Chapter – 1

Introduction
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INTRODUCTION

This chapter provides a brief overview on the background to this research, research gap, the problem statement, objectives of the research, research questions. It also presents an overview of the methodology and limitations of this research.

1.1 BACKGROUND

Knowledge Management (KM) is used today across the world, in public and private organizations, in all industry sectors. Knowledge Management has proved success over the years, in almost every sector / discipline including banking and insurance sector, financial services, Information Technology (IT) industry, automobile industry, chemical and pharmaceutical industry, medical and healthcare services, business sector, customer relationship, supply-chain, production, project management, construction industry, education, food and agriculture, hotel industry, Government and public sector, disaster management and so on. This is because of the benefits it offers in streamlining processes, saving time and efforts, competitive advantage, innovation, facilitating collaborative efforts with better communication and knowledge base, improving quality through organizational learning or best practices etc. Tangible benefits are in the form of innovative products, services and solutions, reduced costs and increased profits. Knowledge is an asset to the organization and knowledge management deals with identifying, developing, applying and sharing the knowledge for betterment and growth.

As useful in other sectors, knowledge management can be helpful in education sector because of sharing knowledge for better identification of students’ and other stakeholders’ requirements, meeting their needs, to improve upon learning outcomes and strategies, administration, research etc. Using KM in higher education is as necessary and important as it is in the corporate sector. With its effective application,
Introduction

it will lead to better decision making capabilities, reduced time for tasks, reduced cost, improved academic and administrative services. In educational institutions, few faculty and staff may possess particular knowledge about the institutional tasks. Relying on such institutional knowledge of specific individuals can hamper the flexibility and responsiveness of the institution. Hence converting this information residing with those individuals and making it available to others is essential. The organization-wide approach to KM can result into exponential improvements in sharing of tacit and explicit knowledge and the resulting benefits. In particular, it can also be effective for curriculum development process (Jillinda J. Kidwell et al, 2001).

Traditionally, curricula are developed in a haphazard manner most of the times, giving little or no consideration to the development process (Finch C.R. et al, 1999). There should be a systematic method to develop effective and useful curriculum along with evaluation methods. It is necessary to formalize the curriculum development process in detail which will lead to quality curriculum. There is need to apply suitable techniques, which will consider requirements of curriculum, save time, efforts and cost to develop quality curriculum.

The past research on curriculum development indicates that the researchers have constantly developed and applied new techniques for curriculum development. After the application of IT in various areas and in education, some researchers have introduced approaches to curriculum development based on concepts in IT like systems concepts, software development, prototype, agile methodology, Database Management Systems (DBMS) architecture etc. Knowledge management has also been suggested as a beneficial technique applicable in education by some researchers. But little work has been done for developing knowledge management system for curriculum development in particular. Since application of knowledge management has been helpful in managing various business processes, it was thought by this researcher that it will also help in curriculum development. It was observed through literature that the process of curriculum development is an iterative process, where knowledge management will help to maintain and use knowledge based on previous experiences and avoid repetitive work.
The term curriculum is derived from the Latin word ‘Currere’ meaning a ‘race course’ or a runway on which one runs to achieve a goal. Thus, a curriculum is a set of instructional guidelines of an educational programme. It sets out what will be achieved after undergoing the programme. It directs the skill set intended to be covered in the programme and the way in which the skill set will be achieved and tested. A curriculum for a course includes the contents, assessment methods and teaching learning methodology. It has become necessary for the educational institutions / universities to have programs having curriculum which will consider the expected skills and knowledge required for the marketplace.

Due to changing professional needs and application of new technologies in various fields, the frequency of curriculum revision for existing courses and need for introducing new courses has been increased. The teaching, learning and assessment methodologies also undergo changes over period of time. The changes in resources, accreditation standards can also be the cause to make changes in curriculum. Hence curriculum development should take into consideration all such factors through frequent feedbacks, reviews etc.

Curriculum development policy document of Douglas College, Canada (web: Douglas college, 2014) has listed changing academic, industry, and/or community needs, changes in pedagogy or instructional methodology, changing needs of students’ changing national, provincial and professional association standards, new directions and initiatives from government as reasons for curriculum revision.

Revolutionary changes are occurring throughout the world in the field of Information Technology. Educational programmes in Information Technology must be continually re-evaluated and revised to keep pace with the changes in technology. The curriculum development process in this area must meet these challenges.

