

# Comparative Analysis of Traditional and WBIs Learning Using T-Test

Dr. Kavita Saini<sup>1</sup> and Dr. Abdul Wahid<sup>2</sup>

<sup>1</sup>Department of Computer Science, IEC College of Engineering and Technology, Knowledge Park I, Surajpur Kasna Road, Greater Noida 201306 UP India

<sup>2</sup>School of Computer Science and Information Technology, Maulana Azad National Urdu University, Gachibowli, Hyderabad, Telangana 500032 India

<sup>1</sup>kavitasaini\_2000@yahoo.com, <sup>2</sup>wahidabdul76@yahoo.com

**Abstract--Web based learning is becoming very popular now-a-days. Learners prefer to get learning material even while not sitting at a same place. The aim of this paper is to present the comparative study of class room learning and learning through WBIs.**

**After developing a WBIs tool it is used to deliver knowledge to undergraduate and graduate learners. Analysis of the effectiveness of Web-Based Instructional systems in the delivery of an undergraduate and graduate algorithm course is presented. WBIs tool's effectiveness is evaluated by comparing performance and perceptions of the sample learners who undergo through traditional learning and those using WBIs tool and comparing the outcomes. Independent T-test analysis is performed to analyze the data inference statistics.**

*Keywords: Web-based instruction, Interactive learning, Web enabled learning, Students t-test, Evaluation of web based instruction, Computer enabled learning, Technology and education.*

## I. INTRODUCTION

IN rapidly shifting technological environment, it is important to present education to pupils to modernize their skills in current technologies. Internet is now an appropriate tool for delivering teaching and other instructional modules to learners. It can easily support the learners having diversified academic backgrounds, interests, and knowledge level. The convenient accessibility and use of Internet is attracting huge number of learners and educators. Latest technologies have been extensively taken up by web users and various factors are influencing such a high adoption rate.

Most of the universities and educational institutes are adopting online and Web based learning. Web based learning is successful for higher education. To design and deliver course online many resources are offered now. Web based learning is defined as higher education classes that are delivered asynchronously via the WWW without face-to-face class interactions, including courses delivered via Learning Management System for example Desire2Learn, WebCT, Angel, and BlackBoard Dziorny.

The use of Web-Based Instructional systems (WBIs) is

becoming very popular and demanding among the instructors and the learners for the purpose of the distribution and delivery of the study material, and other education resources.

## II. TRADITIONAL LEARNING

The teaching and learning process is carried out through two different approaches. With the invention of Internet the distance learning is increasingly turning into Web-Based learning. These two approaches are briefly described in following paragraphs.

Traditional learning refers to face-to-face teaching in presence of learner and instructor together. In traditional learning interaction and communication typically occur between learner and instructor. Learners need to attend regular classes on campus. Steve Pahl stated that other than leaning classroom learning gives more opportunities to join associations, clubs, or fraternities while taking classes on campus. Learners may need guidance from the instructors or counselors, which is readily available on campus. Those who are not very friendly with the technology or who enjoy interacting with other learners and instructors, traditional learning is a better choice.

The advantage of traditional learning is to provide the maximum stress on the learning process. Traditional classroom learning allows the learners to see the instructor face to face and ask significant questions concerning their classes. It also gives the opportunity of the learners to meet with other students for study groups and friendship. Learners in the face-to-face learning able to get together in study groups that help them achieve better in testing.

The disadvantage of traditional learning is that it requires learners and instructors to be physically present at the same time which is the biggest barrier in the traditional learning. Physically challenged people cannot get education as they could not go and attend classes on regular basis.

*Constraints on Traditional Learning:* One of the major problems in traditional learning is geographical barriers among the learners and instructors. Colleges and universities and other

forms of educational institutes are generally located in certain areas and remain open only during certain hours, this may not be convenient to many learners.

Somehow instructor in traditional learning could not make it possible to involve all the learners during learning. Other problems may be the cultural barrier, both instructor and learners may belong to different places and may not know same language. This would have a great problem specially in India.

Since class sizes are usually quite large and there is only one instructor, learning may not take place inter actively. It has been observed that many learners feel shy or have lack of confidence in raising queries and responding to the questions by instructors though they may know the answer. Apart from these more instructors are required if number of learners increases. In such situation educational institutes need to hire and pay to more instructors.

On the other there is only one instructor in the class, it is difficult for the instructor to identify each child's potential learning capacity or deficiency and, in turn, provide close attention for fixing the problem. Providing one-to-one assistance in traditional class room learning is rarely possible due to instructor-learner ratio and due to time constraints.

### III. WEB-BASED INSTRUCTIONAL SYSTEM

WBIs is an emerging field in education and part of the rapid growth that is the Internet. WBI is a reliable and inexpensive source of learning and teaching. It enables learners to learn outside traditional classrooms and removes the geographical barrier.

