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Knowledge management paradigms: implementation through individual fuzzy-based education

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Abstract

Knowledge Management discipline requires interdisciplinary implementation and interaction of separate domains. This conditions have become its nature and to be able to answer these requirements of this condition, different Knowledge Science oriented programs have been founded. In this study, by looking at one of these programs, Near East University Innovation and Knowledge Management Master and Doctorate programs, with respect to epistemological and ontological perspectives and related inter-intra organization, humanist, technological and socio-technical paradigms, these programs structures are shared. As an addition to this concept, to be able to satisfy personalized education requirements of the graduate level students, a fuzzy based system is suggested to build a system over this concept.

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1. Introduction

To be able to achieve successful knowledge management applications in organizations, there is a need of well-grounded curriculum. Knowledge is the only asset in the organization which completes technology, strategy, process and structure as a whole. For this reason, a curriculum must be designed upon comprehensive and interdisciplinary bases to be able to manage the sense of knowledge. Most importantly, every organization and the individuals who are the main assets of them, are different. In this study, while evaluating the knowledge management discipline through the epistemological and ontological perspective on a comprehensive baseline to be able to comprehend these differences, a system suggestion will be shared based on a fuzzy perspective. In this perspective, Near East

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University (NEU) Innovation and Knowledge Management Graduate and Doctorate Program's curriculum will be investigated with respect to this theoretical fuzzy based structure.

In this study, knowledge management is evaluated from historical evolutionary process perspective to support contemporary discipline requirements and the basic reasons of being a discipline with respect to the epistemological and ontological baseline. By giving the basic paradigms that supports knowledge management, this theoretical evaluation concluded with the investigation of NEU Innovation and Knowledge Management Graduate and Doctorate programs from the reflected perspective. With merging the given Knowledge Management Graduate and Doctorate program, a fuzzy based system proposal will be given with respect to answer the Knowledge Management requirements of contemporary curriculum requirements.

2. History of Knowledge Management in Four Era

Even there are many knowledge management definitions in the literature, there is a reality of a consensus which is known that knowledge management is an umbrella concept and supported by many disciplines. In the contrary of this main approach, there are some other perspectives defending that knowledge management is a temporary management fashion¹. However, when this new interdisciplinary domain is evaluated with a historical perspective, first studies on this area could be seen from 1960's². With 1980's Data, Information and Knowledge trio started to use in the book of Aktas, 1987³. Nonaka and Nishinguchi⁴ consider this historical evolution in four eras.

First Era involves the years between 1948 and 1994. In this era, authors note that knowledge management studies are remained hidden even it exists in the literature and knowledge is studied as a management subject. Theoretical studies focusing on knowledge hierarchies, implementation of Artificial Intelligence, cybernetics, information technologies and information theory topics are the main study areas of this era. The leading scientists of this era took responsibilities in different organizations as head of information technologies (IT) departments, and published their experiences (^{5, 6, 7, 8, 9, 10, 11}).

Second Era is held between 1995 and 2001. In the process of occurrence and adoption of knowledge management, is focused on common five focal points in relation to knowledge management, intellectual capital, organizational learning, knowledge management processes and its models, IT infrastructures. Third Era is held between 2001 and 2004. This era could be entitled as "Reflection, Criticism and the process of Re-Discovery". Fourth Era is held between 2005 and present. The current era has been the reflection of main theme of the publications since 2005. Studies on knowledge management as a discipline, the education of this discipline and university programs are covered by the fourth era. Especially the studies made from 2005 up to today, even the knowledge's abstract nature, with a pragmatic perspective, they unite the common understanding of knowledge's potential benefits for the organizations. Likewise, the studies provide the application on knowledge management which is the proof of the transformation of knowledge management for the utilization of real life concepts¹².

3. Knowledge Management Discipline: Epistemological and Ontological Evolution

The initial point of understanding the knowledge management discipline is the creation of knowledge hierarchy¹³.¹⁴. Many common understanding of this hierarchy in the literature is to start from the physical processes; ending at the data, information, knowledge and the wisdom. The break-point of this hierarchy is in the transformation of information to knowledge. From the ontological perspective this shows crossing a subjective dimension, from the epistemological perspective this shows crossing an objective dimension. (see Fig. 1)

