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Relations between online learning and learning styles

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Abstract

In recent years, research works that aim to designate online learning environment based upon learning styles increase substantially. In our research work; we evaluated researches are concerned with both online learning environment and learning styles together in the last decade. We investigated research works are accessible on Internet and evaluated research works are carried out according to the years, countries, and education levels, preferred learning style models, online learning environments and commonly used research methods. In almost all of the research works are done; mostly cognitive learning style models have been used. However, there are two basic research approaches are conspicuous in the research works that are examined by us. According to first of this research approaches, some researchers have investigated that presentation of learning content and learning tools are designated based upon learning styles in the online learning environments is a factor which impacts academic achievements of the learner. In the other research approach, researchers have used learning styles as a supportive factor to design the online learning environments for personalized online learning. In our research, examples both of these research approaches have been examined. As a result, it is saw that, improving of the academic achievements in online learning not only learning styles by itself are utilized on online learning and also motivation of the learner, demographics factors, teaching strategies and teaching methods should be considered.

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Keywords: Learning styles; online learning; learning styles in online learning; online learning styles.

1. Introduction

Nowadays, rapidly developments on science and technology affect all fields and force to change and advancements of them. One of these fields is education is affected the respective advancements and obligated to continually renovate.

Recently, in teaching-learning processes, a teacher’s role is not rather than make information transfer, he (she) is became a situation such as an advisor or a guidance. In addition; learners try to construct your knowledge by themselves in a learning environment, in short they learn to learning. Learning ways or preferences which are used

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to learn or remember a new knowledge by the learner are called as “Learning Style”. Some learners can learn the knowledge in the act of interactive with her (his) friends and teachers together and active experiences by themselves, the others prefer to learn with visual materials. Also, some learners want to make use of written materials and they accept that verbal explanations are more effective for themselves (Felder, 1996).

Today’s learners can use some different ways to learn. One of them is technology based environments is inclusive of using of computers and Internet. Online learning is one of these type environments. An attractive side of online learning is that education service to come to the learner itself and flexible usage of it. In online learning, to perform effective instructional design is being difficult because of the learners characteristics that are related to learning are not being known. As a matter of fact, to bring into existence of effective learning for the learners in online learning environments, needs and expectations of the learners that are in these environments are comprehended and development of convenient environments which are adequate for different learning styles are required. Technology density environments cause a change of learning styles of the learners and bring up a concept that is “online learning style” to the agenda. It is possible that researches is mentioned about the relations between online learning and learning styles are encountered with in our country or in the world.

The main purpose of this research is that to summarize research works which are related to online learning styles are done in our country and the world, and to present suggestions about practicable researches on this field. In this paper, we investigated research works which are studied on the relations between online learning and learning styles, and also we tried to determinate disparateness among performed researches according to years, countries, and education levels, preferred learning style models, online learning environments and commonly used research methods. From this point of view, firstly, learning style and online learning have been explained and then theoretical and practical research works which are studied on the relations between online learning and learning styles have been evaluated.

2. Learning Style

Learning style concept has been used firstly by R. Dunn in 1960. Thereafter, Kolb has been developed researches on “Experiential Learning Theory”. He made these assistive researches to support that concept.

Keefe (1979) explained learning style as signed indicators that how the students perceive, interact and response to learning environments.

Gregorc (1979) states that learning style composes of distinguish behaviors which shows how the student learns knowledge from environment and adopt to himself these knowledge.

Dunn & Dunn (1993) defined learning style as each student uses distinguish and personalized unique ways, while they proceed to learn and memorize a new knowledge.

Ursine (1995) expressed learning style as unchanged personal process group which guides for us while we take a knowledge from our near environment.

Şimşek (2001) clarified that learning style is group of factors which determines how the students psychologically perceive, interact and response to learning environments.

Previously mentioned definitions are reviewed, common expression in all of them is that learn learning speed, learning form and comprehension form for the information are different among the individuals.