WBIs changes the pedagogy and provides a constructive learning environment. Various tools associated with the WBIs make it possible to receive a better overview and understanding of the techniques. The tools associated with WBIs are Bulletin board, Chat room, Video conferencing among the learners and instructors, E-mail and many more.

Web-Based Instructional system (WBIs) and technological advancement [1] is supportive in making learning and teaching more interesting and innovative. It enables to improve various deficiencies of traditional education system. E-communication and other interactive activities were initially used to support learning in distance education [3]. Web Based Instructional system is also supportive in removing the distance among the learners and instructors.

The commonplace technology one would encounter in a WBL environment are:

*Collaboration:* There is the collaborative learning among learners. In order for collaboration to happen, regardless of

where the users are, means of file sharing is a necessity. This would require not only a common platform of document creation, but also a file transfer protocol.

*Communications:* There are two modes of web based communication: Synchronous and Asynchronous. In synchronous fashion user may choose chat room, messengers, web conference. In asynchronous mode user may choose from bulletin board, feedbacks/e-mail, SMS.

Synchronous communication provides the real time interaction among the students and the instructors stated by Tibenderana [5].

Synchronous situations provide affordances that allow "real-time" interaction between student and instructor. Synchronous situations are time sensitive but geographically insensitive. Examples of such situations would be teleconferencing, video teleconferencing, online chat and CUSeeME.

In contrast, asynchronous situations do not provide affordances that allow for "realtime" interaction between student and instructor. Asynchronous situations are both time and geographically insensitive. Examples of these situations are correspondence courses, e-mail and web/server-based instruction.

*Connection:* An organization connects to the web with or without wire. Wired option includes modem, network, Internet, intranet. There is also the Wireless Application Protocol (WAP), Infra Red, Blue Tooth.

*Content-resources:* The print material may include traditional textbooks, web pages, handouts, slides, transparencies, and all other presentation materials that may be printed. Multimedia (non-printable) material is that which not be printed.

### IV. THE TOOLS ASSOCIATED WITH WBIS

Bulletin board: Electronic bulletin boards combine features of electronic mail with private computer conferencing. It is an electronic message center which serves a specific group having common interest. In a group one can review message dropped by others and can also leave your own message for others. People in a group allow each other to dial with a modem.

We can say that BBS is a computer system running an inexpensive software that allows many people to connect to the system using terminal programs. Once a user connect to the BBS they can download and upload files and other software, they can exchange the messages via chatting, message boards or e-mails. Users of BBS can also read news and bulletins. Initially BBSes were accessed through a telephone line using a modem, but by the early 1990s some BBSes allowed access through packet switched network, or Telnet.

*Electronil mail:* E-mail is a method of exchanging digital messages from one user to one or more recipients who has an Internet connection and an email account. It is based on store and forward model where an e-mail server accepts and stores messages and then forward and deliver them. E-mail works across the Internet, Intranet or Extranet. The best thing with the e-mail is that neither the users nor their computers are required to be online simultaneously.

*Chat Room:* Chat room is mainly used to describe a form of synchronous conferencing over the Internet. It may be a web

site or just a part of web site that allows users to communicate in real time through instant and interactive messaging.

*Video conferencing:* A video conference, sometimes referred to as a video teleconference or VTC, is a means of communication where the sound (audio) is accompanied by a live picture (video). A video conference can be relayed over the Internet or it can utilize ISDN telephone lines, satellite links or wireless networks, even cell phones.

TABLE 1--COMPARING TRADITIONAL LEARNING AND WEB-BASED LEARNING

| Topic   | Traditional Learning   | Web-Based Learning (WBL)  |
|---|--|---|
| Cost of Content Delivery                            | Physical space and printed material required in traditional which increases the cost of learning. If more learners get registered for learning, instructors need to be hired by the educational institutes.  | No physical space and printed material required in WBL which reduces the cost of delivering the learning material. No just this more learners can be managed easily without hiring more instructors. Even LMS facilitates reporting, assignment, assessment and other facilities without involving additional cost. |
| Reduce Travel and learning                          |  | Save on hotels; airfare, meals, and other travel expenses associate with traditional onsite training.   |
| Tools for Tracking, Updating, and Managing Training |  | Web-based learning management systems make it easy to track, update, and manage online learners. Learning management systems facilitate, reporting, succession planning, and workforce development from one, centralized, web-based source.   |
| Effective learning                                  | Non-interactive traditional learning makes learning boring so learners cannot learn effectively.   | Use of Interactive Content, Animations, Graphics, and sound for teaching learning become more effective. Learners enjoy learning as they enjoy playing games.   |
| Customized Material                                 | All the learners learn together at the same time and place so it is not feasible for the instructors to provide different learning materials to the individual learners.   | WBL is not just flexible in comparison but also better in providing the information. Learners can be provided customized learning material learns to meet their requirements and desires.   |
| Personalized learning                               | Personalized learning in traditional is just a dream of the learners. Learners go through all the topics being taught by the instructor in the classroom.  | Learner can learn at a pace that works for their individual learning style. Depending on the time availability and learning requirements learners can start learning from anywhere. Unlike traditional learning, depending on the interest and necessity learners can learn topics of their interest.               |
| Improved Performance                                | Traditional learning in not interactive enough. For learners it is difficult to remember everything they listen from the instructors which could be responsible for dissatisfied performance.  | The use of various interactive learning materials in WBL enables learners to remember what they learn more accurately and even can remember for a longer time which improves their performance.   |
| Collaborative learning                              | Collaborative learning is a method of teaching and learning in which two or more learners learn or attempt to learn something together. In collaborative learning learners actively interact by sharing knowledge and experiences. In Traditional learning due to time limitation collaborative learning is hardly possible. | By making use of various tools associated with the WBL learners can actively interact and can sharing knowledge and experiences from anywhere and anytime.  |