The importance of curriculum can be seen from the following purposes of curriculum as stated in Las Positas College, USA curriculum handbook (web: Las Positas College, 2014) :
Introduction

- It is the basis for a contract among the student, institution and teacher. It documents the components of the course which a student is assured to receive from the institution and teacher.
- It is a document which has legal standing.
- It helps faculty to present their courses in a format which precisely reflects the quality instruction they are providing.
- It states the content and level of severity for which students will be held accountable.
- It states the prerequisites for the students to undergo a series of courses referred therein.

Since 1949, researchers introduced various models for curriculum development including the ‘Product approach’ (Ralph Tyler, 1949), the ‘Spiral curriculum’ (Jerome Burner, 1960) and ‘Process approach’ (Lawrence Stenhouse 1974).

1.2 REQUIREMENTS AND CHALLENGES IN CURRICULUM DEVELOPMENT IN HIGHER EDUCATION

Curriculum is an important document which supports educational aims. It helps to decide criteria for suitable teachers, provides suitable teaching methods, reflects what knowledge, experiences, skills students will be achieving and how they will be assessed.

If curriculum includes all these components, it will be known to the teachers as well as students what they are going to learn, how and in what ways they are going to be assessed. This will create a transparency and accountability on both, the teacher and the student.

Education today has to face a lot of competition like any other business field. It has to face the pressures of marketplace and increasing demands of the stakeholders. Globalization has caused the need to benchmark and internationalize the curricula. They have to rapidly respond to the changes in technologies and trends. Assessment
of programmes and courses for ranking and accreditation standards requires curricula to be innovative, meeting the professional expectations and practices.

The curriculum development process should be able to forecast the needs through a multi-dimensional need analysis. The skills to be imparted need to be identified based on the type of learners, balancing global and local needs, melding of theory and application, feasibility of delivery and achievement etc. Globalization and introduction of new technologies like Information Communication Technology (ICT), have an impact on teaching, learning and assessment methodologies also. These methodologies which are included in curricula, contribute to the effectiveness of delivery and assessment of the curriculum contents. If the process of curriculum development takes into consideration all these aspects, the curriculum will meet the expected standards. A knowledge management approach can help by systematically implementing the curriculum development process by capturing and maintaining the requisite knowledge for developing curriculum.

A knowledge management system will provide a platform for collaborating and sharing information and experiences and preserving it by storing in the system so that the past experiences and work done in the past is available and can act as guidelines for other users. For example, the teaching material prepared by teachers or their experiences with students while delivering, lies with them if it does not get communicated to others. The major problem because of this non-communication is that the expertise and efforts of one person are not useful to others and they may take efforts for the same task. A knowledge management system will avoid this repetition of work and quality of work will improve because of availability of previous work and lessons learned in the past.

The basic problem faced in achieving the goal of education is that, the curricula in higher education may not be suitable for sustainable growth. The curriculum may have been developed to provide students with some narrow understanding of disciplines, professions and jobs and may be focused on specific knowledge and skills required in the given area. What is expected from a curriculum is that it prepares learners for living sustainably, on professional and personal ground. In order to accomplish this, there is a need for significant learning opportunities for students to be
planned to accomplish the desired outcomes. This will require significant changes in the curriculum along with the pedagogy used to deliver that curriculum. These changes will only occur when faculty or curriculum developers have the knowledge, resources, skills and support to modify what and how they teach. To ensure sustainability education, it is highly needed to establish active communication among stakeholders like students, faculty, administrators, employers, alumni and professionals to call for and support these necessary changes. This can encourage and help initiate proper curriculum development. (web: Association for the Advancement of Sustainability in Higher Education, 2013).

Another challenge faced in curriculum development is to cope up with the rapid changes in professional environment. An outdated curriculum is the major problem in academic programmes. This necessitates to continuously studying the professional requirements. This requires frequent updations in the concerned information in consultation with concerned experts and taking action on it i.e. anticipating required changes in contents, teaching, learning and assessment methodologies. This will be facilitated through KM if the knowledge repositories are frequently updated to accommodate these changes. Availability of various teaching, learning and assessment methodologies in the repositories will help to take decisions about it.

Thus, KM can help to cope up with the challenges faced in curriculum development.

1.3 KNOWLEDGE MANAGEMENT IN EDUCATION AND CURRICULUM

Sanjay Agarwal et al (2008) have stated that KM practices can benefit educational institutions in faculty development, teaching-learning processes, betterment of the institutional processes like students’ placement, library and laboratory management etc. in addition to curriculum development and research process.

