Towards Integrated Online Learning Paradigm

Manish Kumar Pandey[1] and Aarzoo Sharma[2]
[1]UGC- Junior Research Fellow, Department of Communication Management and Technology, Guru Jambheshwar University of Science and Technology, Hisar- 125001
[2]UGC- Junior Research Fellow, Department of Communication Management and Technology, Guru Jambheshwar University of Science and Technology, Hisar- 125001

Authors Note
[1]https:// orcid.org/ 0000-0003 -3093-0789
[1]Email:manishpandeygpm@gmail.com
[`2]https:// orcid.org/ 0000-0001-9595-9975
[2]Email: aarzoo.sharma35@gmail.com

Abstract
This paper directs the way for the framework towards integrated online learning paradigm to enquire comprehensively on the learning phenomenon in online environment and the ways to improve the learning experience. We argue that factors such as engagement between student-teacher, student-student and student - content;, course design and structure, learner's personal attributes like critical thinking and self-regulation, extrinsic and intrinsic motivation of teacher and student, technological compatibility with online tools and interfaces affect learning in online environment and they must be conceptualized in relational terms. Influential theories, including cognitive theories of multimedia learning, connectivism approaches, constructivism outlook, social learning theories, self-determination theory and self-regulation theory is reviewed in the context of online learning environment and online learning outcomes. Implications for online education and online learning practices are examined in the view of these theoretical constructs and paradigms.

***Keywords*:** integrated, critical thinking, motivation, engagement, technological compatibility, online learning

Engagement

Engagement is closely connected to learning but theories of learning do not exclusively deal with it. Constructivist learning theory does point out engagement but with oneself not with others. The dialogue that happens among the students and between students and teachers in an online learning environment improves the engagement and inferred quality of the course content. Besides online lectures, syllabus-oriented content and the amount of teacher's online time spent increase student engagement. The definitional and theoretical framework is critical in engagement as it aids in giving preciseness and saving lots of time which may go into discussions of insignificant definitions in the class (Moisey, 2006). Therefore, teachers' role in an online learning environment is dynamic where course quality and structure are pivotal in building an online community that engage among themselves (Peltier, 2015).

Controlling the online environment by the teacher did not affect the satisfaction level of students but influenced their opinion of perceived learning. Costley and Lange (2016) in their study gauged three different situations having a varying level of control on class from the instructor. The study found that perceived learning among students is directly proportional to control on class from instructor particularly on interaction and content provided. Instructors get empowered by controlling content as the fundamental concept becomes clear for them and interaction through organization and efficient course design raised perceived learning among students (Costley and Lange, 2016). In addition, feedback from instructor to students is associated with positive learning outcomes for students (Siragusa et al., 2007).

However, the lack of repetition of class contents in an online environment and the gap in answering the student's query are impediments found in engagement between teacher and learners. Lack of proficiency or hesitancy in a language also inhibits engagement (Dwivedi et al., 2019). The content quality influences the course design and engagement between teacher and learners.

DOI: 10.9756/INT-JECSE/V14I3.668

Course structure

The engagement is corresponding to the learner's values and according to that only contents can be designed and structured. Otherwise, the search for the best learning environment will delude the teachers and students (Marom, 2003). The course design is influential in students' satisfaction and level of perceived learning (Barbera, 2013). The flexibility and convenience of online learning settings like recorded lectures, quizzes at the end of class make it a lucrative option for students.

There are lots of interrelated and antecedent factors for the successful course design like the user-friendly and practical course structure that also requires commitment from faculty and management. Moreover, the right course structure is relevant in an online environment in contrast with the offline one where structure alters according to teachers' wishes. Previous studies have found a correlation between course design and student perceived learning (Eom et al., 2006). Interaction is unable to raise perceived student learning and student satisfaction in comparison to the presence of the instructor (Gray and DiLoreto, 2016). However, course design and interaction along with teacher presence have affected the perceived student learning. Among all interactions i.e. learner-learner, learner-content, and learner-instructor; learner-learner interaction provides the lowest satisfaction to the student and learner-instructor provides the second-largest contribution in student satisfaction (Kuo et al., 2013).

In addition, educational media is found to be influenced by the organizational culture in which it is placed. Because culture shapes the ethos that eventually determines how much learning can happen. Repository caters to culture through reducing time and providing content when demanded (Moisey, 2006). Culture also has a role to play in online learning particularly when the learners try to engage with others (Wang, 2007). Intercultural engagement between learners requires an understanding of the impact of culture on individuals (Hill et al., 2009). Said & Tahir (2013) have suggested categories of the cultural dimension in the online learning environment. One deal with student personal interests, values, and aspirations, and the next covers the student's cultural and social identity and their interests and aspirations.

