Associative Relevancy in eLearning Materials enhances Knowledge

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Abstract

Advancements in the studies on better-quality instructional techniques have reached at a new phase of challenges and demands of next generation. These research studies lead towards a wide range of knowledge transfer applications in diverse scenarios. In this study, we conducted experimentations to collect data from participants who took part in this study. To verify our supposition that the e-learning materials based on associative relevancy notion have better transfer of knowledge, we analyzed and interpreted the collected data. The experimental evidences and analyzed data confirmed the supposition that associative relevancy in e-learning materials enhanced knowledge tremendously.

Keywords*: Instructional Technique, Cognition, Associative Relevancy, eLearning*

1. Introduction and background

Studies on e-learning and instructional techniques have become essential necessities for our modern societies, as knowledge is an integral part of every matter of interest or importance and transfer of learning is the way through which we deliver knowledge, in other sense, transfer of knowledge. Although instructional techniques have improved with the aid of sophisticated tools, softwares, frameworks, and systems, yet there need many splendid endeavors for further enhancements.

One of the core studies about instructional techniques of eLearning is aiming at improvements in transfer of knowledge. Improvements in transfer of knowledge are significant for further advancement of undeveloped and partially developed techniques and methodologies that we generally use these days. Highly dedicated people are exerting tremendous endeavors to bring the needed solution of the problem [1-5].

In addition to these, to tackle the issue, people have put forth crucial endeavors to study the cognitive impact of eLearning, i.e. influential underlying factors of human cognition on eLearning process. Available literatures have addressed the causes and effects of cognition in learning and concluded with several potential models and means to upgrade the learning processes [6-15].

Further, it comes out that by improving the influential underlying factors in eLearning materials, we can strengthen the process of learning as well. Human cognition is a system consisting of numerous neurological, perceptual, and other cognitive phenomena happening unceasingly. In the midst of these happenings, there exists an essential and mandatory process, i.e. the process of viewing the objects and assigning relative identities. The human viewing process initiates a series of cognitive functions, including sensation, consciousness, visual attention, perception, analogical thoughts, cognitive reasoning, and metacognition. These are bound to exist until the end of viewing of objects. During the viewing of eLearning materials, a human regards the materials and underlying cognitive processes make efforts for efficient retrieval of knowledge or information that the human regards. Further, human mind is working for memory management and permanent storage of the human brain [6-26].

By adapting an instructional technique of learning in accordance with human cognitive phenomena that exist during the learning process, we can improve the learning process. At the same time, the mind can perceive and withstand gigantic amount of knowledge and retain it in memory for longer duration. We propose eLearning instructional technique based on associative relevancy that can enhance knowledge reasonably [6-26].

Associative relevancy is evolutionary and cohesive notion that human thoughts of analogy emanate. In the underlying mechanism of human cognition, the human sensory bring about the impression of associative relevancy along and after the happening of the phenomena based on analogy. Like analogy, associative relevancy is significant in cognitive processes and is key mechanism in concluding creativity, which is also a part of the subject, like eLearning. Further, associative relevancy stands for a hardwired or chaining process of contexts or intents based on similarity in which the same relations, sameness, or likeness holds between different domains or systems [26-31].

The focus of our research relies on the associated chaining and analogical thoughts along with the cognitive processes placed in eLearning materials. In the present eLearning materials, the correlated and coexisted contents have extensive associative relevancies by which people understand a content or matter in terms of another, as they are associated in intents or contexts.

2. Present study

We study the eLearning materials from cognitive perspective, including the underlying mechanism of associative relevancy, during viewing of eLearning materials. For the purpose, we follow along and finish steps of planning experimental setup, statistical data analysis, and data visualization for interpretation, which are the key steps during the entire study.

At first, participants view general eLearning materials that we show them by means of general learning technique process. We collect the data related to this eLearning material based on general instructional technique as participants' feedback.

Thereafter, we request the participants to view eLearning materials based on associative relevancy. Further, we collect the data related to this eLearning material based on associative relevancy as well in terms of questionnaires as feedbacks. Finally, we analyze all collected data for interpretation statistically. Finally, we carry out data interpretation with the help of statistically existing parameters for such study.

The flow chart shows the steps for our study (as in figure 1). This is a comparative study of two data (the data from general instructional learning technique and the data from associative relevancy learning technique) analytically.