Thorn, C.A. (2001), has commented that in an educational environment, documents associated with curriculum development can be thought of as knowledge repositories. For example, the Milwaukee Public School’s Curriculum Design Assistant (CDA)
Introduction

acts as a source of documentation-standards, learning outcomes, etc., and a repository for lesson plans to be prepared based on this documentation. These instructional plans can be stored in the system and shared electronically to provide a knowledge base for other users.

A knowledge management system enables its users to share knowledge that they need and to take action when needed. KM system is a method that could increase institutional innovation as it is the source of new ideas and will facilitate educational decision making (Kalaimangal R. et al, 2012)

As stated by Ms.G (2005), “curriculum is metadata about metadata”, meaning that it is information about how to know what is required to be known and it is claimed that curriculum management is knowledge management. This paper discusses mainly about setting benchmarking standards for curriculum. It is stated that, these standards can be treated as metadata to be applied to the curriculum. Arriving at the standards involves knowledge capture, codification along with co-ordination and negotiation among a large group of people. It also states that knowledge management practice “taxonomy” is getting applied when the standards for various disciplines, are used to “tag” and categorize curriculum elements. The careful organization of the standards, based on a broad consensus, allows people working in education to employ a common language as their goals are common. This “informed consensus” (about standards and benchmarks) represents a knowledge management effort. This is because it needs ideas to be collected, organized, categorized, and presented on a platform that can be shared, transferred and modified.

Jillinda Kidwell et al (2001) have outlined the basic concepts of Knowledge Management applied in corporate sector, current trends in KM and explored how KM can be applied in higher education. Following is the brief description of the same.

KM connects people with knowledge that they need to take action, when needed. Knowledge is difficult to codify unlike data and information. Knowledge starts with data in the form of raw facts and numbers with next form as information which is data added with context. Information can be easily stored in documents and databases and can be easily to retrieved using information technology systems. When this
information is supported with experience and judgment to act on it, it becomes knowledge. Knowledge can be shared through simple means like e-mails or even documents stuck on walls. Documented information useful for action is explicit knowledge which is easy to communicate. Tacit knowledge is the knowledge embedded in minds of people as know-how and learning involving perceptions, insights, values and beliefs.

Knowledge is also embedded in organisational processes, systems and infrastructure. Effective KM systems identify this embedded know-how and work on how it can be applied. Thus knowledge management involves making the right knowledge available to the right people at right time.

The new trends that are shaping the field of KM are upcoming technology solutions, combining KM with e-business, more enterprise-wide KM projects, use of KM for innovation, growing use of tacit knowledge than explicit knowledge.

Higher educational institutions should become ready to accept KM through their culture i.e. norms, values, beliefs and behaviours unique to the organization. In the new culture, employees should think of benefit of customers than of themselves. This culture is getting developed in the educational institutions to embrace knowledge management. To launch KM initiatives, higher educational institutions can adopt following KM practices from corporate sector:

Decide the strategy, determine what to achieve with KM, organization-wide support for KM from human resource, financial measurements and information technology. Technology should be used as a means to measure the impact of KM in the form of cost reductions, customer satisfaction and market value. Start with a small KM project with high impact but low risk on the organization to develop credibility for KM. A detailed action plan should be developed for this pilot project to define process, IT infrastructure and roles of the participants. This should be followed by assessing the results and refine the action plan.

Illustrations of how KM can be applied and would benefit the educational institution’s processes and services include: administrative services, student and alumni services,
Introduction

curriculum development process, research process and strategic planning. Out of these
the brief guidelines given for applying KM in curriculum development process are as
follows:

To include repository of: curriculum revision efforts, modularized contents for
subjects with updated material, pedagogy and assessment techniques, best practices,
analysed student evaluations, corporate relationships etc. To have portal giving
facilities for: information in each disciplinary area, teaching learning styles, lessons
learned, best practices, guiding curriculum development, do’s and don’ts etc.

These concepts have given insights to the present researcher to study and work on
applying knowledge management in higher education. The guidelines given above
were extended by this researcher to cover the practical aspects of curriculum
development. Knowledge management concepts were explored further along with
study of KM applications in business, education and other sectors. This led to the idea
of developing a framework for a knowledge management system for curriculum
development. Hence KM systems and KM frameworks developed for applications in
various disciplines were studied.

A knowledge base of best practices, lessons learned, outcomes tracking, research
conducted, information related to teaching and learning if available will help in
curriculum development process. Knowledge management will reduce time, efforts
and improve the quality of the curriculum. Maintaining a knowledge base will help to
bring the tacit knowledge (the knowledge in minds of the people, acquired through
experience) into active use for effective curriculum development. This will avoid
repetition of same work for development of different curricula or their revision. There
is a need to develop a knowledge management system in order to streamline the
process of curriculum development.
1.4 RESEARCH GAP AND STATEMENT OF THE RESEARCH PROBLEM

Through the literature review it was observed that Knowledge Management has been proved successful in various sectors concerned with business, management and industrial applications. Based on the suggestions given by Jillinda Kidwell et al (2001), it was concluded that the complex process of Curriculum Development can be efficiently and effectively managed using Knowledge Management.

