Significance of Knowledge Reuse in the Three Dimensional Academic Environments

Mohammad Shuaib Khan, O. K. Harsh

Abstract: In the present research an effort is being made to understand the significance of knowledge reuse in an academic environment. For this we will require appreciating the role of knowledge reuse, sharing and its management. Quality of reusable tacit and explicit knowledge has also been discussed. Various issues of knowledge quality and reusability in contemporary age have been analyzed. For comprehend the above undertakings in greater details we apply the three dimensional model of knowledge reuse and management by Harsh based on Nonaka and Takeuchi model and present the discussion on the various issues of knowledge reusability and its applications in an academic environment. Suggestions to improve the reusable tacit and explicit knowledge for a country like India are being also detailed.

In the present investigation the importance of reusable tacit and explicit knowledge in diverse learning situation which is extensively valuable for the country like India is being explored. In academic environment it is very much essential to analyze the flow of the knowledge. Reusability concept not only providing a way to achieve the desired objective but also encapsulating the tacit as well as explicit knowledge. Combination of the knowledge is quite interesting field in academic environment. This study helps in optimization of educational resources by simple a technique of reuse. Present discussion also point out the enhancement of quality of tacit and explicit reusable knowledge as a result of its refinement in a three dimensional knowledge environment. Application of Information and communication technology can further exploit not only the effortless confined reusable knowledge while it also opens the enormous opportunity for trouble-free applications of reusable knowledge.

Keywords: Explicit knowledge reuse, Knowledge reuse, Software reuse, Three-dimensional reuse model, Tacit knowledge reuse.

I. INTRODUCTION

Knowledge reuse (KR) is not only a novel budding area in the academic setting but at the same time, it has necessity. Many international universities are exchanging knowledge for the purpose of reuse or its related measures and are engaged in varieties of research. The power of reuse is important to reveal the logical rule accessible in an organization for distribution and practices of knowledge. Knowledge reuse in academic organizations has a great deal and Implication for the future of every type of higher educational setting. Reuse not only saves time and energy [1, 2] while it also helps to build quality of knowledge and learning in an academic organization.

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Good educational actions including novelty could be repeated successfully and easily through the appropriate reuse of respective knowledge.

The main source of regeneration of knowledge could be appropriately handled to utilize its applications through reuse. Involvement of quality knowledge with higher educational academic organizations can continuously help in exploiting new reusable knowledge which might be vastly helpful in a widespread way.

Knowledge reuse is the very important aspect for educational organizations particularly specialized knowledge which if reused appropriately can save huge time and energy [1-3]. Application of technology makes reusable knowledge more viable for a common person. It can reach to a large number of people across the globe. Reuse of explicit knowledge is easier than the tacit knowledge. Collection of tacit knowledge is difficult and time-consuming which needs special efforts.

Knowledge reuse can be further exploited if we employ the appropriate level of technology where the capture of knowledge can be boosted. Management of explicit knowledge can also be boosted if it is combined with rational needs of the organizations. Protective or caring knowledge at the organization level could become enormous beneficial if conversation of knowledge amid organizations is permissible. It is objective nowadays to exploit the all bases to their maximum perimeter without compromising the quality of education in a technological atmosphere where critical valuable reusable assets display vital part.

Setting of education should be in such an environment that both tacit and explicit assets play not only the key role while their reusable assets are also invaluable to the entire knowledge community. Particularly tacit knowledge which is in the mind of academic people and which cannot be easily commissioned is a great backing to the academia and that is why academia is dependable on the conferences, seminars, and discussion of ideas. It is paramount to advance the skill and competences of faculty members to mature both explicit and tacit knowledge using the latest technologies.

Present research is related to diagnose the implication of knowledge reuse in a higher educational setting of their existing one and derived from other useful resources. Thus there is a great emphasis on kind of data, perception mapping, connecting and rewrapping of facts, methods and policies concerns in reusing and distributing such facts in knowledge organization. Nonaka model [4-6] which is the proven knowledge management model, should involve the reusable knowledge in one or other way.

It should be noted that developing countries are still in the process of chasing the knowledge management and knowledge reuse activities.

