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A Framework for Learner Preparation and Support in Academic E-learning Environment

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Abstract—**E-learning as a modern educational system has certain components, and adopting this system will affect the conditions and characteristics of administrative aspects of the educational systems. Some of the critical educational factors such as requirements/ necessary skills /capabilities/ admission factors and learner capabilities / characteristics will evolve significantly in this modern educational paradigm.**
The main objective of this paper is to present a framework for main indices and factors regarding e-learner readiness evaluation and also identifying the learners' skills, capabilities and limitations in a way to enable e-learning system administrators to provide preparation and support services for improving learning quality. In this paper, through a survey of e-learners' readiness characteristics, a framework for e-learners' primary preparation and corresponding guidelines for e-learners' support is proposed which is based on level of readiness. The proposed framework is targeted to academic courses, though its analysis mechanism can be easily workable for other educational courses as well.

Keywords: E-learning, learner's readiness, e-learning support, e-learning readiness framework

I. INTRODUCTION

With respect to e-learning, when the learners issues becomes topic of discussion, benefits such as having no dependence on time and place limitations are planned, while influence of the modern educational system on learners' educational and behavior styles is also important.
E-learning success as the alternative or supplement of traditional education requires many changes with

respect to the concepts and accepted principles about education and learning. These changes include our understanding and imagination of educators and lecturers responsibilities with respect to confidence of learners' sufficient readiness for success in the e-learning system. Some of the problems that have caused the failure of e-learning programs in the world are lack of attention toward current learner's situation and position, and also ignorance of mechanisms and methods of educational goals realization and appropriate supporting of educational process [5].

Indeed, the main issue discussed in this paper for which solutions are suggested, is studying the measurement indicators for learners' current situation, as one of the main components of e-learning, in terms of educational and non-educational, and turning it to prepare recommendations and provide appropriate and intentional supporting them during the learning process to increase the quality of this process.

The main goal of this paper is describing and extending a modern framework to prepare learners for a successful completion of e-learning courses. For this purpose, the features in modern approaches to e-learning, learning processes, as well as learners' required skills will be examined. Having applied these concepts, indicators and factors to assess e-learners' readiness are extracted and subsequently a framework for preparation of learner is introduced. Finally some strategies are proposed to implement this framework.

II. FEATURES OF E-LEARNING SYSTEMS AND THEIR BENEFITS FOR THE LEARNERS

Using computer in education is not a new concept; rather its special method of usage for encouraging learners to generate knowledge by themselves (and not only acceptance and delivery from the educator) is considered. [6] May be the Salmon and colleagues' interpretation about computer role as educator (teaching through computers), and computers as cognitive tools (learning with computer) is the most communicative interpretation in this regard [7].

Cognitive tools indicate constructivist use of technology and their roles can be explained by the most important constructivism epistemology concept, i.e. knowledge construct process by people. Constructivism is the set of assumptions about human learning nature that is solidified in learning theories. An evolution aspect is also viewed among the emerging technologies and constructivism where developing each causes reinforcement of the other. According to constructivism's approach, which believes that learning is occurred in context, the role of design technology and learning environment preparation to encourage learner, is constructing knowledge by critical thinking [8].

In constructivism approach, in contrast with the approach which believes learners should understand the educator's interpretation of the world, the major emphasis is on creating an environment where the learners collaborate actively in ways that help them construct knowledge. In constructivism environments, learners are encouraged to interpret external world and receieve reflections from the out world. According to the theoretical bases and principles of this approach, constructivist learning environment characteristics' are either:

active/manipulative, constructive, collaborative, intentional, contextual, conversational, reflective and/or complex[1].

III. E-LEARNERS ANALYSIS

We can identify the learners' and addressees' properties and features through their analysis, to use this information for planning the considered learning activities. In this paper, the analysis is done in an academic educational domain some required for planning. The appropriate academic courses are illustrated in Table 1 [9].

