Learner's Perception towards Semantic E-Learning

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Abstract:
E-Learning is the delivery of learning material to learner without any constraint on time and place. It can be viewed as a dynamic and flexible approach in contrast to traditional learning. The prevalent growth in the internet will prove effectual in the area of e-learning. Semantic Web (i.e. new web technology) is used to implement an e-learning system proficiently by enhancing the current search mechanism. This paper broadly analyzes the craving and openness of students, to accept the semantic web as a new web technology to improve the access to the learning materials by means of content and context. A combination of such system is called an e-learning system by means of semantic web. Semantic web technology offers personalized and flexible access to the learning resources with the help of ontology-based descriptions of content, context and structure of the learning materials. This research paper has threefold objective. The paper begins with an analysis of students' openness to internet usage in learning. The focus then shifts to students' awareness about e-learning in relation to traditional learning. Lastly, the paper analyses students' perception about semantic e-learning in higher education. This study has been conducted through a survey on students enrolled in various graduate and post graduate courses in Panjab University, Chandigarh.

Keywords: E-Learning, semantic web, ontology, semantic e-learning

1. Introduction

E-Learning aim is to replace traditional learning or classroom learning with on-demand process of learning in terms of content and time. Online learning materials provide a personalized learning experience to students and can also review course material according to their own learning styles. Hence, e-learning is flexible, comparatively economical and supplies just in time learning opportunities to students. But many e-learning systems are lacking of knowledge representation technology. Semantic web, content-aware intelligent web, is an influential approach to satisfy the e-Learning requirements. E-Learning by means of semantic web is based on ontology that helps in semantic querying [1] and navigation through learning materials. To implement an e-learning system proficiently, semantic web provides all means for e-learning as mentioned below [2]:

Semantic web services to E-Learning [3]
Ontology creation [4]
Annotation of learning materials using ontologies
Composition of ontologies in learning courses
(Pro) active delivery of the learning materials

Table 1

Semantic Web architecture [2,6] can be defined as common shared meaning and machine-processable metadata as shown in figure 4 [5]:
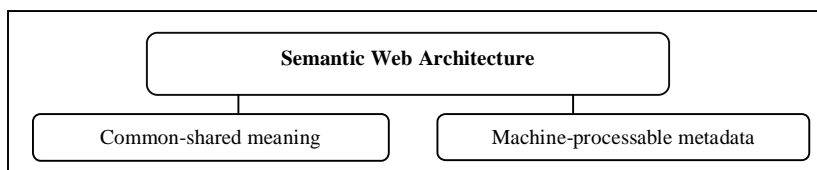

Figure 1

Semantic Web technology offers a learning process [7, 8] that can be problem-dependent, context-sensitive and user customized process. From the student's viewpoint, to search learning materials [9] two most important aspects are:

- Content: Learning material is concerned about what.
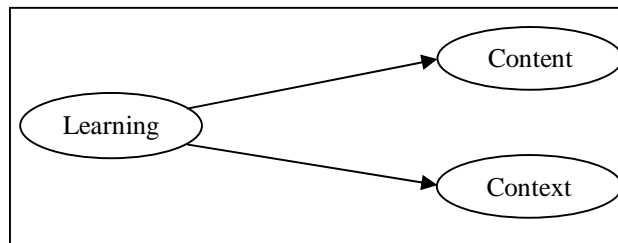- Context: The topic is going to present in which manner or form.

Figure 2

Ontology, a key constituent of the semantic web, supports aforesaid aspects, i.e. semantic content, learning context and structure of learning materials [10]. Thus, ontology is a valid tool for the learning Process. E-Learning by means of semantic web comes across as a powerful technology for learning materials in terms of content and context. To utilize this technology productively, a user must be consistent, enthusiastic to learn, disciplined and sharply focused. This learning technology promises new ways for navigation through the learning materials and provides enviable methodologies to the student and the lecturer.

This study, thus, brings us to an analysis of learner's inclination towards Semantic e-learning. This analysis is assessed through a questionnaire with its sample comprising of students enrolled in Graduate or Post Graduate courses.

2. Study

2.1. Objective
This research paper helps to analyze the openness of students to internet usage in learning and awareness about e-learning in relation to the traditional systems of learning. The foremost objective is to gather round information on the subject of learner's inclination towards E-Learning semantic web systems in higher education and to comprehend how open they are to newer forms of learning.