These countries have little skills to develop and promote scholarly infrastructure in the form of diverse information or publication.

It is now high time to carry out these activities in educational organizations to kick off the expansion of related facts, which might be useful to widen a system of knowledge reuse relevant to pedagogic organizational level by the help of technology. In the present research, a basic attempt to develop reuse of knowledge support for an academic organization will be undertaken.

The old system of collecting, learning and distributing knowledge has become outdated therefore we need to think about transforming and recreating a new system which encourages a new way of imagining and planning.

II. LITERATURE SURVEY

Review of tacit and explicit knowledge literature

Tacit knowledge which involves greatly in teaching and learning in an educational organization is a key area of organizational knowledge management. Such knowledge is implicitly known as individual as well as casual knowledge and is the part of an organization. Off-course it is based on our societal and material understanding, our cognitive aptitudes, and intellectual and substantial observations. Tacit knowledge comes from by learning as a result of practice which is imminent, and is found in material form in community. According to numerous researchers it is hard to articulate and codify consequently it is difficult to transfer [8, 9]. According to some authors [5, 10] majority of tacit knowledge is transferrable. Tacit knowledge is not easy to aggregate or disseminate. It is now believed that it represents knowledge that generates constant aggressive benefits during advancement of educational knowledge. Such type of knowledge is of extreme tactical significance for an organization [11].

Tacit knowledge is basically diverse from explicit knowledge. Explicit knowledge is said to be universal, predictable as well as simple to convey in usually understandable language and probable to distribute, codify and exchange in the form of data, procedures and information [5, 12]. It is easy to access and relocate explicit knowledge. It is also called individual or assertive knowledge [13]. Iqbal, Harsh and Choudhary [37, 38, and 40] have suggested that ADRI (Approach, Deployment, Result and Improvement) model is highly useful in teaching and learning environment where knowledge management is a paramount.

It is interesting to note that that tacit knowledge is the largely noteworthy reason for the construction of novel knowledge in an educational environment, because according to Nonaka [5, 14]: "the key to knowledge creation lies in the mobilization and conversion of tacit knowledge." Explicit knowledge may be indicated by some kind of object for example text or a video, which can be usually created for the purpose of talking with a diverse human being.

Tacit Knowledge

It is difficult to assemble the reusable tacit knowledge (into a hub capability) of any organization. It needs expertise in reusability issues with numerous supplementary organizations. The organization can help in encouraging the rearrangement of reusable tacit knowledge belonging to different types of applications for the given tacit knowledge

[20]. It is not normally easy to multiply the tacit knowledge to duplicate. It is also very hard to quantify the tacit knowledge due to the weak strength [21]. It is a significant feature to note that tacit knowledge can be a source of viable assistances; consequently, it is important to identify how it can be substituted or shared [22].

Academia and Reuse of Tacit Knowledge

Tacit knowledge can be easily reused and shared by university faculties which can allow making them capable to easily instruct and investigate. It is natural to say that university academicians have the reasoning skills as well as the expertise and analytical knowledge. They do also possess the "coaching and humanizing aptitudes" [18]. According to authors [19] obviously, tacit knowledge is logically accountable in these practices. Such knowledge is appreciated as well as self-effacing for the university academicians. Yu and Zhou [23] mentioned that tacit knowledge sharing actions in teaching has been related with four varieties, such as i) peer review, ii) learning community, iii) thumb-a-lift, and iv) academic conference.

It is clear that similar to explicit knowledge tacit knowledge is not acknowledged suitably because tacit knowledge is concealed in the human consciousness. However, technology can recognize and reuse such type of knowledge. It is therefore requires that such knowledge is preserved in order to allocate reusability in the higher educational organizations. It can be realized that in the educational organizations faculty members are constantly involved in reusing tacit & explicit knowledge at various levels.