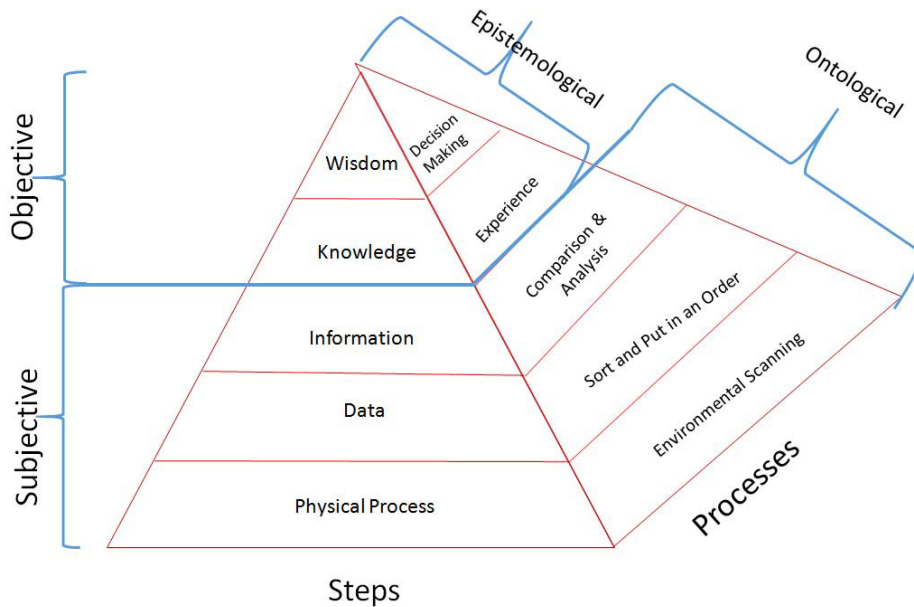


Fig. 1. Knowledge hierarchy from the perspective of epistemological and ontological perspective.

Rather than explaining knowledge hierarchy step by step approach, explaining transformation from information to knowledge with an objective view with a general to specific transformation example could be a better practice to clarify the structure. One of the most important points in the knowledge hierarchy is the relativity of the hierarchy. For instance, on the one hand, considering hierarchy ladders for someone who is decided to buy a product, purchased value of a product is equal to knowledge. On the other hand, the purchase value of a similar product will carry the data or information meaning for another person. Therefore, knowledge for someone will be data or information for another individual or an organization. Scope is the other important point that needs to be considered. Physical process is the one that requires most of the volume in the whole decision making process. On the other hand, wisdom is the one that consumes lowest volume that only stores, experiences, imbedded facts and realities in the hierarchy¹⁵. For this reason, wisdom is shown as the most valuable asset in the hierarchy.

When it is approached to knowledge management discipline from the epistemological and ontological perspectives, this new disciplines conceptualization, main definitions and the effort of being a discipline must be evaluated carefully. When the knowledge management is evaluated from the epistemological perspective, the question of what is the knowledge and how it is defined questions gets the attention rather than how it is created and how it is used¹⁶.

On the other hand, ontological perspective gives the perspective of where the knowledge is and how it is used in the literature. These two perspectives will be considered for the knowledge management and its education to be enlighten the relation and place of these domains.

4. Paradigm Oriented Knowledge Management Discipline and Its Intersected Areas

The studies consider Knowledge Management as interdisciplinary domain which refers to the basic paradigms. The reason is the paradigm focused development of the domain. These paradigms could be grouped in four basic domains: technology; social-technical, organizational/inter-organizational and humanist. These paradigms could be studied with focusing on knowledge hierarchy, knowledge types, epistemological and ontological perspective and development of knowledge management. By looking at the historical perspective, it can be seen that technological paradigm of knowledge management provides the information with the support of ontological base-line. Mathematical areas, such as computer science, technological science, system theory and engineering sciences generally considered as technological paradigms of the knowledge management. These areas also considered for the applicability of the systems. Actually, this paradigm is considered under the information management¹⁵.

When these two paradigms investigated by considering knowledge management evolution, the processed information can be easily visible. Without managing the information, knowledge management cannot be achievable. This reality shows the co-existence of these two paradigms. For this reason, between these two paradigms, decision support systems, artificial intelligence studies, expert systems, knowledge structures and classification (for example: mapping, acquisition and storage) subject must be included¹⁵.

Humanistic paradigm is the paradigm that remains in the focal point of the knowledge management and gives it to the crucial difference when comparing with the other discipline. Informatics science, psychology and individual learning disciplines also included in this area. Humanistic paradigm, by moving from the reality of knowledge's being individual, focuses on especially tacit knowledge of the knowledge management.