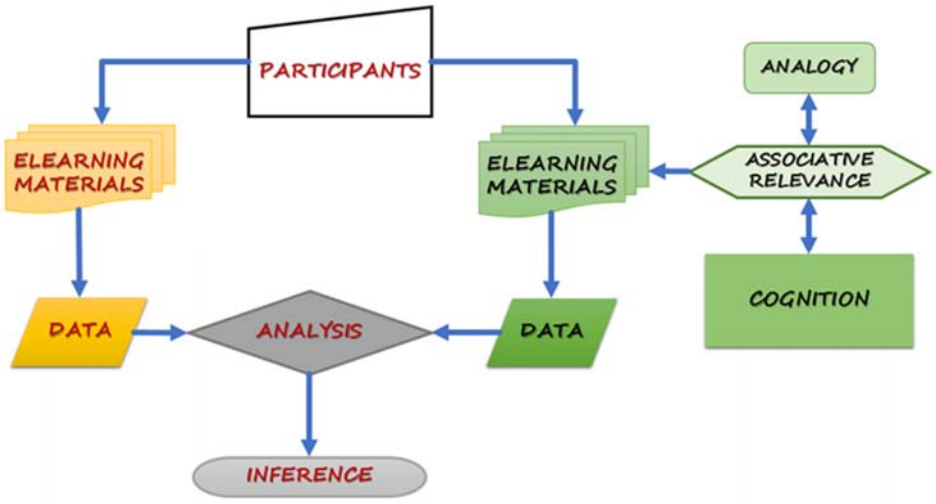

Figure 1. Flow chart of research study

3. Method

We selected 140 participants from a number of classes randomly, aging from 21 years to 35 years. These Subjects, i.e., the participants regarded two sets of Computer Programming Language Lecture slides as shown below in figure 2.

As shown in the figure, the first set of slides (in first row) consists of four slides related to the topic of ‘Control Structures’ which is a section of Computer Programming Languages and the second set of slides (in second row) consists of four slides related to the topic of ‘Logical Operators’ that is a section of Computer Programming Languages. We display these Computer Programming Language slides, related to Computer Science course during active viewing of the participants.

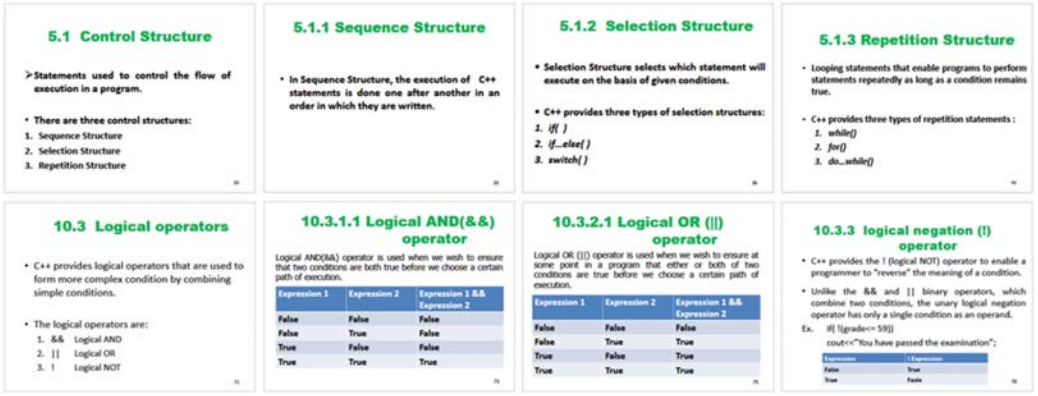

Figure 2. Selected Computer Programming Language slides for research study

4. Analysis

At first, we studied the two sets of slides as 'Analysis 1' and 'Analysis 2' for our experimentations. Thereafter, we carried out detailed data analysis out for interpretations.

