

Babes-Bolyai University
Faculty of Economics and Business Administration
Business Information Systems Department

Contributions to learning systems

(Thesis summary)

Scientific Advisor:
Ph.D Ștefan Ioan NIȚCHI Professor

Ph. D Student:
Eniko Elisabeta Țolea

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Abstract

Using the extensive learning and knowledge area, our desire is to offer through this research a e-learning tool to support willing learning in a more efficient and productive way. Guiding their steps and assisting them in the learning process we can increase the learning rate.

Through our proposed model we can track the steps made in the learning process and create a link between trainers and trainees.

The connection can be done through a training system that connects trainers and trainees but also it is based on offering qualitative learning materials.

This work presents the transposition of knowledge into learning materials offered through an intelligent training system that assists trainees and offers the support needed based on standards, dedicated theory and leaks that are transposed into strengths in our favor.

Knowledge is something that changes often and increases from one day to another, the management of it is the key to personal development, to good business and to all fields. We need to properly store information, which is undefined and boundless in order to use it properly as content that offers further knowledge to be productive and useful. This paper is all about offering qualitative knowledge under the form of training in order to help gather knowledge for the willing ones. It is about offering learning materials and helping trainees to be well trained.

It is also about assisting the learning process and offering support where it is needed in order to improve the gathered knowledge and to transpose it into useful information.

Also this paper is about new concepts and a new approach in the research area. In this thesis the approach is focused on proposing a model that can help and support learning.

Key Words: e-learning, courses, learning materials, Bloom's Taxonomy, Learning Process Management, Learning Flows, learning processes, database.

Motivation

We found fascinating how the area of e-learning developed throughout the years and decided to take a deeper look into it.

We discovered interesting systems that are extremely helpful to users and started analyzing them from all points of view. Through the researching process we found different tools that offer learning materials or trainings but those are not user dedicated. These tools resulted to be extremely used and sought. We started then researching more the training and learning part of the e-learning systems.

Even if e-learning systems compete with traditional learning, libraries, chats, universities, video conferences or virtual conferences and consultancy we decided to prove that these systems are the ones that will bring future benefits.

We want to propose a new direction, to see e-learning as part of the business and education process. We would construct an analogy between Business Process Management and Learning Process Management. This aspect has not been covered according to our knowledge as of yet. We also intend to adapt Workflows to the learning area and create corresponding Learning Flows. We consider this an important yet extremely challenging step towards developing our prototype.

The innovative and new direction of this research is because we believe that proper knowledge management represents the future of learning. This fact together with innovative concepts such as Learning Flows, Learning Process Management and Recommendations system for the learning process, collected together and offered as a Computer Based Training system represent the key to

improving the e-learning field that we had studied. We feel that we bring something helpful and useful to this topic through our research.

Introduction

The goal of the project was to research the e-learning field and search for the best options for creating an e-learning tool for the learning environment.

Latterly information can be found everywhere but can we trust that if we transform it into knowledge it's the right thing to do? Can we trust e-learning platforms and take for granted what they offer?

When you know what you want and before starting taken a course or virtual class you do a thorough research you should trust these systems because this is the purpose of them, to offer valuable information that will help you in the future.

On the web there is a wide range of e-learning systems, researchers, students or all those who want to attend such a class just enroll into one of these platforms and whenever they have time they can attend a course or attend an exam.

Our contribution to this research will reflect on integrating into one e-learning system workflows and recommendation systems and adapt them to e-learning area in order to result an intelligent training system. We want to propose something similar to Business Process Management but adapted to the e-learning environment and we called it Learning Process Management as well as adapting Workflows to the researched area and proposing Learning flows.

Chapter 1 E-learning

1.1 Introduction into e-learning

Nowadays life puts great focus on internet and software. Due to this, learning has adapted to the technological changes of the 21th century. Most of us use e-learning systems to improve skills and to gather new knowledge.

We are in a continuous learning process during our life and in order not to waste time and money it is necessary to access quality knowledge and make it helpful in our daily routines. It is important that these systems offer quality learning materials in order to increase the level of knowledge and intelligence and this applies to each and every field no matter if we talk about multicultural companies, universities or people who want to learn on their own. Courses, trainings and other forms of delivered knowledge are sent via different types of e-learning systems.

First of all learning means acquiring, information or developing new skills that will help us at some point in our activity. Learning using electronic systems means the acquisition of knowledge and skill using electronic technologies such as computer- and Internet-based courseware and local and wide area networks [1].

With the boom of computers and the Internet, E-learning, as an efficient and effective education method, has drawn more and more attention from researchers and practitioners. It is now possible to provide customized learning styles for different learners to meet their personalized requirements.

Many international organizations and standardization bodies are engaged in development of new approach to achieving personalization in today's distributed E-learning environment [2].