Obviously, this work is not the first of its kind. Considerable research has been done relating to defining ‘curriculum’ and exploring ‘Curriculum Development Process’ in different manner. But comparatively little work has been done facilitating knowledge management system for curriculum development. The work undergone by the researcher is interdisciplinary as it is concerned with the field of Education as well as Information Technology. The review of literature covers the study of two parts

1) Curriculum and Curriculum Development Process

2) Knowledge Management practices in various fields and their applicability in Curriculum Development

It was found that most of the work has been done in context with the theory of curriculum development and curriculum development exercises with particular subjects under consideration. Though various theoretical models have been designed earlier, there is need to identify appropriate curriculum design strategy based on a theoretical model.

It has been observed that Curriculum Development is a process like a software development process, where Systems approach like SDLC (Systems Development Life Cycle) or prototyping can be applied. The steps in the process can be systematically analysed to find the requirements in each step. A lot of prerequisite knowledge is required for curriculum development. This knowledge will be used repeatedly in developing curriculum of many courses. Using the curriculum development models, a knowledge management framework for curriculum development may be proposed which will lead to quality curriculum.
In particular, little work has been done regarding incorporating knowledge management practices for curriculum development. The researcher’s work focuses on generalizing the process of curriculum development, developing a KM framework and determining practical detailed approach to implement KM and thus fill the above mentioned gaps.

**The Statement of the Research Problem**

Accordingly, the problem considered for the present work may be stated as to identify the major steps in KM as applied to business processes, to develop a framework to apply KM to curriculum development processes and demonstrate the proposed framework in the context of IT education.

### 1.5 RESEARCH QUESTIONS

The above research problem has been reformulated in the form of following research questions:

1) What are the components of a good curriculum?
2) What are existing curriculum development processes?
3) Which is the appropriate Curriculum Development Process and what are its detailed steps?
4) Which are the KM tools and techniques that are commonly used in business processes?
5) Which KM tools and techniques can be adapted for curriculum development?
6) What is the appropriate KM Framework for curriculum development?
7) How can the framework be illustrated?
8) What are the specific requirements related to information technology elements for implementing this KM framework?

### 1.6 OBJECTIVES AND SCOPE

Based on the above research questions, the following research objectives were derived for the study.
Objectives

1) Identify the components of the best models of curriculum development and study the components.
2) Understand application of KM in other business processes and determine its suitability for curriculum development.
3) Propose a generic KM framework for curriculum development and validate it.
4) Illustrate the proposed framework in the context of an IT course.
5) Propose an approach for a realization of the framework as an IT application.

Scope of Work

In this study, the components of curriculum, the steps in curriculum development process, the knowledge management framework for curriculum development are generic. The above are applicable to any discipline. The framework was validated by taking opinions of experts from various disciplines. It considers minimum requirements of curriculum development process. In order to apply it to a particular discipline, additional components may be added. The curriculum development process considered in this study does not include implementation as actual delivery of curriculum to the students. It considers one phase as ‘Preparing for Implementation’ which will help teachers to some extent for delivery of curriculum.

This research does not concentrate on social issues/ aspects of KM like organizational strategies for motivation of employees to share and use knowledge by giving incentives or rewards, organizational culture for development of learning culture, leadership, commitment of top management etc. Methods for measurement of results after implementation of KM system or evaluation of performance of the organization are not within the scope of this study. This research concentrates on technological or IT oriented aspects and managing the knowledge associated with curriculum development process.

1.7 RESEARCH APPROACH

The above objectives were achieved by the following research approach:
Various models for Curriculum Development were identified through literature review and their relative merits were studied. Components of curriculum and the curriculum development process were determined. This was followed by synthesis of various curriculum development processes by selecting better components from each and augmenting with other necessary components. Components of good curriculum were identified by studying good curricula from various institutions and model curricula prescribed by some academic bodies. The process of curriculum development identified through this research is represented by detailing various steps and their requirements through six phases.