2.2. Methodology Followed
For this study data was collected by conducting surveys. A sample space of 105 university students was taken, enrolled in a graduate or a post graduate course. Statistics gathered from a 35 itemed questionnaire was designed to inquire about:

- Demographics (i.e. Age, Gender, Academic   Background etc)
- Openness to Internet Usage
- Awareness about E-Learning
- Perception about Semantic e-learning in higher education

For the above mentioned items except demographics data was collected based on the likert chart (i.e. 5 point scale) where Strongly Disagree (No not at All)=5, Disagree(No not much)=4, Maybe(Somewhat)=3, Agree(Yes but not much)=2, Strongly Agree(Yes definitely) = 1.

2.3. Analysis
From the sample study it is observed that 73.33% of total students prefer internet as ease of access and user-friendly information source as shown in following figure 3:
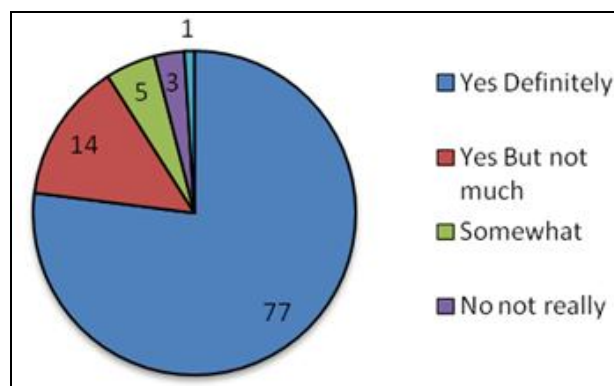

Figure 3: Internet as user friendly information source

	Statement Description	No. of students (yes definitely)	Percentage (%)
S1	Do you think students use the Web primarily as the source of information?	60	57.14
S2	Do you think Web enables learners to build enduring communities of practice to share knowledge?	54	51.42
S3	Do you think online learning facilities helps in studies?	71	67.61
S4	Do you prefer internet as ease of access and user-friendly information source?	77	73.33
S5	Do you think new web technologies are required to improve the current search mechanism?	49	46.66

Table 2: Student's openness to Internet Usage

On basis of statistics it is observed that a cumulative percentage of 57.14% students use the web primarily as the source of information and 51.42% students find the web helpful in knowledge sharing. Moreover, 67.61% students acquire online learning facilities so as to help in studies and also 73.33% students prefer internet as ease of access and user-friendly information source, whereas 46.66% think that new web technologies are required to improve the current search mechanism.

The following chart depicts student's openness to internet usage, from sample study of various statements (i.e. S1 to S5) as given in table 2.
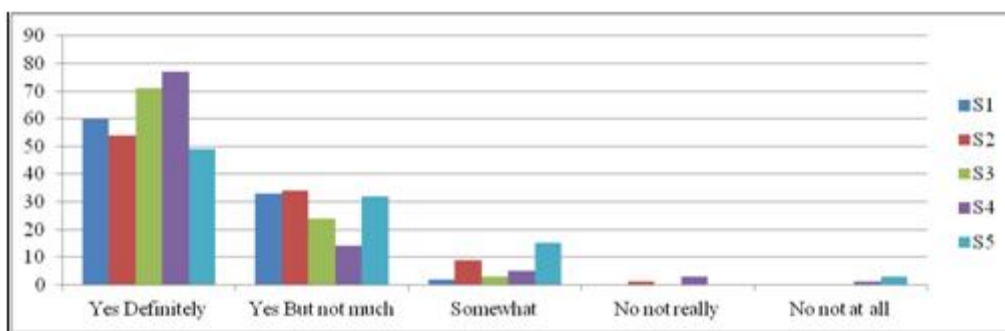

Figure 4: Graphical representation for Table 2

The following table 3 depicts the frequency of students agreed to awareness about e-learning. About 51.42% students feel that E-Learning makes a significant difference from traditional learning.48.57% of students find e-learning helps to reach learning objectives and about 37% has found e-learning as effective teaching method. Besides this, about 36.19% of student's experience that e-learning is useful for online distance-learning courses and 33.33% feel that computer knowledge is necessary for e-learning.

	Statement Description	No. of students (Agree)	Percentage (%)
S1	Do you think E-Learning provides a learner-oriented environment for teachers and students?	39	37.14
S2	Do you think E-Learning makes a significant difference from traditional learning in terms of how learners learn and how quickly they master a skill?	54	51.42
S3	Do you think e-Learning is self-directed and self-paced i.e. allows learners to complete their education and training faster than in traditional courses?	37	35.23
S4	Do you think E-Learning is flexible, relatively cheap and supplies just in time learning opportunities?	37	35.23
S5	Do you think e-learning helps you to reach learning objectives?	51	48.57
S6	Do you think e-learning is effective teaching method?	39	37.14
S7	Do you think e-learning support phases of self-study?	39	37.14
S8	Do you think e-learning is useful for Online distance-learning courses?	38	36.19
S9	Do you think Computer knowledge and access to equipment is necessary for e-learning?	35	33.33