Harsh [14] and Sharma and Harsh [15] demonstrated in their three dimensional knowledge management model which is based on well known Nonaka model [4, 5] that both tacit and explicit knowledge are opposite to each other. These authors also mentioned that both explicit and tacit knowledge are reusable. According to them "the successful knowledge of an organization considered to be enhanced with the time since each instant we add further knowledge (it may be tacit or explicit or both) due to new ideas, new concept or new interpretation". As a result of knowledge reusability it is possible to acquire qualitative knowledge due to repeated applications of tacit and explicit knowledge. According to March [16], an organization can grow their persuaded operational procedures that are hard to articulate and these are comparable to organizational individual tacit knowledge.

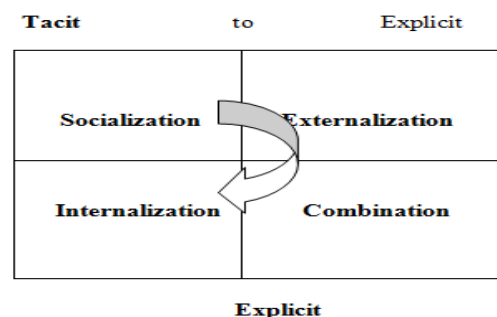### Nonaka And Takeuchi Knowledge Management Model

Figure 1. Nanaka and Takeuchi Model [5]

Alani, Harsh and Iqbal [39] studied the qualitative knowledge management and reuse in a higher educational setting while Alani, Harsh and Iqbal [41] studied the role of information and communication Technology on Knowledge Management in a higher educational learning environment. Several researchers have added to the growth of knowledge management hypothesis, but Nonaka and Takeuchi's [5] theory of knowledge formation (model illustrated in Figure 1 in their research) is the most sound known and extensively cited work in knowledge oriented organizational tactic literature [17]. According to Nonaka model [15], the vibrant contact of tacit and explicit knowledge facilitates a knowledge exchange process that ultimately generates the knowledge. The model of Nonaka [15] is the highly established model in the knowledge management history which consists of four dissimilar approaches of knowledge translation processes namely Socialization – transport of knowledge by the way of blend which results tacit to tacit knowledge conversation. Externalization – knowledge transport by the way of change or codification of tacit knowledge to explicit. Combination is the process through which knowledge transfer from explicit to explicit takes place and lastly, Internalization – adoption of knowledge in the course of learning [5]. It is clear that all these processes repeatedly take place in higher educational environment during teaching, learning, and training or during seminars or conferences. Thus there is a continuous reuse of knowledge in the higher educational environment.

III. RESEARCH OBJECTIVE

This study is aimed at studying reuse of tacit and explicit knowledge, particularly reusable tacit knowledge (by sharing or transfer) in higher educational institutes, and finding whether tacit knowledge influences maintainable viable benefits when restrained by top organization support. The present research will differentiate the reusability of tacit and explicit knowledge and it claims to make the benefits to the educational organizations by enhancing the quality of available knowledge as a result of continuous rectification of repeated knowledge. The major purposes of the present investigations are to understand the following facts in the higher educational environments:

- To understand the clarity between the reusability's of tacit and explicit knowledge in the lights of higher educational settings.
- To understand the applications of reusable knowledge of an organization such as higher education in the lights of tacit and explicit knowledge.
- To understand the Quality and its role for tacit and explicit reusable knowledge.
- To learn the relevance of ICT for generating reusable knowledge.
- Finally discussion of saving the efforts as a result of reusability of tacit & explicit knowledge in higher educational environment.

IV. METHODOLOGY

It is an amazing gap that in-spite of immense concern to knowledge creation and allotment assumptions theme, the reusable knowledge has not been taken care of by the Nonaka and Colleagues [4-6, 26] mainly for the educational

setting which suggests that a further study to purify this model in the light of knowledge reusability in an educational setting may be a significant part of the investigation.

The technique of knowledge management and its reuse has been becoming a vital concept due to the consequences of enrichment of an enormous number of advanced educational institutions. Furthermore, the requirements of augmentation in the quality and necessity of a reduction in time has been fetching a significant feature in the scientific setting of educational organizations.