Authors Attributes	Tool or framework	Offering learning materials through electronic means	Provide training	Acquiring new skills and access knowledge	Improve knowledge and performance	Facilitated and supported learning	Use of innovative technologies	Course Management
The American Society for Training and Development	x	x	x			x		
Derek Stockley	x	x	x			x		
Marc Rosenberg		x	x		x		x	
Allison Rossett	x	x						
Clark Adrich	x	x			x		x	x
Brook Manville	x	x	x		x			x
Drucker		x		x				
Elliott Masie		x			x		x	
Victor Jeurissen	x	x	x	x	x	x	x	
Gyula Mester	x	x			x			
Eyitayu	x	x			x			

Table 1. Authors view of e-learning definition based on predefined attributes

We took some relevant attributes and wanted to see how many of them are checked. We took into consideration the author's cited into our thesis point of view. With "x" we marked where the author considers the attribute into the definition. The majority agree on the fact that e-learning is offering learning materials via electronic mean through a tool or framework and that the consequence of this should improve knowledge and performance. Victor Jeurissen has the most complex definition covering all most all the listed attributes. He has the following opinion.

Victor Jeurissen, global practice leader for IBM Management Development Solutions, defines e-learning as: the use of innovative technologies and learning models to transform the way individuals and organizations acquire new skills and access knowledge [5]. He further defines learning as a collaboration of information, interaction, collaboration, and in-person.

So as it can be seen there are a lot of definitions for e-learning in the literature, and the ones described above are just so few of them, but in our opinion e-learning is: Offering quality information and learning materials through electronic means. Or we can define e-learning as the delivery of learning materials to educate learners via internet, intranet/extranet, audio-video tools, and more others.

One form of personalization in intelligent e-learning is the ability to recommend learning materials that fit their needs, such as a feature commonly referred to as a recommender. To guide

the users in learning and to fully understand a specific topic, a subject network, which is a relationship among subjects, is used. The subject network will be presented in a list that suggests the order of learning **Error! Reference source not found.**

Also an e-learning system can be viewed as a tool or framework that offer quality information that can be transform it into knowledge and will help in some point of life. These systems are the best option in terms of time vs. money vs. utility.

Narrowly, e-learning is a type of distance education as a planned teaching-learning experience organized by an institution that provides materials in a sequential and logical, to be assimilated by the students in their own way.

In a broad sense, e-learning means all learning situations that use information and communication technology resources significantly.

In our days there are a lot of possibilities to study. Unfortunately, few of them provide opportunity to brake time and distance barriers. Not every student has the possibility to follow a school on a strict program basis. This is why we consider e-learning a great opportunity to allow every person to follow any school he wants [14]. This is another reason for using e-learning and not traditional learning.

Concluding e-learning is an area that is growing, and it is becoming increasingly popular that is why we need to improve and too came with innovative proposals.

1.2 Training in e-learning

Training could be the process by which someone is learning or the method or strategy that someone is using to learn or teach others; the skill, knowledge, or experience acquired by one that trains someone else.

Into e-learning systems we add a lot of learning materials that by training and trainers is distributed and offered as knowledge. It is our responsibility to offer qualitative materials, training systems and trainees in order to have the expected results.

To better integrate these concepts is useful to discuss the training, development and education in terms of their contribution to the professional life of an individual. So how simplistic that:

- training helps the employee to be more efficient,
- development is a prerequisite for promoting,
- Education supports an individual to succeed in your career, regardless of the activity.

A training system is a group or family of coursework that will achieve a stated series of training objectives [27].

Into our system or better said prototype we based our learning materials on Bloom's Taxonomy, a taxonomy that is described in the followings.

1.3 Bloom's Taxonomy

If we go back in time, shall discover that in 1956 Benjamin Bloom made a classification of learning objectives known as Bloom's Taxonomy. Knowledge sharing is important since ancient times and has been studied. Bloom had identified six levels within cognitive domain. The cognitive domain (Bloom, 1956) involves knowledge and the development of intellectual skills.

In 1956, Benjamin Bloom with collaborators Max Englehart, Edward Furst, Walter Hill, and David Krathwohl published a framework for categorizing educational goals: *Taxonomy of Educational Objectives*. Familiarly known as Bloom's Taxonomy, this framework has been applied by generations of K-12 teachers and college instructors in their teaching [28].

Here are the authors' brief explanations of these main categories in from the appendix of *Taxonomy of Educational Objectives*: [29]

- **Knowledge** “involves the recall of specifics and universals, the recall of methods and processes, or the recall of a pattern, structure, or setting.”
- **Comprehension** “refers to a type of understanding or apprehension such that the individual knows what is being communicated and can make use of the material or idea

being communicated without necessarily relating it to other material or seeing its fullest implications.”

- **Application** refers to the “use of abstractions in particular and concrete situations.”
- **Analysis** represents the “breakdown of a communication into its constituent elements or parts such that the relative hierarchy of ideas is made clear and/or the relations between ideas expressed are made explicit.”
- **Synthesis** involves the “putting together of elements and parts so as to form a whole.”
- **Evaluation** engenders “judgments about the value of material and methods for given purposes.”

1.4 E-learning architecture

In the literature we found a lot of approaches. These approaches depend on the type of the system and also on what kind of software and hardware equipment are used.

But as a general observation we saw that these systems have the followings:

- Online and Offline environment;
- Database for information storage;
- User interface;
- Learning materials;
- Goals and resources.