Table 3: Student's awareness to e-learning

The following pie chart depicts the percentage of students agreed upon various statements (i.e. S1 to S9) about awareness to e-learning.
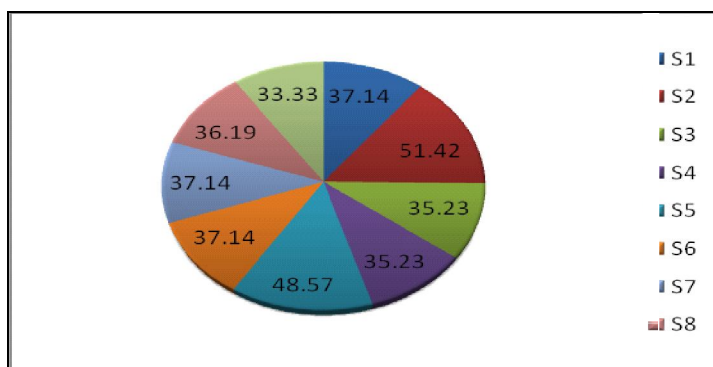
Figure 5: Number of Student's agreed upon awareness about e-learning

The following chart from sample study of various statements (i.e. S1 to S9) as given in table 3, depicts student's awareness to e-learning.
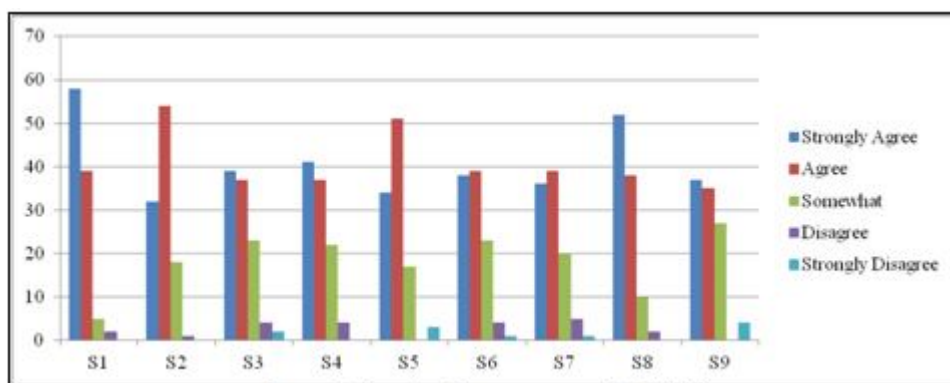

Figure 6: Graphical representation for Table 3

The following table 4 depicts the student's inclination towards semantic e-learning in higher education. About 34.28% students feel that semantic web technologies will influence the next generation of e-learning systems.42.85% of students find semantic web enables construction of a user-specific course and about 36.19% students think semantic web-based courses provide ease of access to educational resources. Besides this, about 45.71% of students' believe that semantic web enables intelligent reasoning with meaningful data.

	Statement Description	No. of students (Agree)	Percentage (%)
S1	Do you think Semantic Web (SW) technologies will influence the next generation of e-learning systems and applications?	36	34.28
S2	Do you think e-learning with semantic web enables construction of a user-specific course, by semantic querying for topics of interest?	45	42.85
S3	Do you think Semantic web as a technology for e-learning is replacing query-based search with query answering?	46	43.80
S4	Do you think distributed nature of the Semantic Web enables continuous improvement of learning materials?	50	47.61
S5	Do you think Semantic Web-based courses offer advantages for learners by making access to educational resources, at any time or place?	38	36.19
S6	Do you think ontology is a valid tool for the learning process?	38	36.19
S7	Do you think ontology improves the learning process as it focuses on relationship rather than information?	35	33.33
S8	Do you think semantic web enables intelligent reasoning with meaningful data?	47	45.71
S9	Do you think by semantic web learners can be directed intelligently towards resources of relevance?	49	46.66