We start with the Figure 2 of Extended model of Nonaka by Harsh [1, 2, and 14] where tacit and explicit knowledge are opposite to each other. Knowledge and its reuse is the key for not only teaching and learning in higher educational institutions while it also helps in making conclusion and policy formation. In an educational organization, there is a continuous transfer of knowledge from a teacher to student. In order to sustain growth of knowledge reuse (in fast moving world) all educational institutes should implement effective tools for knowledge reuse management. We need to add concept of reusability in the work of Barbara Friehs (2000) for effective management of reusable knowledge and hence need to:

Activate the hidden implicit/tacit reusable knowledge Integrate reusable knowledge from organization and make it accessible to all recognize the absent reusable knowledge particularly tacit knowledge Generate new tacit and explicit reusable knowledge Make reusable knowledge supplementary available and exploitable Generate reusable knowledge sharing traditions to test and learn Assess and reproduce reusable learning practices
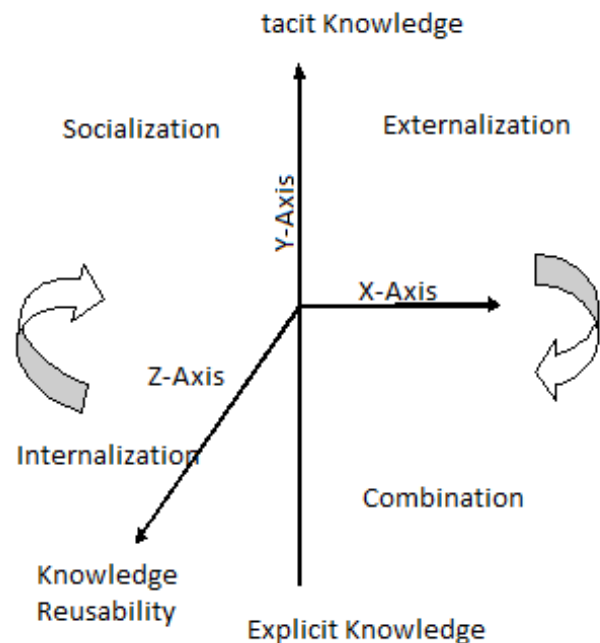
Codify new reusable knowledge.

Figure 2. Extended Nonaka and Takeuchi (1995) Model.

Reusable knowledge management not only supports learning institutes to progress their aptitude of fulfilling and distributing information,

knowledge and relates these to difficulty resolving as well as maintaining the investigation and recurrent development of their efforts while also creating the qualitative knowledge as well as generating self-confidence. Reusable tacit knowledge helps the organization to allow its employees to easily enhance not only teaching and learning activities while also allow them to enhance the quality and prestige of the organization by applying this knowledge to media, seminar and conferences. Reusable explicit knowledge and its supervision of the respective learning system must replicate and squeeze information at every altitudes beginning from organization stage to student stage so that such reusable knowledge can advance (of workers) which assists in getting excellence of teaching materials for scholars. Seminars and conferences also help in the enhancement of tacit as well as explicit knowledge as per the cycle of the three dimensional knowledge management model (see Figure 2). Off course such figure enhancement happens with time, as the time progresses; more and more such activities will take place.

Extended Nonaka model and Reusability in Higher Educational Environment:

Nonaka and Takeuchi [4-6] demonstrated the revolution of tacit to explicit knowledge (and vice versa) during the socialization, externalization, combination and internalization practices. They revealed that shared relocation of tacit to explicit and explicit to tacit knowledge is persistently occurring due to one or other procedures in any establishment (see Figure. 2). Such types of activities are 'recurring learning act' happening in an instructive setting throughout where knowledge is augmented like a spiral. However, work of Harsh [24, 25], on the three dimensional knowledge management further adds the concept of the reusability to these recurrence activities which create fresh category of reusable knowledge. Such knowledge can be exploited in an instructive environment which can widen not only novel reusable knowledge while also improves the superiority or quality of knowledge [Harsh 2, 14, 24].