Felder who is one of the researchers that are made researches are related to learning styles expressed that there are differences among the learners in the way of their learning, some learn by reflecting and acting, seeing and hearing, reasoning logically and intuitively or analyzing and visualizing (Felder, 1996).

It is considered that if learning styles of the learners can be determined and learning environments are designed according to that, academic achievements of the learners will be increased (Babadogan, 2000). Learning styles aims personalization of the learning by finding of clues with regard to their learning and to establish a ground to each learner to study by individually or in small groups. Akkoyunlu (1995) is pointed out that determination of the learner’s learning styles can assist to teachers for the matter is that a method how to develop in teaching process. Determination of the learner’s learning styles is a benefit in terms of the learners, also. Therefore, if the learners have knowledge of their learning styles, in the learning process, they can see their weak and strong sides in regard to their learning and they can tend to suitable learning environment and learn knowledge easily and permanently, also.

Until today, a lot of research works has been done about learning styles and developed a good deal of learning style models. Some of them are Kolb Learning Style Model, Dunn & Dunn Learning Style Model, Gregorc Learning
Style Model, Butler Learning Style Model, McCarthy (4 MAT) Learning Style Model, Canfield Learning Style Model, Silver-Hanson Learning Style Model, Witkin (field-dependent, field-independent) Learning Style Model, Felder-Silverman Learning Style Model, etc.

3. Online Learning

In the literature, the explanation of the online learning has been used different terminologies. Because of this, makes it difficult to develop a generic definition. Terms that are commonly used include e-learning, Internet learning, distributed learning, networked learning, tele-learning, virtual learning, computer-assisted learning, Web-based learning, and distance teaching (Anderson & Elloumi, 2004). In the literature, there are many definitions which are reflect the diversity of practice and associated technologies of online learning. For example, while some researchers define online learning as educational material that is presented on a computer, the others defines online instruction as an innovative approach for delivering instruction to a remote audience, using the Web as the medium (Anderson & Elloumi, 2004).

However, today’s definition for online learning not involves just the presentation and delivery of the materials using the Web, also it involves the learner who use the Internet to access learning material, interacts with the content, instructor and other learners. In addition it involves the learning process which should be obtained support for the learner in order to acquire and construct knowledge and to grow from the learning experience (Anderson & Elloumi, 2004; Dietinger, 2003; Wentling, Waight, Gallaher, Fleur, Wang & Kanfer, 2000).

Briefly, we say that online learning can be defined as an approach to learning and teaching process that utilizes acquisition and usage of the knowledge in an educational context by using primarily Internet and communication technologies in collaboration.

We saw different classification of online learning in the literature. Solomon Negash and Marelene V. Wilcox (2008) make most comprehensive classifications of online learning according to presence and communication properties. It is defined as real-time presence where both the instructor and learner are present at the time of learning content delivery. In addition, physical and virtual presence terms are included by them. The other is communication, that is defined as the content delivery include whether electronic communication or not.

According to these classifications of online learning, online learning can be face-to-face. An example of face-to-face online learning is a traditional class that utilizes PowerPoint slides, video clips, and multimedia to deliver content. Online learning can be designed for a self-learning approach. This type online learning is an example of hypermedia based learning. Learners receive the content media and learn on their own. It is content delivered on a specific subject or application using recorded media like a CD ROM, DVD or web based courses. Online learning can be in the asynchronous format. The communication between the instructor and the learner is occurred in the asynchronous format, especially over the internet. In this format, the instructor and learner do not meet at the time of content delivery. But, rich interaction is occurred by using e-learning technologies like threaded discussion boards and e-mail and instructors may post lecture notes for online access and schedule assignments online. Typical example of this type online learning environment is the Learning Management Systems. Online learning can be in synchronous format. In this format, the instructor and learner do not meet physically; however, they always meet virtually during content delivery. Typical example of this type online learning environment is the Video conferencing. Lastly, online learning can be blended or hybrid online learning format. This is a combination of face-to-face and asynchronous online learning. In this research, all of these types of online learning have been distinguished in the searched studies.

