CHAPTER - 4

A FRAMEWORK FOR KNOWLEDGE SHARING
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4.1 Introduction

The importance of KS relies on the context that it is shared in as well as the actual knowledge, knowledge producer and user. Several researchers emphasised that context play an essential role in knowledge sharing. Accordingly, examining not only the importance of knowledge sharing, but also the importance of knowledge itself in an organisation is a difficult prospect. This is true when it comes to actual methods of knowledge sharing. Different organisations use different methodologies. Every situation, context and need of the individual and organisation differ. Therefore this research endeavours to devise a conceptual framework for KS in WBLE. The second section of this chapter is intended to implement this framework whereby a working system was developed to demonstrate this framework.

4.2 SECI Model

KS is a complex cognitive process which requires the cooperation among the collaborators. The famous SECI model [137] has been considered as the basis of knowledge transformation between explicit and tacit knowledge. SECI model addresses that human knowledge is created and expanded through continuous interactions between explicit and tacit knowledge. Knowledge creation is not confined to individual but to social interaction among individuals, groups and organizations.

Tacit and explicit knowledge continuously influence each other. The two knowledge categories are interdependent. Ikuijro Nonaka and Hirotaka Takeuchi [87] created the SECI model (Figure 4.1) to demonstrate the dynamic interactions between tacit and explicit knowledge. The SECI model is of great significance when examining KS.
The SECI model can be explained as follows [137] [36]. Socialisation is when tacit knowledge is added to tacit knowledge through, for example, on-the-job training, sharing experiences, observation, brainstorming, imitation and practice. This creates technical skills and shared mental models, for instance. Externalisation is when tacit knowledge is converted to explicit knowledge. This is seen as the key knowledge creation activity and is done through, for example, using metaphors, models or analogies.

Combination is adding explicit knowledge to other explicit knowledge by bringing together a variety of sources such as, for example, databases and memorandums. Lastly, internalisation is a process focussed on adding to personal, tacit knowledge by examining explicit knowledge. Explicit knowledge is, thus, converted to tacit knowledge. These methods have a variety of implications for an organisation and highlight the importance of KS.
4.3 A framework for Knowledge Sharing

KS can be associated with opportunities offered by social computing technologies [20] [55]. The technologies can contribute greatly to the transfer and sharing of knowledge without geographical limits. More specifically, they can share data, information and knowledge from a sender to a receiver [20].

Basically, KS and creation mainly involve educators and learners in WBLE. One of the most important roles for educators is to transform their knowledge to learners. Thus, educators (as senders) attempt to transfer and codify explicit and tacit knowledge to learners (as receivers) by building a KS space through social computing tools. Thus, the framework shown in figure 4.2 was devised to integrate the SECI model and social computing concepts and tools that can be taken as basis for the development of system to implement WBLE. For educators, the most difficult thing is to learn how to transfer tacit knowledge into explicit knowledge for learners’ retrieval. In this framework, the processes of combination and externalization are applied to transfer educators’ explicit and tacit knowledge into explicit knowledge. On the other hand, web based learners can learn individually through internalization or with group interaction provided through social computing tools in WBLE.

Figure 4.2: Framework for Knowledge Sharing
The basis of this fame work is a distinction between two types of human knowledge: explicit and tacit. Explicit knowledge or information is codified, objective knowledge that can be transmitted in formal, systematic language. In contrast, tacit knowledge is not easily codified, difficult to express and subjective. It consists of four modes of knowledge conversion: socialization (tacit to tacit), externalization (tacit to explicit), combination (explicit to explicit), and internalization (explicit to tacit). Each of these modes will be discussed in detail below within a learning context, along with actual examples on how various social computing concepts and tools can be applied and used in conjunction with one another to support each mode of the sharing process.

Socialization is the process of sharing tacit knowledge, i.e. the rich and untapped knowledge that resides in individuals such as knowhow, expertise, understandings, experiences and skills resulting from previous activities, not through language but through observation, imitation, practice, and participation in different formal and informal communities. According to them, the socialization mode starts with building a “field” or “space” of social interaction, social computing provides great opportunities to build such spaces and hand on tacit knowledge from one person to another.

