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Virtual Reality: A Communication Tool for Educating History of Architecture

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Abstract: Basic knowledge of the architectural perspectives and structures of the past is a prerequisite for understanding and interpreting today's architecture and our built environment. There is a particular emphasis in the classroom on identifying and explaining the social, ideological and technical assumptions that have influenced building design and built environments through time. History of Architecture acts as an elementary component in architectural teaching –learning process. Students lack in achieving a complete comprehensive understanding of the subject due to the descriptive method being adopted since ages. At times it is studied with no understanding of relationship or the global viewpoint and hence it is unable to generate the required interest and curiosity. Teaching History of Architecture by using Virtual Reality software students act as builders of historic landmarks studied during the course. Virtual Reality is a student-centered approach which concentrates on students learning and also allows for high degree of student autonomy and creativity.

Keywords: Interrelations, Transitions, Experiential, Domains, Architectural Design Studio.

INTRODUCTION

'History of Architecture' is an important course offered in the first and second year of Bachelor of Architecture (B.Arch.) Program in academic institutions in India. This subject covers disciplines such as social, cultural, political and economic studies with other subjects such as gender, race, ethnicity, and post-colonialism, creating a new kind of architectural history. Teaching history allows the student to develop a broad framework in economics, design, philosophy, urban development, and art. Presently method of teaching adopted development of history according to chronology or educating reverse chronology so that present is comprehended first or sometimes even random. This descriptive format of teaching and the prevailing pedagogical issues associated with this course make it difficult for students to assimilate the course content. History has lost its vibrancy and significance and has become far too neglected from the realm of personal experience. There is a need to understand the importance of this subject and give History of Architecture its status in Architecture curriculum. We need to research and evolve a balanced 'Methodology' of teaching History of Architecture that addresses and encompasses both the conflicting nature of 'subjects' and nature of 'learning's'; that enables students to make connections and thereby set the stage for lifelong learning. The use of virtual reality in architecture education is helping to communicate ideas and had the power to illustrate the projects as well as the elimination of much of the guesswork in the design of the building. Virtual reality was used within the process of analyzing the architecture and construction technology, The aim is not only to deepen constructional understanding but to discover the historical and social context. Virtual Reality is an environment simulated by computer. It is interactive (users can interactive with models), spatial (models are represented in three spatial dimensions), and real-time (feedback from actions is given without noticeable pause).History of Architecture is the discipline that records, studies and interprets architecture. It studies its forms, purposes, and most importantly its evolution. History of Architecture focuses on the evolution of buildings, monuments, pediments and settlements in relation to art, history, and philosophy as well as enables us to understand the society and culture. Architectural historians understand settlement patterns and regional growth.

HISTORY AS A GUIDELINE FOR FUTURE DIRECTION: PAST-PRESENT-FUTURE

History of the society which evolved through many years. To satisfy the needs of the society, the material, and technology developed through years together. The era of Industrial Revolution played a vital role in changing the human intellect. Hence time moves hand-in-hand with technology. The cultural belief has tried to remain same but technology has dominated 'Past' is always true and brings about 'facts' in front of the learner. 'Future' is always 'imagination' and 'predictable'. But 'present' is a 'transitory phase'.

METHODOLOGY ADOPTED

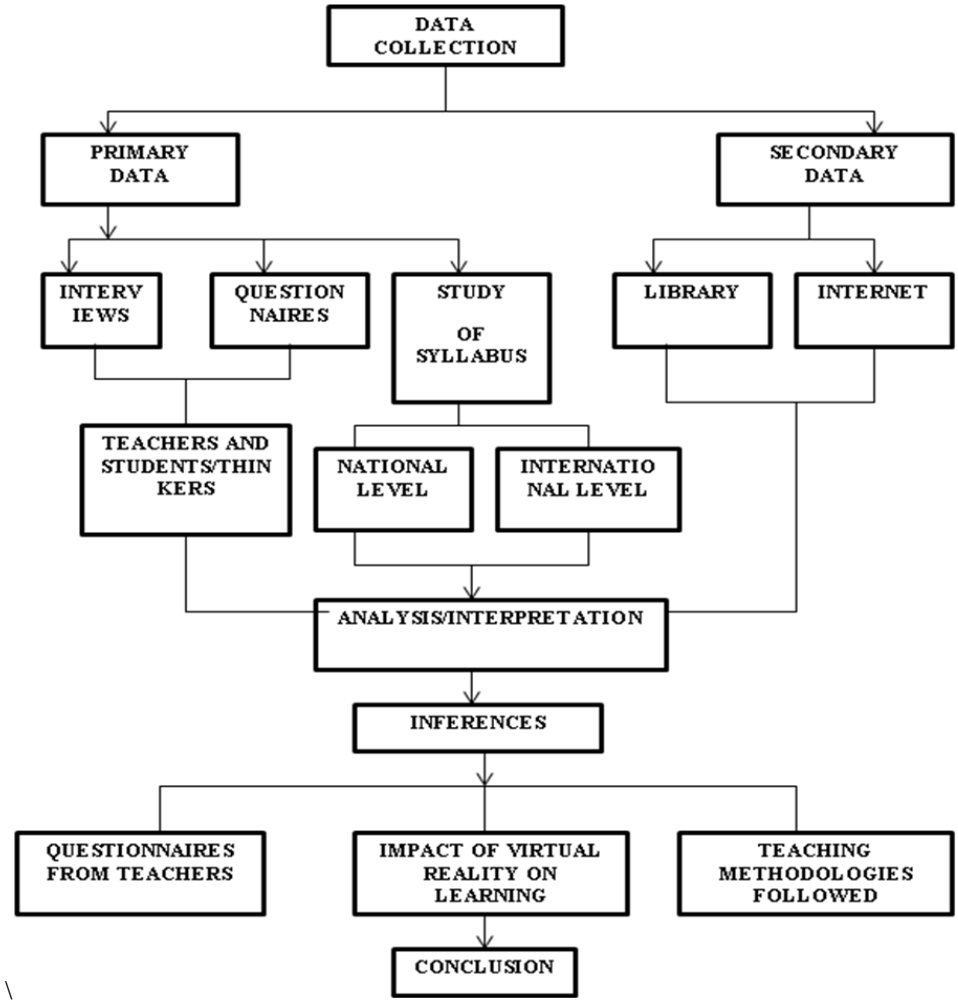
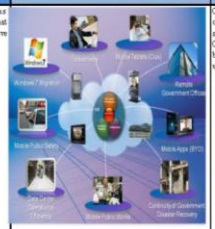
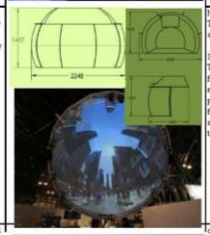


