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Full Length Research Paper

Emergence of web 3.0 with e-learning

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Since the beginning of the web, and in their evolutionary process, the web has developing been important changes in education to the degree that has become possible to integrate web 1.0 and web 2.0 e-learning tools, in a big part, has benefited in its development because of the huge momentum achieved with the emergence of internet, and the world wide web, possibilities of great opening, facilitating the methods and strategies that allow the emergence of e-learning, and therefore, access to knowledge. Before the emergence of a new paradigm such as web or the semantic web 3.0, it is necessary to study the possibilities that this area offers for the educational environment, particularly for distance education. This research document is about the possibilities opening up in education by developing this environment, which according to its characteristics, is transforming the web into a whole environment for true knowledge management, and may well be completely utilized by the area of education strategies and make the semantic web a facilitator in the educational process. This study presents an overview of the new paradigm of web 3.0 or semantic web from the point of view of their applicability in educational virtual environments, emphasizing the potential of this and the possibilities in could provide education in the new functionality for the management tools used of educational content in web environments. On this issue, Arroyo and others (2008) point out that achieving this goal involves the creation of entire technology architecture, which contemplate the battery technology. Moreover, these authors also highlight the fact that it requires solving various technical and theoretical problems that have prevented the goal, mainly with regard to the creation of ontologies for each domain of knowledge, and the expressive power of these, plus everything about the logical layer and inference engines that enable to extract knowledge content on the web.

Keywords: e- learning, distance education, web 3.0, training, semantic web

INTRODUCTION

Educational visionaries and reformers have held high hopes for the use of technology to improve the quality of education. Distinct from technology education, which emphasizes technology skill development as a content area, educational technology is used to enhance or augment instruction in other subjects. With each innovation, in communications technology during the 20th century, claims have been made that their use in classrooms would revolutionize the educational process, improving effectiveness, resource efficiency, and/or pedagogical approach. Advocates promoted the adoption of educational motion pictures in the 1920s, educational

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radio in the 1930s, educational television in the 1950s, personal computer use for education in the 1980s, and classroom use of the Internet in the 1990s. The general consensus of those who have studied technology's influence, however, is that these innovations have failed to engender either significant learning benefits or reform in mainstream schooling.

Assessments of educational technology's value and effectiveness are in part influenced by the definition of the term that is used. Current, idiomatic usage tends to assume that technology refers to devices, especially digital innovations, such as software, laptop computers, and PDAs, that are used in learning contexts without inherent consideration of the device's pedagogical design. Many of those who conduct educational technology research, however, hold an alternative perspective that defines educational technology as an application of scientific principles to consistently attain specified outcomes. When this definition is used, pedagogical design itself is considered the dominant functional aspect of educational technology that drives student outcomes. The selection of media to deliver these technologies is driven solely by cost and organizational factors (Adobor and Daneshfar, 2006).

Literature review

One of the best–known proponents of this perspective, Richard E. Clark, argues that media can never influence learning, because media are "mere vehicles that deliver instruction but do not influence student achievement any more than the truck that delivers our groceries causes changes in our nutrition." Substantial empirical evidence supports this perspective. A meta–analysis conducted in 2004 synthesized 232 studies published between 1985 and 2002 studying the effectiveness of e-learning education technologies. Analysis found that research methodology accounted for the most variation in outcomes, followed by pedagogical approach, and then media. In general, the study found that e-learning education (delivered primarily through computer–based means) and classroom instruction are equally efficacious. Further, extreme variability in results from individual e-learning education studies led to the conclusion that the structure and relevance of the instruction to the medium has substantially more power than the medium itself (Chapman, 2008, September).