Some of the assumptions related with how organization workers tacit to explicit transformation made by the knowledge management discipline, with staying between these two paradigms as intersection (4. Intersection area) consist of organizational learning theory, knowledge theory, communities of practice, intellectual capital and innovation theory subjects.

With technological paradigm, inter and intra organizational paradigm are strongly related to each other (1. Intersection area). The scientific areas such as Management Information System, Information Management, Knowledge Management Systems are created by the merge of these two main paradigms. This intersection area, could be considered as the transformation point of structured information to tacit knowledge. Similarly, the area stays between social-technical paradigm and humanistic paradigm (3. Intersection area). It shows the creation of new study areas. For example, social and group level learning theory and social psychology could be placed in this area. The 3. Intersection area, semi-structured and un-structured information especially transforms to the knowledge, as a result of transformation to objective/ontological base to subjective/epistemological base reflective specialty¹⁵.

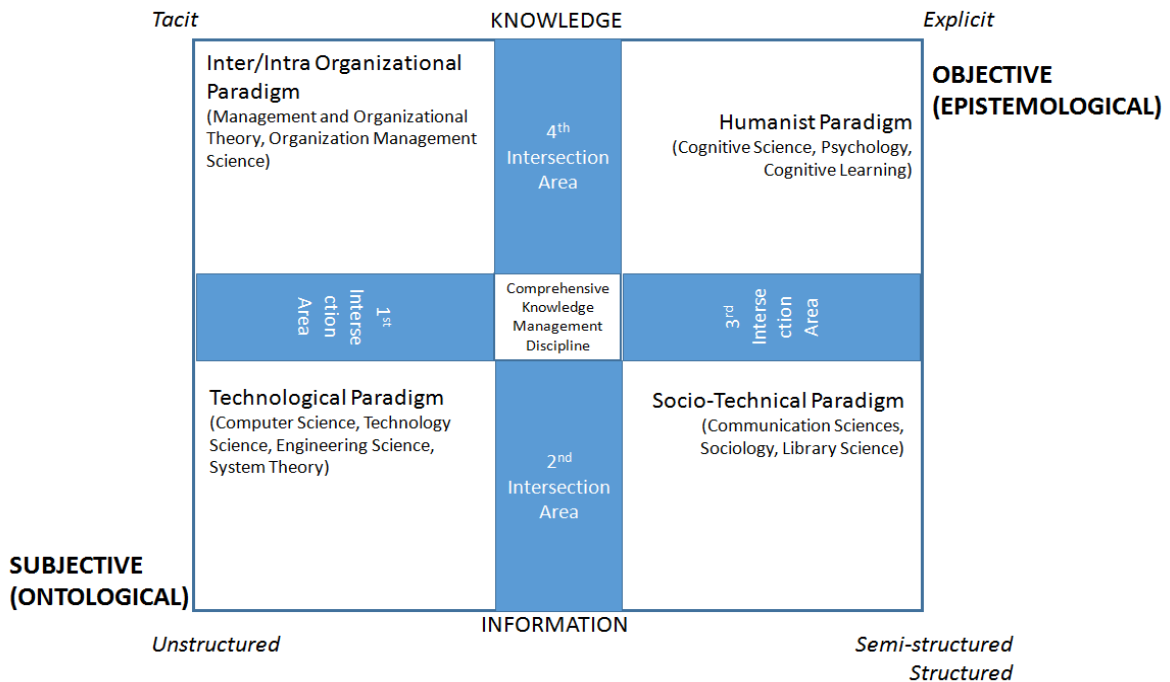


Fig. 2. Knowledge management paradigms and intersection areas¹²

Based on its institutional framework, a knowledge management education with the combination of four paradigms and intersections areas will support undergraduate, graduate, and other sector oriented educations to support this young and new disciplines understandability and will support awareness in the scientific domain. These education programs could be evaluated in the ontological dimension of knowledge management. Because this domain brings organizations a pragmatist approach and also concrete application steps for different types of conjectures.

5. NEU Innovation and Knowledge Management Graduate Programs

NEU’s innovation and knowledge management graduate program consist of one MSc and one PhD program. The aim of the PhD program is to provide the ability to question the 21st century organizations with respect to knowledge’s epistemological and ontological background and to educate scientists with the analytical and theoretical thinking abilities. With respect to this aim, the goal of the program is to educate candidates which will teach them the knowledge management globally. Moreover, it can show them why it is needed for the organizations and increases the level of knowledge returns from the knowledge assets. This program structure is supported by the knowledge of economics and management disciplines to create, share, configure, usage and auditing of the knowledge in the organizations to highlight this special baseline¹⁷.

