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Research Article

VIRTUAL CLASSROOMS TRANSFORMING THE DYNAMICS OF THE TEACHING AND LEARNING PROCESS IN HIGHER EDUCATIONAL INSTITUTIONS OF INDIA

Shazli Hasan Khan

MANUU, CTE, Sambhal-U.P

A R T I C L E I N F O

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A B S T R A C T

In recent years there has been a phenomenal increase in the growth of what some are calling 'digital', 'online' or 'virtual' classrooms and 'virtual' universities. Today, information and communication technologies are radically reconfiguring the landscape of higher education, and changing the very 'nature' of the university; now the vision has decreased the importance of the campus, so students 'login' from a distance to access 'courseware', new media technologies replacing traditional lectures, courses being delivered and assessed over the Internet, promising to make higher education available anywhere and at anytime. Now Virtual Classrooms are being depicted as a viable solution to the increasingly demanding problem of higher education, all of this fired the imagination of academics, policy makers, and educational specialists alike. It is well known that information and communication technologies provide a powerful incentive to standardization and as the technology grow, virtual education will become realistic as its technology brings sound, visuals and interactivity together and hence create a learning environment nay where in the world. Virtual classroom aims at providing computer generated virtual environment, which can be used as the most advanced tool of visualization for a large number of scientific applications such as study of computer structures, near realistic simulation of natural phenomenon and conducting hazardous experiments. The students can interact with a life-like artificial world that can be perceived, explored and manipulated at will. In virtual reality, computer is used for creating visual environment, audio environment and tactile environment and tactile environment is taking care of input to three senses. In the present paper the authors tries to explore that how virtual classrooms are going to develop an education-on-demand system for delivering lectures, tele-courses to home-bound personal computers at their door step. While each student would work independently, computer conferring, e-mail and voice mail access to a faculty or advisor would be available to answer questions, evaluate assignments and provide guidance.

INTRODUCTION

With the ever increasing popularity and accessibility of the Internet, it is only natural that the educational community should want to make use of this tremendous resource. Use of the Internet and Web are leading to significant changes in educational models. As this use of Internet is increasing, a traditional classroom has shifted to e-learning. Thus, e-learning can be defined as an approach to facilitate and enhance learning by means of personal computers, multimedia components and the Internet. The growing popularity of e-learning has introduced new terns to education, as Virtual Classroom, where student will be present with his professor and fellow learners in a classroom. They will not be present physically in the classroom but connected to the classroom via Internet.

Corresponding author:* **Shazli Hasan Khan
MANUU, CTE, Sambhal-U.P

This new facet of life highly increases students capability of acquiring technological skills as they are exposed cot the tools used for web-based learning, computer-based learning typically provided by Internet. This is extremely valuable since computers are becoming prevalent for future students.

With the advent of Internet there has been much talk about how learning can now be delivered at a distance, with no need for individuals necessarily to attend face-to-face courses. It is suggested that the potential to open up learning to a wider audience by allowing a person to have greater flexibility, regarding where, when and how they learn. This concept is often referred to in education as the virtual classroom, virtual university or virtual learning environment. A virtual classroom enables to bring learners from around the world together online in highly interactive virtual classes while greatly reducing the travel, time and expense of on-site teaching/training programs. It can be used as a solution for live delivery and interaction that addresses the entire process of

creating and managing the teaching-learning process. It facilitates instructor and student in training for teachers or administrator in the school. In a traditional classroom, professor students and fellow learners are present, similarly the same set of participants are present in a virtual classroom. They can talk with each other alike the traditional classroom via chat. Similarly presenter uses whiteboard, gives notes/resources and gives presentation as given in traditional one. Thus, virtual classroom can be visualized as a classroom where a lecture or session is conducted using Internet. As this use of Internet is increasing, a traditional classroom has shifted to e-learning. While advancements in communication tools were easily adapted to learning methods, it was the introduction of the personal computer and the development of the internet that would create the most radical transformation in higher education.

Virtual classroom

Virtual classroom is a computer mediated communication system. The need of gathering at one place for communication in traditional classroom has been overcome by virtual classroom, the main advantages of virtual classroom is that due to shrinking, the distance communication is improved. The architecture of virtual classroom is in three phase which include the normal instructor to classroom setup, classroom behind firewall setup and instructor to group of geographically dispersed student. The term virtual means a simulation of the real thing, *Virtual Classroom is a simulated classroom via Internet, which provides a convenient communication environment for distance learners just like traditional face-top-face classroom*. A virtual classroom allows learners to attend a class from anywhere in the world and aims to provide a learning experience that is similar to a real classroom.