Not all scholars agree with this view. William Winn, another widely recognized leader in the field, characterized the development of educational technology as progressing through four "ages." The first age was that of instructional design, in which researchers and educators found that instruction could be planned and evaluated independently from human interactions with students. This allowed students to learn the material in a more efficient way in terms of both their cognitive effort and freedom to learn from material at their own pace without needing to be physically present in a classroom environment. The second age, message design, focused on the ability to use different media through which designed instruction could be delivered. The age of simulation emerged as computers and other media developed sufficiently to simulate real–world experiences that students could control as an aspect of the learning process, even if the activity would be too dangerous or otherwise impossible to perform in the real world (e.g., the visualization and manipulating of subatomic particles or the flow dynamics under pressure of deep-sea research). The current age of learning environments extends the developments of the age of simulation by facilitating multi-participant communication and social interactions around a learning activity. Although Winn acknowledged that pedagogical prerequisites must be met for learning environments to be effective, he maintained that delivery media could play a significant role in influencing learning independent of pedagogical design. He argued that the lack of empirical evidence to support this position was due to the use of research methods that were inadequate for understanding the nuanced learning that occurs in complex social learning environments (Alcock, 2008).

The emergence of web 3.0

In the current climate of uncertainty, the utmost caution seems necessary when one ventures on the shifting sands of what the future holds. The term Web 3.0 opens the developments that will succeed in Web 2.0. Tim Berners Lee in May 2006 highlighted the first feature to provide access to an unprecedented amount of data, easy to identify and locate.

For this reason, some focus on the concept of Semantic Web, although these discussions are already under development in the current web. Others see the spectacular development of virtual reality and 3D worlds. Still others are likely to qualify what might be a web 3.0.

Wikipedia says it could take the form of a proposed solution on the web (SaaS) without being a website to answer a mobility feature that would make it independent of the support which the vehicle (screen size, etc.). Universal, it would be supported by any operating system and any hardware (brand, software, etc.). Available (within the meaning of compliance to the W3C), it would be usable by a variety of applications, specific needs created by disability.

With caution, we believe that Web 3.0 will focus primarily on two key concepts that are part of governance and interoperability on the other. Governance is based on the need for shared rules in specific situations related to the use of network technologies, both in terms of internal use own labor organizations and external uses related to the general public. It will include, in addition to a specific regulatory framework, behavioral rules (principles of ethics and conduct).

This governance appears necessary because of the systemic development of information technology and communication in the various aspects of professional and personal lives. She will meet the requirements of clarifying the mechanisms of globalization underpinned not new technology, the example of the necessary regulation of e-business transactions (used in case of dispute) to the maze of local jurisprudence. It will also support the adoption of common rules in the field of knowledge structuring, like the model established by the DCMI (Dublin Core Metadata Initiative). Moreover, it will require the integration of these standardized rules in software applications as in the tools used by each.

Interoperability is based on the other hand the increasing ability of any application or product to connect and share with others without complex manipulation. More than just compatibility, this approach requires the description of the terms of trade. It is based on the definition of explicit standards, common standards for regulating the complexity of technical solutions and their opening for the purpose of communication and synchronization. Very operative, it would also result in simplification of standard connectivity solutions. 3.0 The Intranet itself is pregnant and its forms remain to be defined. It is however possible to identify some questions in the light of progress already. The structuring of the growing company, having invested in stages progressive spheres of information, communication, collaboration and knowledge management, led to perceive the emergence of a notion of collective intelligence, based on the interaction and a systems approach to work organization. Simultaneously, it is possible to see the following approaches.

First, flight by the systematization of indicators operates in a very fine multiple encrypted data traceability. The latter, in the context of human resources, open new perspectives in the field of variable compensation to the extent that it will be possible to determine the contribution of each to collective intelligence. Especially, the field of knowledge management will increase dramatically. The systematic use of metadata in content production will portray the heritage of fine and at the same time facilitate the accurate access to it. In the traditional distinction between data (basic information), information (data arranged to structure the way) and knowledge (structured information with metadata) will be added the notion of "knowledge" that address a range of knowledge listed according to their intrinsic value (e.g. patents) or their contribution to the know-how of the company (which is necessary for the formation of individuals and the spread of expertise).