The aim of the Master program is, beyond the data and information, to support practical implementations of knowledge in the 21st century organizations. The questioning the organizational knowledge background achieved by library and information sciences. It is seen that the incompetence of the organizations to create competitive advance from the knowledge is because of the lack of data and practice of transforming information to knowledge. For this reason, this program designed by putting “KNOWLEDGE” into its baseline, from ‘learning organizations’ to ‘knowing organization’ formation examination.

This program will give to their students for the implementation in their organization the following important aspects; tacit knowledge concept, the importance of intellectual capital, the effect of effective and complete processing of knowledge to create value for the organizations, why the organizations required knowledge management, the competition in a strategic level knowledge and innovation, has been teaching to the students of the program.

The education language of these programs are English. These programs were accredited by the Northern Cyprus Turkish Republic Higher Education Planning, Monitoring and Accreditation and Coordination board.

The curriculum of these programs could be evaluated with respect to these four basic paradigms to respect general framework. The inference implementation could be helpful to realize curriculum’s intersected points this scientific domain. (See Fig. 3 and Fig. 4.)

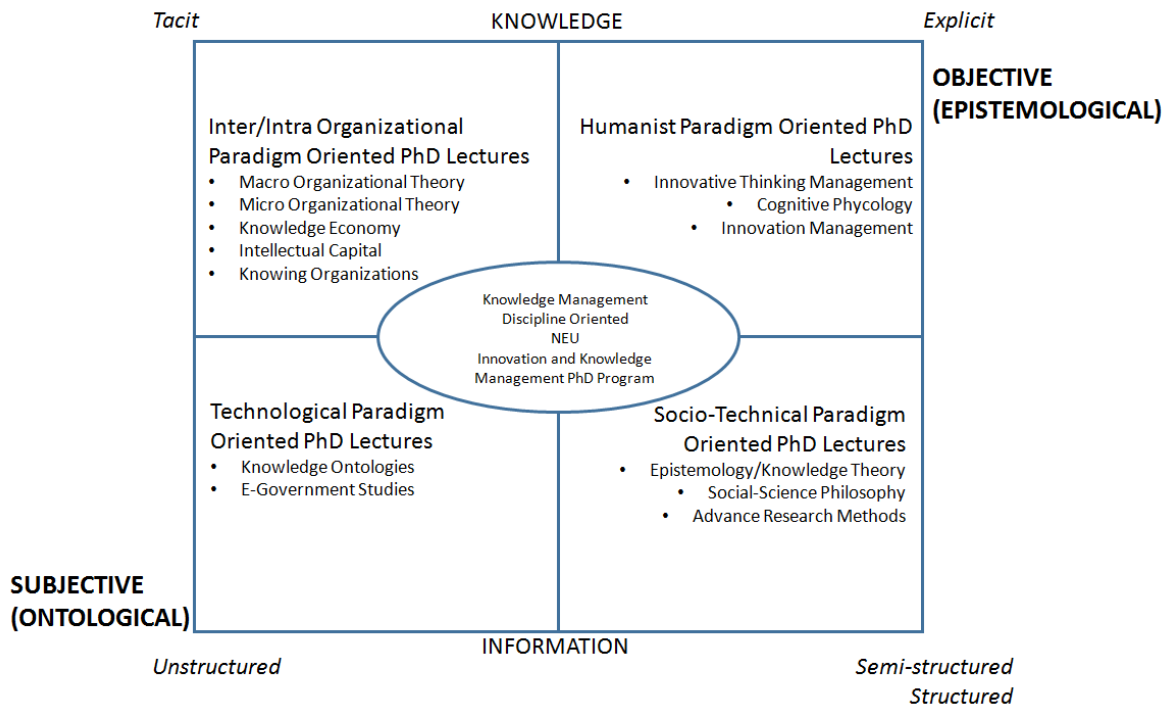


Fig. 3. Knowledge management oriented NEU innovation and knowledge management PhD program