Table 1. Appropriate academic courses

Appropriate academic courses
Average rank/ Grade of standard test/ Cultural history/Physical and learning disabilities/Learners' request/Experience/Personal goals and features/Learning references/Learning methods/ Motivation/Writing skills/Reading skills/Mathematical and calculations skills/Communicational skills/Technical skills/Collaboration ability with other different culture learners/Introduction to various educational methods/E-learning past experience

One of the important issues in identification, analysis, preparation and supporting the learners, is learner modeling. We can divide this issue into three categories of "modeling process", "learning model" and "learner" [1].

In general, according to current theories, we can define different criteria to partition the learners' capacity, capabilities and abilities. These criteria and their appropriate usage can play a key role in organizing the educational processes and increasing e-learning approaches efficiency.

IV. RELATION BETWEEN NECESSARY SKILLS FOR THE LEARNERS' SUCCESS IN E-LEARNING AND TRADITIONAL LEARNING

Practical studies strategies used by the successful e-learners differ from utilizable methods in traditional classrooms, and include some techniques such as internet search to identify the web sites which are used for clarifying and sending message to classmates (in waiting time for teacher's feedback). Adjusting the old skills and behaviors of the traditional classes for using in e-learning and using the new skills and behaviors specific for e-learning, can be mentioned as two essential skills for success in e-learning [10].

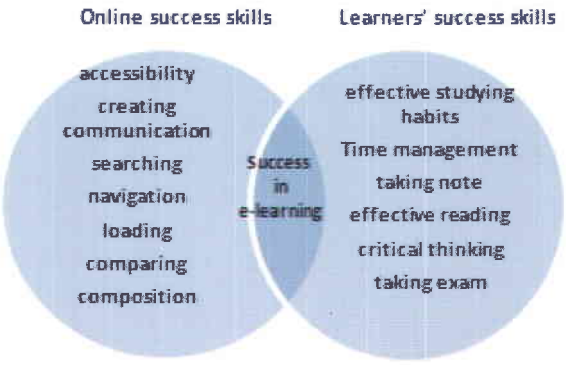

Figure 1. Successful entrepreneurs' skills relations between online learning and traditional learning

A. Successful e- learners' features

E-learning often is presented as a different approach in learning issue; the approach in which achieving success is difficult and depends much on learners' features identification. According to the current e-learning frameworks, some of the features can be explained as follows:

B. E-learners' technical readiness

Each learner who has proper and sufficient knowledge and skills in the issue of technology can utilize e-learning system as much as possible [8].

C. Learners' readiness in self-directed learning

Self-directing is described as a process and also as a learner's psychological readiness in learning. Malcolm Knowles describes the self-directing as a process in which the learner, by using or not using others' helps, identifies the learning requirements, defines the learning goals, develops and implements the learning and evaluates the educational results. This cyclic process often identifies the new educational requirements [8].

D. Learners' readiness in e-learning communications

The major part of learning process is the result of learners' collaborations and communications with classmates and educators in classroom. For this reason, collaboration in online group-based learning provides better opportunities to develop skill and knowledge rather than individual courses. Anyway, the ability of creating and maintaining remote communication through limited media is a significant skill to utilize the opportunities. Due to internet limitations and its specific structure, collaboration in online group-based learning, requires a special focus on interpersonal skills. Creating and developing virtual individual or group communication thus requires different compositions of skills which are used in daily communication [11].

E. learners' readiness in meta-cognitive e-learning competency

Meta-cognitive competencies include cognitive active control process used in e-learning. Meta-cognitive thoughts, mental, intentional, based on future and deep behaviors can be used for doing cognitive responsibility. The successful e-learner has excellent understanding of learning process and his/her direction learning and knows how to make e-learning activities structure. Further, the learners are able to assess realistically their learning growth (I see that I'm learning or not). In order to progress the issue of learning, it is necessary for e-learners to have the primary understanding of adults learning theory, recognize the personal learning preferences and styles, and by using the most efficiency strategies organize their learning experiences [12].