Thus reusable knowledge provides highly successful method to relocate proficient techniques, representations, thoughts, performance and is capable of producing quality network as the ground for communication that will offer effortless movement of knowledge and its related activities. These are the examples of combination as well as socialization of tacit and explicit knowledge. It also helps in strengthening novelty and advancement and hence helps in making the branding of the organization. Particularly for some countries which require advance resources, trade of such material resource can be valuable. As a matter of reusability of knowledge, teaching staff can reuse by sharing learning material and can set aside duplicate resources. It also helps in optimization of material like exchange of information and knowledge in a mutual set up. Thus the newsletters, meetings, conferences, seminars and symposiums can provide us as a gadget for reusable knowledge and thought transitions and hence the good practices.

All the mutual exchange programs with other organizations takes place as a result of discussion and exchange of ideas and hence due to the tacit knowledge. Thus in Figure 2, practices of externalization of reusable knowledge takes place. If only the people, processes and infrastructure of own organizations are involved in refining and exploiting the reusable knowledge then it becomes the process of internalization. Thus we see that both not only tacit and explicit knowledge while their reuse also contribute to the entire knowledge cycle in the three dimensional model.

The recommended procedure for reusable knowledge administration in scholastic and educational organization:

Considering various systems to build up a reusable knowledge management or a reusable knowledge foundation for an educational establishment in the information and communication technology age (as well as digital media), it may be suggested that cost-effective and constructive equally novel budding approaches which increased the openness to conventional and organizational reusable knowledge is a key by making open right to use literature. Latest web tools and sharing of useful ideas may be employed during the practices of reusable knowledge management.

Concept of knowledge reusability in India is being used in the projects like "Shodh Ganga", "Vidya Nidhi", and "TKDL" [42]. Some journals and media are being also developed to converse information to customers as well as. Similarly many other countries have developed similar projects. Point is that if the above three dimensional reusable knowledge management model of Harsh [24, 25] is applied to projects like "Shodh Ganga", "Vidya Nidhi, then there would be continuous evolvement of reusable knowledge due to its repeated applications. Such knowledge activities can help greatly to educators in India where there is a huge lack of resources.

It should be noted that the reimbursement achieved due to growth of reusable knowledge repositories in the educational organizations are numerous but major advantages are:

Improved gain on assets spent in creating reusable knowledge bases Superior bibliographic management of reusable tacit knowledge Healthier diffusion of institutional objectives and procedures

➢ Helps in sharing precious reusable knowledge amid diverse kinds of clients and make broad mutual procedures and practices
➢ Creating independent qualitative reusable assets
➢ Production of novel reusable tacit and explicit knowledge and perceptions
➢ Optimization of practices for creating reusable data

Thus in orders to sustain such actions, educational organizations have to commence the expansion of reusable knowledge management base. Such base may be advantaged to expand a network of reusable knowledge created at educational institutional stage using relevant expertise and technology. In the present three-dimensional model knowledge reusability is orthogonal to both tacit and explicit knowledge which implies that both tacit and explicit knowledge reusabilities are independent quantities and hence such reusable knowledge can be made independent for the relevant applications. The development of reusable knowledge management requires issues similar to information, domain specialists from records and expertise, association with departments, group of employees, and notion of data charts. These are some of the fundamental points needed for expansion of efficient databases, reusable knowledge bases along with repositories, gateways, websites etc.

Foremost point is the requirements of librarians and information specialists who can grip and sort-out the implicit or tacit reusable knowledge being created in an organization and trace it correctly by applying typical techniques. For this a variety of skills are also needed akin to reusable data capture, reusable data analysis, reusable data categorization, reusable data mining, reusable data mapping, reusable knowledge mapping, reusable concept mapping, reusable indexing and reusable linking.

Reusability of tacit and explicit knowledge is highly recommended which could be applicable to large number of educational organization using the ICT (Information and Communication Technology) technology. Indian primary and secondary as well as higher educational institutions are running high shortage of faculties and other related staff which could be overcome to certain extent using online and distance education systems where reusability plays a great role.

The responsibility of knowledge experts and executives in growing reusable knowledge and its management is to synchronize the information related actions and grouping data accurately. However, the major test to confine reusable tacit knowledge and its control is rising in warehouses. For this the knowledge experts require to capture diverse techniques.