Externalization is a process of articulating tacit knowledge into explicit concepts. It is generally based on metaphors, analogies, concepts, hypotheses, and models. According to Nonaka and Takeuchi, externalization holds the key to knowledge creation, because it creates new, explicit concepts from tacit knowledge. Blogs for example support the externalization process by giving voice to everyone and providing a space to capture personal knowledge and distributed discussions across blogs, immediately document thoughts, and annotate information. The nature of knowledge is such that we always tell more than we can write down [14]. Consequently, tacit knowledge that may be expressed but cannot be easily recorded into formal documents and manuals can be verbalized via oral communications. VoIP and phone/video-conferencing for example are powerful tools to trigger externalization via open participation, dialogue, and discussion. Social computing in
general offer unique means for effective capturing of context-rich and quality
knowledge as it gets created, with a minimum amount of effort. Collaboration
classifies content. For example, discussions around a blog post through
comments and trackbacks give more context to the codified knowledge. And
recording of phone/video-conferences and instant messaging sessions support the
online capturing of context-rich knowledge as it gets created. The collective
intelligence ensures that knowledge is up-to-date and relevant. In fact, knowledge
captured by many is more likely to be of better value. Wikis are good examples of
the collective intelligence at work. They provide an opportunity for social
interaction and collaborative knowledge capturing. Knowledge can be expressed and
captured through different possible modes of representation and expression
including words, spoken or written; image, still and moving; video; music etc. Each
medium has its own affordances, its own systems of representation, and its own
strategies for representing knowledge [12][15].

Consequently, learners need to reflect across media; that is get familiar with
a range of different media tools and determine which is most effective in capturing
their knowledge. This is however not a big challenge, since today's learners are
growing up digital and are comfortable with various media. Emergent social media
provide learners with effective ways to capture and publish their knowledge in a
number of ways and in a variety of media such as pictures, video or audio
recordings. Knowledge capturing and publishing becomes easier through
increasingly better devices that can capture high-quality audio and video.

Combination is the process of systematizing concepts into a knowledge
system, and it integrates different bodies of explicit knowledge. Once knowledge is
captured, it becomes explicit knowledge i.e. information that can be stored and
accessed. Unlike traditional centralized learning object repositories, blogs and wikis
build distributed community information stores with up-to-date, context-rich, and
searchable learning assets. The captured information can then be transferred within a
social context. Blogs and wikis allow quick and wide information dissemination
across classroom and organization boundaries. Podcasting is growing in popularity
as a powerful tool to share audio and video recordings. RSS is a successful technology that makes it easy to share resources across networks, as it brings content from different sources (e.g. new blog posts, podcasts) to a learner’s personal space. The captured information can also be managed individually or collectively. A blog is a very valuable tool for personal information management and wikis and folksonomies are highly effective forms of collaborative information management. During the combination process, reconfiguration of existing explicit knowledge through adding, reorganizing, and combining, can lead to new knowledge, possibly more complex. Other social computing technologies such as mashups can be used to pull together content from more than one source, remix and assemble it to form a new service. Since information is available in different forms such as texts, images, sounds, and videos, it is necessary to have federated search technology that make it possible to perform search across media and plug into multiple distributed repositories to locate relevant learning resources with a single query. Further, it is desirable to have social and community-oriented search technology that builds on the collective intelligence to locate quality resources and services as well as appropriate communities and experts. The collective intelligence decides what is valuable through filtering, rating, feedback, reviews, criticisms, and recommendations and supports the certification of people’s expertise and the assessment of individual digital reputation. Amazon’s review and recommendation system, YouTube’s rating scheme, Google’s PageRank algorithm, eBay’s feedback, Flickr and Del.icio.us’ social tagging, Digg’s voting are successful examples of the collective intelligence at work. The search result should be modular content that can be remixed and aggregated to generate personalized learning resources, third-party lightweight services that can be mashed up to form adapted learning services, personal learning environments (PLE) that can be connected to build a learning community, and small communities that can be networked to create interdisciplinary learning clusters.