RESEARCH METHODOLOGY

Research questions and hypotheses

1. Will employees who are trained using rapid e-learning simulations (experimental group) report a higher level of satisfaction with their training 6 experience than employees who receive the instructor led training (comparison group) ?
H 1: There is no statistically significant difference between the satisfaction level of the experimental group and the comparison group.
2. Will employees who are trained using rapid e - learning simulations (experimental group) report a higher perception of usefulness of their training experience than employees who receive the instructor led training (comparison group)?
H 2: There is no statistically significant difference between the perception of usefulness of the experimental group and the comparison group.
3. Will employees who are trained using rapid e - learning simulations (experimental group) report a higher ease of use of the new tool than employees who receive the instructor led training (comparison group)?
H 3: There is no statistically significant difference in the perception of ease of use between the experimental group and the comparison group (Byrne, 2002).

Research design

This study implemented a randomized post-test only experimental design. Participants were randomly drawn from the population for inclusion in the study. A random number generator was used to choose which participants were to be included in the experimental group and which were to be in the comparison group. The comparison group underwent the traditional training method, which was an instructor led training in a “lunch and learn” format. The experimental group received an email directing them to the rapid e-learning simulation training. Both training methods were implemented over the same time frame. Three-weeks following training, a post-test was sent via email in survey form. The survey was conducted using Survey Monkey, an online survey

instrument. Data from the instrument was gathered and three separate t-tests were used to determine whether a statistically significant difference existed in user responses between the two groups (Ali et al., 2008).

Population

The target population for this study was a medium-sized U.S.-based company providing Information Technology services to other firms. The company has slightly over 1500 employees with eight offices: six offices are in the continental United States, and two are off-shore offices in Panama and India. All employees are English speaking. Each employee in the firm required training on a new helpdesk system. Specifically, a self-help console was rolled out that enables the employee to create service desk tickets without calling in the ticket via the phone system. Once a ticket is entered, the employee may also edit, update, and track their service desk request using the same self-help console. Traditional training within the company was informal and was conducted within a "lunch and learn" environment, where employees were asked to attend training at 11 a.m. Lunch was provided during a two hour training session. During the training, employees listened to an instructor overview and demonstrate the new self-help console. The traditional training sessions utilized both demonstration and job aids to introduce learners to new technology. All employees participating in training were considered part of the target population.

Sample and power analysis

A simple random sampling method was used to ensure that the experimental and comparison groups were comprised of roughly the same mix of employees each. To create the simple random sample, all participants were randomly assigned to either the experimental group or the comparison group. To ensure randomization, each person was entered as a line on an Excel spreadsheet. Using a random number generator, the researcher then randomly picked someone for group 1, and then randomly picked someone for group 2, until both groups were filled. To obtain the optimum sample size for this study, a power analysis was conducted by using G*Power 3. According to Faul, Erdfelder, Lang, and Buchner (2007), G*Power 3 is a widely used statistical tool used for power analysis. Through the use of G*Power 3, it was determined that in order to achieve a power greater than or equal to .80 for a one-tailed t-test, the sample size necessary is 310 persons in each group. The power calculation is based on an alpha level of .05and a small effect size of (d = .2). Therefore, testing the hypotheses required a total sample of 620. To achieve this sample size, a return rate of 41% of the surveyed participants was needed. A cash incentive in the form of a drawing for one of three $50 gift cards was used to help increase survey responses. To control the treatment effect, training sessions provided the same training material to all participants (Allen, 2003).

Instrumentation

The instrument that was used in this study is an adaptation from the original technology acceptance model (TAM) used by Davis. This adaptation also used by Bradley and Lee (2007) incorporated a measure for training satisfaction in addition to perceived usefulness and perceived ease of use. Perceived ease of use, perceived usefulness, and employee attitude has been positively linked to intention to use. System usage, in turn, is often linked to successful implementation of a new technology. In Bradley and Lee's (2007) study, the authors found that training satisfaction was a key factor in employee's perception. Previous studies have also shown that training is able to impact an employee's perception of how useful new technology is and how easy it is to use. The instrument from their study contains two items measuring perceived usefulness (PU), one item measuring perceived ease of use (PEU), and three items measuring training satisfaction (TS). Bradley and Lee calculated the reliability at a = .838, which "exceeds the customary lower limit of 0.70". Bradley and Lee's (2007) original instrument was adapted slightly to better fit the subject of this study. The original study used the term "People Soft system." For this study, the term "People Soft system" was replaced with the study specific term "Self-Help Console." To ensure that the validity of the instrument is not greatly altered, items were evaluated by a 3- member panel of subject matter experts to verify face validity prior to the study. The Cronbach alpha was also calculated on the survey results (Bradley and Lee, 2007).