Figure - Flow Chart of Methodology Adopted

ANALYSIS AND INTERPRETAION

VIRTUAL REALITY

POSSIBILITIES OF			CONCEPT						IMPACT ON TEACHER-STUDENT			SWOT					
S.NO	NAME	DEFINATION	IMAGE	NOS. OF STUDENTS INVOLVED	PHYSICAL INFRASTRUCTURE- CLASSRM. FURNITURE /NETWORKING EQUIPMENTS	TECHNOLOGY	SOFTWARES REQUIRED	AREA OF APPLICATIONS IN EDUCATIONS	LEARNING ACHIEVED	MAIN FEATURES OF LEARNING	ADVANTAGES	STRENGTH	WEAKNESSES	OPPORTUNITY	THREAT	REMARKS	APPLICATION IN ARCHITECTURE EDUCATION
1	DESKTOP VIRTUAL REALITY	Desk-top virtual reality refers to computer programs that simulate a real or imaginary world in 3D format that is displayed on screen (as opposed to immersive virtual reality)		One student at a time can use it on the desktop. Others can only see it and can not operate it. Group learning can be achieved by showing the real or imaginary world to the students	Desktop VR focuses on mouse, joystick, or space/smoorball-controlled navigation through a 3D environment on a graphics monitor under computer control.	ordinary screen, mouse or keyboard control polemous mouse, steering wheel, computer graphics software and reasonably priced consumer computers with high-end graphics hardware components	VRML, ARML, X3D. 3D could be generated in AutoCAD while files are converted in VRML, in order to achieve virtual reality	Biology and Chemistry Virtual arts, geography, archeology, etc. Visualization and visualization of mathematical functions 3D-chat rooms / Virtual environments Architecture and other engineering areas project-based learning related designs or exhibits applicable in Architecture Education.	PROJECT BASED LEARNING- STUDENT CENTRED	Project-based learning is centered on the learner and affords learners the opportunity for in-depth investigations of worthy topics. The learners are more autonomous as they construct personally-meaningful artifacts that are representations of their learning. Central aspects of project-oriented learning: Practical relevance Learning of soft skills A systematic process Acquisition and transfer of learning "something needs to be learned, at least how to apply more typical "school knowledge" Anticipation, planning, implementation. Alone or with pairs Under the supervision of a teacher. An observable activity Leading to a final product that can be evaluated.	Increased Motivation. Working on a tangible "product" that takes "shape" yields feelings of success which in turn boosts motivation. Projects engage learners to connect knowledge, including prior knowledge. Therefore projects are important component of constructivist approaches. Projects engage learners to work with other people, including teachers and partners from practice. Project-based learning and the construction of artifacts enable the expression of diversity in learners, such as interests, abilities and learning.	PROJECT BASED LEARNING. MOTIVATION	criticism of this form of immersion is that there is no sense of peripheral vision, limiting the user's ability to know what is happening around them.	Projects engage learners to connect knowledge, including prior knowledge, work in cooperation and diversity create interest, abilities and learning.	Technical issues of sharing files, information and working with materials in another language.	APPLICABLE ON HISTORY OF ARCHITECTURE	Through desktop virtual reality architecture education can be enhanced in different subects like history of architecture, building construction, climatology etc.
2	IMMERSIVE VIRTUAL REALITY	Immersive VR = iVR iVR is the science and technology required for a user to feel present, via perceptive, cognitive and functional immersion and interaction, in a (computer) generated environment		Multiple users experience virtual reality at the same time.	A CAVE is 2.5mx 3m square four projected surfaces (three walls and floor), five surfaces, or fully enclosed six-surface configurations for complete virtual immersion. Variety of input devices, for example, a **joystick, wand or more commonly, a haptics device, i.e. data glove**	• Magnetic position/orientation trackers • DataGloves • 3D Mouse and Spaceball • MIDI keyboard • Shutter glasses • Head-Mounted Displays • CAVE Real-time video input Real-time audio input	A VR application is very often composed of a group of processes communicating through inter-process communication (IPC). As in the Decoupled Simulation Model [10]	Ford Motor Company uses 3D imaging to help them construct the interior of their vehicles. (CAVE) is also used by developers to look at the exterior as well as the interior of concept designs. What future products are intended to look like. Entertainment environments such as motion simulators that immerse the rider/players in a virtual digital environment.	Learner-driven, the example show specific possibilities of VR in architectural education that allow students to review building concepts using three dimensional visualization, interactive control and group discussion. This method of learning provides a vivid experience that could result in better understanding when compared to lectures or static images.	MULTIPLE LEARNING -help learners build communities of practice, collaborate with peers in group work, and create and share content. LEARNER develop problem-solving, decision-making, inquiry, creativity, and technology skills	Use less material Environment friendly No water, nothing to clean Faster to setup	awareness of the pupil's cognitive experiences, and improvement is significantly greater.	Dizziness, fatigue, and nausea are the most common symptoms of motion sickness	LEARNER develop problem-solving, decision-making, inquiry, creativity, and technology skills.	Challenge, Threat, and Social Influence in Digital Immersive Virtual Environments	APPLICABLE ON HISTORY OF ARCHITECTURE	Through immersion different projects proposed can be seen in reality. Helps in designing projects, history of architecture etc.
3	THE VISION DOME	Upon entering the VisionDome, the user views are into its hemispherical structure, which forms a fully immersive 180- degree hemispheric screen. The user sees virtual images that take on depth and reality inside the VisionDome. Combining com- puter generated 3-D models with advanced projection equip- ment, the VisionDome immerses users in a 360 degree by 180 degree virtual environment.		Number of users: 1-2 The VisionStation is 2.0 meters and has 1920x1080 resolution. Minimum Resolution: 1920x1080 The V-4 model can accommodate up to 45 people. The larger model is finding use in museums and trade shows. Both models are relevant to education.	Panadoma screen and hood, Projector Immersive Optics, Warping and geometry correction software, VR PC, All signal and power cables, Setup instructions and tools, Sample content	Warping and geometry correction software, Three-dimensional immersive environments (3-D Models) are developed for the VisionDome in modeling applications such as AutoCad, 3D Studio Max, or Alias Wavefront. Models are exported in VRML or Inventor format. These interactive files types can be displayed over the Web by using a VRML plug-in with a Web browser.	Warping and geometry correction software modeling applications such as AutoCad, 3D Studio Max, or Alias Wavefront. Models are exported in VRML or Inventor format.	a) Simulation and Training b) Research, commercial, military and academic. c) Oil and gas exploration. d) Product design, research and prototyping. e) Marketing, presentation of products and services. f) Medical, diagnosis, surgical planning and teaching hospitals. g) Urban planning, geophysical research and planning. h) Architectural presentation and walk-throughs. i) Entertainment, arcades, museums, and theme parks.	It represents practical aspects of enhancing their understanding of three sence of architectural scale, proportion and space. To architectural educators, these provides alternatives to traditionally restrict historical curriculum material and allow for more exploration within the learning process.	enhancing their understanding of the sence of architectural scale, proportion and space to architectural. 	Virtual reality also offers many possibilities as a tool for instructional learners, including the physically disabled and those undergoing rehabilitation who must learn (or relearn) communication and psychomotor skills	can view into two direction, Virtual Reality environment. By combining computer generated 3-D models with advanced projection equipment, the VisionDome users are immersed in a 360 degree by 180 degree virtual environment	expensive, requires huge set up.	Since this system does not require interface devices such as head-mounted displays for individual users, it is less expensive than immersive VR systems and it can accommodate a much larger audience	Upon entering the VisionDome, user views are into its hemispherical structure, which forms a fully immersive 180- degree hemispheric screen, create confusion.	immersive experience is critical to the visualization and evaluation of design solutions	The dome VR is also applicable in history of architecture like planetarians at small scale in college through dome VR system. Architecture of a place or civilization can be reviewed and enhances the level of learning
4	CAB SIMULATION ENVIRONMENT	Simulated reality is the hypothesis that reality could be simulated—for example by computer simulations—to a degree indistinguishable from "true" reality. It could contain conscious minds which may or may not be fully aware that they are living inside a simulation. Simulations or reflections of the "real" The world is a close representation of the physical world and governed by the same rules No avatars—you are yourself		can be used by a small group or by a single individual	A full cab instrumented motion-based vehicle simulator and a vehicle drive-on motion pad system.	The simulator will be a full-cab six-degree-of-freedom, motion-base research vehicle simulator that includes a cylindrical-based 240- degree screen with high-resolution, edge-blended visuals.	vehicle simulation software and "SimSimulator," The visual component is able to render VRML or OpenFlight databases in real time. Audio software and hardware	Cab simulators are finding many applications in training and entertainment. cab simulator training system for police officers to practice driving under high-speed and dangerous conditions. Location based entertainment system where players in six cabs are linked together to play simulation games. For flight training sessions where they learn how to operate the simulator and then they get to go through a flight scenario.	game base learning "Motivation and engagement are key factors of game-based learning, and virtual reality takes those to the next level,"	The skills requirement which can be enhanced with the use of simulation include: Technical and functional expertise training Problem-solving and decision-making skills Interpersonal and communications skills or team-based competencies The features of simulation which best facilitate learning include: The ability to provide feedback Repetitive practice Curriculum integration The ability to range the difficulty levels	"The pedagogies of constructivism and game-based learning show that children learn best by doing or by being," said Corbett. "So they shouldn't just read about history – they should be 'historians.' They shouldn't just study archeology – they should be 'archeologists."	game based virtual reality 				Simulation is a tool for learning and training as well as for assessment of performance	education, these provide alternatives to traditionally restricted historical curriculum material and allow for more.