According to Nonaka and Takeuchi, internalization is the process of embodying explicit knowledge into tacit knowledge. Explicit knowledge is internalized into individual’s tacit knowledge bases in the form of mental models or
technical know-how. Learning by doing triggers internalization. Bringing learners competitively and cooperatively together via multiplayer games and multi-user simulations offer the potential to learn through a new form of social experience. Games encourage us to take risks and learn through trial and error. Simulations broaden the kinds of learning experiences by way of getting a chance to see and experiment things in a safe environment that would be impossible in the real world [12]. Internalization is also a process of continuous individual and collective reflection. Effective reflection requires the mastery of different skills such as the ability to see connections and recognize patterns and the capacity to make sense among fields, ideas, and concepts [10]. Figure 4.3 represents a suite of tools available and it can be seen that these tools predominantly support KS or social interact

![Figure 4.3: Suite of Tools for Knowledge Sharing](image-url)
4.4 Working System

To demonstrate the implementation of the framework a working system was developed which encompasses social computing tools as part of the system.

4.4.1 Technical Architecture of the System

The underlying architecture of the system has been built on 3-tier architecture. The first tier is the client tier which controls the presentation views of the blog posts, wiki articles, and podcasting posts. The second tier is the application/business logic tier which controls communication between back end data resources and presentation layer (client tier). The third tier is the data tier which stores the necessary data for blog, wiki and podcasts. Figure 4.4 below represents the architectural view of the working system.

![Figure 4.4: Architectural View](image_url)

As figure 4.4 shows the Logical tier of this system is entirely controlled by an Apache Web Server with PHP Script which handles the flow of Information between the Data tier and the Client tier for display. The back end layer consists of
the Data tier which stores the data and information such as databases for Blogs, Wikis, and Podcasts and is managed by a MySQL database management system. So the whole working system runs under an Apache/MySQL Servers platform.

Therefore the system will be working in a Web Based environment. Essentially it integrates all the necessary social computing features. The entry page consists of the necessary links to Blogs, Wikis, and Podcasting, with RSS which are tools that have been recommended (Chapter 3) based on the research findings.

The operational mode of the system is that lecturers could post contents regarding their courses and approaches in blog explaining how his/her lectures are delivered in a reflective manner. Also they could use wiki to share knowledge in a collaborative manner and they could use podcasting to listen or watch media files about the courses and expertise as well as podcasting their lectures. RSS is important tool which will be acting as a bridge to inform about any new postings from the wiki, blog or podcasting so that they could contribute to them through commenting. Hence each of these tools will demonstrate how knowledge could be shared.

The home page technically contains the static features with global links in the page header. These links will send a user to the desired application such as the blog, the wiki, or podcasting. The home page of this portal can be shown in the figure 4.5.
4.4.2 Blog

Blogs (also known as web logs, or weblogs) are essentially highly interactive online journals.

Blogs are web sites that contain frequently updated posts that are usually displayed in reverse chronological order.

Students can use hypertext to link to what others have written on given topics or to external resources. Blogs permit other students to post comments which are logged and become visible from within the blog page. Usually blogs are created by individuals, but there are also group blogs that contain highly interconnected blogs which form communities.

Blogs are about sharing information, ideas and resources. When they first appeared, blogs were not so oriented towards a collaborative environment [26]. There have been three major additions to the blog: permalinks (permanent links), comments and trackback. Permanent links point to the individual blog posts, users have the possibility to place comments to other user's posts and trackback is a citation notification system. When many blogs have common topics they will eventually link each other and discussions will start. One of the criticisms of blogs is that they consist of personal opinions of individuals who usually are no experts on the discussed topics.

Most blogs are personal or journalistic. In education, blogs are used as personal journals for students, where they can link the blogs to different courses and use them as personal electronic portfolios, tracking the development over time. Blogs can be used as environments for personal learning, however a limitation of the structure is that they are chronological organized, rather than by content. Indices and search mechanisms on blogs can also be used for finding information.