We have our own architecture for the prototype. Will describe it and analyze it when we speak about implementation. As shown this generic architecture also can change when or where a company is the provider of the e-learning system. Even so the structure remains the same, just the top is changing. In the following chapter we focus our attention on e-learning system management and business processes and will try to propose the concepts of learning processes,

Learning Process Management and Learning Flow. Based on this will propose the model and our own architecture.

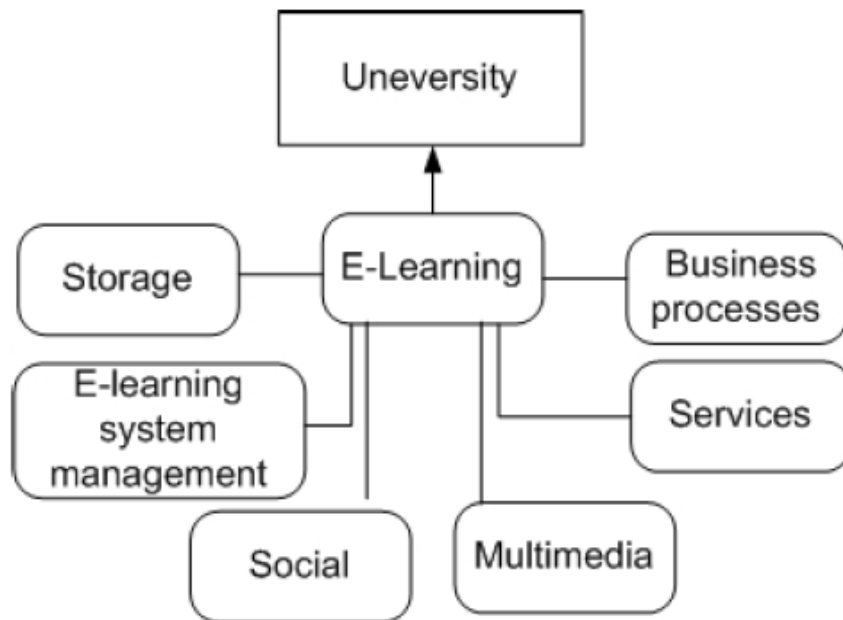


Figure 1. Generic e-learning architecture [39]

Our structure includes the following: It is an e-learning tool based on definitions that have like any other tool advantages and disadvantages it is based on standards and offers learning materials (various types) for users to help them in the learning process.

CONCLUSIONS

Technology has become an integrated part of human life. Computer, internet, and software enable users to collaborate and interact over distributed environments. Use of modern technology to ease every day work is now available for majority of world's population. We cannot imagine our life without technology, and in consequence the computer has become part of our life. [40]

E-learning area is one that experiences growing and furthermore is the next direction in which universities and companies alike are turning their attention.

E-learning systems will become training tools for the personality and creativity of the users, if they have not already become.

E-learning represents a huge opportunity for those who want to learn but don't have time to attend regular classes. Learning materials are offered through different type of systems and are targeted on users. Attention is directed to them and their needs.

In today's business world there is a saying: "time is money" [41]. That is a reason why Internet and all related to it became more and more used and it is on growing. E-learning as well became used also for the saying "time is money" and because it is an alternative to the traditional learning model.

The impact of e-learning platforms is largely due to media technologies used to achieve them. The benefits of their use are represented by consumption reduction, the possibility of adapting programs which are customized to accommodate with rapid change and new knowledge in various fields, expanded opportunities for interdisciplinary education and, not least, significant reduction of educational costs [42].

Chapter 2. Business Process Management vs. Learning Process Management/ Workflows vs. learning flow

2.1 Business Process Management vs. Learning Process

Business Process Management is all about how we manage our business processes. It can be seen as a set of symbols that describe a business process, processes in which we apply specific activities from the company in order to present the way different processes work. Tools offer different approaches for different areas, but they also offer configurations that are adapting to each business process or area.

And if this is the trends why not have “Learning process management” that is designed to serve in the e-learning field. These processes should describe from inside e-learning systems different activities specific to this domain. The learning process is extremely complex and deserves to pay attention.

In our opinion Learning Process Management could be considered how we study and learn, the process in which we accumulate information and transpose it into knowledge. We have different processes for different situations, we learn based on research, we learn by testing applications, we learn managed by the organization, in which we operate. We develop our own learning methods but these ones are based on processes and in order to have the expected results we should manage them properly.

The main advantages of LPM are:

- Good organization for learning materials, improving the learning process by modeling, analyzing and others.
- By incorporating learning flows it is possible to visualize the learning processes.
- Offers graphical view on processes.
- Gives learning the possibility to compete with business from equal to equal.
- Improves coordination and communication between trainers and trainees.

2.2 Workflows vs. learning flows

Flow as we find it in different online dictionaries signifies movement [50] [51]. In the business area flows signify the movement between processes. And in the learning field flows are used to describe the learning process. **Flow objects are** the main graphical elements that define the behavior of a business or learning process in our case.

Workflow may be seen as an abstraction of real life, it consists of a sequence of logical steps. The flow that is described may refer to a document or to a product; in our case the flow will describe the learning process.

Flow through their structure are made to support learning first by their easy to understand design and then by the commonly and general accepted symbols. As a characteristic for learning flow we can propose the used symbols to be about objects (books, notebooks, etc.) to be easily to understand.