STRENGTH, WEAKNESS OPPORTUNITY AND THREAT OF APPLICATION OF VIRTUAL REALITY IN HISTORY OF ARCHITECTURE

Strength:

i. The student will able to understand the social significance of the historic building.
ii. As per its name, this method of teaching is more near to reality as compared to other medias like photographs, 2D, 3d sketches, drawings.
iii. It gives an environment, in which student can link its geographic location and can understand the socio-environment impact of the monument, it helps to understand physical and able to visualize as a part of a whole.
iv. To some extent students are able to understand the nature of materials, services and community need instead physically present.
v. Students were motivated to go through the building using the buttons provided by the software and during that exploration we noticed that a type of dialogue was developed concerning the status, the dresses at that time, and the geometry of the space and the techniques of the sculpture.
vi. Virtual reality provides new forms and methods of visualization, drawing on the strengths of visual representations.

In some instances, VR can more accurately illustrate some features, processes, and so forth than by other means, allowing extreme close-up examination of an object, observation from a great distance, and observation and examination of areas and events unavailable by other means.

i. Virtual reality motivates students. It requires interaction and encourages active participation rather than passivity. Some types of virtual reality, for example, collaborative virtual reality using text input with virtual worlds, encourage or require collaboration and provide a social atmosphere.
ii. Virtual reality allows the learner to proceed through an experience during a broad time period not fixed by a regular class schedule, at their own pace. It allows the disabled to participate in an experiment or learning environment when they cannot do so otherwise. It transcends language barriers.
iii. VR with text access provides equal opportunity for communication with students in other cultures and allows the student to take on the role of a person in different cultures.

Weakness:

i. Scale and proportions are required to be carefully worked out to avoid the wrong impression of the monument.
ii. The weakness of using virtual reality are primarily related to cost, the time necessary for learning how to use hardware and software, possible health and safety effects, and dealing with possible reluctance to use and integrate new technology into a course or curriculum. As with all new technology, each of these issues may fade as time goes by and virtual reality becomes more commonly used in areas outside of education.

Opportunity-

i. Data gathering and visualization, project planning and design, the design of interactive training systems, virtual field trips, and the design of experiential learning environments. Virtual reality also offers many possibilities as a tool for nontraditional learners, including the physically disabled and those undergoing rehabilitation who must learn (or relearn) communication and psychomotor skills

Threat-

i. Architecture is a feeling of spaces, which is more understood physically, so it is the only tool through which we are to some extent immersive. VR equipment is rare and expensive. For viewing graphical data sets of any interesting size and geometric complexity, powerful, expensive graphics computers are also required. Standards, languages, APIs, tools, and hardware interfaces are still not yet well established and widely accepted. Specialized technical people are also required for the installation and operation of the VR system.

APPLICATION -PROPOSAL OF DIFFERENT POSIBILITIES APPLIED TO ENHANCE PEDAGOGY OF HISTORY OF ARCHITECTURE

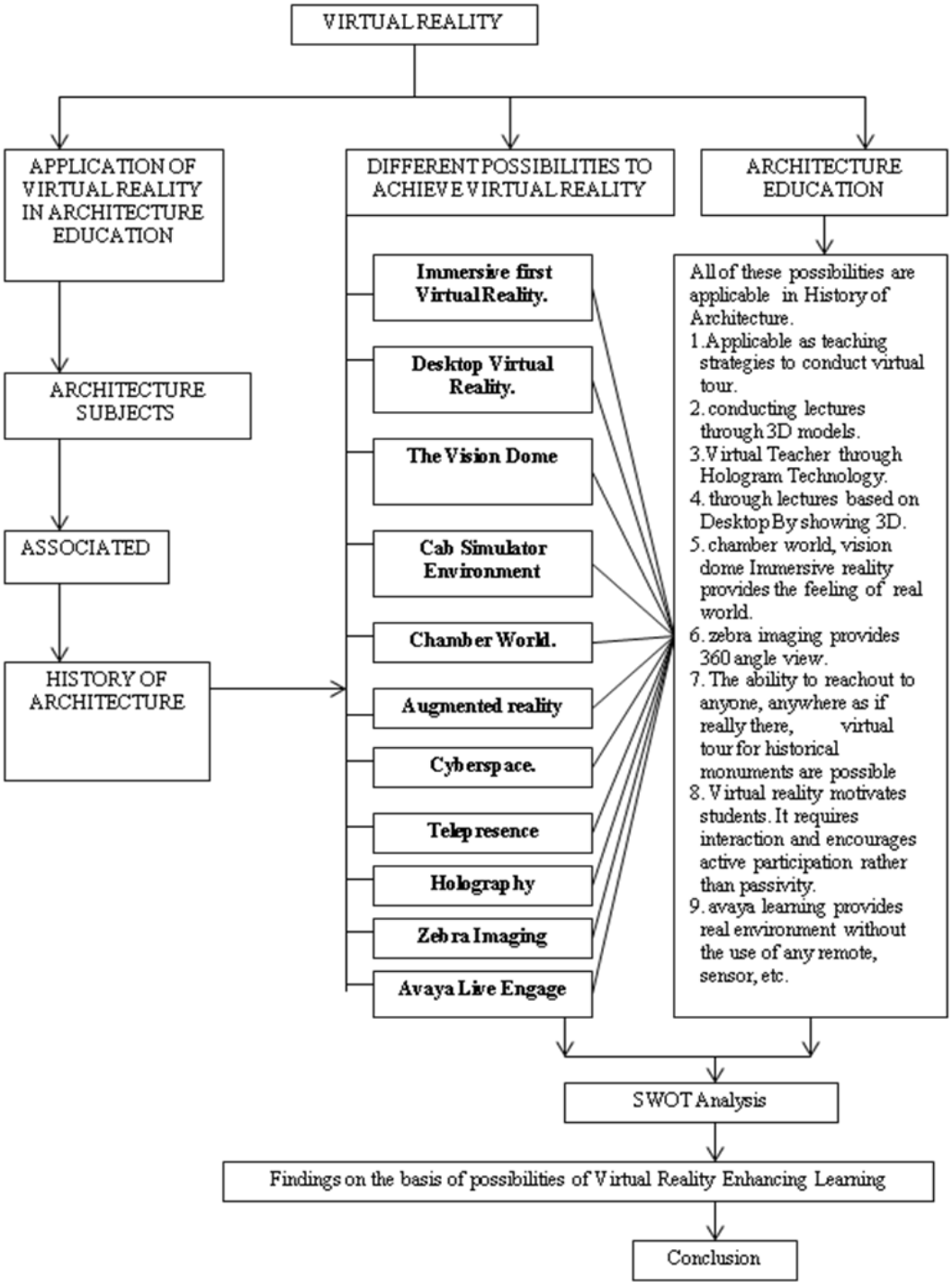


Figure - Flow Chart of Methodology Adopted to understand Virtual Reality Enhance Learning of History of Architecture

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METHODOLOGY – CASE STUDY OF SCHOOL OF ARCHITECTURE TEACHING STRATERGIES/ TEACHING METHODOLOGY ADOPTED FOR TEACHING HISTORY OF ARCHITECTURE