Recent developments of the online learning are also related to Adaptive educational Hypermedia Systems (AEHS). An AEHS aims to build a model of the goals, preferences and knowledge of each learner and use this model throughout the interaction with the learner, in order to adapt learning content to the needs of that learner (Brusilovsky, 1996). For example, in an AEHS, learning content that is adapted specifically to the learner’s knowledge of the subject is given to the learner. In addition, AEHS can support learners in their navigation by limiting browsing space, suggesting most relevant links to follow, or providing adaptive comments to visible links (Brusilovsky, 2003). Over the last five years, AEHS researches are centred on learning style based personalization researches (Brown, 2006; Paredes, 2004; Piombo, 2003; Shanghua Sun, 2005).
4. Method

In this research work, we used documental scan method aimed at investigation of resources that are accessible on electronic environment in national and foreign.

While doing documental scan, we paid attention to select research works are appropriate for our research topic and give a suitable answer to the questions which are related to our research objectives. Scope of the research, research works are completed between the years on 1998 and 2008 in Turkey and the world are investigated in regard to years, countries, educational level, preferred learning styles and research methods.

5. Research findings

In this research work, we scan totally fifty four (54) number research works that are completed between 1998 and 2008 in national and foreign, with various parts of them. We present the findings below. These findings are found out as a result of descriptive statistical analysis on the strength of sub goals of this research.

5.1. Findings for years

The research works which are studied on the relations between online learning and learning styles are realized mostly in years 2004-2006. There are totally twenty eight (28) number research works in this period. In addition to this, there are eighteen (18) number research works has been studied in the year between 2002 and 2004. According to decade which is between the years 1998 and 2008, we say that there is a growing interest in this research field after the year 2001.

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998</td>
<td>0</td>
</tr>
<tr>
<td>1999</td>
<td>4</td>
</tr>
<tr>
<td>2000</td>
<td>1</td>
</tr>
<tr>
<td>2001</td>
<td>3</td>
</tr>
<tr>
<td>2002</td>
<td>6</td>
</tr>
<tr>
<td>2003</td>
<td>5</td>
</tr>
<tr>
<td>2004</td>
<td>7</td>
</tr>
<tr>
<td>2005</td>
<td>11</td>
</tr>
<tr>
<td>2006</td>
<td>10</td>
</tr>
<tr>
<td>2007</td>
<td>3</td>
</tr>
<tr>
<td>2008</td>
<td>4</td>
</tr>
</tbody>
</table>

5.2. Findings for countries

When examined research works between the years 1998 and 2008 in regarding to countries, we say that most of the research works in this field has been recognized in America. We encountered with thirty four (34) number researches which are doing in this country. However, there are only (5) research works that have been recognized in Turkey. The researches works are recognized in other countries (Norway, Greece, New Zealand, Ireland, France, Finland, Spain, UK, Hong Kong, China, Taiwan) are considerably low. In some research works (4), we did not discover any information about the country where the research work is done.


Table 2: Distribution of the research works according to the countries.

<table>
<thead>
<tr>
<th>Country</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turkey</td>
<td>5</td>
</tr>
<tr>
<td>America</td>
<td>34</td>
</tr>
<tr>
<td>Others</td>
<td>11</td>
</tr>
<tr>
<td>Not definite</td>
<td>4</td>
</tr>
</tbody>
</table>

5.3. Findings for the level of education

Most of the research works have been applied for undergraduate level. We encountered with thirty six (36) number researches which are doing for undergraduate level. There is almost limited number of study for other level of education. In ten (10) number of the research works, we did not discover any information about the level of education which the research work is applied.

Table 3: Distribution of the research works according to the level of education.