4.1. Analysis 1: Study of first set of slides for 'Control Structures'

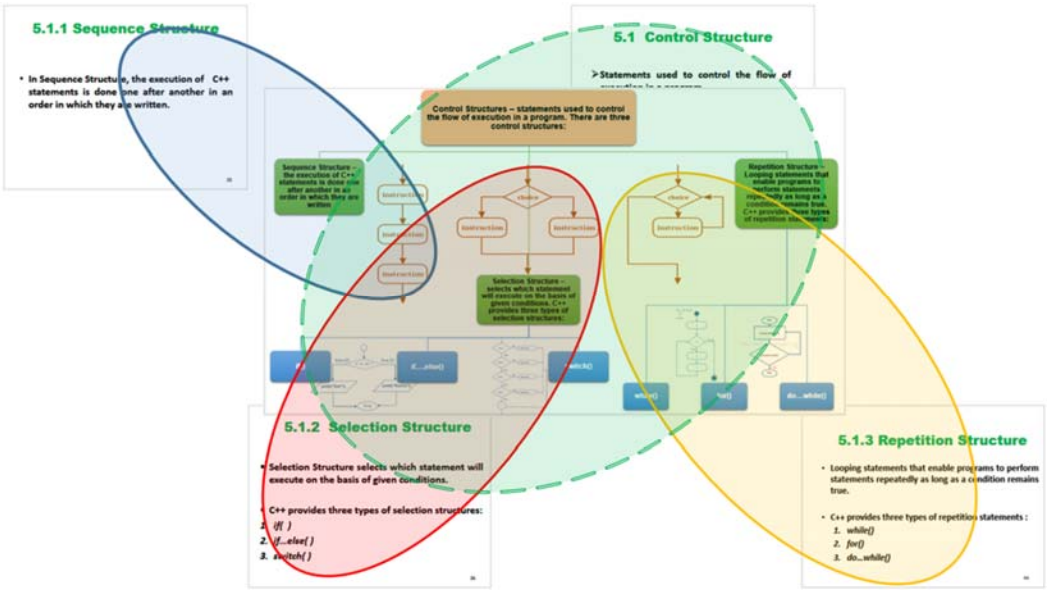

Figure 3. Selected first set of slides and associative relevancy based modified slide

In this analysis for the set of slides related to 'Control Structures' (figure 3), at first, we followed the general learning mode of instructional technique. In this general technique, keeping single topic for single slide had considered the easiest and the most efficient way of gaining knowledge.

We arranged our experimentations and demonstrated the set of slides with general instructional technique. The participants regarded the individual four slides and concluded their feedbacks.

Afterward, the participants regarded the modified slide (the central slide in figure) based on associative relevancy consideration, i.e., keeping the associated topics in unified form, just in single slide rather than separating for individual slides. We ensured the existence of associative relevancy within the

slide by linking the contents or contexts, which were relevant in intents or thoughts based on analogy. The contextual relevancy was symbolized in terms of diagrammatic associativity that elaborated the existing associations among different portions or contents of the slide.

The participants viewed the modified slide as well. We explained the contents with associative relevancy found within the contexts. Finally, we collected the data as feedbacks of participants' responses in the survey.

4.2. Analysis 2: Study of second set of slides for 'Logical Operators'

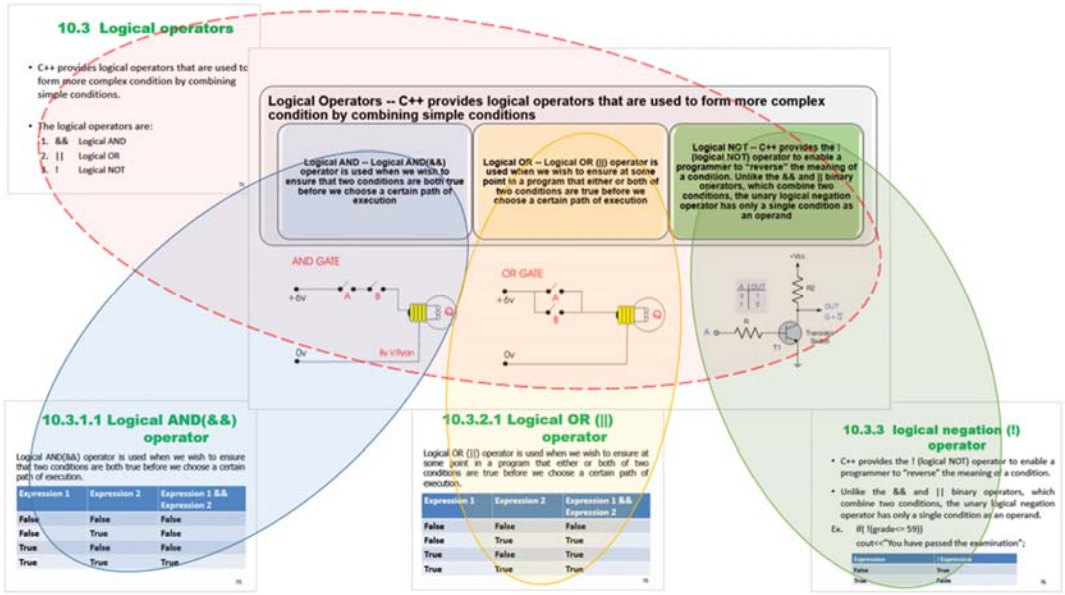

Figure 4. Selected set of slides and modified slide based on associative relevancy

In this analysis of slides for 'Logical Operators' (in figure 4), at first, we conducted experimentation and recorded the observation as data from participants who looked for the individual four slides. These slides had eLearning materials based on the general mode and demonstrated in formal way of general instructional technique. The general instructional technique for transfer of knowledge in eLearning stated that for the easiest and optimized mode of learning, there should be separate slide for separate topic.

Afterward, we presented and demonstrated experimentation for the modified slide (the central slide in the figure) based on associative relevancy consideration. Further, the mode of instruction during demonstration relied on associative relevancy in contents of materials.