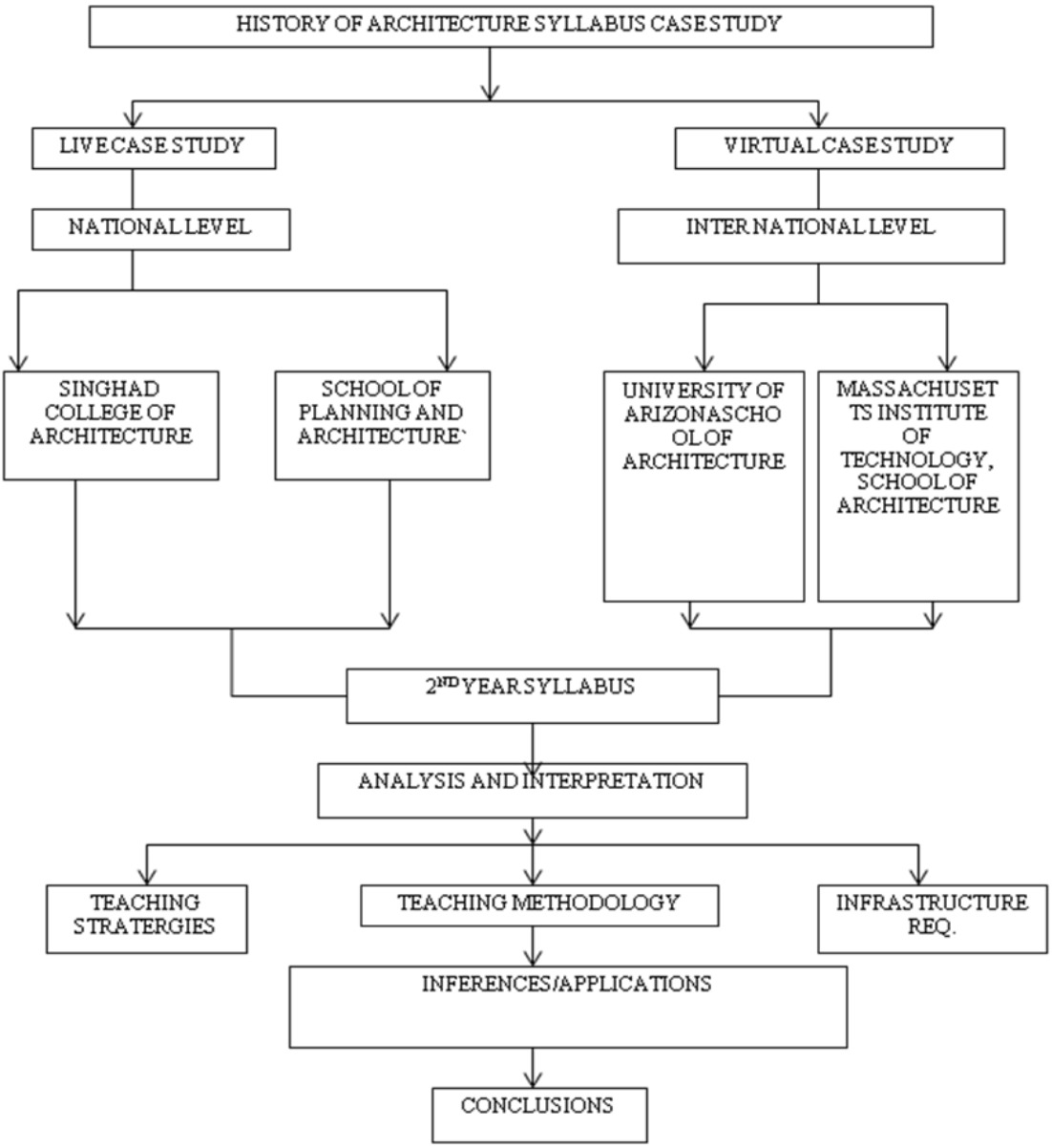

Figure - Flow Chart of Methodology Adopted for the study of Syllabus of History of Architecture.

COMPARATIVE ANALYSIS OF TEACHING METHODOLOGY ADOPTED BY ARCHITECTURE SCHOOLS.

COMPARITIVE ANALYSIS OF TEACHING METHODOLOGY FOR HISTORY OF ARCHITECTURE- ARCHITECTURE SCHOOLS

History is the long struggle of man, to understand his environment and react upon it. History is of the society which evolved through many years. To satisfy the needs of the society, the material and technology developed through years together. History is related to society. The era of Industrial Revolution played a vital role in changing the human intellect. Hence time moves hand-in-hand with technology. The cultural belief has tried to remain same but technology has dominated.

				TEACHING METHODOLOGY/ TEACHING STRATERGIED ADOPTED					
SN O.	ARCHITECTURE SCHOOL	YEARS TAUGHT	SYLLABUS OF 2ND YEAR	COURSE OBJECTIVE	TEACHING METHODOLOGY	TEACHING STRATERGIES	INFRASTRUCTURE	IMPACT OF TEACHING LEARNING	TEACHERS REVIEWED	TEACHERS REVIEWS ACHIEVED AS PER QUESTIONNAIRE
								TEACHING / LEARNING	VIRTUAL/LIVE	
NATIONAL COLLEGES										
1	**SCHOOL OF PLANNING AND ARCHITECTURE**	2, 3 YRS	HA-2a Indus Valley civilization and the early Aryan architecture of the Ganges valley, Vedic planning principles. Study of the architecture of the Chinese, West Asian, Egyptian, Greek, Roman and Latin American civilization. Buddhist architecture in India and abroad.	The course is designed to arouse in the student a sense of curiosity and to sharpen his powers of observation. The imp. of the timelessness of architecture shall be emphasized. Students shall undertake a chronological study of world architecture with emphasis on the Indian sub-continent and a comparison of the diff. stages of dev. in India and other parts of the world. The architectural study is to be linked with the social developments of civilizations, geographical and geological factors, materials and structures etc. The course shall include sketching and understanding of historical buildings, historical analyses and measured drawings.	**Lectures** are delivered through ppt., Teacher centred lectures. **Studios** are conducted in order to analyze architectural. Discussion whenever there is transition of topic, which is having least participation, since students are not from history back ground.	**monuments.case study** is given for few topics in order to analyze building at site, and to understand th impact of historical building on sorrounding. **Measured drawings** in order to make understand students the historical buildings.	Class rooms, projector, white board, chalk, duster, studio.	Teacher centered, monotonous teaching, least intraction between teacher and students	Students lag interest due to teacher centred	live discussion from Manoj Mathur **Professor of Architecture, Aruna Ramani Grover Professor of Architecture.**	History is generally taught in a descriptive format. History has lost its vibrancy and significance, and has become far too neglected from the realm of personal experiance. The great achievements of a civilization in form of 'Iconic monuments' are listed and described where students lag the interest. There is a need of alternative method of teaching history of Architecture. Active participation of student is requires. students can be taken for site visits to the monuments where they can realize and experience their grandeur and intricacies at first hand. Visits to Historic sites would definitely arouse their interest and curiosity towards the subject.
									Virtual discussion from SPA Bhopal to **krishnakumar dhote, Savita Subherwal Raje**	

COMPARITIVE ANALYSIS OF TEACHING METHODOLOGY FOR HISTORY OF ARCHITECTURE- ARCHITECTURE SCHOOLS

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								TEACHING	LEARNING	VIRTUAL/LIVE	
					NATIONAL COLLEGE						
2	**SINGHAD COLLEGE OF ARCHITECTURE, PUNE**	HISTORY OF ARCHITECTURE AND HUMAN SETTLEMENT. 1ST AN D2ND YEAR	Pre – historic Period , West Asiatic Civilizations, Eygptian Architecture, Greek & Agean, Mycanean, Cretan Civilizations, Roman Civilisation-I) General Architectural Character, 2) Major Building TypesTombs Temples, Amphitheatre, Hippodrome, Circus, Palaces, Arches, Bridges, Aquaduct, Thermae, Elements of Special Attribute, Roman Column Orders, Roman Contruction Technology, Masonary Types Mayan, Inca, Mexican Civilisation, Chinese Civilisation	Broad study of periodic history of culture, architecture and human settlements of specified western civilizations with reference to formative influence and salient architectural contributions in terms of structural technology, planning and form of significant building types. (Stress to be laid on comparative and critical studies so as to develop among students habits of reading and research as well as sympathetic awareness of architectural heritage in the environment bearing significance to periodic history under study.	**Lectures** are delivered through ppt., Teacher centred lectures. **COMPUTER LAB** are conducted in order to analyze architectural. Discussion whenever there is transition of topic, which is having least participation, since students are not from history back ground.	**Digital Application**, where students are taught in Desktop virtual environment. **Virtual Tour**-A virtual tour is a simulation of an existing location, usually composed of a sequence of videos or still images. It may also use other multimedia elements such as sound effects, music, narration, and text **Monuments Case Study** is given for few topics in order to analyze building at site, and to understand th impact of historical building on surrounding. **Measured drawings** in order to make understand students the historical buildings.	class rooms with cacomputer set up inaddition to above	Ppt are shown of shown and lecture is dilevered, student centered,	Interest is maintained, can visualise 3Dimensionally, are semi immersive part of virtual environment. **STUDENTS ONLY VISUALISE 3DIMENSIONALLY BUT DOES NOT CREAT.**	Virtual discussion from **Pankaja Bagul HOD**	Traditional method of teaching needs to be modified. Most of the time monuments design material and construction techniques are not very clear. virtual reality make students understand the concept more effectively as student visualize the monument 3Dimensionally. it is always possible to come closer to view details and move away to see as a part in whole. VR develop interest among students coz it chnges so fast and if in motion maintains eye contact.