Table 4: Student's perception about semantic e-learning in higher education

The following chart from sample study of various statements (i.e. S1 to S9) as given in table 4, depicts student's perception about semantic e-learning in higher education. This chart depicts the number of students strongly agree, agree and disagree upon different statements regarding semantic e-learning. Hence, it is concluded that most number of the students agreed upon the semantic e-learning in the higher education.
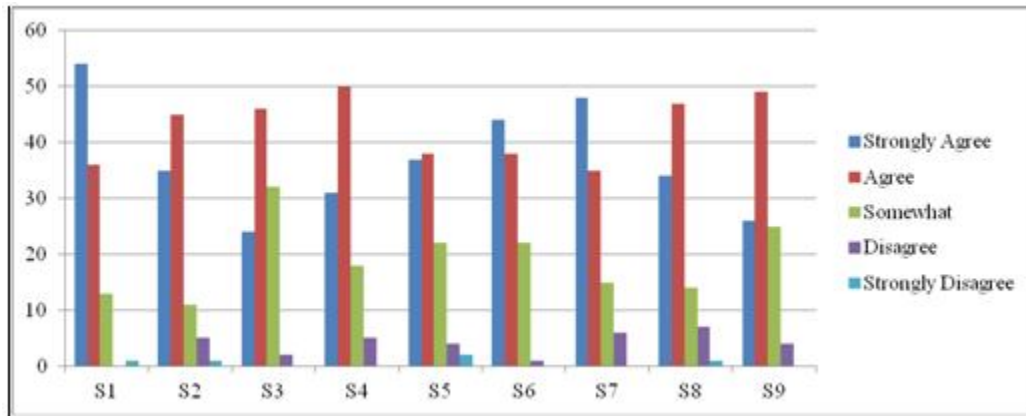

Figure 7: Graphical representation of table 3

To find the relation between openness to internet usage, awareness about e-learning and perception towards semantic e-learning in higher education, we come up with correlation of three variables naming i.e. INTERNET_USAGE, E-LEARNING AND SEMANTIC WEB as shown in table 5.

		INTERNET _USAGE	E-LEARNING	SEMANTIC WEB
INTERNET _USAGE	Pearson Correlation	1	.337**	.226*
	Sig. (2-tailed)		.002	.042
	N	99	82	81
E-LEARNING	Pearson Correlation	.337**	1	.559**
	Sig. (2-tailed)	.002		.000
	N	82	85	70
SEMANTIC WEB	Pearson Correlation	.226*	.559**	1
	Sig. (2-tailed)	.042	.000	
	N	81	70	86
**. Correlation is significant at the 0.01 level (2-tailed).				
*. Correlation is significant at the 0.05 level (2-tailed).				

Table 5: Correlations

From the statistical analysis as given in table 5, we find that Pearson's Correlation lies between -1 to1 (i.e. always positive). The Sig. (2-Tailed) value is less than .05. Hence, it can be concluded that there is a strong relationship between three variables i.e. INTERNET_USAGE, E-LEARNING AND SEMANTIC WEB.

The following table 5 is the result of regression test applied to SEMANTIC WEB (i.e. dependent variable) depends on
E-LEARNING and INTERNET_USAGE (i.e. independent variables).

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	9.543	4.552		2.096	.040
	E-LEARNING	.792	.158	.545	5.018	.000
	INTERNET_USAGE	.083	.381	.024	.219	.827
a. Dependent Variable: SEMANTIC WEB						

Table 6: Coefficients[a]

On application of regression test as given in table 6, we find that perception towards semantic e-learning (SEMANTIC WEB) is dependent on awareness about e-learning (E-LEARNING) and usage of internet (INTERNET_USAGE).The relation amongst these three variables can be represented as under

SEMANTIC WEB=9.543+0.792 *E-LEARNING +0.083 *INTERNET_USAGE

From the equation it is clear that SEMANTIC WEB is dependent on two variables namely E-LEARNING and INTERNET_USAGE.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.553[a]	.305	.284	6.26413	.305	14.287	2	65	.000

Table 7: Model Summary

According to Table 7, R Square Change value for SEMANTIC WEB is 30.5%. So the extent to which SEMANTIC WEB can be explained by these two variables namely E-LEARNING and INTERNET_USAGE is 30.5%

3. Conclusion

The focal point of this study is to analyze students' perception towards semantic e-learning in academic performance and to determine the factors, i.e. openness towards internet usage and awareness about e-learning in relation to the traditional systems of learning that can influence their inclination towards semantic web. The consequences revealed that there was a strong relation between internet usage and awareness about e-learning. However, computer knowledge and access to equipment is necessary for it. From the sample study it can also be concluded that semantic web enables continuous improvement of learning materials by providing ease of access to educational resources and enabling intelligent reasoning with meaningful data.