Data collection procedures

Three-weeks following training, all training participants received an email containing a link to the post-test survey. The survey was hosted on an online survey service. This same survey service was also used to tabulate the results. A notice of study participation preceded the survey and included the notice of informed consent. Participants indicated their agreement to participate in the survey by clicking on the link that took them to the questionnaire. Survey questions were in a 5-

point Likert scale, ranging from 1 – strongly disagree to 5 – strongly agree. Radio buttons were used to indicate their responses. Submitted data were logged in the survey service's database, which I later downloaded. The entire survey process took between 5 to 10 minutes (Allen, 2003).

Data analysis

Responses from the surveys were transferred to Statistical Package for the Social Sciences (SPSS) version 19.0 for analysis. Three separate t-tests were conducted to compare group differences. Statistical calculation was conducted specifically to address the following research questions.

Research question 1

Research question 1 tested whether employees using the rapid e-learning simulation reported higher satisfaction than employees who received the instructor led training. To answer this question a comparison of the experimental group and the comparison group's mean satisfaction scores was analyzed using an independent t-test. The hypothesis being tested is as follows:
H1: There is no statistically significant difference between the satisfaction level of the experimental group and the comparison group.

Research questions 2

Research question 2 tested whether employees who are trained using rapid e-learning simulations perceived that the self-help console was more useful than employees who received instructor led training. To answer this question a comparison of the experimental group and the comparison group's mean perceived usefulness (PU) scores were analyzed using an independent t-test. The hypothesis being tested is as follows:
H2: There is no statistically significant difference between the perception of usefulness of the experimental group and the comparison group.

Research questions 3

Research questions 3 tested whether employees who were trained using the rapid e-learning simulation reported a higher usage than employees who were taught using instructor led training. To answer this question the effectiveness measures and perceived ease of use (PEU) were analyzed for both groups. The perceived ease of use was analyzed using an independent t-test. The hypothesis being tested is as follows:
H3: There is no statistically significant difference in the perception of ease of use between the experimental group and the comparison group. To determine support for these hypotheses, the item responses for each category were summed for each participant. The mean score for the experimental group was then compared to the mean score of the comparison group to see if there is a statistically significant difference between the means of both groups (Alshare et al., 2009).

Statistical assumptions

Before conducting the statistical procedures, the data were analyzed to determine their level of compliance with associated statistical assumptions. The statistical assumptions common to testing a t-test include normality and homogeneity of variance. The assumption of normality was tested by examining kurtosis values. A Levene's test was used to assess homogeneity of variance (Bush, 2009).

FINDING, CONCLUSION, AND RECOMMENDATIONS

Data analysis

Each of the study's three hypotheses was analyzed using independent sample t-tests to compare the mean scores of the experimental group with the mean score of the comparison group. Table 5 reflects the analysis for a 95% confidence rating.
H1: There is no statistically significant difference between the satisfaction level of the experimental group and the comparison group.
The t-test revealed that though employees using the rapid e-learning simulation reported higher satisfaction than employees who received the instructor led training, the scores for the experimental group were not significantly higher than the comparison group, $t(389) = -1.29$, $p < 0.05$. Cohen's d was computed to be 0.13, which indicates a small effect size. The power achieved was.36 based on an alpha level of .05and an effect size of $d = .13$.
H2: There is no statistically significant difference between the perception of usefulness of the experimental group and the comparison group. The t-test revealed that employees who are trained using rapid e-learning simulations perceived that the self-help console was more useful than employees who received instructor led

training. However, the scores for the experimental group were not significantly different, t (389) = -0.60, p < 0.05. Cohen's d was computed to be 0.05, which indicates a very small effect size. The power achieved was.12 based on an alpha level of .05and an effect size of d = .05.