Throwing light on the concept of a virtual classroom, Professor Murray Turoff of New Jersey Institute of Technology, USA (2011) has said, "*Virtual Classroom is a web-based environment that allows you to participate in alb exercises, ask questions, and receive feedback just as you would do in a conventional classroom-----except you do it from the convenience of your desktop, or anywhere you have an Internet and phone connection. It saves the hassle, expense, and travel time to a training site*". Based on the above definition, "*virtual classrooms*", as the name suggests, are the classrooms functioning in a system of virtual reality. These are, in fact, the cyber classrooms where the teacher and the students can converse in real time. In every sense, a virtual classroom tires to stimulate, in every way it can, the learning platform provided by a conventional classroom.

In a college setup, lectures are scheduled, students arrive on time; find their teachers, fellow learners, a blackboard or whiteboard, LCD projector, optionally a television screen with videos. Likewise, a Virtual Classroom is a scheduled online, teacher-led training session where teachers and learners interact together using computers linked to a network such as the Internet. They will not be present physically in the classroom but connected to the classroom via Internet. Virtual Classroom aims to simulate the experience of attending a class over the web. So everyone is able to see other participant virtually. *A virtual classroom is an advanced learning environment, created using Internet, computers, supplicated video conferencing devices, in which either teacher is not physically present (for remote learning) or students are not present (distanced education) in the classroom*. Virtual Classroom learning is an evolving way of learning where the learner attends "Live" lectures remotely on his/her computer terminal, given by the subject matter experts or instructors at other end, using Internet as the medium between the learner and instructor. As lectures are given "Live" on Internet, the student gets to have the opportunity of asking his/her queries to the instructor at any instant. Most of the distance learning degree and training courses heavily rely on the concept of "*Virtual Classroom*". As the learner is no more required to attend the lectures/sessions in person, this new method of learning helps keeping the lecture costs much lower than conventional classroom teaching without compromising on the quality of learning. This makes Distance learning much affordable compared to regular training courses. Virtual Classroom is very multipurpose technology or platform which can be used for Webinars, Tuition, One-to-one training and tuition, mentoring, interviews, Team meetings, Project meetings, demonstrations, staff or students meetings, Technical support, student service, On-line user communities. A virtual classroom enables to bring learners from around the world together online in highly interactive virtual classes while greatly reducing the travel, time, and expense of on-site teaching/training programs. It can be used as a solution for live delivery and interaction that addresses the entire proves of creating and managing our teaching-learning process. In Virtual classroom commonly we find the tools like Projector, Liquid Crystal Displays (LCDs), Server Machine, Video conferencing System and its accessories, High Definition Multimedia Visualizer, Interactive Whiteboard or Touch Panel, Digital Canvas, Silver Board, High-Definition Cameras etc. Thus, virtual classroom can be visualized as a classroom where lecture or session is conducted using Internet. Rather than being built of steel and concrete, the Virtual Classroom consists of a set of group communication and work "***spaces***" and facilities that are constructed in software. Thus, it is a *"virtual facility"* form interaction among members of class, rather than a physical space.

Thus, as a definition therefore, virtual classroom can be understood "*as the classrooms, capable of replacing partially or totally the conventional educational, evaluative and administrative functioning of a regular classroom by adopting the advanced computer and ICT technologies like the Internet, e-mail, on-line chatting, World Wide Web, CD-ROMs, DVDs, teleconferencing and video conferencing"*.

Virtual Classrooms and their Mode of Operation

Virtual classrooms stand for bringing various types of school courses and classroom activities at the doorstep of the students for being accessed by utilizing the advanced computer and ICT technologies at their end. The operation and working of the virtual classroom system may be summarized in the following manner:

In its basic operation, a system of virtual classrooms may allow the subject experts or experienced teachers to deliver instructions on one or the other topics of the school curriculum. These may be telecast live with the help of satellite-based teleconferencing (as happening with the EDUSAT {Educational Satellite} programme of NCERT).

In another mode, the study materials prepared by the experts and experienced teachers may be uploaded on the website of a virtual classroom or campus and the students are allowed to

download the text and graphics for their study by issuing a confidential password to the students registered with the class or campus.