V. RESULT & DISCUSSION

Present research reflects the importance of reusable tacit and explicit knowledge in varied educational settings which is widely useful for the country like India where there is a need of optimizing educational resources through various manuals as well as through the technology.

Present discussion also indicates the enhancement of quality of tacit and explicit reusable knowledge as a result of its repeating applications in a three dimensional environment. Information and communication technology further exploit not only the easy captured reusable knowledge while it also opens the huge possibility for trouble-free applications of reusable knowledge.

Current research also helps in understanding the reusable knowledge of software being used in an educational environment which will not only boost our knowledge and its related processes while it also saves our huge time.

Present work can help in making reusable software knowledge components as well as other related educational software which not only helps in saving our time and resources while it will also enhance the quality of our reusable knowledge with optimum efforts.

Based on Nonaka-Takeuchi [5] as well as extended Harsh [5] models, all the processes taking place during the applications of reusable knowledge could be extremely helpful for the country like India.

A further mathematical calculation is required to learn exactly about the efforts estimation and cost reduction as a result of reusable knowledge applications.

Resources employed in an education industry can be further optimized based on reusability concepts in rural India where knowledge components could be imported from viable industry sources.

Knowledge Reuse Effect In Different Parameters
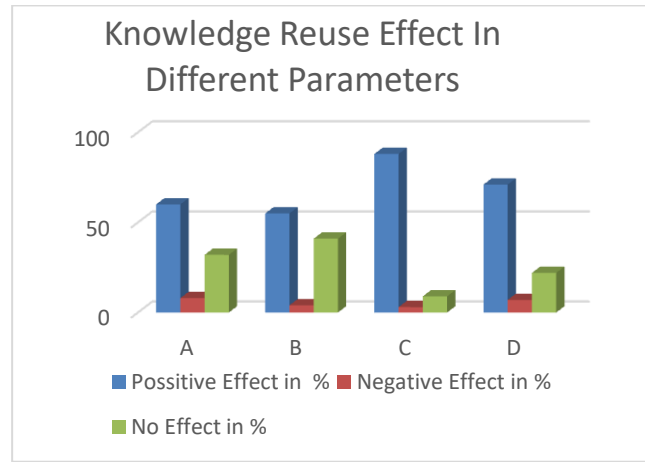
Graphical representation of the Survey

Table: Variable for the respondents

Variables	No. Of Respondents N=2000	%
Age:		
Below 20 Years	200	0.10
20 to 35 Years	1100	0.55
35 to 50 Years	700	0.35
Gender:		
Male	1250	0.63
Female	750	0.37
Education:		
Diploma	432	0.22
Under-Graduation	287	0.13
Post-Graduation	1051	0.53
Professional	150	0.08
Doctorate	80	0.04

Marital Status:		
Married	1370	0.68
Unmarried	630	0.32
Department:		
Management	498	0.25
Engineering	543	0.27
Agriculture	464	0.23
Law	229	0.11
Applied Science	266	0.13
Average Fee:		
Below 50000	1170	0.58

VI. CONCLUSION

Present work can help in making reusable software knowledge components as well as other related educational software which not only helps in saving our time and resources while it will also enhance the quality of our reusable knowledge with optimum efforts. Based on Nonaka-Takeuchi [5] as well as extended Harsh [5] models, all the processes taking place during the applications of reusable knowledge could be extremely helpful for the country like India.

An analysis is made and on the behalf of that analysis it is found that knowledge reuse is an abstract version to combine the knowledge. Socialization is basically providing the platform for combining the tacit and explicit knowledge. The concept becomes more creative when we take the concept in three dimensional natures. No doubt knowledge is getting changed over the time. Here we noticed in academic environments that every moment the level of the knowledge is differing. If a student or the faculty having a perception regarding any topic then definitely this perception would be change over a time. It is still the objective of further research that how the concept is getting converted into four dimensional from three dimension when we analyze the things over a certain period of time.A further mathematical calculation is required to learn exactly about the efforts estimation and cost reduction as a result of reusable knowledge applications. Resources employed in an education industry can be further optimized based on reusability concepts in rural India where knowledge components could be imported from viable industry sources.

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