2.3 Using Internet technology to support flexible learning in business and in educational field

Through the medium of Internet we as consumers or users have access to a wide range of information but this information is not guaranteed or certified as being good or bad, helpful or unhelpful. We as end users are the one deciding what to take for granted and what not. Flexible learning had become highly wanted for its primary advantages time and location, and more than that because the connection to Internet offer the possibility to find anything. A lot of questions find their answers after a simple search [58].

Employers and students alike expect to find answer to all the questions, but more and more are searching for programs or trainings in which they actually learn in order to find the answer to different questions and from here a multitude of tools have emerged to meet the demand.

Our attention goes in the direction of these three concepts: Intelligent Training System, Computer Based Training, Web-based Training, because we think that the best solution is one of them and because our proposal is underlying to one of this concepts.

2.4 Intelligent Training System, Computer Based Training, Web-based Training

ITS's are more sophisticated in their basic design and more effective in their role as a tutor. They are intended to supplement the classroom environment by helping individual students identify their specific weaknesses and rectify them in an effective manner. ITS's are designed to be sensitive to the student's strengths, weaknesses, and preferred style of learning [60].

Intelligent Training Systems overcome the limits of simulators in training operators of sophisticated physical systems. Intelligent computer tutors resemble human tutors as they can plan a lesson, monitor the trainee's performance. Give remedies and explanations, always adapting contents and form of the training course to the trainee cognitive needs and preferences [61].

The primary components of an ITS are knowledge storage, tutoring knowledge and the user-interfaces. We also added LF (Learning Flows) and LPM (Learning Process Management) to improve the proposed model.

CONCLUSIONS

In this Chapter we outlined in our opinion the importance of learning and knowledge gathering. Also the necessity of integrating into the Business Process Management the role of learning and we had defined this as Learning Process Management. LPM is an extremely important piece that needs to be integrated and we funded necessary also integrating into LPM Learning flows in order to help this process to be better understood and easier to us. We had expressed our opinion concerning these concepts and offer a personal view on them.

Each step of our life is a process in which we learn sometimes more, other times less but still in an ongoing learning process. The same thing happens in the business area where in order to maintain yourself on the market you need to grow, to have the same amount of knowledge as your competition, to use the same weapons and the same strategies, and not only that but to improve all this to be the best.

Processes are alike part of the learning and business area, tailored to the needs the results are targeted and the expectations fulfilled.

The Internet offers the new environment through which learning is done and users learn. The advantages that Internet is offering need to be exploited and we want to do this through our proposed model.

Learning will remain forever, thanks to the need of humans on learning new thing and due to the fact that today's businesses, schools and factories are in constant development phase. Accordingly e-learning environment and its affiliates are changing fast and are offering now quality and not quantity. This is the reason why LPM and learning flows are needed, to bring something new and competitive to the environment.

Chapter 3. Prototype

In order to start let's take a look at the following image and see which are the requirements to accomplish this mission.