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INTERNATIONAL COLLEGES											
3	**MASSACHUSETTS INSTITUTE OF TECHNOLOGY. SCHOOL OF ARCHITECTURE**	Bachelor of Science in Architecture (History, Theory and Criticism of Architecture and Art Stream) in all 4 years	Provides an outline of the history of architecture and urbanism from ancient times to the early modern period. Analyzes buildings as the products of culture and in relation to the special problems of architectural design. Stresses the geopolitical context of buildings and in the process familiarizes students with buildings, sites and cities from around the world.	Studies the interrelationship of theory, history, and practice. Looks at theory not as specialized discourse relating only to architecture, but as touching on many issues, whether they be cultural, aesthetic, philosophical, or professional. Topics and ex. are chosen from a wide range of materials, from classical antiquity to today. Studentsanalyze bldg. through drawing, modeling, reading, and writing. Provides a framework for understanding contemporary architectural design and to building a visual vocabulary to communicate actively about design.	lecture through 3d desktop virtual reality.	students are delivered lectures through virtual tour and virtual reality. 3d modelling of different historical monuments are prepared and students are delivered lecture. construction details and walkthroughs are worked out in class	Class rooms, projector, white board, chalk, duster, studio with computer set up. Desktop VR focuses on mouse, joystick, or space/sensorball-controlled navigation through a 3D environment on a graphics monitor under computer control. Virtual Reality Modeling Language (VRML). VRML developed as the standard programming language for creating web-based VR.	Teaching covers- A Three-dimensional Space: Interaction: Autonomy: (without teacher working certain objects continue to work), (Thematic) Presence:	**Virtual reality** provides new forms and methods of visualization, drawing on the strengths of visual representations. **Virtual reality** motivates students. It requires interaction and encourages active participation rather than passivity. **Virtual reality** allows the learner to proceed through an experience during a broad time period not fixed by a regular class schedule, at their own pace. **Immersive Virtual environment.**	virtual discussion-FACULTY **Lorena Bello lobello@mit.edu** Lecturer	1) "Immersive VR furnishes first-person non-symbolic experiences that are specifically designed to help students learn material. 2) These experiences cannot be obtained in any other way in formal education. 3) This kind of experience makes up the bulk of our daily interaction with the world, though schools tend to promote third-person symbolic experiences. 4) Constructivism provides the best theory on which to develop educational applications of VR.