|   |   |   |
|---|---|---|
| Extendibility and Accessibility             | In traditional learning once the course is changed or extended can't be implemented immediately. There will also be extra reprinting cost involved is course is extended.   | Learners can proceed through a learning program at their own place and pace. They can also access the learning material at any time, receiving only as much as they need stated by Gary James. Learning content can be extended and implemented easily whenever required. |
| Flexible Scheduling (Anytime and Anywhere ) | Unlike WBL traditional learning does not provide flexibility in timing and physical location of participation. Learners need to be present at a fixed time for learning at the same physical place where and when instructor is teaching. | The best feature of WBL is flexibility in timing and physical location of participation. WBL learning could be asynchronous or synchronous manner [10].   |
| Assessment                                  | Immediate assessment and feedback is not possible in traditional learning as every thin is done manually.   | WBL facilitates assessment of learners knowledge in real time. Online assessment can be done immediately. Learners can also be provided feedback along with the assessment so that they can better understand the deficiencies in learning [6].                           |

*The WBIs will help to fulfill various learning objectives as follows:* WBIs will help in provide fundamental and in-depth knowledge for subjects being taught. Usually the lack of time and appropriate tools act to limit this aspect of education in various courses. Use of web-based instructional system for learning to overcome barriers of traditional learning and will encourage learners.

To provide individual assistance to the learner during practice and implementation of various algorithms which helps in enhancing knowledge level.

Web Based Instructional systems also support an open learning environment and inspire learners for self-regulated learning [1]. WBIs also helps in improving the level of interaction in the course, experimental learning and to extent of Web use throughout the course.

Web-based instructional system is highly interactive and allows learners to actively participate in the learning process. A variety of interactive learning tools have been developed and are being developed to empower educators in support to change the way teaching and learning occurs [1]. Interactive learning system, in contrast to the traditional learning system is more powerful and supports and allows learners and educators to actively participate in the learning process.

One study was performed to describe the learners' perceptions towards traditional class room learning and Web-Based Interactive learning of algorithm. Experimental method has been used in this study. The aim of experiment was to compare the outcome of result of two different groups studied with different methods. Experimental research is important to learners and instructors to improve the way of using and delivering the learning material.

Prerequisite test paper and final examination paper to assess learners' knowledge was constructed on the basic of experience

and past year question papers of various universities. Where prerequisite test was constructed to check programming skills of learners and final examination paper was constructed to assess algorithm knowledge after they participated in algorithm learning. Both the test papers were checked by the instructors of computer science to verify that important aspects have been covered and unnecessary questions had been omitted. Changes were made several times as suggested by the experts; the process was continued until no further modification was needed.

During modification some questions were modified because they appeared ambiguous or irrelevant to perceive learners knowledge. In our study prerequisite test had been carried out for and carried out 28 questions to check programming skills of C language. C had been chosen because algorithm implementation is done in C language, while final examination paper had been carried out of 25 questions.

*Participants in study:* Participants consisted in two groups G-1 and G-2 enrolled in two courses Masters of Computer Applications and Bachelor of Technology (Computer Science and Information Technology). Random sampling was the procedure for selecting participants whereby each participant has an equal probability of being included in the sample [3].

Each group comprises of fifty learners each and has learned programming language as mandatory to learn algorithm. Algorithm learning is part of courses for both of the groups. Both groups have been selected from undergraduate and graduate course randomly. Learners of Masters of Computer Applications and Bachelor of Technology had been selected randomly from an engineering college.

*T-Test Analysis:* In analyzing the statistics, SPSS package program was used. The data collected from the groups (G1 and G2) were compared by independent t-tests. The most typical use of this test is to compare means. The t-test is a test of significance that can be used to determine whether a significant



difference exists or does not exist between two groups. Statistical test called the t-test for Independent Means is used when independent samples come from the same population.