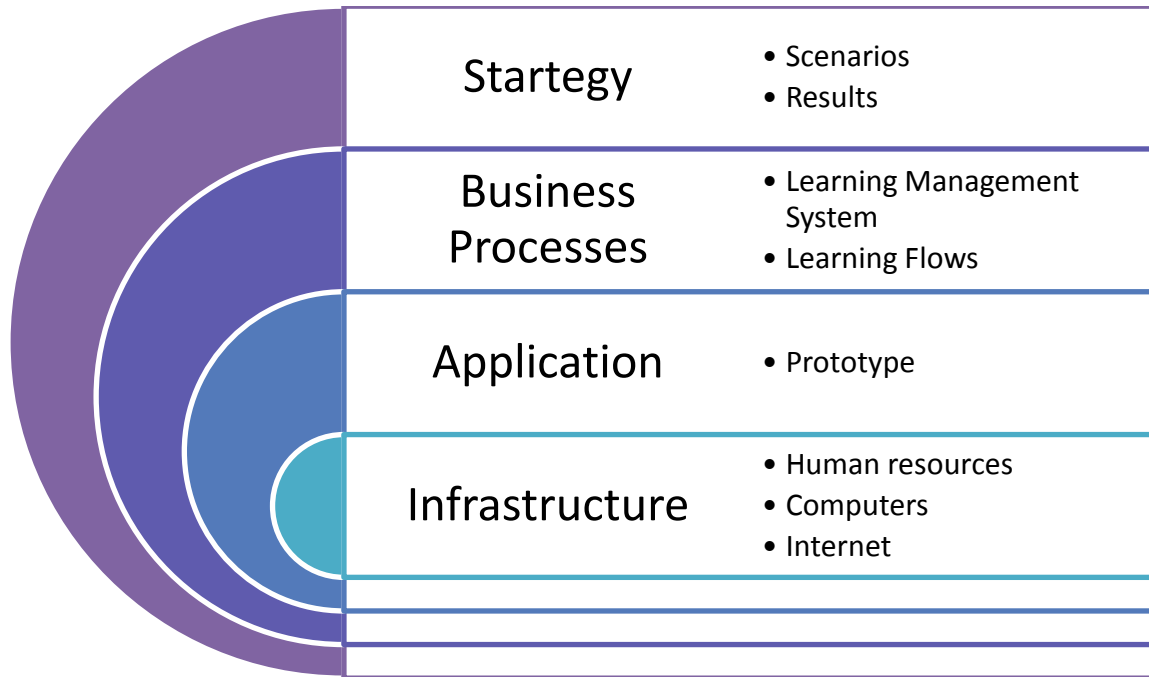


Figure 2. Proposed debate steps

Although some times the order is not the indicated above, because of the mixture between them, we will approach all the above mentioned. From the debate steps the application is the one that raise the most interest in this chapter, but will approach this based on Scenarios and at the end present the expected results of this application. Our goal is to create a prototype that offers qualitative learning materials through an easy to use interface and assists the learning process until they end with success. If it does not happen from the first attempt to assist them and help them to achieve their proposed goal.

For a good process management we established the requirements and tried to understand them, then we designed them and implemented into our prototype.

This project is viewed as a new generation tool based on users' needs which support them and offer them the possibility to learn from home or from where they need as long as they have internet connection to access the courses.

For the implementation we needed a DB (database), a place where we store information and then use it as needed depending on different situations.

3.1 Database Architecture

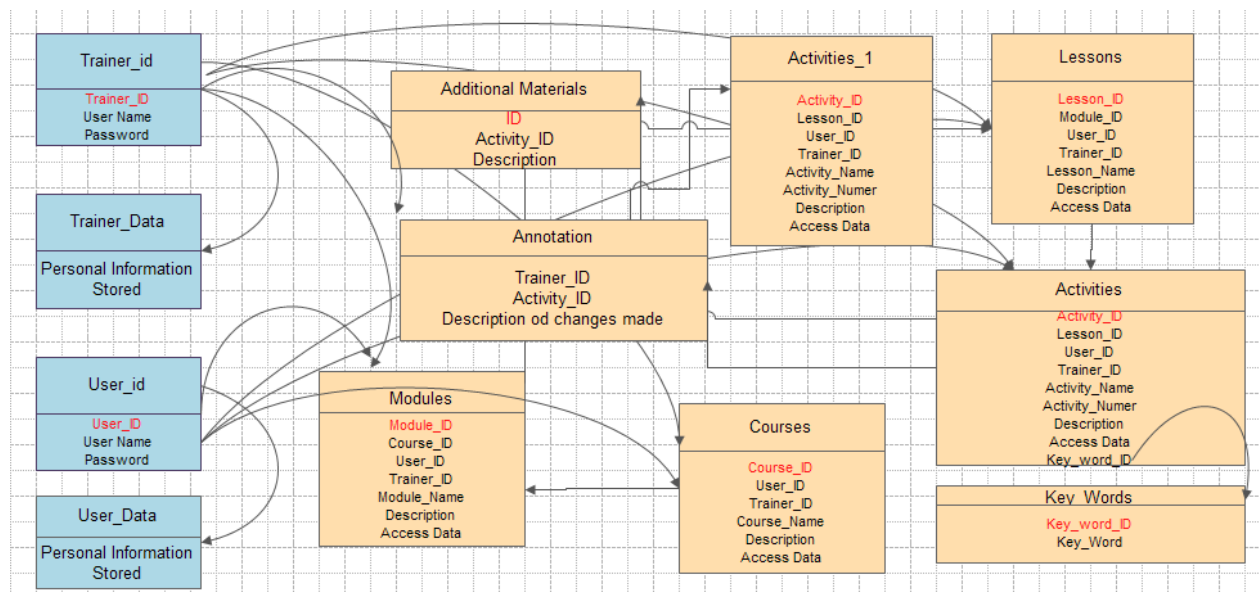


Figure 3 Database Architecture

We exposed some goals to follow during the description of our prototype:

- specify the type of e-learning system;
- describe the Learning Process Management used in our design;
- describe the Learning Flows;
- describe our tool and use at least one example to prove our theory;
- describe the design of our course and the creation of it based on Bloom Taxonomy;

- final remarks regarding our prototype.

For checking the list we did specify which type of e-learning system we propose. We propose and CBT (Computer Based Training) System that has as the main goal to offer under a training system qualitative learning materials transposed into courses.

3.2 Learning process management

Based on what we discussed in Chapter 2 we specify now our strategy in which is found also our Learning process management system.