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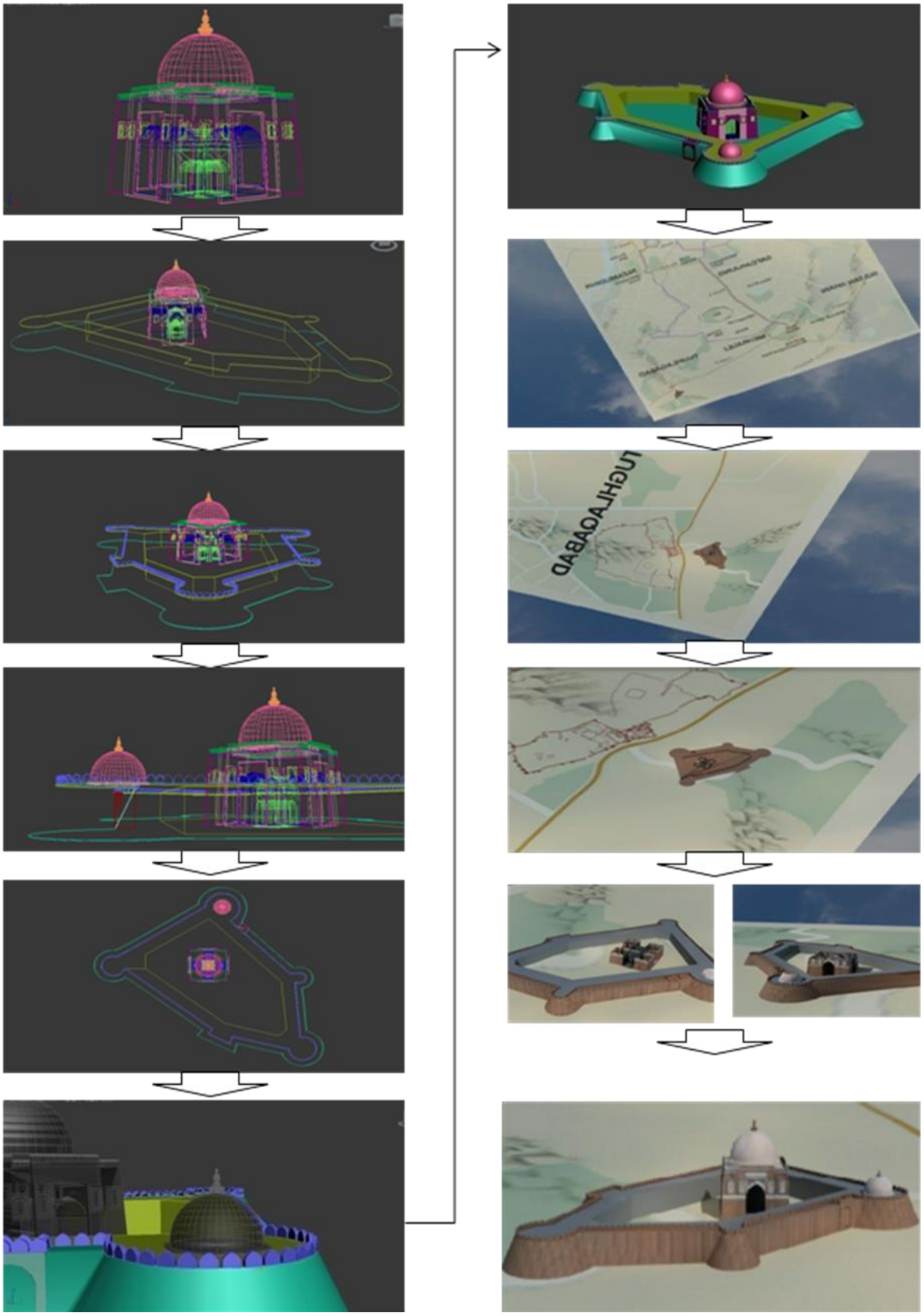
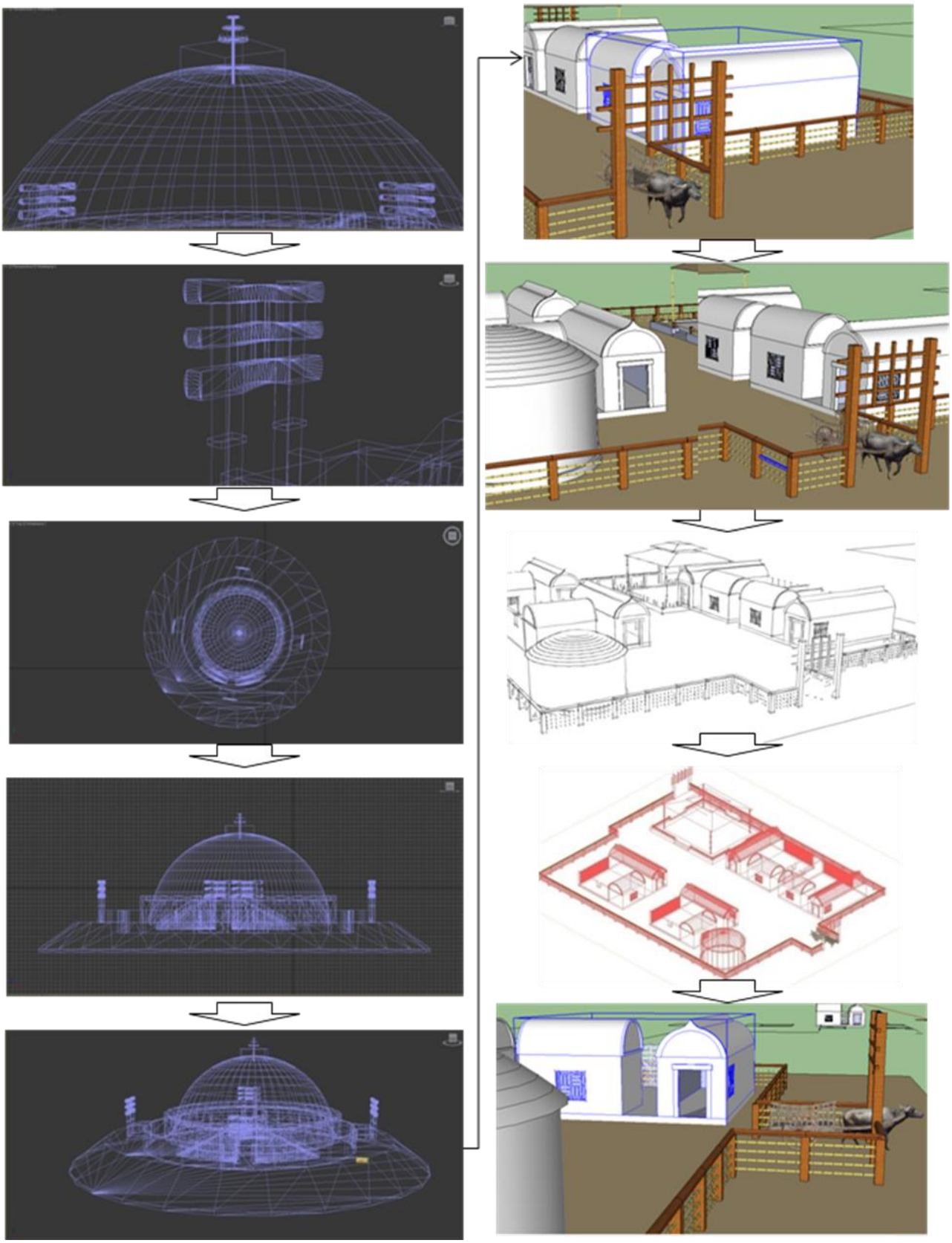
								TEACHING / LEARNING	VIRTUAL/LIVE	
					INTERNATIONAL COLLEGES					
4	COLLEGE OF ARCHITECTURE, ARIZONA	HISTORY AND THEORY OF ARCHITRECTURE 2nd, 3rd and 4th YEAR	Prehistone Architecture: Earth, Sky, and Structure Egyptian Architecture: Old Kingdom Pyramids and New Kingdom Temples (2 lectures) Ancient Near Eastern Architecture and Urbanism: Sumerian, Assyrian, Persian Bronze Age Architecture in the Aegean: Minoan and Mycenaean greek Architecture and Urbanism: The Orders, Polis/Acropolis, Hellenistic Experimentation, Urban Planning (4 lectures) Roman Architecture and Urbanism: Building Types and Building Patrons (3 lectures) Pre-Columbian Architecture and Urbanism of the Americas: Olmec, Mayan, Aztec, Inean Early Asian Architecture and Landscape Architecture: Buddhist, Hindu, Shinto (2 lectures) Early Christian and Byzantine Architecture: Tombs and Churches (2 lectures) Early Islamic Architecture: Mosques and Palaces Early Medieval Architecture: Vernacular Architecture and Medieval Urbanism	1. To familiarize the student with the principal architectural achievements from prehistory through the Middle Ages. 2. To present a historical understanding of those works in their social and cultural contexts. 3. To help the student acquire and develop the fundamental critical tools of visual and historical interpretation: a descriptive and analytical vocabulary with which to express visual perception verbally; the ability to identify and evaluate different kinds of historical evidence; and a sense of the complex constitution of historical context. 4. To encourage effective oral and written communication through training in argumentation. 5. To teach the student to think critically about the aspirations, constraints, tools, and choices involved in all architectural design, past and present.	Teacher conduct lecture by using INFORMATION AND COMPUTER TECHNOLOGY to deliver lecture and to motivate students	1. Collaboration in virtual reality classroom fosters social integration of learners 2. Not possible in reality is possible in virtual reality. 3. Virtual game-based experience increases students motivation. 4. Virtual reality introduces new approach to rewards. 5. Virtual platforms and headsets are the new tools for inspiring creative learning. 6. CREATING PILOT STUDY, FOR EXPERIMENT	A CAVE is 2-5mx 3m square. four projected surfaces (three walls and floor); five surfaces, or fully enclosed six-surface configurations for complete virtual immersion. Variety of input devices, for example, a joystick, wand or more commonly, a haptics device, i.e. data glove	most of the teaching in virtual environmen, teaching turn out to be game based and experiments are conducted through PIOLET STUDY	Exploring: learners explore a virtual world's locations and communities as fieldwork for class. Collaborating: learners work together within a virtual world on collaborative tasks. Being: learners explore themselves and their identity through their presence in a virtual world, such as through role-play. Building: learners construct objects within a virtual world. Championing: learners promote real life causes through activities and presentations in a virtual world. Expressing: Symbolic and experimental learning;	internet study	1) VR has great value in situations where exploration of environments or interactions with objects or people is impossible or inconvenient, or where an environment can only exist in computer-generated form1. The student's intense investment toward reaching a goal defined by the educator or designer. 2. Continual feedback for the student while interacting with the system. 3. A high degree of student involvement or investment in the activity itself. 4. The potential for intense student concentration on the learning task. The key is to make the goals of the game serve the student's learning goals and thebroader curriculum. For example, it would be easy to design a game in which the student gains points for solving riddles or remembering facts.However, it would be much more effective if the goal of the game was to accomplish something within the context of the topic matter.

VIRTUAL REALITY FOR PEDAGOGY OF TUGHLAQABAD TOMB.



VIRTUAL REALITY FOR PEDAGOGY OF SANCHI STUPA.



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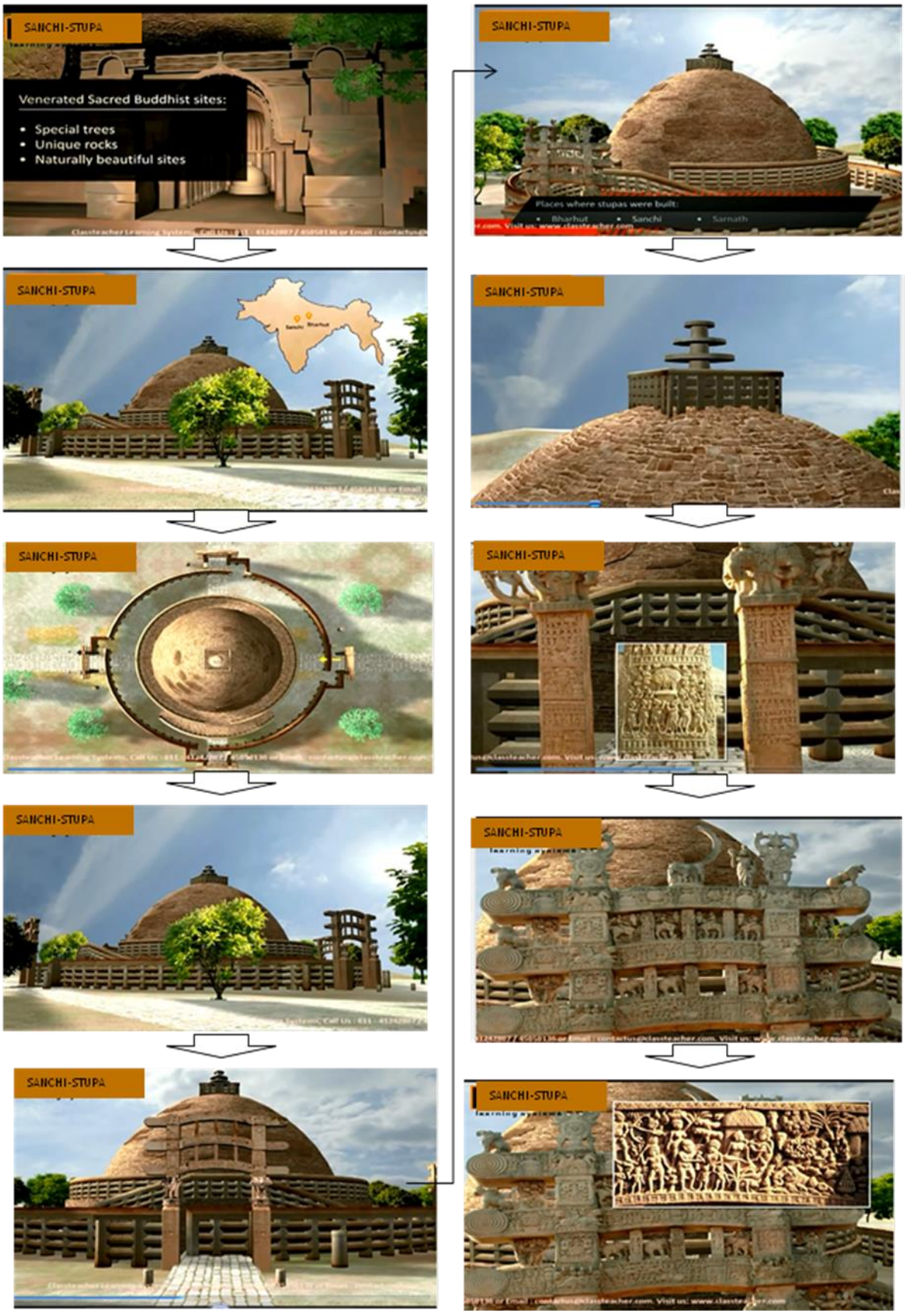