A T-test is used to compare the differences in scores achieved by groups **G1** and **G2**. The mean for each of the two groups is shown in Table 1. The average score of group **G1** is **19.23**, versus **14.23** for group **G2**. On average, **G1** had higher score in final examination ( $M = 19.23, SD = 2.88, N=48$ ) than **G2** ( $M = 14.23, SD = 2.56, N=47$ ). This difference was statistically significant,  $t(93) = 8.91, p=.000$ , two tailed), indicating that the higher average score of learners using WBIs was more than learners who had not used WBIs.

*Study Result:* G1 was used AlgoWBIs for learning while G2 was taught with the traditional method. Both the groups improved their algorithm skill. Results shows that the G1 has the better result over the traditional learners. It is found that the learners adopting AlgoWBIs have better result than the learners learned with traditional method. That is why it results as the: Reject the null hypothesis while **Null hypothesis** of the study is that there is no significance difference between traditional learning and learning through WBIs. This can be expressed as:

H0: There is no significance difference between the results of the learners learning without tool AlgoWBIs and with tool AlgoWBIs.

**Alternative hypothesis** of the study is that there is significance difference between traditional learning and learning through WBIs. This can be expressed as:

H1: There is significance difference between the results of the learners learning without tool AlgoWBIs and with tool AlgoWBIs.

### V. CONCLUSION

Information technology is changing the learning methods in various universities, their educational structure and the way in which their study material and knowledge is delivered to learners.

The study presented in the paper shows that WBIs tools are effective enough for increasing knowledge level of learner. T-Test result proves that learners not only perform better but they also perceive that they have acquired better knowledge of the concepts they are supposed to. Such tools are very useful for the universities, colleges and for learners for delivery of courses in their educational program [1].

### VI. REFERENCES

[1]. H. Atan, F. Sulaiman and R.M. Idrus, "The Effectiveness of Problem-Based Learning in the Web-Based Environment for the Delivery of an Undergraduate Physics Course," *International Education Journal*, Volume 6, No. 3, 2005, pp. 430-437.

[2]. Saeid Farahbakhsh, "A study of quality of educational services of Lorestan University, Iran," *Academia Journal of Educational Research*, Volume 1, No. 2, 2013, pp. 019-024.

[3]. B. Akkoyunlu and M.Y. Soylu, "A Study of Student's Perceptions in a Blended Learning Environment Based on Different Learning Styles," *Educational Technology & Society*, Volume 11, No. 1, 2008, pp. 183-193.

[4]. V. Koller, S. Harvey and M. Magnotta, "Technology-based learning strategies. Social Policy," 2008.

[5]. P. Tibenderana, P. Ogao, J. Ikoja-Odongo and J. Wokadala, "Measuring Levels of End-Users' Acceptance and Use of Hybrid Library Services." *International Journal of Education & Development using Information & Communication Technology*, Volume 6, No 2, 2010.

[6]. Yi-Cheng CHEN, Yi-Chien LIN, Ron Chuen YE, Shi-Jer LOU "Examining Factors Affecting College Students' Intention To Use Web-Based Instruction Systems: Towards An Integrated Model," *The Turkish Online Journal of Educational Technology*, Volume 12, No. 2, 2013.

[7]. G. Piccoli, R. Ahmad and B. Lves, "Web-Based Virtual Learning Environments: A Research Framework and a Preliminary Assessment of Effectiveness in Basic IT Skills Training," *MIS Quarterly*, Volume 5, No. 4, 2001.

[8]. Sue B. Schou, "A Study of Student Attitudes and Performance in an Online Introductory Business Statistics Class," *Electronic Journal for the Integration of Technology in Education*, Volume 6.

[9]. J.C.F. "Using the Student's t-test with extremely small sample sizes," *Practical Assessment, Research & Evaluation*, Volume 18, No. 10, 2013.

[10]. Gang Chen & Ruimin Shen "Collaborative Education Practice in a Data Structure E-Learning Course," *World Academy of Science, Engineering and Technology* 54 , 2009.

[11]. Vedran Kosovac and Bozidar Kovacic, "Adobe Authorware 7 as Programming Tool".



**Dr. Kavita Saini** is working with IEC College of Engineering and Technology (Computer Science and Engineering), Greater Noida. Obtained MCA degree from MDU, Rohtak in 2004 and PhD from Banasthali University in 2015. She has published and presented various papers in National and International Journals and conference.



**Dr. Abdul Wahid** is Head of Department of CS & IT MANUU, Central University, Hyderabad, India. He completed his MCA, M.Tech. and Ph.D. in Computer Science from Jamia Millia Islamia (Central University ), Delhi. He has published and presented various papers in National and International Journals and conferences. He has guided various M. Tech and Ph. D. students.