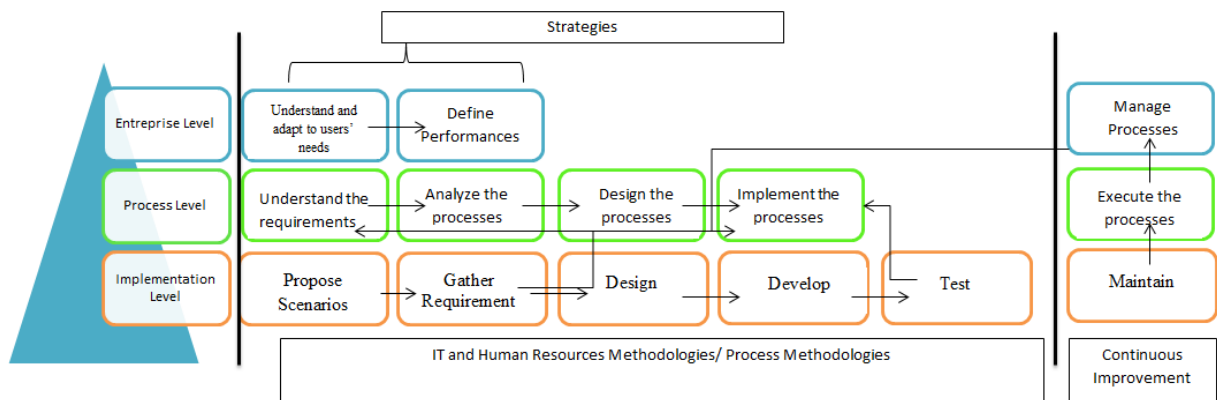


Figure 4 Processes into our designed model

We defined our scenarios and we concluded that the best strategy to approach is online courses because as we studied more the field we realized that the market needs in this period of speed and ultimate generation systems, and more than that the lack of time that people have is to offer something that satisfies all these needs at the same time.

For a good process management we established the requirements and tried to understand them; then we designed them and then implemented them into our prototype.

This project is viewed as a new generation tool based on users' needs which support them and offer them the possibility to learn from home or from where they need as long as they have internet connection to access the courses.

3.3 Learning Flows

As we already mentioned the idea is to create the analogical for workflows in the e-learning area and called them learning flows.

Workflows help people to collaborate on documents and to manage project tasks by implementing specific business processes. Learning flows are designed to help users to understand the learning process, to manage it and to implement specific learning process.

Based on our case study described above let's take a look on how learning flows look like.

Workflow is sometimes described as a series of tasks that produce an outcome. Learning flows can be described as a series of task that produce as an outcome a certain part that belongs to the wide learning process.

3.4 Course Creation based on Bloom's Taxonomy and test on case study

Bloom has established six levels in his pyramid. Even though in literature one can find a lot of reviewed approaches, derived from Bloom's theory, we decided to stick with the old-fashioned version, as we think that it represents the core of leveled studying. Using e-learning system we intend to offer a modern approach for information transition from lecturers to their students. Our goal is to provide the right mechanisms to help students to transform this information into knowledge.

In order to see how these modules can be structured based on Bloom's Taxonomy we decided to create a short table in which we included all six level of the taxonomy, their definition and behavior. Based on it will adapt our courses to our prototype.

Level	Definition	Behaviors
KNOWLEDGE	Student recalls or recognizes information, ideas, and principles in the approximate form in which they were learned.	The student will define what Artificial Intelligence is and What does it. Some definitions are required in order to pass this level and also the ability to describe "What is..." .

COMPREHENSION	Student translates, comprehends, or interprets information based on prior learning.	Understanding what does it mean and how can we use it. In order to pass will propose several situations and see if they can recall in which situation Artificial Intelligence is needed.
APPLICATION	Student selects, transfers, and uses data and principles to complete a problem or task with a minimum of direction.	They should be able to apply what they study so far into a situation or a problem.
ANALYSIS	Student distinguishes, classifies, and relates the assumptions, hypotheses, evidence, or structure of a statement or question.	The ability to analyze what they have applied. To highlight, classify or structure the information received.
SYNTHESIS	Student originates, integrates, and combines ideas into a product, plan or proposal that is new to him or her.	To propose or design a model that uses Artificial Intelligence, or to integrate a requirement into an application or study which is based on Artificial Intelligence.
EVALUATION	Student appraises, assesses, or critiques on a basis of specific standards and criteria.	To promote the course after passing some test in order to check the level of knowledge in this area.

Table 2. Bloom's Taxonomy in our case study

CONCLUSIONS

Using flow technology in order to support learning we provide an innovative, learning flow based environment to deliver educational courses.

This chapter is the most important one because of its content; we put theory into practice and developed an e-learning tool which is based on the concept of learning process management and learning flows.

We bring something new to the e-learning environment; something that in the future could help and improve the management of courses offered via Internet.

The e-learning area is one that has already become very searched and used. Our model with all its aims is designed to help and facilitate learning.

Chapter 4.Recommendation System

4.1 Recommendation System

Recommendation systems are designed to help users in different situation. They “Know” the needs of the user in that particular moment and are able to assist and offer them what they need.

Recommendation systems differ from system to system thanks to the specific of the systems and the desired goal of the recommendation. They also differ in the way they analyze data sources in order to respond to different situations.

The goal of a Recommender System is to generate meaningful recommendations to a collection of users for items or products that might interest them. Suggestions for books on Amazon, or movies on Netflix, are real world examples of the operation of industry-strength recommender systems. The design of such recommendation engines depends on the domain and the particular characteristics of the data available [97].

Our system is somehow based on content but will recommend to users more information needed to pass the chosen course. It can be called as a hybrid based on content and will debate later why.

The goal of a Recommender System is to generate meaningful recommendations to those who need and to by focus on the requirements of each users. Obtaining recommendations from trusted sources is a critical component of the natural process of human decision making. If we offer quality learning materials and they trust the content we base our recommendation systems on the same quality level.

