International Journal of Applied Research

Sandeep Kaur
Assistant Professor, At Babe
Ke College of Education,
Mudki, Firozpur, Punjab,
India

(Special Issue- 4)
One Day National Seminar
"DIGITALIZATION OF HIGHER EDUCATION"
(2nd March, 2019)

Innovative technologies in digitalization of higher education

Sandeep Kaur

Abstract
Today we are living in the area of science and technology. In today's world, digitalization is being used in every field to fulfil the needs of changing society and is also entered into education. Digitalization means the shift from analogue text to digital text. Use of media in the teaching-learning process is also becoming boon to our education system to boost the quality of higher education and to save the resources. Internet-based learning also equips the learners with, media skills which are necessary for professional life, in the digital, age. This article covers the innovative technologies, in digitalization of higher education. The innovative technologies are the virtual university, adaptive learning, flipped learning, open learning, gamification, web 2.0 tools for electronic learning and fog computing.

Keywords: digitalization, higher education.

Introduction
Digitalization demands not to change only in the field of communication and knowledge but also in all parts of society. With the change in technology, the education sector is also suffering from the digital turn in higher education. Digitalization means shifting from book-based content to Internet-based content and practising in the digital age. Use of media and internet for action and product-oriented teaching and learning is called digitalization of higher education. To implement digital-based teaching and learning requires proper theoretical, Epistemological and ethical foundation as well as practice-oriented methods.
The objectives of modern higher education are giving as follows:
- Media skills become a crucial element for the professional growth of learners in the digital age.
- To provide employability of students.
- They are making individual capable of analysing the impact of digitalization on society.
- To enhance the quality of higher education.

Innovative technologies in digitalization of higher education
1. Virtual University
In the digital age, online learning has become popular. The virtual university is a new concept which uses information and communication technologies to deliver the course. The virtual university has three components, and these are instruction, self-study and collaboration.

Correspondence
Sandeep Kaur
Assistant Professor, At Babe
Ke College of Education,
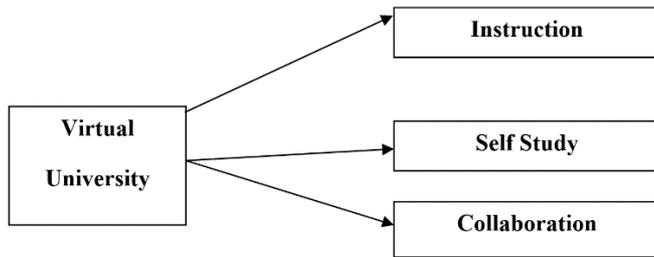Mudki, Firozpur, Punjab,
India

Fig 1: Shows the elements of the virtual university

- **Instruction:** the instruction portion of the course is delivered via satellite live transmission broadcast and as well on the internet.
- **Self-Study:** this element deals with the student's involvement in the process of learning with the resources like books, internet, notes etc.
- **Collaboration**: these elements deal with the collective efforts of the virtual group via the internet to explore the knowledge.

Functions of virtual university
- Offers best services that enable learners to learn at their place, time and speed.
- Cost effective.
- Self-paced learning.
- Provide opportunity to develop technical competencies.
- It provides opportunities that they can grow and become lifelong learners.
- Learners and tutors participate in online interaction of various kinds.
- Enable the learner that they can construct their knowledge and apply in real life

In Florida, 130 thousand educational programs are provided in the virtual form. The virtual education requires extra resources and common policies (Abbas Abdoli Sejzi, 2012) [2].

2. Adaptive Learning
Adaptive learning is an approach of online instruction that traces the students' knowledge, needs and advises as the student progresses through course content. The number of advanced navigational tools are used for the tracing of requirements of the individuals. Navigating tools are transport buttons; help buttons assist the learner in moving forward in a nonlinear manner.
- It allows students to provide direction to move more quickly with the application of prior knowledge and develop a customized learning plan.
- It is based on the theory of constructivism. Learner constructs knowledge with the application of active learning techniques.
- It is dependent upon the student's locus of control.
- It uses a hypermedia system which is based on hypertext. Hypertext is a node-link structure, which allows the user to move through the information using advanced navigational tools.
- It provides the flexibility that students can decide their path of learning.

It provides online help and advice if students face difficulty to move forward in the course (Chandra, 2005) [4].

3. Open Learning
Traditionally, higher education is course-based, but now the technology opens the gates for students that they can become an independent learner. Technology increases the accessibility and flexibility of higher education. Open learning means learners can learn at their own time, need and place.
- Provide an opportunity to tutors that they can address the full range of audience.
- It provides guidance services to students to facilitate their learning.
- The quality of learning material is evaluated from the feedback of learners (Chandra, 2005) [4].

4. Gamification
A game can be defined as the presence of content in the form of a game with a set of rules and a specific objective. Gamification is based on the theory of constructivism and humanism. The cognitive aspect of gamification has the following elements:
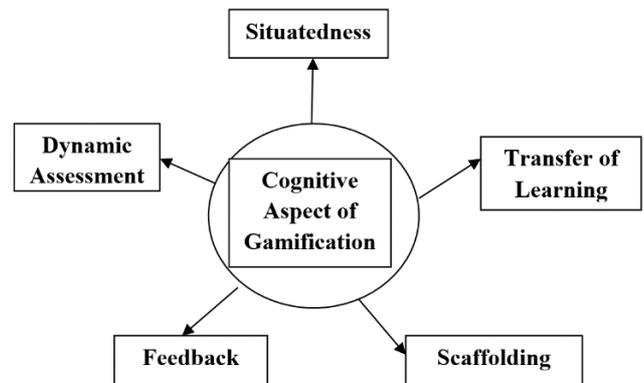

Fig 2: Shows the cognitive aspect of gamification

- **Situatedness:** Games put the information in a meaningful context according to the needs of the learner.
- **Transfer of learning**: it provides a correlation between practice skills and applies knowledge to novel situations.
- **Scaffolding**: break the content in the smaller parts for new learners.
- **Feedback**: provide feedback in the areas when the learner could be facing difficulties.
- **Dynamic Assessment**: provide information about current knowledge and skill.