It is also possible on the part of the institutions to provide CD-ROMs or DVDs with course contents and instructional guidance to be accessed by the students through their computers or laptops. In such supplied learning material (whether in CDs, Internet files or web pages), the teachers and school authorities also try to send the support material, reference material and the supplement in the form of Frequently Asked Questions (FAQs) which may help the students in grasping and solving the problems related to the contents of the learning material supplied to them.

There may be a number of appropriate options available to the students for interacting with their teachers and also with their colleagues through on-line chatting, e-mail or audio and video-conferencing as permitted by the organizational system of a virtual classroom or campus. The teachers may also make use of these interaction opportunities for seeking active participation of the students in the instructional process, asking questions for testing their comprehension and evaluating their progress besides giving them freedom for removing their doubts and quenching their thirst of knowledge.

A virtual classroom system may evolve its own system for assigning practice work, projects, and questions/problems for reinforcing, fixing and evaluating the progress of the students. It can upload the needed material on its website for this purpose at regular intervals and the students may then be asked to do the desired work and send it back for the needed checking, feedback and evaluation on the part of the teachers.

This system also takes care of the other essential administrative and managerial requirements of the students enrolled in this system like their on-line admission, information on the Web about the type of courses and instructional programmes available with the school campus, information about the modes and technologies available, on-line provision for the tutorial, the needed feedback, guidance and evaluation for the academic progress of the students, grading of the students' achievements, informing them about their scores and grades and providing them their certificates and degrees including holding convocations on-line.

Objectives of Virtual Classroom

The important objectives of virtual classroom are as following:

1. To support live on-line classes for distance learning and remote education.
2. To pool academic resources thereby improving access to advanced educational experiences.
3. To improve the quality and effectiveness of education by collaborative learning and teaching process.
4. To hold and participate in the meetings, Webinars, conferences, Symposium, Workshop, interviews etc. through video conferencing.
5. To increase and improve the accessibility of educational resources to the persons of disabilities.

Different Users of Virtual Classroom

There are different classes of users of virtual classroom based on the roles that they play. When presenter enters in virtual classroom, he has different work to do than participant. Depending on the user type, virtual classroom takes different form for each user. These forms can be categorized depending on the user's role. These roles are as following:

Facilities provided by presenter interface to Faculty

1. ***Register new users:*** Presenter as an administrator has to register new users that will be attending the session.
2. ***Create a session:*** Presenter has to decide the session time, users that will be invited for the session. While creating a session, he can specify the time and users of the particular session.
3. ***Cancel a user:*** If any registered user does not wean to attend the session, presenter cancels his registration.
4. ***Conduct online presentation:*** As a presenter, he conducts the session for participants. During presentation he performs various activities in the classroom. He can load the presentation slide that will be displayed to participants.
5. ***Share Resources:*** Presenter can add various resources to the session. It may be a file or just a simple web page link that participant can download at their end.
6. ***Conduct Poll:*** He can create a poll for various participants. Also he can chat with participants.
7. ***Explain concepts using Whiteboard:*** He can use Whiteboard to explain some of the topics, which may not be able to explain via presentations, or to solve any particular doubt asked by the participant.

Facilities provided by Participant interface to Students

1. ***View online presentation:*** When a participant joins the session, they can view the presentation (Power Point presentation slides or it may also include the snap of the whiteboard), which are conducted by the presenter in the virtual classroom.
2. ***Public/Private Chat:*** The participants can have a conversation with the fellow participants publicly or privately via the chat feature available in the interface, the chat allows the participant to send the instant messages to the participants who are also attending the session. Participants can also send private messages to the presenter but can do so by using the hands up facility.
3. ***Raise Hands:*** Whenever any participant will have nay doubt, then he can tell that to presenter by using the hands up facility available in the user interface of the participant, using this feature the participant can interact with the presenter via the private chat.
4. ***Give Response to the polls:*** The participants can answer the polls that are submitted by the presenter by using the "Submit Response", facility provided in the interface. The poll can be of objective type of it may be of Yes/No type. If the particular poll is public then participants can see response for that particular poll, else it will be kept hidden from the participant. The only presenter is able to see the response for that private poll.
5. ***Download Resources:*** The resources that are been shared by the presenter can be downloaded by the participants at their machine. The resources can be files which may include course material' e-book's etc, or it may be also web links which presenter may want the participants should refer.