F. E-learners' readiness in e-learning collaboration

This issue refers to required skills in asynchronies or synchronizes online learning activities in collaboration where may include forums, email exchange, discussion sets, immediate message and virtual classrooms. Two main topics are privileged on collaboration in this region. First, in online collaborative learning the body language, and in many cases language symbols are missing. Second, in asynchronies situation, collaborators as classmates and guides may not desire synchronized learning activities. Successful e-learners should have competencies in asynchronies accountability and virtual feedback [12].

1) An overview of performed activities

Various activities are done in this context out of which same are briefly reviewed. In [2, 13, 14] proposed a sample of students readiness assessment at universities with case studies. The vital point is the lack of specific readiness assessment model. Accordingly, it is not possible to provide the appropriate solutions based on measurements and statics analysis. [3, 15, 16, 17] proposed samples of plans to composition knowledge management and e-learning topics that have been planned based on organization preparation from e- learning perspective and aiming to improve the processes and collaborations related to organizational knowledge components. In these plans the focus is on components that are involved in organization process. There was no attention to various educational contexts, like universities, including important and related activities to this topic [4, 18]. In these papers usually a limited e-learning environment is considered, which is assessed usually doesn't contain all aspects of an educational environment conjoined. The other activity sample related to this field is checking efficient factors on learning process of groups such as teachers. In [19] this related topic sample is provided in a case study format where all related activities to this stakeholder are considered in e-learning. In this study the issue sharing overlapped contexts related to learner or meta-cognitive factor, are not considered.

V. PROVIDING THE E-LEARNERS' READINESS FRAMEWORK

Expert Panel Method was used to investigate the preparation and support factors of e-learners, and

thereby comments of 30 e-learning professionals on factors affecting the preparation and support of e-learners were obtained (Table 2).

Table 2. Expert opinions

Expert opinions
Feel confident of using hardware, software, network and probable problem solving, Financial readiness, Access to proper hardware, software and internet, Appropriate skills to use hardware, software and internet, Complex educational topics reading ability, ideas and thoughts writing ability, focus ability, study independently, Perceived ease of use, personal progress and delivery time monitoring, time management ability, Independency in learning, learning responsibilities, innovation, desire to help searching, valorize personal learning, having goal setting, information processing, cognitive and executive and decision making skills, self-awareness and self-monitored ability, deep processing skills, content competence , Ability to create effective online communication, Need for a component of face to face teaching, using online communication tools properly, familiarity with successful online interoperability principles, collaboration in different ways Having meta-cognitive knowledge, regulation and experience, receipt Ability, organizing, using and maintenance information and knowledge, self-assessment ability, Goal alignment ability, goal perception ability, power to continue education in case generation of problems, define learning success Ability, set goals effectively ability, set burning goals ability, Recognition learning style Ability, ability to select and using from content and educational context Proportionate to learning style, Familiarity with teaching methods, recognize current Ability and necessary motivation, ability to increase current motivation, perception of e-learning system concept, digital content, role of learner and professor, Learner control, Change management ability

The results were analyzed and expert opinions priorities were identified. In the next phase, relationship between the factors raised in the priority expert opinions was interpreted. In this regard, their commonalities were combined in one subset and some less relevant cases were excluded. In order to achieve this, various useful preparation and support factors, which had the same content and concept, were classified into the same category (Table 3).

Table 3. E-learners' readiness aspects in proposed framework based on experts' comments priority categories

Proposed framework facets	Features of facets
Technology self-efficacy	Feel confident of using hardware/ Software/Network and probable problem solving
Access to necessary tools	Access to proper hardware/Software and internet/Appropriate skills to use hardware/Software and internet
Proper studying habits	Complex educational topics reading ability/Ideas and thoughts writing ability/ focus ability/Studying independently/personal progress and delivery time monitoring/Time management ability
Self-directing	Independency in learning/ learning responsibilities/Innovation/desire to help searching/Valorize personal learning/Having goal setting/Information processing/Cognitive executive and decision making skills/Self-awareness and self-monitored ability/ Deep processing skills/Content competence
Efficient online communications	Create effective online communication Ability/Using online communication tools properly/Familiarity with successful online interoperability principles/Collaboration in different ways
Meta-cognitive ability	Having meta-cognitive knowledge/Regulation and experience/Receipt Ability/Organizing/Using and maintenance information and knowledge/Self-assessment ability
Ability for goal alignment	Goal alignment ability/Goal perception ability/Power to continue education in case generation of problems/Define learning success Ability/Set goals effectively ability/Set burning goals ability
Learning styles	Recognize learning style ability/Ability to select and using from content and educational context Proportionate to learning style
Motivation	Recognize current ability and necessary motivation/Increase current motivation ability
E-learning concepts familiarity	Perception of e-learning system concept/Digital content/Learner and professor role