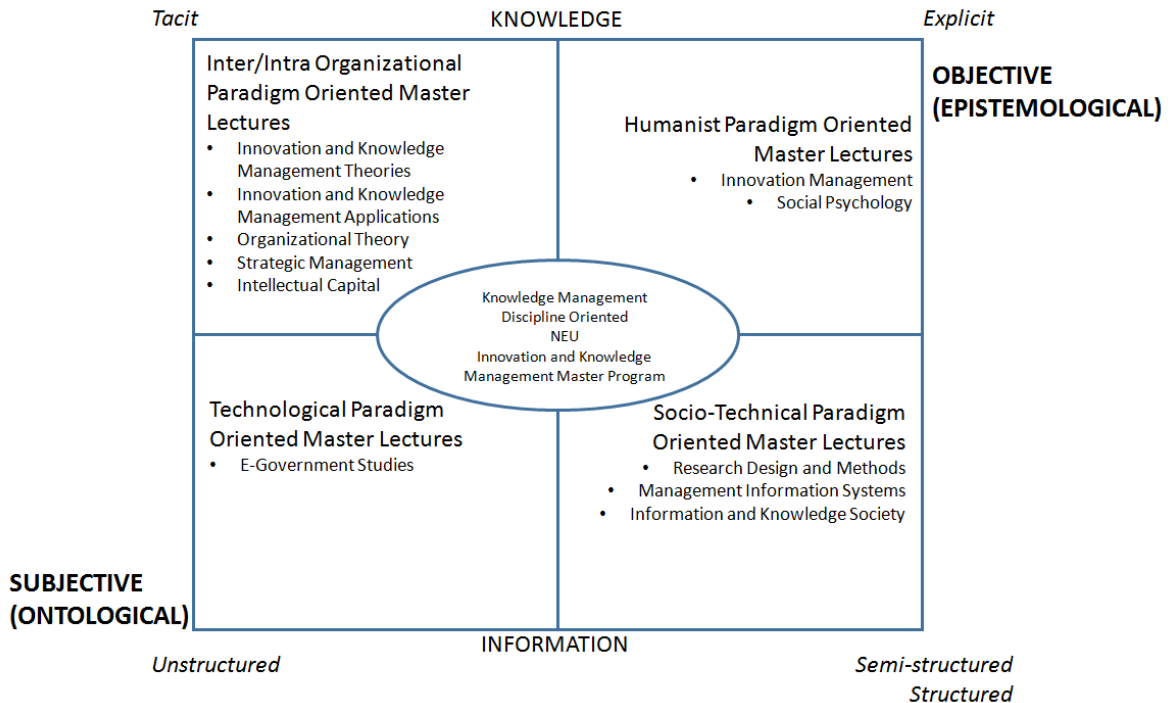


Fig. 4. Knowledge management oriented NEU innovation and knowledge management master program

6. Fuzzy Perspective for the Graduate and Doctorate Curriculum

The candidate students of these two programs have been from different disciplines. This an important aspect for the interdisciplinary nature of the Knowledge Management related disciplines. However, this nature, without implementation of an information system, students could lead into unrelated areas and courses. Nonetheless, the essential course core should be also given to the students who are really required. Most probably, the students could take or could already know the related concepts which are already included in the given courses. This could also cause unnecessary duplication of the course concepts, which could steal the important study time from the thesis students. A candidate system, would be specified with the implementation of a fuzzy based system. The static or dynamic systems that build over fuzzy sets or fuzzy logic could be defined the fuzzy systems¹⁸. However, a single fuzzy system could not be simply implementable for the specific purpose. Hybrid fuzzy systems could be answer for the most contemporary solutions. Hybrid systems are basically merging of two or more different aspects of well-known model structure in the aim of solving problems that cannot be solved with a solo structure. Especially, for the educational purposes, there are some already implemented studies in the literature. In the study of Taylan and Karaözoğlu¹⁹, a neural network fuzzy based system implemented to evaluate academic performance of students. For the degree completion, in the Moore’s study²⁰, a two-phase expert system was implemented on new admissions to an MBA program. In the study of Herrero²¹, a similar knowledge based implemented based on Cooperative Maximum Likelihood Hebbian Learning (CMLHL) model. In the study of Dominguez²², the concept of artificial intelligence in knowledge related research was implemented through Self Organizing Maps (SOM). In the study of Kasabov²³, a knowledge engineering system established through fuzzy neural networks. In the study of Leng²⁴, fuzzy rules were created by self-organized fuzzy neural network structures.