4. References

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[Annexure]

Review Questionnaire for Students

Name:	Age:	Gender:	Course:

There is no right or wrong answers to the following questions. Answer them to the best of your knowledge.
State your agreement based on following scale:

Yes Definitely	Yes, but not much	Somewhat	No Not much	No not at all
1	2	3	4	5

		Yes definitely	Yes but not much	Somewhat	No not much	No Not at all
	Openness to Internet Usage					
1	Do you think students use the Web primarily as the source of information?	1	2	3	4	5
2	Do you think Web enables students to build enduring communities of practice to share knowledge?	1	2	3	4	5
3	Do you think online learning facilities helps in studies?	1	2	3	4	5
4	Do you prefer internet as ease of access and user-friendly information source?	1	2	3	4	5
5	Do you think new web technologies are required to improve the current search mechanism?	1	2	3	4	5

State your agreement based on following scale:

Strongly Agree	Agree	Somewhat	Disagree	Strongly Disagree
1	2	3	4	5

		Strongly Agree	Agree	Somewhat/ Maybe	Disagree	Strongly Disagree
	Awareness about E-Learning					
1	Do you think E-Learning provides a learner-oriented environment for teachers and students? [E-learning is computer–assisted teaching and learning.]	1	2	3	4	5
2	Do you think E-Learning makes a significant difference from traditional learning in terms of how learners learn and how quickly they master a skill?	1	2	3	4	5
3	Do you think E-Learning is self-directed and self-paced i.e. allows learners to complete their education and training faster than in traditional courses?	1	2	3	4	5
4	Do you think E-Learning is flexible, relatively cheap and supplies just in time learning opportunities?	1	2	3	4	5
5	Do you think e-learning helps you to reach learning objectives?	1	2	3	4	5
6	Do you think e-learning is effective teaching method?	1	2	3	4	5

7	Do you think e-learning supports phases of self-study?	1	2	3	4	5
8	Do you think e-learning is useful for Online distance-learning courses? [Online distance-learning courses is where the instructor conducts all class sessions primarily online without any face-to-face meetings between students and instructor]	1	2	3	4	5
9	Is e-learning is a visualization of complex collection of facts via multimedia presentations or simulation processes?	1	2	3	4	5
10	Is e-Learning program directly related to the amount of effort done by the learner?	1	2	3	4	5
11	Do you think Interactive educational software is helpful in e-learning?	1	2	3	4	5
12	Do you think Computer knowledge and access to equipment is necessary for e-learning?	1	2	3	4	5
13	Do you think many E-Learning applications are lacking in knowledge representation technology?	1	2	3	4	5
14	Do you think E-learning lacks in learner-centric usability and interactive involvement? [Interactive involvement is lack of understanding of multimedia-aided learning and teaching.]	1	2	3	4	5
	Perception about Semantic E-Learning in higher education					
15	Do you think Semantic Web (SW) technologies will influence the next generation of e-learning systems and applications? [Semantic web is content-aware intelligent web, helps in intelligent decision making.]	1	2	3	4	5
16	Do you think e-learning with semantic web enables construction of a user-specific course, by semantic querying for topics of interest? [Semantic querying provides intelligent answers to complex queries as SW supports web content with associated formal semantics or meaning.]	1	2	3	4	5
17	Do you think Semantic web as a technology for e-learning is replacing query-based search with query answering?	1	2	3	4	5
18	Do you think Semantic web is organizing knowledge in conceptual spaces according to its meaning?	1	2	3	4	5
19	Do you think distributed nature of the Semantic Web enables continuous improvement of learning materials? [distributed nature is to exploit heterogeneous knowledge sources]	1	2	3	4	5
20	Do you think semantic web composition in learning course is useful?	1	2	3	4	5
21	Do you think Semantic Web-based courses offer advantages for learners by making access to educational resources, at any time or place?	1	2	3	4	5
22	Do you think ontology is a valid tool for the learning process? [Ontology defines knowledge of a particular domain as a set of objects and relations between those objects.]	1	2	3	4	5
23	Do you think ontology improves the learning process as it focuses on relationship rather than information?	1	2	3	4	5
24	Do you think semantic web helps in ontology-based annotation of learning materials? [Ontology based annotation is indexing on a collection of items.]	1	2	3	4	5
25	Do you think ontology supports eLearning in three aspects: semantic content, learning context and structure of learning materials?	1	2	3	4	5
26	Do you think semantic web helps in proactive delivery of the learning materials?	1	2	3	4	5
27	Do you think semantic web enables intelligent reasoning with meaningful data?	1	2	3	4	5
28	Do you think by semantic web learners can be directed intelligently towards resources of relevance?	1	2	3	4	5
29	Do you think semantic web will hold greater interoperability, share ability and reusability among existing Web applications? [Interoperability and share ability is possible with domain-specific classifications and ontologies of semantic web.]	1	2	3	4	5
30	Is intelligent semantic e-learning means to bring semantic context awareness into multimedia learning information processing and learning practices?	1	2	3	4	5