E-learners' readiness framework is presenting, aiming to covering all the e-learners' readiness requirements:

Table 4. The proposed solutions for learners' primary readiness

Descriptions	Proposed solutions
- Learners' technical readiness assessment -Readiness assessment in self-directed oriented learning -Learners' learning styles assessments	Providing the opportunities for learners assessment
-Technical problems education -Self-directed learning education and awareness -E-learning concepts education and awareness -Meta-cognitive, goal alignment, proper studying habits education -Effective communication education	Organize the educational courses
-New technical tasks gradual introduction -Using various educational styles in order to learners' supporting	Providing the transfer structures from traditional learning to e-learning

Figure 2. E-learners' readiness framework

VI. ANTICIPATED SOLUTIONS FOR IMPLEMENTATION OF PROPOSED FRAMEWORK

Taking into account thee-learning system definitions and features as well as the anticipated topics for e-learners' preparation, we can classify learners' preparation into "primary preparation" and "continuous preparation and supporting".

In primary preparation, topics such as learners' assessment in technical readiness, readiness for self-directed learning and proper learning styles, organizing required courses of education for readiness, and learners transfer space from traditional education to electronic education are considered. With regard to continuous preparation as well as support, issues such as learners' supporting services and proper supporting services in learners' maintenance helping successful completion of e-learning courses, are considered.

A. Providing the proposed solutions for learners' primary readiness

The strategies already mentioned in this section can improve the possibility of learners' success in e-learning environment. The first strategy is providing opportunities for learners to self-assess in technical readiness, readiness for self-directed learning and proper learning styles. The second strategy is to provide required educational courses for preparation. After this step, it would be necessary to provide the trouble-free acceptance of requirements, and e-learning exceptions transferring learners from a traditional learning to an e-learning space. Finally it would be possible for learners to be more successful by supplying learners' supporting services, which are available during e-learning experience. Some of the suitable approaches to achieve these strategies are explained in [7].

B. Providing the opportunities for learners assessment

1) Learners' technical readiness assessment

In order to assess the learners' technical readiness, usually questionnaires are prepared. The remarkable point is that the questionnaires require learners' minimum requirements to start a course, is considered and there is no need to consider all technical issues requirements, which may be needed. Actually the learners, who collaborate at these education courses and trends to self-direct more and more, and having basic technical knowledge, can learn special technical skills for their own education courses.

2) Learners' readiness in self-directed learning

Independency, independent learning management and planning or self-directing in learning is very important. Therefore it is necessary for learners to be assessed by available questionnaires or by the questionnaires which are prepared relevant to the education courses requirements.

3) Learners' learning style assessment

Learners collaborate in learning process by using different methods and styles for receiving and processing information. Although some learning assessment styles results are so complex and difficult to the extent that some learners cannot recognize and follow their better style, but the most learners understand the result of assessments easily and do their educational selection with respect to assessment results. The remarkable point about learning styles assessment is using questionnaires having validity and reliability. That's better after assessing, the result of assessment is provided to the learners, and in this case they can choose the appropriate educational

alternative and strategies. Of course it is possible to provide learner, appropriate content and educational materials by automation learning management system. Even if the education system does not have difference education content and material to cover the styles types, the awareness of the styles will help learner to use the educational aid tools. As an example, the learner who learns by listening can record the teacher' voice and class discussions to listen again, instead of taking notes.