For the NEU graduate students, this system design would be best fitted with a fuzzy neural network structure. The candidate structure could be visualized in the following figure;

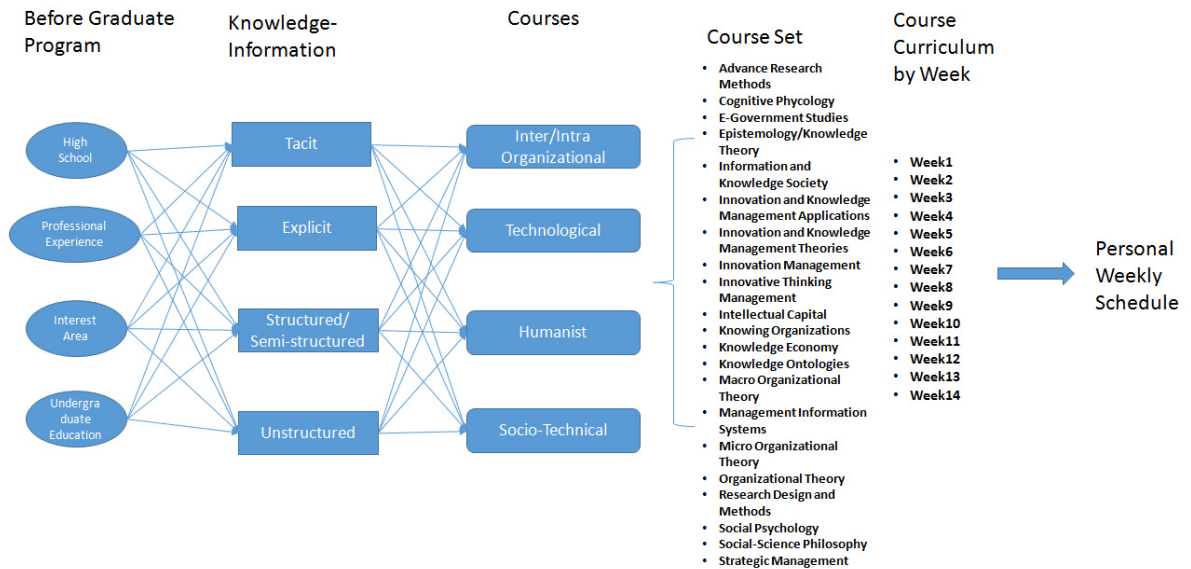


Fig. 5. Fuzzy based structure could be built for the NEU graduate students, an example design.

There will be four main neurons to identify current condition of the candidate students. In this figure, the education related neurons high school and undergraduate education are given. To be able to reflect non-education related experiences, Professional Experience and Interest Area neurons are given. The number of input neurons could be increased to be able to make more specific decisions.

The knowledge-information level neurons are the corresponding concepts that welcomes in each data stream. Before Graduate Program level data streams could be knowledge (tacit, explicit) or could be information (unstructured, semi-structured or structures) or could be both in between 0 to 1.

Even NEU Innovation and Knowledge Management program has specific course categories to the related corresponded epistemological and ontological paradigms, each course has its own relation in each paradigms, and each course has inter/intra organizational, technological, humanist and socio-technical perspective in different weights. To be able to identify these levels, between knowledge-information neurons level to courses neuron levels, the connections must be specified with the fuzzy levels. To be able to define who will take which course, in each course, the weekly schedules must be well-defined for the related data flow of the courses neuron level. Based on the result of the single individual, the weekly schedule of each individual will be able created. Rather than specialization to the one area, knowledge management should be considered as whole, this system will help students to get the important aspects of their study area with looking at a general range of the courses. This concept given in this structure is represented based on the idea of each courses weekly specialized courses curriculum. Every student is different, and from this perspective, in a classical view, this make this impossible to create personalized course schedules. However, a fuzzy based system will support this idea for implementation.

7. Conclusions

Without any doubt, as a controversial, new and young discipline, the knowledge management, will continue to evolve and progress in the first quarter of the 21st century. However, it should not be forgotten that every criticism and the answers given to each one, show the respect given to this discipline. Even this area is based on interdisciplinary fundamentals, its own concepts, its own journals and conferences, its own occupation groups and the existing professional groups, the domain oriented universities' existed curriculums show the reality of this new and young nature. Growing form this real fundamentals, the NEU Innovation and Knowledge Management graduate programs has been graduated an elite group of knowledge scientist since 2012. A system, similar to this one, would create a great opportunity for the NEU not only for the Innovation and Knowledge Management graduate program, but also for the other NEU programs. The implementation of this program, will add an important know-how into the NEU graduate schools.

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