In this case our systems works like this: we offer courses and the possibility that the user chose which one to attend. Then we offer him a visual view of its chose by displaying the correspondence of the course in a Learning flow, a graphical view. After attending there is the need to evaluate in order to climb Bloom’s pyramid and where problem is funded the recommendation systems is intervened. The system finds the problem (the puzzle piece that is missing) and offers solution (helpful materials to clarify the doubts and pass the obstruction).

In the following we approach and describe how we recommend. The aim of our recommendation system is to offer help when and where needed. We can see our approach as a personalized one because it will offer recommendations individually, the chances that two persons to need the same information are minimal.

We approach this problem from two different points of view, first we have recommendations that we apply to ongoing evaluations and recommendations that are made after the final evaluation, if necessary. We should discuss both of them; they are similar as approach but different in term of recommended content.

Now we describe how we designed the recommendation system and how does it work. For this we need to take a look into how we create evaluations and how we recommend based on the result of the test. We need to mention that the evaluations process is an important one in our model and that also is an element of the six steps of Bloom's Taxonomy.

The first approach is based on the result of the ongoing evaluation systems proposed by us as a guiding result for those who want to know how much of the offered content have they covered.

This evaluation is guided by the following principle: after completing each Activity they have the option to verify their knowledge by testing themselves.

CONCLUSIONS

This Chapter is an add-in to our model, a proposal to improve more the training systems and to help users.

Recommendation systems are extremely useful if they are applied where needed, and we consider that we do just that. We are offering support by supervising the learning process and by supporting all the way long the achieving of knowledge.

We do not intervene where not the case is; we are using this asset just when and where needed.

Chapter 5. SWOT Analysis of the proposed prototype and comparison with other e-learning systems

We described in few lines just some of the products from the market. Their appliance is as it can be seen in different environments and with different goals.

Our goal was to design a model that is responsible and meets the entire requirement established at the beginning.

When expressing our Strengths, Weaknesses, Opportunities, and Threats we express our objective and not subjective opinion.

Based on what we know so far about some of the soft from the market and what we offer we can express our position towards our prototype in comparison with others and include it into figure below.

So far we compared different tools and analyzed others, now we want to express by the instrumentality of a SWOT analysis how we see our model. Our opinions about the prototype are expressed in Figure 6.

We do not consider that our product is the best and that it covers all, we just wanted to emphasize advantages and disadvantages of our proposal in comparison with other existing and used e-learning tools. Because the SWOT analysis isn't enough we want to compare our model with which we treated throughout this paper. We go now from tail to head to see how much we fit into theory. An analysis of the proposed prototype in order to see if meets the definitions in Chapter 1 and especially standards and how if the new concepts of LMP and learning flow were integrated or not.

We revealed through this analysis our opinion regarding our proposed model in comparison with other similar tools and based on the theoretical background developed during this research.