Mode of Virtual Classroom Session

The presenter can create the session in the beginning and will conduct online presentation in the session. The participants can

attend this session using the name of the session and view the presentation made by the presenter. In the session of the classroom, various functionalities that will be performed by the users are as following:

1. ***Agenda:*** The presenter creates the agenda in the beginning of the session. This agenda specifies an outline of the session. The participants can only view the agenda in their main window. The agenda will give him an idea about the topics that will be covered in the session.
2. ***Presentation Area:*** In the presenter interface, the presentation area allows presenter to upload the presentation file. It also allows him to navigate between the slides in the participant window; the presentation area will display the slide that the presenter is explaining.
3. ***Whiteboard:*** The presenter will be able to write, draw and highlight any particular area on the whiteboard. The whiteboard consists of various components such as various shapes, lines, eraser, pointer etc, using which the presenter would be able to explain the particular topic to the participants. The participants can view the whiteboard in their interface, but they will not be allowed to use it (they will not be allowed to make any changes to whiteboard). The changes made by the presenter on the whiteboard will be displayed to the participants.
4. ***Shared Resources and Web Links:*** The presenter can share their resources using the load resources facility that will be present in the presenter interface. The resources will be files of type (doc, rtf, PDF) or web links (Uniform Resource Locator). The participants can download these shared resources on their machines, also they can refer the given web links using their web browser.
5. ***Poll:*** The presenter can ask the participant any question by using the poll functionality that will be of the objective or yes/no type question. The response of the poll will be public or private. If the response of any particular poll is private then the response will not be shown to the participants and only presenter will be able to see the response. The response will be shown in the vertical bar chart format. The participant will be able to submit his response to the poll submitted by the presenter. Also, he can view the responses of the polls for which presenter has allowed permission to see the response by participants. The private responses will be shown to the participants.
6. ***Chat:*** The presenter will use the chat functionality to send text messages to the participants. He can send a message to particular participant or to all participants. The participants will be able to send text messages to each other. But, he will not be able to send message to presenter directly. He can do it by using the hands-up facility.
7. ***Hands-up:*** The presenter interface will consist of hands-up list, which will display the names of the participants, which has raised their hands. Hands-up by participant indicates he has some doubt or question to be discussed with presenter. Participants will use the hands-up facility if he wants to ask some question or want to talk with presenter. He can use this facility to initiate the conversation with the presenter. After the participant uses the hands up facility, presenter will allow him to have a private chat with him.
8. ***Participant List:*** In the presenter interface, there will be the list of participants, which will consist of the names of the participants that will be attending the session. If the presenter has to eject any particular participant, then he can use the eject facility that will be available in presenter interface. In the participant interface, the list of participants will only show the names of the fellow participants that are attending the session.

Potential Advantages of Virtual Classroom

The potential important advantages of Virtual classroom over traditional classroom model are as following:

1. ***Removal of geographical barriers (Anywhere learning):*** A virtual classroom allows learners and teachers to attend a single live training session from any place in the world, provided they have a computer and Internet connection.
2. ***Sessions can be recorded:*** A virtual classroom has a facility to record the session so learners or teachers can replay it afterwards. Teachers can get an opportunity to review their own or their colleagues' performance. The entire classroom session can be recorded in video format and stored in library for future reference. This feature is extremely useful, especially for absent students, who can review the recordings later and understand the concepts elaborated by the professors. Moreover, the students can also refer to the recordings for revision purpose, at their convenience.
3. ***Quicker to organize:*** Training can be organized more quickly than traditional classroom-based training. Classrooms and projectors do not need to reserved; materials do not need to be distributed. The sessions are easier to schedule or reschedule since attendees will not be traveling to the venue of the session.
4. ***Synchronous Learning:*** In this type of learning process, students and Professors connect and interact with each other in real time. This is indeed a very significant process where students get answers to their queries and questions then and there. Interaction with professors and peers makes the learning process interesting and enriching for students.
5. ***Live Audio-Video Support:*** Audio and video support both contribute towards the e-learning process in virtual classroom. Various tools are available for text-based chat-verbal interaction through audio conferencing and sharing of one's own video through web-camera. Professors can share their audio and video, thus establishing one-to-one relation with students. Moreover, the students asking questions can share their videos with the fellow students as well.
6. ***White Board:*** it is an alternative to the traditional blackboard method, used as a tool for drawing graphics or diagrams in virtual classroom. It comes handy when Professor wants to visually explain any abstract concept.
7. ***Sharing of Learning Resources and/or Desktop Screen:*** The resource sharing feature in virtual classroom allows professor to share varied content in different formats with the students in real time while