<table>
<thead>
<tr>
<th>Level of Education</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undergraduate</td>
<td>36</td>
</tr>
<tr>
<td>High school</td>
<td>4</td>
</tr>
<tr>
<td>Graduate</td>
<td>3</td>
</tr>
<tr>
<td>Postgraduate</td>
<td>1</td>
</tr>
<tr>
<td>Not definite</td>
<td>10</td>
</tr>
</tbody>
</table>

5.4. Findings for online learning types or environments

At investigated researches, mostly blended online learning, asynchronous online learning, synchronous online learning, hypermedia based learning environments has been preferred. Among of them, mainly preferred environment is asynchronous online learning (19) environment. Following to this, secondly preferred environment is hypermedia based learning (9) environment. Otherwise, especially since 2003, there are research works that are related to adaptive educational hypermedia systems (4) based upon learning styles. Besides, three (3) number of the research works that are recognized in synchronous online learning environments. In addition, in eight (8) number of the research works, preferred environment is indicated as online learning environment, but property of that online learning environment (such as synchronous or asynchronous) is not clearly explained.

Table 4: Distribution of the research works according to online learning types or environments.

<table>
<thead>
<tr>
<th>Online Learning Environment</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adaptive Educational Hypermedia Systems</td>
<td>4</td>
</tr>
<tr>
<td>Asynchronous Online Learning</td>
<td>19</td>
</tr>
<tr>
<td>Synchronous Online Learning</td>
<td>3</td>
</tr>
<tr>
<td>Online Learning Environment</td>
<td>8</td>
</tr>
<tr>
<td>Wireless Online Learning Environment</td>
<td>1</td>
</tr>
<tr>
<td>Face-to-Face Online Learning</td>
<td>4</td>
</tr>
<tr>
<td>Hypermedia Based Online Learning</td>
<td>9</td>
</tr>
<tr>
<td>Not definite</td>
<td>6</td>
</tr>
</tbody>
</table>

5.5. Findings for learning style models

At the research works are related to the online learning environments based upon learning styles, generally, Kolb learning style model has been preferred. Seventeen (17) number of the research works that have used this model. Following to this, in some research works (11), Felder and Silverman learning style model has been preferred and
used. The other learning style models such as Dunn & Dunn, Neomillenial, Canfield, Witkin and etc. are used rarely.

Generally considering, in the years between 1998 and 2008, research works are examined to determine dominant learning by using a variety of learning style models as base in online learning environment is show that there is a growing interest in this field. Most of the research works that are studied on the relations between online learning and learning styles generally preferred the use of cognitive learning styles instead of physiological and sensory learning styles. Besides, in three (3) number of the research works, preferred learning style models not be explained clearly. Otherwise, in one research work a new learning style inventory that is specialized for online learning has been proposed. The researcher said that this new model is developed to help instructors or online learning course designers to understand students’ learning styles, as a reference to design suitable course and teaching methods (Yu-Ching Liu, 2008).

According to Table 5, in four (4) number of the research works that use face-to-face online learning approach, a comparison has been made in these research works in regarding to effectiveness of learning styles in online learning and traditional classroom learning. As a result of that, there is not a meaningful difference in regarding to academic achievements, when a comparison is made between learning styles in online learning and learning styles in traditional classroom learning.

In some research works, learning style has been presented a key to design online learning environments to support personalization. In this work, four (4) number of the research works have been investigated in this type. Online learning environments that are mentioned in these researches are named as AEHS. These research works are mostly in design level. Because of that, in research works is concerning with these systems, has not been explained distinctly effectiveness of learning styles on online learning. In this field, there are needs to do more researches.

5.6. Findings for the research methods

At most of the investigated research works, quantitative research methods have been used instead of qualitative research methods. When considered from research types, there is mostly empirical (34+1) research works in this
field. Following to this, there are (12) descriptive research works. There are (3+1) design based research works that are recognized to compose adaptive educational hypermedia systems on the basis of learning styles (Brown, 2006; Paredes, 2004; Piombo, 2003; Shanghua Sun, 2005). Only one of these research work is not only recognized to design an AEHS that is based on learning styles also, recognized a limited empirical research on that system (Brown, 2006). Otherwise, Three (3) numbers of the four (4) design based research works are related to design hypermedia based learning environment based on learning styles (Hong Hong & Kinshuk, 2004; Mu & Ding, 2005; Vasilyeva, 2006). Only one (1) number of the four (4) design based research work is related to design asynchronous online learning environments based on learning styles (McNutt, 2005).