VII. Organizing Educational Courses

A. *Technical problems education*

While deficiencies and problems observed in results of assessments are considered before starting the main courses, learners' success will be facile. Organizing a short education session or suggesting the education classroom and workshop to learners, can help weak learners in a technical field. Organizing a primary face-to-face education session can be the best start for the new learners. In this session they can learn the necessary technical skills, then examine them to become familiar with e-learning environment, thus to get the opportunity of asking question and receiving the emerge answers from the teacher. If it is not possible to organize the course presence, an online class can be replaced and also it would be possible to create some groups including specialists and amateur learners by using assessment results of technical readiness and utilizing the learners supporting for each other styles.

B. *Self-directed learning education and awareness*

Organizing an informant session provides motivation and desire to move from old learning patterns to the modern methods and patterns for the learners' low readiness level with regard to self-directed learning. Self-directed learning is a natural process where is missed in many cases in teacher-oriented classes. Teachers tell learners how to learn what at what time, and also are charged to do final confirmation. Actually, one of the main learning topics is self-directing: how to make communication effectively, how to solve the problems or develop new products, how to make ready ourselves to prepare career, and what are our educational goals and requirements. All these are examples for self-directed learning projects. Primary familiar session in order to make these changes and move to this goal will be useful. In such session the main self-directed learning concepts, principles and challenges can be presented.

VIII. Providing the Transfer Structures from Traditional Learning to E-Learning

In addition to assessment, technical education and self-directed learning, e-learners require support to transfer from traditional educational to modern education space as the first e-learning experience.

A. *Progressive introduction the new technical tasks*

Learners unfamiliar with virtual class, encounter difficulties in first learning activity for using the virtual class online group discussions. The first learning activity should start with more simple actions and tasks, and the complexity thereby is increased slowly. All technical users' activities and tasks should be referenced to the user's manual. As the high-quality educational planning shifts from simple to complex, a high-quality planning in technical problems movements from simple technical skills to complex ones comes necessary.

B. *Using different educational methods for learners' support*

Providing the different educational methods including completely traditional and class-centered, rather course-centered, rather electronic and completely electronic, will tremendously affect learners' stress reduction and their familiarity with e-learning. Many problems happening in e-learning are due to this point of view, all or none, to the educational styles topic. Often, e-learning courses completion rate is low, or in case of completion, it does not have high-quality educational results. One of the main reasons is insufficient learners' readiness for this change. If most learners have the common usage of e-learning and presence classes opportunity at first, they will get used to e-learning with low stress and concerns.

After the learners were used to e-learning features and specificities and could utilize them in an acceptable way, their requirement for the face-to-face connection would be reduced. Of course, it is necessary to consider the point that e-learning would not be necessarily useful for all concepts and courses.

In this case it would be important to consider the following points:

1. Preparing the exact list of educational courses' technical requirements
2. Preparing the priorities list in technical issues for presenting in technical readiness session
3. Preparing the help documents on how to do online and offline activities like collaborating in virtual class, using the groups and discussions, progressing control and scores and financial issues …and presenting them to learners in a systematic or manual way.
4. Preparing the help documents for effective digital library usage
5. Preparing the instructions that help learners to move from self-directed learning [7].

A. *Learners' continuous and ongoing readiness with the purpose of support*

After the learners' introduction and primary readiness (including initial technical readiness, primary readiness in self-directed learning and initial concepts of e-learning introduction), providing proper supporting services in learners' maintenance and help for successful completion of educational course can be effective[8]. Providing proper support in an e-learning system can be classified into three categories of "Support as learner centered design", "Technical

supporting" and "Teacher's supporting of learner (educational supporting)".

1) Support as learner centered design

With regard to this point in e-learning, the most focus is on learner in a dynamic process from the beginner to the expert in nonliner and changing, so some valid research principles maybe required for understanding and creating learning experiences which invest on richness and human learning complexity. Learner centered design is the view where links toghether focus on learners individually (their psychological and phisycal features, experients, opinions, history, capacities, talents, appliactions and requiremnets) with the focus on learning (best available knowledge about learning and it is happening mode) and the most effective teachers' activities to increase learning motivation and learners' success. This point of view, in fact, is the reflection of using psychologic principles based on learner in plans, activities and policies that support learning for everyone. In this section some practical requiremnets are proposed to create e-learning activities based on learner in four general categories, as illustrated in [12].