delivering lectures on various course topics. This resource sharing feature supports sharing of various file formats----MS-Word/ Excel/PowerPoint, PDF files, flash presentations, flash videos etc. While teaching, the Professors can exhibit all the operations from the desk, by sharing a particular applications or the entire desktop. This resource sharing feature is extremely useful for sharing various course materials like topic notes, subject diagrams or graphs, explanatory videos etc. With this type of supportive and informative course material, learning becomes interesting and gives an interactive experience.

8. ***Classroom Control by Professors and Active Student Participation:*** In virtual classroom when Professors deliver lectures to the students while explaining or elaborating concepts, ideally one sided process of communication is followed, and students are not permitted to talk/express themselves at the same time in order to avoid chaotic situations. Though all the participants from the virtual classroom are connected through audio and/or video conference, the participation rights are controlled by the Professors. During the lectures, in case the students come across a particular doubt or query, while the professors are explaining, the students can set their status to "raise hand" which indicates that the student has a question which needs to be addressed by the Professor. However, only one student can ask question at a time, in order to avoid confusion as well as commotion and to maintain focus and clarity on queries asked. Since the Professors have the control rights, they can respond to the question or else disable the status of "raise hand" and take the question at the end of the session.
9. ***Multi-Level Fallback Mechanism for Class Continuation:*** Virtual classroom is a web-based tool which is solely dependent on Internet connectivity. If in the remotest possibilities, participants get disconnected from virtual classroom, then there are various alternatives to keep the class active. The technical team operates the fallback mechanism. If the Internet is intact, then with the pre-configured *Skype* accounts of all participants, a common *Skype* call is initiated to connect all participants to further carry on with the class. In case all the participants loose Internet connectivity then the successive portion of the class is conducted through telephone.
10. ***Live Tech Support:*** With this feature, technical support representatives of the institutes or corporate organizations will be able to provide text based chat and live tech support to their users.
11. ***Offers any time Access:*** Offer live classes, office hours, and group discussions at times that are convenient for instructors and students, not just when the physical facilities are available.
12. ***Ensures Comprehension:*** Ensure students understand their lessons by asking form immediate feedback, answering questions, and giving in-depth verbal explanations of complex material.
13. ***Electronic whiteboard and polls, quizzes and surveys:*** A best practice of live instructions to regularly offer interactive exercises. By offering whiteboard exercises and asking polling questions, students will remain highly engaged.
14. ***Flexible content area:*** A variety of content, types can be viewed such as Power Point, Word, Excel, HTML, Web pages, images, movie clips, PDF, Flash etc.
15. ***Access to Persons with disabilities:*** Just because a student has a disability doesn't mean they shouldn't be able to attend live on-line class. Live and archived classes can be close-captioned for the hearing impaired persons while also reaching out to the visually impaired persons by offering numerous key board short cut keys, hotkeys and compatibility with most screen readers. These accessibility features will ensure this technology is inclusive to all.
16. ***Create Community:*** Create a sense of community among students and instructors whjo might not otherwise interact with one another.
17. ***Public and Private Text chat:*** Some students are more comfortable writing than speaking, and our chat messaging allows the shy student to communicate textually so they can participate with their more talkative classmates.
18. ***For Participants:***
    1. Offers the combined advantages of face-to-face interaction and distance learning.
    2. Enables working professional who would like to acquire new skills and/or enhance their knowledge in their respective functions to do so without taking a career break.
    3. offers those who missed obtaining a degree the chance to get one now from premier colleges without having to take leave from work or travel out of their hometown.
    4. Minimizes disruption to work as classes are conducted on weekends or at convenient timings during working days.
19. ***For Institutes:***
    a. Increases the institute's reach to a vast and geographically dispersed pool of potential students across the globe.
    b. Enables institutes to meet the demand for quality the heavily skewed demand-supply ratio of students and educational institutes.
    c. Facilitates access to a network of Virtual Classrooms across different cities.
    d. Enables seamless delivery of lectures and supports display of Power Point/Audio/Video/Animation presentations and usage of whiteboard.