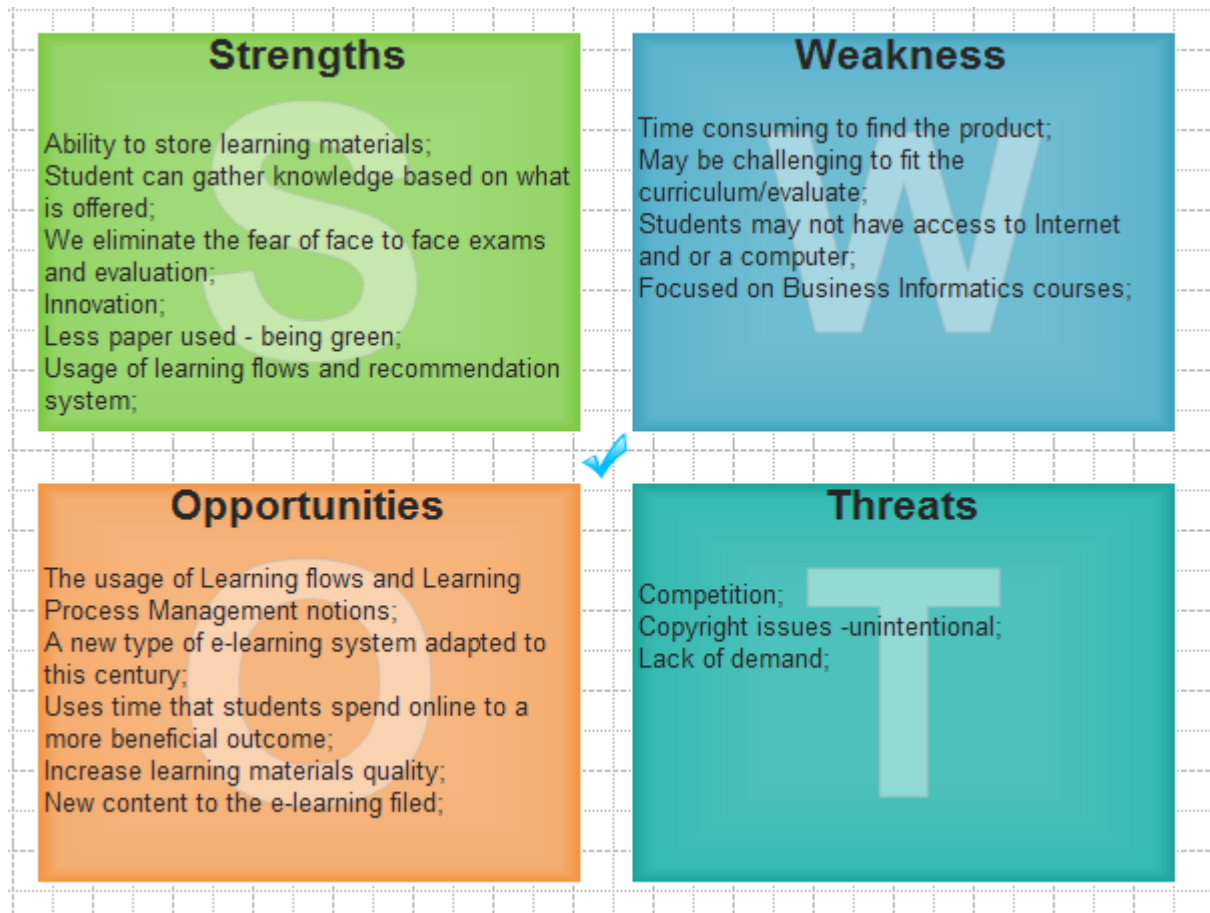


Figure 5. SWOT Analysis

CONCLUSIONS

This Chapter was one of analysis. As concluding remarks to it we can declare that our prototype is a competitive one and that we brought something new by incorporating learning flows and creating a connection between them and learning materials. Also based on our SWOT analysis and comparison with other tools our model has good strengths and opportunities.

Final Conclusion and Future work

The key points of this research were to research the e-learning area and to find the opportunities and gaps that this area might have. After our research we established that even if it is an on growing area there are more to be added to it. As we showed in this thesis BPM is well known and used along with workflows, why not have Learning management process and Learning flows as used as the first one and as useful as those. As well as having a complex tool to support the learning process by offering qualitative learning materials and assist the user until the end of the learning process, and when needed to help by recommending in order to successfully complete the task.

As a future work for our recommendation system we want to propose the following implementation: to bring together into a complex intelligent learning system all the above described and to have a visual perspective of the product. The “problem” to be evidenced on the flow by overlapping a red circle on the problematic module and offering simultaneous the possibility to choose which helpful material needs to complete the task to remove the problem.

We contributed as it follows:

- In the first and second chapters we expressed our own opinion regarding the researched area and came with a first attempt on introducing LPM and Learning flow concept into the e-learning topic. We also revealed the analogy with BPM and Workflows and this can be seen as a first approach on these topics.
- In chapter 3 we brought into practice what we had expressed in the first two chapters. Further we proposed a recommendations systems and made an analyses of our work compared to other theories and tools that are related with what we proposed.

PhD. Thesis Bibliography

- [1] Țolea Enikö Elisabeta, Costin Aurelian Răzvan, Ontology for an E-learning model, Conference: The 5th International Conference on Virtual Learning, 2010
- [2] Keisuke Nakamura, Kiyoshi Akama, Constructing new functions for E-learning system based on Clause-Rule model, Computer Sciences and Convergence Information Technology (ICCIT), 2010
- [3] Costin Aurelian Răzvan, Țolea Enikö Elisabeta, E-collaboration. The new economic world, Jisom, 2010.
- [4] http://my.safaribooksonline.com/book/hr-organizational_management/1562863509/training-systems-marketing-and-maintenance/ch08lev1sec1, "What is a Training System?", Safari Books Online, Retrieved 29 January 2013.
- [5] <http://cft.vanderbilt.edu/teaching-guides/pedagogical/blooms-taxonomy/>
- [6] Bloom B. S. (1956). Taxonomy of Educational Objectives, Handbook I: The Cognitive Domain. New York: David McKay Co Inc.
- [7] Anita Finke, Janis Bicans, E-learning system content and architecture evolution, 16th International Conference on Information and Software Technologies, 2010
- [8] http://www.ibm.com/developerworks/websphere/techjournal/0702_koehler/0702_koehler.html
- [9] Costin Aurelian Răzvan, Țolea Enikö Elisabeta, E-collaboration. The new economic world, Jisom, 2010.
- [10] Enikö Elisabeta, Costin Aurelian Răzvan, Ontology for an E-learning model, Conference: The 5th International Conference on Virtual Learning, 2010
- [11] <http://www.thefreedictionary.com/flow>
- [12] John A. Campbell, Using Internet technology to support flexible learning in business education, Information Technology and Management 1 (2000) 351–362

- [13] Kornecki et al.: Intelligent Tutoring Issues, IEEE Transactions On Control Systems Technology, Vol. 1, No. 3, September 1993
- [14] A Bertin, F Bucioli, C Lanza, Concepts Of Didactics In Intelligent Training Systems, CISE Spa, Italy, p257
- [15] Prem Melville , Vikas Sindhwani, Recommender Systems, Available at:
<http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.163.3573> and
<http://www.vikas.sindhwani.org>