain.” “A teacher can see if you understand. E-learning cannot. There is no human factor.” Some proposed that ETaP has “a place where students can post questions and teachers can answer.”

Let us look at the **reasons for knowledge-sharing hostility by the receiver/consumer who rejects knowledge.**

- **Lack of Trust.** The students expressed doubt about the safety of shared content, “Got virus and hacker”. A lot of students called for a vetting committee to go through any submissions, formed either by MOE officials, teachers “or even someone from NUS [National University of Singapore]”. Most students preferred the book when asked to choose between websites and a textbook – “Textbook is official”. Regarding online contributions, a student wanted to “see what else he has contributed” or the contributor’s picture. They would trust content from sites like “BBC or .org sites” or “Cambridge or Harvard”.
- **Having strong group affiliations.** Some students saw themselves as being in mutually exclusive/competitive groups. They would use content contributed to ETaP by students from “good schools”, but not that contributed to the portal by students from “neighborhood schools”.

Apart from addressing the issues discussed above, explicit suggestions were made on **ways to fight knowledge-sharing hostility.** Let us look at these:

- **Desire to see Incentives.** Many students were only willing to “trade” or sell learning objects, instead of simply sharing. Many suggested rewards for contributors. One suggested “lucky draws”.

‘To hoard or to share knowledge is an individual decision. However, individuals act in particular contexts – cultural, social, economic and organizational.’ (Michailova and Husted 2003, p.62). When evaluating the results, Michailova and Husted (2003, 2004) consider factors such as strong group affiliation, suspicion of foreigners and a highly centralized decision-making structure. It might be possible that Singapore, like Russia, also have a largely centralized (top-down) decision-making structure (suggestion to involve the Ministry of Education), as well as a strong group affiliation (collectivistic Asian culture), which could potentially have an impact on the knowledge sharing hostility within the education community studied. Also, Singapore has had a long history (since 1992, as per Tan 2006 p.93) of officially releasing to the general public a ranking of schools. The practice was revised recently² (in 2004, as per Tan 2006 p.93). In addition, the students interviewed were studying for the O-Levels (US 10th grade) exams which may be using bell curve grading i.e. a competitive, relative system where one’s results depend not just on absolute grades but also on the performance of other students. Furthermore, education performance in the O-Levels also affects students’ chances of obtaining higher education qualifications, which can be linked to better jobs with higher starting salaries. With these factors in mind, there exists a possibility that hoarding knowledge is a strategy for increasing one’s potential future income. Also, the cultural aspects of ‘concern for face’ and ‘ingroup/outgroup distinction’ that negatively affect knowledge sharing in Chinese cultures (Voelpel and Han 2005), could be seen in the reluctance to knowledge sharing of Singapore students (and schoolteachers) as well.

The responses by students throw light on the impediments to sharing knowledge and learning objects across Singapore school students, and tell how students have different concerns and motivations from those of schoolteachers. The responses by students conform largely to Husted and Michailova (2002)’s model as well. Table 1 summarizes the impediments to knowledge sharing. Column 1 shows the findings applying to schoolteachers. Column 2 shows the findings applying to students. Important impediments are listed in *italics*. The first two columns of Table 1 answer our first research question, “Why are schoolteachers (and students) averse to sharing knowledge and learning objects with their peers from other schools?”

Husted and Michailova (2002) use their model to assess the level of knowledge sharing hostility (mild to high). The actions that they take to reduce knowledge sharing hostility depend on the level of hostility. If this hostility level is high, the involvement of the Education Ministry may force schoolteachers and students to start sharing knowledge. Otherwise, as Husted and Michailova (2002) point out, aligning incentives and structures will be a promising strategy to develop a knowledge sharing culture. Based on Husted and Michailova (2002, p.65), we can deduce the level of hostility to be mild. This is because the transmitter is hoarding knowledge due to individual concerns rather than survival in power games and schoolteachers appeared sympathetic towards the mistakes of colleagues (as opposed to mistakes being taboo). Allaying fear, rewarding contribution and building trust are three of the solutions offered by Michailova and Husted (2002). These can be done by addressing issues and by implementing the

² www.moe.gov.sg/corporate/yearbook/2006/enrichment/towards_a_holistic_recog_of_sch_achievements.html

suggestions brought up in the teacher and student interviews. Some potential solutions are listed in the rightmost column in Table 1. This (as well as the rows on ways to fight knowledge-sharing hostility) answers our second research question, “How can schoolteachers (and students) be encouraged to share learning objects?”