Table 6: Distribution of commonly used research methods for the researches

<table>
<thead>
<tr>
<th>Method</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Descriptive</td>
<td>12</td>
</tr>
<tr>
<td>Empirical</td>
<td>34</td>
</tr>
<tr>
<td>Design</td>
<td>7</td>
</tr>
<tr>
<td>Design+Empirical</td>
<td>1</td>
</tr>
</tbody>
</table>

In the research works are concerned with both online learning environment and learning styles together; not only findings about the researches methods have been evaluated and also findings about the independent variables which are used in the research works have been evaluated. In twenty nine (29) numbers of totally investigated fifty four (54) number research works, some different independent variables have been used apart from learning style variable. According to this, mostly inspected independent variable is relation between learning style and teaching strategies. There are thirteen (13) number research works are analyzed this relation. Additionally, we are encountered with six (6) number research works that are analyzed the relation between learning styles and teaching methods. The other important independent variable which is analyzed in online learning environment with learning styles is demographic factors is concerned with age, gender, etc. There are nine (9) number research works are analyzed this relation.

Table 7: Independent variables in the research works.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning Style &amp; Online Learning</td>
<td>54</td>
</tr>
<tr>
<td>Teaching Strategy</td>
<td>13</td>
</tr>
<tr>
<td>Demographic Factors</td>
<td>9</td>
</tr>
<tr>
<td>Teaching Methods</td>
<td>6</td>
</tr>
<tr>
<td>New Learning Style Model for Online Learning</td>
<td>1</td>
</tr>
</tbody>
</table>

6. Conclusions

Individual differences are important in learning environment design. When the findings have been analyzed, place of articulation of the research works that are related to both online learning and learning styles are using of different ways in learning of the learners and being of individual differences.

However, mostly as-build, learning style models that are developed by observing of the learners in the traditional learning environments have been implemented by empirical or survey methods to the learners who are learn in online learning environment. By this way, learning styles of the learner who learn in online learning environment have been tried to classify. Any research work is directly to observe the learners in online learning environment according to determination of the expectations and needs of the online learners has not been discovered. Most of the researchers have not explained the reason is related to why that learning style is selected to examine learning style variables in online learning environment. On the other hand, the relation has been brought into connection with between learning styles of the learners in online learning environments and academic achievements of them. But; there are some results of the research works indicate toward a weak relation which is come in view in this point.

In almost all of the research works are done about online learning and learning styles; mostly cognitive learning style models have been used. There are two basic research approaches are conspicuous in the research works. First
of these approaches, some researchers have investigated that presentation of learning content and learning tools are designated based upon learning styles in the online learning environments is a factor which impacts academic achievements of the learner. In the other approach, researchers have used learning styles as a supportive factor to design the online learning environments for personalized online learning. In our research, examples both of these research approaches have been examined.

In conclusion, in the research works are done about online learning and learning styles, learning styles are not unique factor that affects to improve of the academic achievements in online learning environments. Also, some additional factors like as motivation of the learner, demographics factors, teaching strategies and teaching methods should be included in the researches and then doing of new researches should be beneficial.

According to the solutions of the investigated research works, some suggestions have been advanced below, to guide to the researches which are planned to do in the future

After the interest, needs and expectations of the learners in the online learning environment have been detected, new learning style models can be developed according to emergent findings.

Research works are done about online learning and learning styles should be improved in Turkey. In this manner, whether an intercultural difference is being or is not being can be investigated.

Number of research works is done about online learning and learning styles can be improved not only in higher education and also in other education levels.

In some research works are related with online learning and learning styles are claimed that learning style affects to academic achievements of the learner, otherwise, in others are explained this affect is as not or very limited. So, in-depth researches can be done on this manner.

As a result that, nowadays, considering rapidly growing of the information and communication technologies, for development and increase of the technology aided learning systems, doing of a good deal of researches benefit in terms of future of the information societies

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