For important factors in e-learning based on learner implementation, we can mention the bellow services as followings:

Executive and information supporting, academic skills aid, online academic consultant [20], interface based on learner, digital library in e-learning [21] and general policies [22].

Table 5. Practical Requirements to Create Learner Center Design E-Learning Activities

Main factors	Description
Meta-cognitive and cognitive factors	- Planning proportional supporting to online activities - Create customized and nonlinear links for available and new information - Developing the digital literacy and strategic thinking via search and research, and extract proper resources and using electronic information and changing and difference resources
Stimulus and motivation factors	- Supply technical support such as requirements assessment, pre requirements, emails, peer networks, online chats and forums - Providing create e-portfolios and the other credible assessments such learner's self assessment and topics that describe the online collaboration
Developing social factors	- Create direct link to resources and discussions and help learners to reach the next development level - Supply the online facilities to crate online communications, social development, and also encourage to social exchanges, making trust, make the sense of activity and social collaboration
Personal different factors	- Create different paths via text, graphic, audio, picture or animation that more learners can be informed of customized learning and nonlinear learning environment features - Supply the ways to determine the homework scores electronically via different assessments and give feedback and provide the scores electronically.

2) Teacher's supporting of learner

In teaching activity, Rourke, Anderson and Grisoun proposed three key roles to create an efficient teaching. The first role is planning and organizing the learning experience that happens before forming the learning community and during it is activity. The second role includes implemention of the activities that encourage the learners, learners and teachers, a learner and a group of learners and content resources to discuss. Finally the third, is the educator's role, when uses the special skills through the education instruction beyond the learning experiences mangement. In many domains, specially advanced courses, teaching component will devolve the learners, and skills and knowledge are therefore used to develop the learning communities. In addition to these tasks, in formal education, school and educators play an important role with respect to providing certification, including leraners' learning assessment and confirmation [20].

3) Technical support

Learner should know what the required technology for online environment is, before making any decision to register.

Someone who enters into the e-learning environment needs an available and clear supporting. Usually differentiation between clear technical supporting and educational supporting is considered as a challenge and this kind of supporting is coordinated accurately. There are three types of usual supporting:

- An information center where provide the planning and educational information
- Help desks which solve the technical problems
- Contact centers which usually are used to support the special domain.

All of three must work together to support the whole education process [20].

VI. CONCLUSION

Developing countries such as Iran are in initial steps of entrance experience, and modern technology is being utilized in applied domains such as education. Success in passing transition steps from traditional system to modern system requires an exact identification of current state, planning and explaining appropriate road map to design the desirable state based on same indigenous concerns and potential and de facto facilities and capacities. What is considered in this research, is considering learners' readiness assessment to begin learning and supporting process in this case. It is also shown to be necessary to prepare the learning process having an efficient e-learning system from start to end. For this purpose, in this paper a framework was proposed for learners' readiness assessment and support including aspects, such as; components related to required skills for learners' success in e-learning and successful learners' features. In order to present the capacity of this framework, which is prepared in education field and is validated based on group of experts, next step would be suggesting the practical solutions in two levels; primary and continuous. In the first level, addition to learner's readiness assessment education by assessment, organizing required courses and providing transfer structures from traditional learning to e-learning will transfer to him/her. At second level, continues learner will be benefited by learning system planning, educator's supporting style and technical supporting.

The framework in this paper is proposed for education courses and components and proportional solutions based on learners' features and education knowledge domains are also recommended. With regard to the main question of this research and importance of learning role in every education course, the proposed process for analysis and extraction of this framework can be used in other levels a prior to university, organizational courses, or even general courses and special courses and provide proportional components and solutions with the course features.

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