When a lecturer or student clicks on the blog link he/she will be sent to the particular blog where he/she could read posts and comments from different lecturers about their subject skills as well as being able to post contents and provide real time
comments on others’ posts. In this system, the researcher have used the Wordpress blog software for blog creation. All users of blog will be managed by the Blog administrator who will have to register blog users, managing what they post and comment.

Knowledge will be shared and captured using blog due to the ability of the posting and the comments provided by blog that enhance people exchanging their views in a conversational manner. The screen shot in figure 4.6 below shows the blog post on a particular programming teaching skill.

![Blog & Share Your Learning's on knowledge Management](image)

**Figure 4.6: Blogs**

4.4.3. RSS

*RSS feeds* are used to alert users about new blog postings and also to help sort information coming from different blogs and other Internet resources. RSS stands for “really simple syndication” and was first developed by Netscape as a way for users to add “channels” to MyNetscape pages. RSS is a family of web feed formats, specified in XML and used for Web syndication. They are mainly used by news websites, blogs and podcasting. Web feeds provide web content or summaries
RSS as proposed by students is an important tool to share knowledge. In this system RSS helps to remind students on any updates from the wiki, the blog, and podcasting in their own time without necessarily having to visit the site. The screenshot in figure 4.7 below represents an RSS feed of the teaching programming blog displayed using a feed aggregator;

![RSS Feed](image)

**Figure 4.7: RSS Feeds**

4.4.4. Wiki

Wikis ("wiki" means "quick" in Hawaiian) are more suitable for online collaborative projects. A wiki is a type of website which allows users to easily add, remove or edit all content. Wikis were invented in 1995 by Ward Cunningham and by his definition a wiki is the simplest online database that could possibly work. Wikis are intensely collaborative and are topic related rather than user related. They represent a loosely structured set of pages, highly interlinked and also linked to other Web pages. The largest example of wiki is Wikipedia which is a free online
encyclopaedia. Wikis are meant to become large shared repositories of collaboratively written knowledge. Wiki sites can be ideal for communities of practice, used for achieving collective applied learning.

Wikis have a simple syntax for authors and allow authoring via web browser and also uploading multimedia content. The main feature of wikis is collaborative editing. A page can be contributed to and edited by any user. Wikis also provide a rollback mechanism, so that the pages are versioned and the changes are transparent to all the users. Within a wiki system any concept in the text of a page can be made into an active resource very easily. Traditional wikis provide capabilities for full text search, and the recent research [34] is investigating on semantic wikis which provide also semantic search and contextual navigation.

Wikis are used in different areas. They are used as encyclopaedia systems; a good example is Wikipedia which has around one million articles and is currently the largest wiki system. Another use is for collaborative writing, in which a number geographically distributed authors can contribute on the same work simultaneously and the work can also be immediately available to readers. Wikis are also used in project and personal KM, as they provide a good tool for knowledge versioning, notes and ideas repositories, knowledge base, task organization, bookmarks, etc. Other application areas for wikis are in content management systems and also for software development where collaborative tools are needed for writing documentation and for tracking software bugs. Many projects coordinate via wikis, they public or private ones.

A ‘Wiki’ link in the home page sends a user to a wiki application where students will be collaborating together to create and share articles related to particular course or subject. The Wiki application in this system has been configured using a MediaWiki software tool which operates under an Apache/Mysql server environment. The screen shot in figure 4.8 below demonstrates an editable wiki article.
Knowledge sharing

Knowledge sharing is an activity through which knowledge (i.e., information, skills, or expertise) is exchanged among people, friends, or members of a family, a community (e.g., Wikipedia) or an organization.

Organizations have recognized that knowledge constitutes a valuable intangible asset for creating and sustaining competitive advantages. Knowledge sharing activities are generally supported by knowledge management systems. However, technology constitutes only one of the many factors that affect the sharing of knowledge in organizations, such as organizational culture, trust, and incentives. The sharing of knowledge constitutes a major challenge in the field of knowledge management because some employees tend to resist sharing their knowledge with the rest of the organization.