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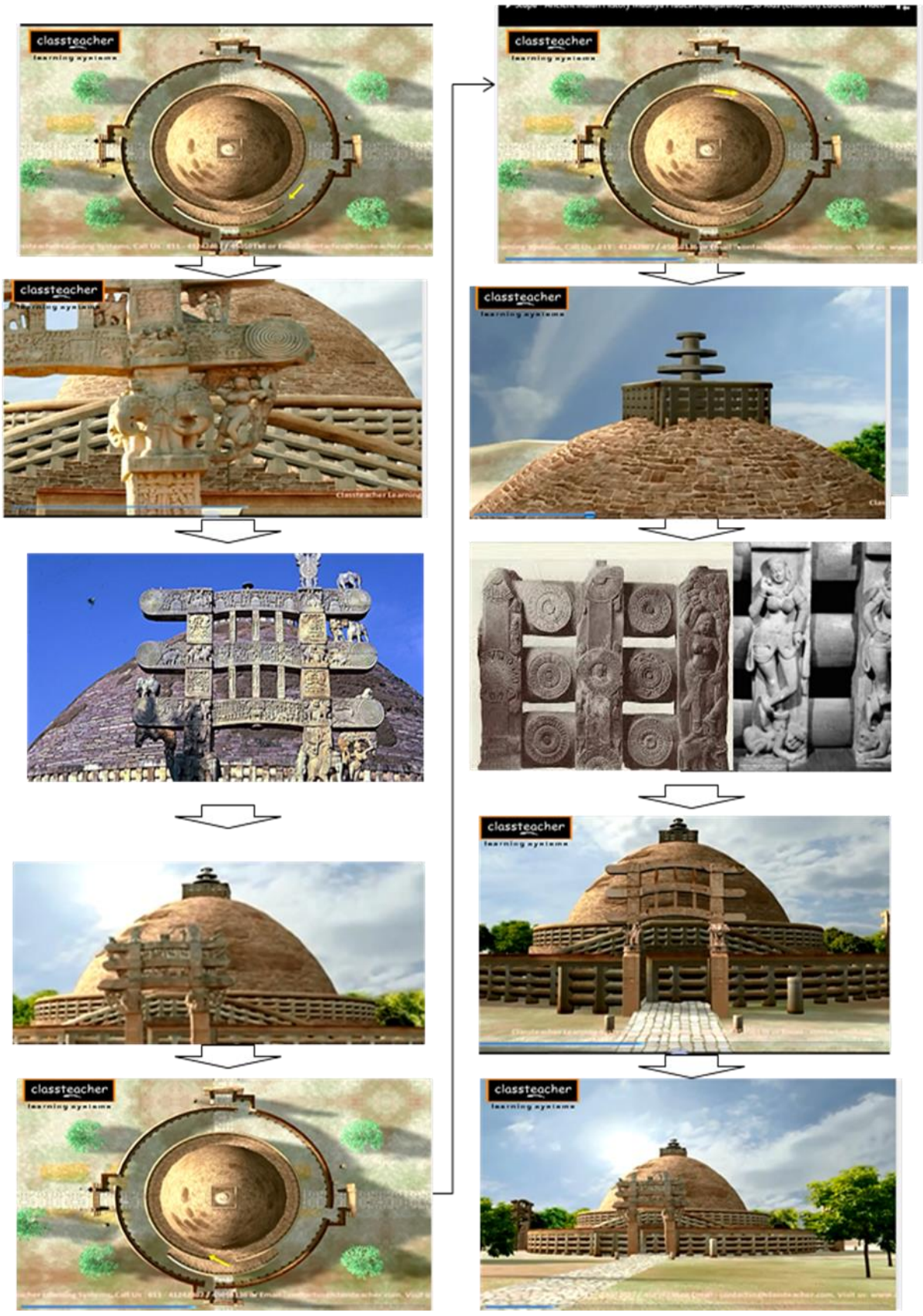

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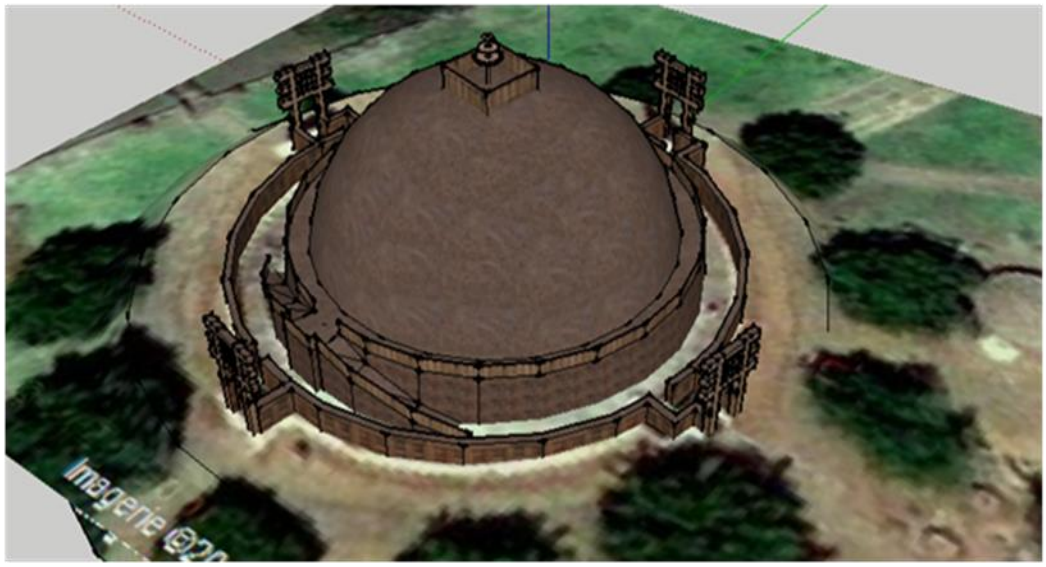