Disadvantages of Virtual Classroom

To pose as a virtual for a thing and phenomenon is a limitation and drawback in may ways. The same holds quite true in the case of the organization and functioning of the virtual classes and campus. This is why virtual school system in-spite of its so many advantages and virtues is found to suffer from a number of loopholes and limitations, which are as following:

1. The flexibility of this system to the learners for taking their studies at their will, convenience, comforts and adjustments of the space and timings according to their needs may be misutilized and misdirected on the part of the students especially when they are younger in age and are not matured enough in feeling their responsibilities for the building of their career, or are shirkers and lazy by nature.

2. In many cases, the organization and working of a virtual classroom or campus is found quite hopeless in terms of its quality of study material and its delivery to the students. The staff employed for providing instructional material, guidance and timely feedback is also very poor in the quality, sincerity and devotion to the work, In such a scenario, the students enrolled with the system are bound to suffer adversely and such incidences may give a bad name to all virtual classroom systems in general.
3. The dreams and promises of providing real classroom experiences through virtual realties of the virtual classroom system are hard to realize. A virtual cannot be turned into real in toto. We cannot provide real time face-to-face interactive experiences to our students through virtual classes. Who is there to study the faces and exchange other verbal and non-verbal clues for the lively classroom interaction and effective classroom discussions in a system of virtual classroom? The warmth of the teacher-pupil relationships, the charms of the group cohesion and fellowship, and the humanistic touch prevailed in the surcharged social and emotional climate of the conventional classrooms are altogether absent in the virtual classroom system. In such a situation we cannot expect a better environment for the academic and personal growth of the students.
4. We aim to develop a wholesome personality of the students with what we teach and do with opur students in the schools. Along with the curricular instruction work, the organization of co-curricular activities, students' welfare services, community activities, the interaction with the parents and members of the community, etc. help the conventional system much in seeking the all round balanced development of the children. However, such things are completely lacking in a system of virtual classroom. Therefore, in the absence of the needed humanistic touch, socio-cultural environment, and activities to promote social and moral values and opportunities for building physical, social and emotional competencies, the system of virtual classrooms is quite incapable of turning our youngsters into a perfect human being sensitive to moral values and mutual brother hood.
5. Time dependency for Live sessions: Attending virtual classroom training is restricted to a certain scheduled time.
6. Infrastructure for the Participants: Personal Computer (PC) needs to be prepared virtual classroom sessions need to be scheduled, teachers need to be invited and participants' PCs need to be prepared.
7. Technical Limitations: Technical issues such as bandwidth speed of the connection or power failure may create problems while presentation is going on.

In-spite of the certain shortcomings and limitations pointed out above, virtual classrooms can solve many problems and maladies coming in the way of realizing our constitutional obligation towards the younger generation, i.e. providing "*Education to All*" and ensuring quality instruction to them at their doorstep according to their needs and convenience. It can also open a new vista to many of our adolescents and youths for venturing into the new areas and fields of employments and entrepreneurships needed today. Hence, there is a great need of the promotion of the virtual classroom along with the formal set up of real classroom.

CONCLUSION

The emergence of virtual classroom is arguably one of the most powerful tools available to the growing need for education. Virtual classroom education is rapidly7 increasing and becoming as a viable alternative for traditional classrooms. Virtual classroom enables to bring learners from around the world together online in highly interactive virtual classes while greatly reducing the travel, time and expense of on-site teaching/training programs. It can be used as a solution for live delivery and interaction that addresses the entire process of creating and managing out teaching-learning process.

It is now well known that information and communication technology provides a powerful incentive to the standardization and Virtual education ahs emerged from the application of C-IT in the context of distance education, however, it has now developed to the point where it can be used to support classroom-based learning as well as distance education (Coz, 2003). "Virtual classrooms will develop an education-on-demand system for delivering tele-courses to home bound personal computers. While each student would work independently, computer conferring, e-mail and voce mail access to a faculty or advisor would be available rot answer questions evaluate assignments and provide guidance" (Salavati, 2005). In this multimedia virtual environment teachers can design-individualized instruction for students who can learn in real-time or on demand. In the end, we can assume that the concept of '*Virtual Classroom*' is truly the way towards '*Global learning*' on web.

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