Benefits of Gamification in higher education
- Motivation element of game learning act as a path to engage learners and encourage them to fulfil their learning objectives.
- It provides a different learning environment in different ways.
- It encourages learners to learn new things and take risks.
- It presents content innovatively and creatively.
- It offers an opportunity to receive feedback and correct weaknesses (M.Stefanie Vasquez, 2017) [8].

5. Flipped Learning
"I hear, and I forget. I see, and I remember. I do, and I understand."

Flipped learning is student centred learning rather than direct instructions by the teacher. In the flipped learning students receive content outside the classroom through different modes of delivery and class time is used for students to envolve in hands-on learning, collaborative with their peers and evaluate their progress.

Elements of flipped learning
- **Student centred classrooms:** the environment of the school is student centred. Students watch recorded lectures at home from various resources. In the next class, the learners are to synthesise the knowledge and demonstrate understanding. The role of the teacher is to assist and guide the student's self-actualisation.
- **Teacher as facilitator:** teacher act as a facilitator because the teacher gives opportunities for students that they can analyse their understanding and evaluate their progress towards the completion of the unit/goal.
- **Content Delivery resources:** content can be delivered by a variety of resources to cover the different learning styles. Students can listen to their book online, read an article online, hear content through online text videos, online lectures by various experts.
- It develops higher order thinking among learners (4 Essential Elements of a Flipped Classroom, 2014) [1].

6. Web 2.0 Tools for electronic learning
Web 2.0 tools are consist of websites that provide an opportunity for students to read and to create knowledge with interaction and collaboration with others.
- Wikis utilise software that allows for the easy creation and editing of interconnected web pages.
- Blogs are a platform where teachers and students can share their thoughts and knowledge.

Types	Sites
Multimedia	Voice Thread, Animoto
Website	Weebly, Jimdo
Social Bookmarking	Delicious, Diigo
Blog	Blogger, Edublog
Productivity Tools	Google.docs, Zoho
Concept Maps	Mindmeister
Wiki	Wikispaces, PB works
Video Conferencing	Skye
Second Life	Virtual World
Organise library	Library Thing
Polling	Polleverywhere
Video	YouTube EDU

- Delicious and Diigo are bookmarking websites that use to keep the website in one place.
- Create websites using Weebly or Jimdo.
- Create a multimedia presentation using digital photos and Animoto.
- Video conferences are free using Skype.
- Do live audience polling using Pollyeverywhere.
- Second life is used for the virtual class meeting.
- Mindmeister can used for creating Concept maps.
- Library Thing can be used to organise books and share a library with others.

- Youtube EDU includes the video from higher education partners including clips from lectures on a variety of subjects.
- Second life used for the virtual world (Berg, 2011) [3].

7. Fog Computing
Cisco defines Fog computing is an extension of Cloud computing and services to the edge of the network. Similar to Cloud, Fog provides data, compute, storage, and application services to end-users. Fog computing refers to a decentralized computing structure, where resources, including the data and applications, get placed in logical locations between the data source and the cloud.

Advantages of fog computing
- Data can still be processed with fog computing in a situation of no bandwidth availability.
- Fog computing provides an intermediary between these IoT devices and the cloud computing infrastructure that they connect to, as it can analyse and process data closer to where it is coming from, filtering what gets uploaded up to the cloud (DeMuro, 2018) [6].
- Eliminates the core computing environment, thereby reducing significant and a point of failure.
- Improves the security, as data are encoded as it is moved towards the network edge.
- Edge Computing provides a sub-second response to end users, offers high levels of scalability, reliability and fault tolerance.
- It Consumes less amount of bandwidth (Cisco Blogs, 2015) [5].

Conclusion
Technology has changed the whole educational scenario. The education system is shifting from instructor-led learning to technology-led learning. The main factors which are responsible behind such transformation are the economic and demographic change. The Indian education system is the third largest in the world next to the United States and China. The higher education system of India has the challenge to shift from national education to global education and this can be attained by using technology in the education system (M.K, 2017) [7].

References
1. 4 Essential Elements of a Flipped Classroom, 2014. Retrieved from http://smarterteacher.blogspot.com/2014/02/4-essential-elements-of-flipped.html
2. Abbas ASBA. The Phenomenon of Virtual University in New Age: Trends and Changes. Procedia-Social and Behavioral Sciences, 2012, 565-572.
3. Berg S. Web 2.0 Technologies in Higher Education Teaching: A Practical Introduction. Kentucky Journal of Excellence in College Teaching and Learning. 2011; 2:20-27.
4. Chandra R. Trends in Higher Education. Delhi: Kalpaz Publications, 2005.
5. Cisco Blogs. (M. Abdelshkou, Producer) Retrieved from IOT, From Cloud to Fog Computing, 2015: https://blogs.cisco.com/perspectives/iot-from-cloud-to-fog-computing

6. De Muro J. What is Fog Computing? 2018. Retrieved from https://www.techradar.com/news/what-is-fog-computing

7. MK N. ICT in Education. Delhi: Meena Book Publications, 2017.

8. Stefanie M, Vasquez MP. Impact of game-based learning on students in higher education. International Conference on Education and New Learning Technologies, 2017.

6. De Muro J. What is Fog Computing? 2018. Retrieved from https://www.techradar.com/news/what-is-fog-computing

7. MK N. ICT in Education. Delhi: Meena Book Publications, 2017.