Barriers to sharing knowledge across Singapore schools: Lessons Learnt from the development of the Educational Taxonomy Portal

Naresh Kumar Agarwal

(with Danny C. C. Poo and Keat Houng Tan)

School of Computing, National University of Singapore
naresh@comp.nus.edu.sg

Nationality: Indian (Singapore Permanent Resident)
Discipline: Information Systems
Panel Preference: ICT Adoption and Use in the Pacific Rim

Abstract. *Knowledge sharing is being facilitated through various tools by removing the barriers to sharing. However, despite the tools, lack of motivation is one of the primary reasons why knowledge-sharing initiatives fail. In this case research, we examine in-depth, the impediments to knowledge sharing across Singapore schools, and the ways to address these. For this, we investigate the reasons behind the reluctance of teachers and students to share educational content in the Educational Taxonomy Portal (ETaP), an e-learning digital repository. The study documents the attempts to get real world feedback on the repository through interviews with teachers and students. 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 in the case of ETaP, as well as similar initiatives in the Asian context or other countries that largely follow a collectivistic culture. Based on the interaction with both schoolteachers and students, we present the reasons for transmitter 'hoarding' knowledge and the reasons for the receiver 'rejecting' knowledge. Conducted using Klein and Myers' 7 principles for interpretive studies, this study sheds light on the level of enthusiasm of schoolteachers towards ICTs/e-learning, attitudes towards mistakes or failures, as well as ways to fight knowledge-sharing hostility. The findings support Husted and Michailova's model of knowledge sharing hostility and would be useful for similar e-learning knowledge-sharing initiatives.*

Keywords: Knowledge Sharing Hostilities, Case Study, Singapore Schools, E-Learning, ICTs

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 knowledge/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 our study, we examine the impediments to knowledge sharing across Singapore schools. 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 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 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 (see 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. However, this 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 other schools? How can schoolteachers and students be encouraged to share learning objects?*

We adopt the 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 2002); in our case, this event is the sharing of learning objects between Singapore schools for the development of the Educational 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. The findings supports Husted and Michailova (2002)'s model of knowledge sharing hostility and would be useful for similar e-learning knowledge-sharing initiatives.

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. 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. We ourselves have faced an initial defeat in getting teachers and students to share educational content. 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". 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 their model where they examine reasons for this hostility.

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

Figure 1. Assessing Knowledge-sharing Hostility by evaluating different parameters (Husted and Michailova 2002)

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. 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 are 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.

In this study, we adopt the lens of Husted and Michailova (2002), and apply it to the context of sharing learning objects between 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).

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 other schools? How can schoolteachers and students be encouraged to share learning objects?*" The unit of analysis is schoolteachers and students.

In order to gain insight into the reasons for knowledge-sharing hostility in Singapore schools, in-depth, face-to-face interviews were conducted with 12 individual teachers from 9 different schools, which were all current users of commercial, paid-for, Learning Management Systems. 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 verify Husted and Michailova (2002)'s model of knowledge sharing hostility (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, it might mean that the solutions offered can 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. Before asking questions, a short demonstration of ETaP would be given. No attempt was made to quantify the findings.

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.

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

Through the help of one of the teachers interviewed, the interviewer was able to talk to 108 male students from a single local Secondary school (in 6 batches of 15-23 respondents). All 6 sessions were semi-structured. Questions asked include 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. 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 spoke using short, broken phrases, instead of giving complete answers. This made transcribing very difficult.

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.

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).

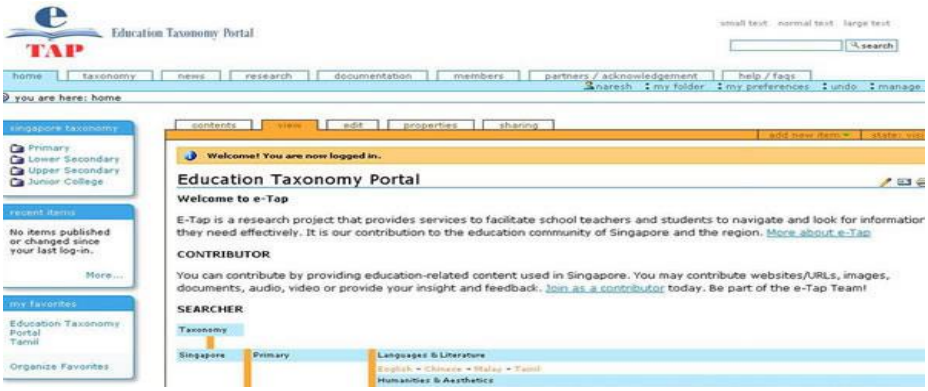

Figure 3. Snapshot of the Educational Taxonomy Portal (ETaP)

ETaP aims to reduce the overload for local students via provision of (Agarwal *et al.* 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 *et al.* 2005). See Figure 4. The levels/grades of study are on top – primary, lower secondary, upper secondary or junior college. The subsequent branches of the taxonomy cover the subjects, followed by the individual learning objects covered in the subjects.