Applications of Knowledge management in various sectors / fields were studied through literature review. Knowledge management frameworks proposed in various fields and for various processes were analysed. Their applicability to curriculum development process was determined through analogies. A generic knowledge management framework for curriculum development process was developed along with a questionnaire to validate this framework. This was put to pilot survey. Following were the observations revealed through pilot survey:

Experts who were not having IT background could not understand all components of the framework. They were not aware of the technical terms used in the framework and its explanation. Experts from IT background commented that it was implementation specific, more technical and not concentrating much on curriculum development. In the pilot questionnaire, detailed explanation of the components of framework was attached separately so that respondents can refer to it as and when needed while answering the questions. But it was observed that they were not willing to spend time to search for the required information in the separate paper.

Hence, the framework and questionnaire was revised. The next version was made more application oriented i.e. concentrating on aspects of curriculum development and not technical aspects so that curriculum experts from non IT background could also understand. Also brief explanation of the required terms was included immediately after the respective question so that experts did not have to refer for explanation separately. These were seven new frameworks accompanied by new questionnaire to validate these frameworks. They consisted of one framework as
Introduction

abstract view of the KM Framework and other six detailed frameworks for six phases in curriculum development process defined by the researcher. The rating scale was also changed to Linkert scale for the questions in the questionnaire, as suggested by the participants of the pilot survey.

The proposed framework (set of seven sub-frameworks) was validated using survey method through questionnaires and interviews with curriculum experts. The experts included Deans, Heads of Departments of various disciplines, Professors, Associate Professors from various institutions and were selected by following snowball sampling method.

Snowball Sampling is a kind of purposive sampling which is a non-probability form of sampling usually used in qualitative research. In a purposive sampling, cases are selected purposefully to fit the study. Quota sampling is also an example of purposive sampling used in quantitative research. In purposive sampling, decisions about the persons to be included in the sample are based upon a variety of criteria such as special knowledge of the research issue, willingness or capacity of the individual to participate in the research. Sometimes those participants are selected who are most likely to contribute appropriate data in terms of relevance and depth.

Alan Bryman et al (2011) state that snowball sampling method is used to access deviant or hidden populations and to overcome the problem of not having an accessible sampling frame. It is also applied in a qualitative study to theorise inductively.

Advantages of Snowball Sampling are that the process of referencing through chain allows the researcher to reach populations that are difficult to reach through other sampling methods. The process is simple and cheap. The disadvantages are that, the researcher has to rely mainly on the subjects that were incorporated previously. The researcher has no idea of the true distribution of the population and of the sample. (web: explorable.com, 2015)

In this research, it was difficult to know whether the persons are involved in curriculum development and to how much extent i.e. their experience in curriculum...
development. Even if a person is senior in academics, it cannot be assumed that he/she is experienced in curriculum development. Hence through referrals, it was possible to identify such persons.

Sixty % of the questionnaires were filled up by the respondents in presence of the researcher. It was a good experience as the queries of the respondents while filling up the questionnaires were satisfactorily answered. Other questionnaires were received in person, by post and through e-mail.

The proposed framework is demonstrated in the context of IT education. The demonstration includes illustration of the documents that can be part of the knowledge repositories in the system. It illustrates how this knowledge will be used or applied to frame the curriculum.

The previous framework used for pilot survey was modified and presented as realization of the framework as an IT application. It was accompanied by suggesting technical (IT specific) guidelines related to knowledge management for implementing the above frameworks.

1.8 STRUCTURE OF THE DISSERTATION

The brief outline of the contents of further chapters in the dissertation is given below:

Chapter 2: Theoretical Foundations
This chapter overviews the discipline of knowledge management and review of literature regarding curriculum and curriculum development process. This chapter also reviews application of knowledge management business organizations and education. This sets the foundation for describing the components of good curriculum, curriculum development process and development of the knowledge management framework for curriculum development discussed in chapter 3.

Chapter 3 : Research Contributions
This chapter presents the model process for curriculum development proposed by this researcher with detailed steps. A knowledge management framework for this identified process is proposed. The results of survey done through questionnaire and interviews with experts for validation of the framework are also analysed.

**Chapter 4 : Discussions and Findings**

This chapter includes demonstration of the framework proposed in context of IT education, another framework to implement a knowledge management system for curriculum development which details the technical aspects. Techniques suitable for acquiring and representing knowledge required for curriculum development are also identified.

**Chapter 5 : Conclusions**

This chapter details data, information and knowledge required for the Knowledge Management System for Curriculum Development. It also presents conclusions and recommendations for future research.

To see the applicability of knowledge management to curriculum development, theoretical study of concepts related to knowledge management, its application in other disciplines and concepts related to curriculum and curriculum development process was carried out. This is described in the next Chapter 2.