Table 1. Impediments to Knowledge Sharing among Singapore Schoolteachers and Students (conforms to Husted and Michailova 2002)

| Schoolteachers | Students | Potential solutions |
|---|--|---|
| Reasons for the Transmitter 'hoarding' knowledge | | |
| | <i>Desire to preserve competitive advantage</i> | Provide incentives for sharing |
| <i>Reluctance to spend time/cost on sharing</i> | | Provide rewards and incentives |
| Fear of work being plagiarized | <i>Fear of knowledge parasites</i> | Put up copyright notices Penalize non-contributors (will lead to less people using the portal) |
| <i>Fear of breaking the law</i> | | Set up “school areas” within portal where only members of a school may access objects shared by its members (against free-sharing aims) |
| | <i>Fear of getting into trouble because of sharing</i> | Put disclaimers where content is not moderated Provide age or grade of contributor |
| Lack of enthusiasm towards ICTs/E-learning | | |
| Attitude towards e-learning | Attitude towards e-learning | Focus promotional efforts on young teachers who might be more open to e-learning Promote as free replacement for commercial, paid e-learning systems (match commercial services by providing 'Experts' to create learning objects). |
| Longevity/enduring nature | | “Up-since” counter that tracks that number of days the portal has been continually up |
| | Lack of “human factor” | Videoconference features Specialized forums where students ask questions and teachers answer |
| Reasons for Receiver 'rejecting' knowledge | | |
| <i>Mistrust of shared knowledge</i> | <i>Lack of Trust</i> | Make portal attractive by first populating itself with textbook-prescribed websites Set-up the oft-suggested watchdog committees to monitor uploads. Get volunteers through: <ul style="list-style-type: none"> ▪ A paid committee ▪ University students ▪ The help of the Education Ministry |
| | Having strong group affiliations | First attempt to get schools with close ties to begin sharing with each other |
| Attitudes towards mistakes or failures | | |
| <i>Fear of mistakes</i> | | Set up “school areas” within portal where only members of a school may access objects shared by its members (against free-sharing aims) |
| Ways to fight knowledge-sharing hostility | | |
| <i>Need for rewards and acknowledgement</i> | <i>Desire to see incentives</i> | Recognition: Top contributing school or top contributing individual award Tangible rewards: Prizes, perhaps lucky draw Reward contribution by increasing download limits (will |

| | | |
|--------------------|--|--|
| | | work against the free-sharing aims) Penalize non-contributors (will lead to less people using the portal) |
| Start from the top | | Share University materials first |

While the level of knowledge sharing hostility observed was largely mild, there also seems to be a culture of fear of authority. Almost all the teachers and students expressed a very strong desire for anonymity. This may be due to group think (sometimes termed ‘herd-mentality’; the nail that stands out is hammered) of Confucian cultures, which majority Chinese Singapore may be qualified to have. It is because of this attribute that we can anticipate that the involvement of the Ministry of Education might compel schoolteachers and students to start sharing knowledge.

While Table 1 looks at the teachers’ and students’ reasons for knowledge sharing hostility and suggests potential solutions, it is also interesting to know how well the issues raised by the schoolteachers and students conform to Husted and Michailova (2002)’s model of Figure 1. In Table 2, we categorize the issues expressed by teachers and students across Husted and Michailova (2002)’s items of Figure 1.

Table 2. Categorizing teacher/student issues across Husted and Michailova (2002)’s items of Figure 1