H3: There is no statistically significant difference in the perception of ease of use between the experimental group and the comparison group. The t-test revealed that employees who were trained using the rapid e-learning simulation perceived that the self-help console was easier to use than employees who were taught using instructor led training. The scores for the experimental group were significantly higher than the comparison group, t (389) = -2.68, p < 0.05. Cohen's d was computed to be 0.27, which indicates a moderately small effect size. The power achieved was.85 based on an alpha level of .05 and an effect size of d = .27.

This is above the generally accepted .80.

Summary

This section addressed the data collected and the statistical tests performed. This included a series of t-tests and measures of effect size used to substantiate the hypotheses. Of the three hypotheses examined, two (H1 and H2) found no statistically significant difference between the experimental and the comparison group. One hypothesis (H3) did find a statistically significant difference between the experimental group and the comparison group. Analysis of hypothesis three indicated a statistically significant difference in the perception of ease of use between the two groups (American Society for Training and Development, 2009).

Synthesis of findings

The study looks to focus on three major factors in determining the results. These factors give us an insight into the level of satisfaction the training instills in the trainees, how convenient do the trainees find the technology and how beneficial is the application of technology. The factors include;

- Training Satisfaction,
- Perceived Ease of Use,
- Perceived Usefulness

Cohen's d was used to measure effect size. SPSS 19.0 statistical analysis software was used for all analyses. For all three hypotheses, the experimental group showed higher scores than the comparison group. However, statistical significance was only found between the experimental and control group for one measure (Burke and Hutchins, 2007), Perceived Ease of Use. No statistically significant differences were found for Training Satisfaction or Perceived Usefulness. Conclusions Because corporate learning trends support the increased usage of simulation training created from rapid e-learning tools and the decrease in instructor-led training, this study focused on comparing user response from rapid e-learning to instructor-led training to verify the appropriateness of this trend. One commonly used measurement for gauging user response is the technology acceptance model (TAM), which has three measures: Training Satisfaction, Perceived Ease of Use, and Perceived Usefulness (Amin, 2009).

Findings

The results of the comparison of these measures are as follows:

H1: There is no statistically significant difference between the satisfaction level of the experimental group and the comparison group.

Training Satisfaction (TS) scores for individuals who took rapid e-learning simulation training were higher than the satisfaction scores for individuals who took instructor led training; however, the difference was not statistically significantly (p = .10, p>.05). Higher scores for e-learning participants were expected based on the increased ability to self pace and interact with the learning content. According to Orvis, Fisher, and Wasserman (2009), by increasing the learner's ability to control his learning environment, satisfaction with training is enhanced. This corresponds to Knowles (1996) suggestion that adult learners prefer learning environments that allow for self-direction. Although the analysis for this hypothesis was not statistically significant, the fact that there is not a statistically significant difference between the mean of the experimental group and that of the comparison group supports the current trend of using rapid e-learning. According to the results of this study, users were equally satisfied with training that was delivered using rapid e-learning as they were with instructor-led training. Thus, the trend of increasing the use of rapid e-learning as the method of training delivery, while reducing instructor-led training, may be considered acceptable based on user response (Anonymous, 2009).

H2: There is no statistically significant difference between the perception of usefulness of the experimental group and the comparison group.

Perception of Usefulness (PU) scores for individuals who took rapid e-learning simulation training were higher than the satisfaction scores for individuals who took instructor led training; however, the difference was not statistically significantly different (p = .276, p>.05).