One prominent obstacle is the notion that knowledge is property and ownership thus very important. In order to counteract this, individuals must be reassured that they will receive some type of incentive for what they create. However, Dalkir (2005) identified the risk in knowledge sharing is that individuals are most commonly rewarded for what they know, not what they share. If knowledge is not shared, negative consequences such as isolation and resistance to ideas occur. Shared knowledge offers different viewpoints and possible solutions to problems. To promote knowledge sharing and remove knowledge sharing obstacles, the organizational culture should encourage discovery and innovation. This will result in the creation of organizational culture.

Therefore by using a Wiki, knowledge of any topic or title could be incrementally generated and shared in collaborative way due to its capability of allowing more than one person to contribute to the same document which is regarded as ‘many to many KS’.

Another link which is available in the home page is ‘Listen/Watch podcasting’. This link will send a lecturer or student to a podcasting application where he/she can share and gain new approach by listening to podcasting posts. This is an audio podcasting application which has been configured using Loudblog podcasting software tool. To be able to podcast every student must be registered by administrator. An individual student has the ability to comment on a particular podcast through text or audio recording. Podcasting will be a more powerful tool for enhancing and sharing of individual tacit teaching knowledge (Figure 4.9).
4.4.5 Forums

The discussion forum increasingly used in the delivery of online learning, has its origins in the early days of the Internet where it was used by academics of American universities to promote discussion and collaboration. Unlike text, audio and video conferencing, the discussion forum is an asynchronous technology, which does not require all participants to be online simultaneously. One of the strengths that the discussion forum provides to the online learning community is the ability to allow learners from a variety of time zones to interact at a time that suits the individual learner.

The use of discussion forums has been explored with enthusiasm. Bullen [29] and Thorpe [188] discussed how the Internet and computer mediated communication (CMC) could be used to promote student learning in groups. Garrison [64] suggested that discussion forums had the potential to change the nature of distance education, providing an opportunity for the distance learners to collaborate and create mutual understanding by building learning communities. Mason and Kaye [117] described computer conferencing as a medium that can
provide opportunities for dialogue, debate and conversational learning, suggesting that students gain a sense of community with access to other student’s thoughts and ideas. Collins & Berge [40] discussing the benefits of CMC explain that it has the potential to liberate education from the constraints of time and distance. Dehler and Portras- Hernadez [50] also discuss the role of discussion forums and how they can be employed to promote experiential learning and collaboration.

Online discussion forums (ODF) are a web-based application that has been used extensively to bring people together with shared interests and mind-set. In education, they have been deployed to complement traditional techniques such as lectures and tutorials [52]. ODFs harmonize with the educational philosophy that considers communication a necessary and fundamental mechanism for effective learning [74] [193]. It was found that learners’ interaction with both human and inanimate objects, and their participation in technology mediated education, were essential for the quality of their learning experience, can enrich the process of knowledge exchange among participants and has positive effects on the student’s performance [94] [102] [205]. Consequently ODFs can be successful in enhancing collaborative learning by attracting students to participate and interact [181].

An important thing to note is that each of the above applications which consist of some KM features, which will assist learners to perform other KM related activities. For instance learners can search for other posts in the blog, podcasting using tags; also a wiki page is enabled by searching ability where learners are able to search for any available Wiki articles.

4.5. Summary

Nonaka and his knowledge transformation model SECI revolutionized the thinking about organizations as social learning systems. Social computing concepts and tools seem to be an ideal fit for Nonaka’s SECI approach opening new doors for more personal, dynamic, and social learning on a global scale. This chapter has interpreted the results obtained from the analysis findings by devising a framework to facilitate KS in WBLE.
The framework, considers the SECI model as the basis for KS among learners and educators in WBLE. The basis of this framework is a distinction between two types of human knowledge: explicit and tacit. It consists of four modes of knowledge conversion. Each of these modes are discussed in detail within a learning context, along with actual examples on how various social computing tools can be applied and used in conjunction with one another to support each mode of the KS process. The system was then developed to demonstrate how these tools might be interacted within this framework. By examining the system it could be obviously seen that these tools are capable of enhancing KS within the academic context. The next chapter discusses the role of social network analysis to analyse the KS pattern of the students of WBLE.