| Husted and Michailova (2002) | Schoolteachers | Students |
|---|--|--|
| 1. Transmitters hoard knowledge because they | | |
| <i>a. Fear loss of value and bargaining power of individual competitive advantages</i> | "Sharing is hard even for hardcopies. You can forget about softcopies." | "Why should we share?"; "Won't share, we <i>kiasu</i> "; "People are selfish" |
| <i>b. Are reluctant to spend time on sharing</i> | "Teachers are very busy people"; "Not interested in your site. No time." | |
| <i>c. Fear parasites who only absorb knowledge and share nothing in return</i> | A fellow teacher's work was plagiarized, leaving the school unhappy about the incident. | Students wanted a carrot and stick approach for sharing (carrot) or not sharing (stick). |
| <i>d. Wish to avoid external parties from assessing the quality of their knowledge</i> | "Will teachers dare to submit their content and risk letting everyone know of their mistakes?" | Students feared getting into trouble when someone else understands "wrong stuff, because different teachers teach differently" |
| <i>e. Wish to prevent misunderstandings and complications</i> | | |
| <i>f. Wish to avoid appearing too eager/knowledgeable to their (potentially jealous) superiors and wish to hoard knowledge so as to protect their present power</i> | | |
| 2. Receivers reject knowledge because they | | |
| <i>a. Prefer their own ideas</i> | | |
| <i>b. Doubt validity and reliability of any received knowledge</i> | "If everyone throws things in, it will be no different from the Internet". | Students preferred the book over websites because "textbook is official"; "Teachers are here and they can explain. A program cannot explain" |
| <i>c. Have strong group affiliations and would prefer interaction within this group</i> | "As long as we can ensure only our own people view those slides, it will be OK." | Students would use content from "good schools", but not those from "neighborhood schools" |
| <i>d. Are too proud to accept knowledge from others</i> | | Students would not use content from "neighborhood schools" |
| 3. Transmitters' and receivers' attitude towards mistakes. They: | | |
| <i>a. Are uncertain about reactions</i> | "Will teachers dare to submit their | Students feared getting into trouble |

| | | |
|---|--|--|
| <i>to any mistakes in knowledge they may share</i> | content and risk letting everyone know of their mistakes?" | when someone else understands "wrong stuff, because different teachers teach differently" |
| <i>b. Desire to avoid anyone catching mistakes in their knowledge</i> | "Teachers are human. Of course they will change but they rather not be criticized." | |
| <i>c. Operate in an environments where failures are punished</i> | "We are afraid that if we share, we would get into trouble because of copyright laws." | |
| <i>d. Lack of initiative arising from belief that not acting means no chance of failing</i> | | "If they are from independent schools, they won't need our stuff, but if they are from neighborhood schools, our stuff will be too <i>cheem</i> (difficult)" |

Conclusions and Implications

The case provides valuable insights into the knowledge sharing hostility prevalent in an Asian context. Through an understanding of the developments embedded within this project, this case offers potential lessons that may have a bearing on future development of such e-learning knowledge-sharing initiatives involving multiple schools.

Theoretically, the study lends support to Husted and Michailova (2002)'s model for diagnosing and fighting knowledge-sharing hostility. Even though Husted and Michailova's model pertains to an organizational context, we see that it was applicable in the case of schoolteachers and students as well. We also found a set of impediments to knowledge sharing relating to the use of ICTs and e-learning. We have made use of Klein and Myers (1999)'s 7 principles in conducting this interpretive study. An important contribution is the set of impediments concerning schoolteachers as well as students, and potential solutions to the impediments in the case of ETaP (as well as similar initiatives in the Asian context or other countries that largely follow a collectivistic culture – see Hofstede 2003). We saw that the cultural aspects of 'concern for face' and 'ingroup/outgroup distinction' that negatively affect knowledge sharing in Chinese cultures (Voelpel and Han (2005), could be seen in the reluctance to knowledge sharing of Singapore schoolteachers and students as well.

However, care must be taken before attempting to generalize the findings. It is to be noted that while teachers from different schools were interviewed, student responses are from the students of only one school in Singapore. Also, the responses from students were only from males. It would be interesting to investigate if students in co-education schools or all-girl schools have different attitudes towards knowledge sharing. Future studies should consider more schools of Singapore, and interview female students as well. The data collection techniques used were interviews, focus groups, as well as researcher's impressions and observations. Other sources such as secondary data can be included to enhance the strength of the findings. Future work will involve further correspondence with Singaporean teaching staff/students, as they are the primary target users of the system. The participation and involvement of the Education Ministry would also give the initiative a boost. Further qualitative/quantitative research can be conducted to find out more about the reasons behind knowledge sharing hostility in adults and children. Usability tests on ETaP should take place to see if the considerations proposed result in any changes. These would be useful in refining ETaP.

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