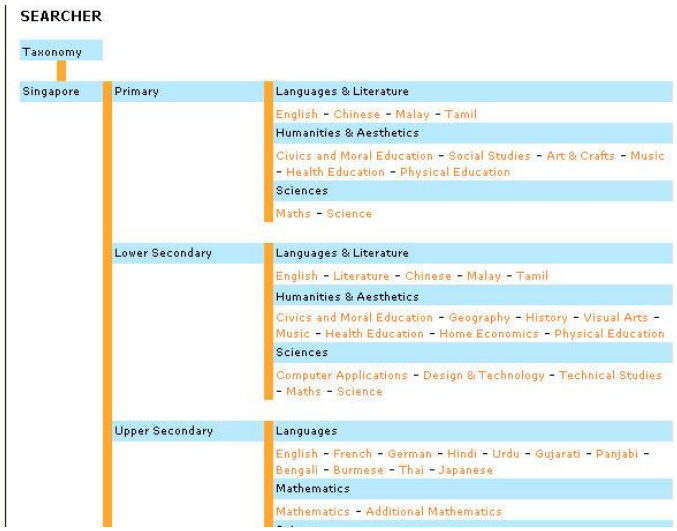

Figure 4. ETaP's Taxonomy

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 *et al.* 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

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). Klein and Myers (1999)'s 7 principles on conducting interpretive studies were also followed.

Our findings concur with Husted and Michailova (2002)'s model. 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***:

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 neighbourhood schools, our stuff will be too cheem (difficult)" (they see no point in sharing).

Reluctance to spend time/cost on knowledge-sharing

Some teachers were sceptical 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

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. 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." However, ETaP aims to have educational content shared across different schools. The 'restricting' feature was available in their subscribed e-learning systems, and appeared keen on getting a free version of their subscribed-for service.

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".

This fear also relate to the 'attitudes towards mistakes' in Husted and Michailova (2002)'s model. 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.

Of students, teachers expressed their concern that students are less likely to use the Internet to learn, "Students would rather use the Internet to chat". The students themselves admitted that the use of computers led to distractions like "MSN", non-schoolwork sites, etc.

Longevity

Some teachers were concerned that the system would be cancelled. They prefer a system that lasts for a long time.

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."

Through our interviews and focus-group sessions, 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 starts 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 checks the content uploaded.

The students also 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". 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 from "good schools", but not those from "neighbourhood schools".

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?"

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".

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 schools. 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 both teachers and students conform largely to Husted and Michailova (2002)'s model. Table 1 summarizes the impediments to knowledge sharing. Important impediments are listed in ***bold, italics***. Among those listed, the fear of breaking laws and mistakes may prove to be the major impediments to object sharing by teachers.

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		
	Desire to preserve competitive advantage	▪ Provide incentives for sharing
Reluctance to spend time/cost on sharing		▪ Provide rewards and incentives
Fear of work being plagiarized	***Fear of knowledge parasites***	▪ Put up copyright notices ▪ Penalize non-contributors (will lead to less people using the portal)
Fear of breaking the law		▪ Set up "school areas" within portal where only members of a school may access objects shared by its members (against free-sharing aims)
	Fear of getting into trouble because of sharing	▪ 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		
Mistrust of shared knowledge	***Lack of Trust***	▪ Make portal attractive by first populating itself with textbook-prescribed websites ▪ Set-up the oft-suggested watchdog committees to monitor uploads. Get volunteers through: o A paid committee o University students o 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		
Fear of mistakes		▪ 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		
Need for rewards and acknowledgement	***Desire to see incentives***	▪ 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

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 other schools?"

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 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?"

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. 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). However, 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.

Future work will involve further correspondence with Singaporean teaching staff and 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 if the considerations proposed in this paper result in any changes. This would be useful in refining ETaP.

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