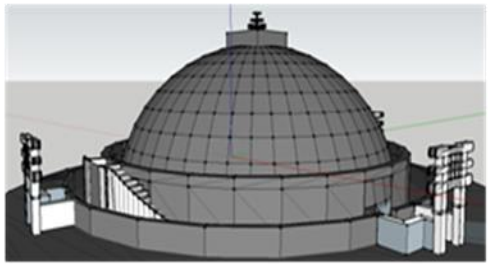

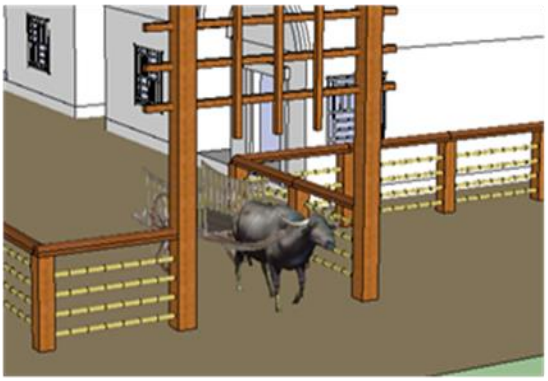

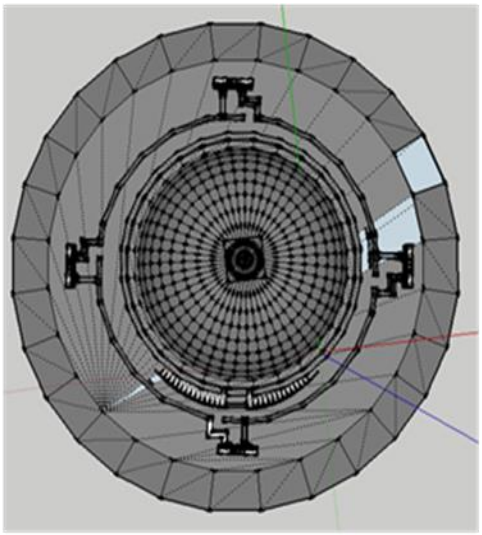

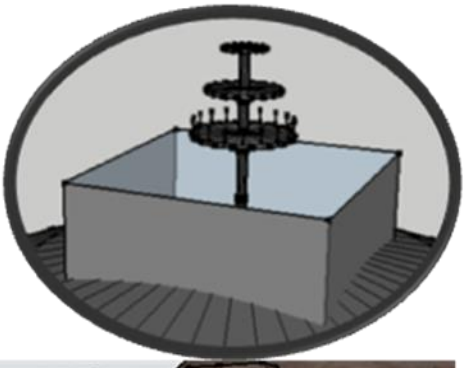

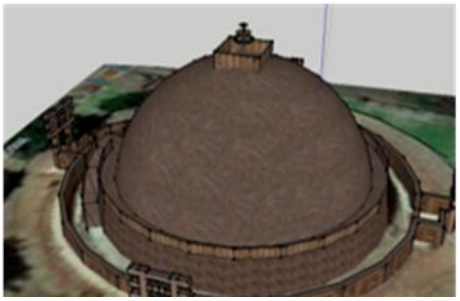

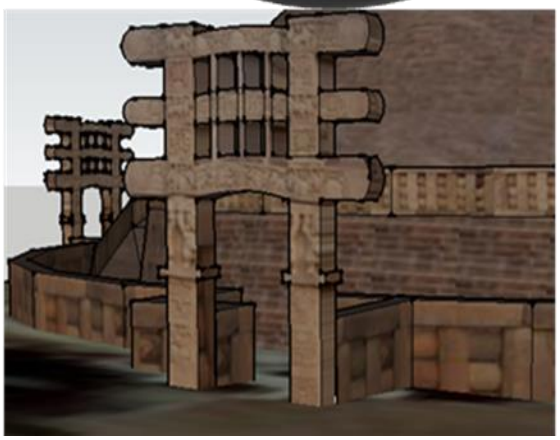

EDUCATIONAL BENEFITS OFFERED BY VIRTUAL REALITY

Experiential Learning

Experience is a powerful learning tool and the one that provides the best long-term retention rate. Students who hear a lecture will retain some of the information presented; Those who view a film will retain more; that will retain the most information for the longest time and with the greatest clarity. Virtual reality, on the other hand, has the potential to provide all students nationwide with unlimited access to chemical manufacturing facilities, without endangering themselves or anyone else, at minimal cost, at their convenience, and without disrupting plant operations. Virtual reality can bring experience to the masses.

Alternate Learning Styles

Students learn through many different mechanisms, including lectures, books, demonstrations, and experimentation. The relative effectiveness of these mechanisms varies from student to student, reflecting differences in their learning style. These learning styles have many dimensions, including verbal vs. visual, sequential vs. global, and passive vs. active. Verbal learners are those who learn well from word-based interfaces, such as books and lectures, whereas visual learners are more attuned to visually oriented stimuli such as pictures, graphs, and movies. Learning styles have been studied extensively by traditional educational methods (which are primarily verbal, passive, and sequential) match the optimal learning styles of only a small portion of the typical undergraduate engineering student population. The majority of these students are then left with teaching methods that do not match their optimal mode of learning. Virtual reality has many features that make it ideal for meeting the needs of those students whose learning styles are not well served by traditional teaching methods.

Unconstrained Exploration

Reality provides the opportunity to explore and understand in a completely unconstrained manner. A student wishing to observe reactor conditions first-hand is free to step inside and look. In a process design environment, virtual reality can provide students with the creative control to combine materials, equipment, and concepts in whatever combinations they choose to explore.

The beneficial value of repetition makes virtual reality attractive to educators on two fronts:

1) VR is not intended to replace traditional methods of education, but rather to augment them with another delivery mechanism.

2) VR incorporates inherent repetition via the simultaneous presentation of the same information through multiple channels. Virtual Reality is also a highly sensuous experience, surrounding the user with sight, sound, color, motion, tactile feedback, and possibly soon smell and taste. These senses can be orchestrated by the virtual world designer in a synergistic fashion to create an experience that has great impact.

CONCLUSION

Virtuality is not just advanced media product that enables representation and simulation of reality by perfect pictorial imitation, but the expansion of informational pictorial space conceptions, that could be found through the history of representations, from perspective invention to contemporary digitalized real-time remote operation. By extension of perceptual and mental experience, man expands the domain of creative imagination. As the result of information processing potential and enhance of human perception experience, real-time experience in virtual space allow access in the alternative dimension to every open mind, giving him possibilities to play and work, to represent and construct, to search, explore and express.

Explorations of the possibility of virtuality demand further investigation, and architecture, as in past being a leading field that synthesize representation, construction and sense of spatial creation, had to be involved in explorations of a multidimensional complex network of dynamic informational space, that is revealed in its real and virtual dimension as the unique universe. Rationality of reality that was the foundation of modern architectural space now is changing into complex, dynamical, virtual informational matrices of the reality that reveals different, multiplied actualizations. Virtuality in Architecture changes reality and opens new dimensions of architectural spaces, in a complex network of information flow between visible and invisible space.

FUTURE TRENDS

Educators and researchers look for more efficient ways of teaching and learning.

Virtual Reality promotes cognitively relevant characteristics such as symbol systems and processing capabilities, enables students to process information more effectively and understand it more. Students involvement in learning is increased, understanding is greater, and the intrinsic features of the computer (e.g., immediate feedback, animation, and individualization) are more likely to motivate students to learn.

Virtual reality can assist the teaching process and add this technology in the traditional lectures have promoted the following pedagogies including:

- An in-depth study of the platonic solids
- Application of the perspective
- To observe the fractal forms
- To manipulate some virtual object in 3D.

It is important that in the laboratory activities the presence of the professorial assistants, it is important because their facilitation can illustrate the correct and active navigation inside the document organized as hypertext.

One of the main aims of VR is to create virtual worlds and virtual environments in which humans can interact together. Virtual worlds are designed for people to understand the psychological effects of the spaces, generated by the computer, on people inside them to a pleasant and stimulating place to work and live in, with a good quality of life.

Architects as designers of Virtual Worlds will be required to make these environments interesting, rich, and engaging places.

The educational approach presented is only a small step towards locating a correct Fit in the Teaching Process. Virtual Reality can promote more interesting and interactive the lessons, instead of the traditional educational methods, It is also proposed that this approach will accommodate different learning styles, favouring the visual learners.

Using holograms to replace physical architectural models

1. This exciting technology provides architects with many advantages:
2. The hologram can be easily duplicated or reproduced with revisions.
3. Holograms are significantly more durable and easier to carry than a physical model.
4. Holograms are also very easy to store, which if you ever had to trash a model because you were out of space in the studio, is much easier emotionally.
5. The amount of detail that is achieved is typically better than a physical model. The accuracy is greater than a rapid prototyping model when it comes to color, texture and the level of detail. Use of Virtual Holography in Architecture.