Higher scores for e-learning participants were expected based on the ability to retake training at will and practice the learning content in simulation form. According to Rhude (2009), training using simulations can provide learners with "practical, hands-on experience that greatly increases skill learning and understanding". Unlike some instructor-led training, computer simulations can also provide immediate and continuous feedback that strengthens the perception of utility. Boothby, Dufour, and Tang (2010) proffer in the case of new technology adoption, different technologies require different skill sets and thereby different types of training. Boothby, Dufour, and Tang (2010) suggest companies engage in "strategic training," where they provide training that is closely influenced by the technology in order to realize greater usage by trainees resulting in greater productivity. Since the training used in this study involved the introduction of a new technology, perception of usefulness may have been influenced by the close proximity of the simulation to the actual instrument. Though the higher perception of usefulness was not found to be statistically significant, results of this study indicate that the trend toward increased rapid e-learning usage with simulations as a replacement for instructor-led training may be considered acceptable given that there is not a statistically significant difference in user response to the two methods of training. In answer to some critics who have suggested that simulation training produced using rapid e- learning tools are less effective as a training solution because production was not performed by professionals, results from this study indicate that in-house production of e-learning simulation training using rapid development tools appear to be as effective as traditional instructor-led training based on user response (Brown et al., 2003).

H3: There is no statistically significant difference in the perception of ease of use between the experimental group and the comparison group.

The Perception of Ease of Use was the only measure that produced statistically significant results ($p = .004$, $p<.05$). Cohen's d was computed to be 0.27, which indicates a moderately small effect size. The power achieved was .85 based on an alpha level of .05and an effect size of $d = .27$. Thus, the t-test revealed that employees who were trained using the rapid e-learning simulation perceived that the self-help console was easier to use than employees who were taught via instructor led training. Explanation for this result may be due to the realistic nature of the simulations produced. Rapid e-learning development tools use a process which involves taking screen captures of the software that is being recorded. By completing an audio enhanced simulation, the end user is able to complete a task that is very much like what would be encountered in the real world. Another explanation for the higher Perception of Ease of Use scores for the experimental group when compared to the comparison group is the influence of "digital natives." (Cabanero-Johnson and Berge, 2009) describe digital natives are younger individuals who have grown up with technology. This group of individuals prefers technology-based communication over "retro ways of content delivery". Though age was not a part of the demographic data collected as a part of this study, anecdotal accounts support the presence of many younger workers (Battle, 2000).

CONCLUSION

This study was limited to the use of one rapid e-learning development tool, Adobe Captivate. Each tool has its own unique features that may influence user acceptance. Future research could be done to test user response to the different rapid e-learning outputs from these tools. The focus of this study centered on the release of a new technology. Thus, the type of simulation involved screen captures of new software. Other types of simulation training used in organizations involve non-technically based training, such as management or "soft skills" training. Future research could be done to see whether rapid e-learning development tools can effectively create simulations for this type of training (Bell et al., 2008).

IMPLICATIONS AND RECOMMENDATIONS

While much research has been done in the area of e-learning in comparison to instructor- led training, little has concentrated on the use of rapid e-learning development. Many of the existing studies refer to professionally created e-learning and not rapid e-learning. This study adds to the body of research by focusing on the new trend of using rapid development tools for the production of e-learning simulations. As such, this study helps to affirm the decision to implement rapid e-learning in medium size U.S. companies as the training may be viewed similar to instructor-led training. Current trends show that companies are moving toward rapid e-learning in order to reduce the time needed to produce training and in order to reduce overall costs (Alcock, 2008). Although this study has examined how rapid e-learning compares to instructor-led training, many more questions remain (Carruth, 2007).

1. is rapid e-learning suitable for different size organizations /different locations? The present study was conducted at a single medium size company predominantly in Texas and Michigan. For the results to have greater generalizability to the field of training, other studies should be conducted using larger and smaller

organizations from different locales.

2. Power was achieved for the one statistically significant hypothesis (H3) in this study; however, because the difference in the means was so small with the other two variables, power was not achieved for H1 and H2 (Blaylock et al., 2008).

Future research should be conducted using a larger sample size.

3. The target population for this study had a higher percentage of female participants than male participants. Thus, the high percentage of female responses versus male responses may have biased the results of this study. This study should be repeated with a sample that is more evenly distributed male to female.

4. As the trend for in-house creation of simulation training has progressed, several rapid e-learning development tools are just now becoming available (Boothby et al., 2010).

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