Additionally, we represented the notion of associative relevancy among different portions or contents of slide, in terms of pictorial exemplifications and ensured the existence of associations as chaining of various contextual segments within the slide.

The intention behind this representation was to initiate sensation of viewers, so that the processes of attention and perception could bring cognitively generated the flow of thoughts based on analogy, which ultimately, evolved relevant linking among the existing contents based on associative relevancy. Finally, viewer might sense this transfer of knowledge effectively with adaptive mind.

However, the participants viewed the reformed slide based on associative relevancy notion. Later, they gave us feedbacks on these slides and we gathered feedbacks as data for further analysis.

5. Statistical data analysis

Based on collected data from the participants as feedbacks, we plotted a graph (shown in figure 5) for data distribution for both learning techniques. The data distribution graph showed both general and associative relevancy learning techniques along with participants' learning capabilities in proportions.

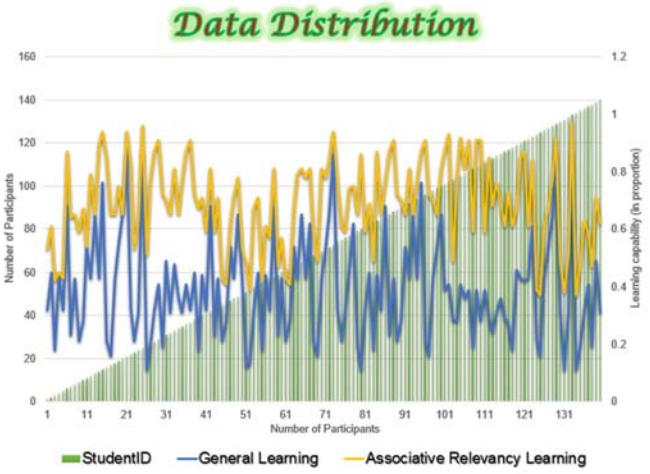

Figure 5. Data distribution of both learning techniques for learning capabilities (in proportions)

Further, we analyzed the data for our hypothesis. We began to validate our hypothesis with the t-test statistical analysis having two samples of unequal variances. At first, we ensured that the assumptions for this t-test were in accordance with our data, i.e. our existing data consist of all the requirements that were the prerequisites of the t-test. In our experimentations, we assumed that the variances of both learning techniques (the general learning technique and associative relevancy learning technique) were unequal, i.e. the dispersions of data in both samples were not equal and in turn, the scattering of data in both samples had inequality [32-35].

We made our initial, i.e. the null hypothesis that there were significant difference in variance between the data obtained from associative relevancy learning technique and the data from general learning technique. This means we assumed that both learning techniques were not equivalent and they had not the same levels of intuition for the learners. Additionally, this hypothesis accomplished that the associative relevancy based learning technique was better technique than the general learning technique because of the variance or dispersion of the data related to learning technique based on associative relevancy was comparatively smaller.

In addition to these, our alternative hypothesis stated that the two samples or datasets obtained from the two types of data, i.e. the data from associative relevancy learning technique and the data from general learning technique had equal variances, i.e. the dispersions or scattering of the data had equal values. Further, we deduced this proclamation as associative relevancy based learning technique was not better level of intuition than general learning technique.

After statistically analyzing the samples, we summarized in Table 1 the outcomes of the t-test. The detailed t-test statistical analysis reveals the following for both types of learning techniques.

Table 1. The t-test for unequal variances of both learning techniques

t-Test: Two-Sample assuming Unequal Variances		
	Associative Relevancy Learning	*General Learning*
Mean	0.689428571	0.389214286
Variance	0.023772333	0.032431752
Observations	140	140
Hypothesized Mean Difference	0	
df	272	
t Stat	14.98343644	
P(T<=t) one-tail	1.02242E-37	
t Critical one-tail	1.650474964	
P(T<=t) two-tail	2.04484E-37	
t Critical two-tail	1.968723847	

The test result evidently pointed out that under the consideration of unequal variances between the dataset of associative relevancy based learning technique and the dataset based on general learning technique, the computed t (t stat) = 14.98343644 is not less than or equal to Critical t (1.650474964 for one-tail (directional) and 1.968723847 for two-tail (non-directional)) values. Hence, the statistical analysis did not reject the null hypothesis.

Therefore, based on statistical analysis, we established that the associative relevancy based learning technique was better technique than the general learning technique. This led to the statement that the instructional technique based on associative relevancy had better level of intuition than the general instructional technique.

6. Conclusion

On the grounds of our statistical analysis, we infer that the instructional technique based on associative relevancy in eLearning materials is more competent, realistic, and manifold in comparison to the instructional technique based on general learning.

We conclude that the associative relevancy in eLearning materials enhances knowledge. Further, existence of associative relevancy cognitively betters the learning process for adaptive minds of learners.

7. Acknowledgement

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