Self-efficacy of learners has affected the way knowledge building would happen for individuals. In offline learning, four elements are deemed crucial for self-efficacy: Enactive mastery experiences, vicarious learning, verbal persuasion, and physiological arousal (Hodges, 2008). To present these elements in the instructional design of online courses, Keller's (1987) model is often quoted that highlights helping students to make a plan and realistic goals besides appreciation of tasks accomplished by learners and motivating remarks after work is completed. The online behavior of people is correlated with civic behavior (Greenhow, 2010).

Social networking sites apart from their role in enhancing social interaction can be helpful in the learning process especially social learning processes (Greenhow, 2011). Greenhow (2011) studied social networking site named "Hot Dish" to track the behavior of participants on the application. Social networking sites have given the option to express oneself and update profiles regularly. Other features are scoring points for bringing articles, images, and other related documents in the discussion that motivated other participants to become active as well. The study emphasizes that such features can be integrated into an online learning environment to raise vigor among students. Moreover, social networking sites provide space for self-expression and self-presentation (Greenhow and Robelia, 2009 a, b) and individual well beings. Cognitive, social, and emotional needs can be fulfilled as well. Thus, such learning programs can be developed that cover multifaceted points that influence learning directly or indirectly.

However, connectivity and infrastructural issues persist in developing countries where students, particularly from rural areas, are deprived of internet connections and if it is present then low internet speed frustrates the learner (Muthuprasad et al., 2020). Content quality and teacher competency including the student's response stands a crucial clog in online learning. Regular breaks are also a must in online learning environments to bust the student's stress and cognitive load (Muthuprasad et al., 2020).

Personal attributes

The personal attribute in online learning is learners' distinct ability in a certain learning environment (Song & Hill, 2007). It also constitutes a student's prior encounter with that learning context and content. Cognitive strategies, motivation, the ability to use resources and fulfill obligations are the different personal attributes of learners (Garrison, 1997; Song & Hill, 2007). In learning, students adapt according to the results they assume for themselves like enhancing critical thinking and self-regulation when the positive result is anticipated. Similarly, emotions have a great role for students in reviewing the contents and getting a good grade. It is seen in the studies that highly anxious students are not able to perform well in comparison to those students who anticipate good results (Arellano, 2018). The liking and perceived comfort with the digital technology in students reduce the degree of anxiety in the online learning environment (Hara & Kling, 1999; Song et al., 2004). The anxiety reduction in individuals is correlated with increased engagement with the online community and learning activities (Hill et al., 2009).

DOI: 10.9756/INT-JECSE/V14I3.668

The perceived usefulness, positive confirmation, and enjoyment during learning have a positive impact on the perceived learning of the students in the online environment (Carril, 2021).

Accessing information and educational content from the interface are two conditions for becoming an active participant in online learning (Chou, 2010; Hillman, 1994). Learners' ease with the technology decides the success in communicating with content, educator, and peers (Said & Tahir, 2013). However, social media sites like facebook - where the students are comfortable- have seen better communication with the interface (Duffy, 2011). Value dimensions are seen missing from online learning, particularly facebook, which is considered as an attribute of offline communication (i.e. face-to-face communication).

Brain familiarity of the same event varies depending on the kind of experience it has accumulated. Different students from unique backgrounds formulate a creative force that can be tapped on. But on the other hand, creates a challenge that needs coherency and consistency in their views. Learning tools that we select must be right for diverse individuals having different experiences and having a distinct way of learning a concept. The contemporary strategy of learning emphasizes making students' thinking clear (Collins et al., 1991; Bransford et al., 2000). The visibility in the thinking of students comes from activities like discussion, project work, diary writing, and blogging (Boettcher, 2007). Such exercises provide clarity to individuals and their peers and instructors as to what one has learned and what is required to complete the learning process. Online tools in this regard can be beneficial for learners and instructors to familiarize them with how concepts are evolving to make a long-lasting mark on them (Boettcher, 2007). Vygotsky (1978, 76) student's zone of proximal development (ZPD) is pertinent here as it underlines student development is dependent on the problem-solving skills and capability of problem-solving under instructor or comments from peers. Feedback and comments of the students are crucial in determining the student understanding level and in which direction the class should move. Here, online courses have an edge in tracking students' discussions and the value of those discussions. Before starting the class or amid a course, student learning must be evaluated through some tools, and accordingly, teaching can take place (Boettcher, 2007).

Motivation

The realization that interactions are relevant and cater to the specific objectives of the participants is crucial for inducing motivation among learners. Both long and short terms goals of learners must be associated with the interaction objectives to raise the frequency of students in the class (Hartnett et al., 2011). The perceived learning as a consequence is increased among students after the realization that topics discussed are closed to their objectives (Hartnett et al., 2011). Perceived learning of students is better managed when the students start to participate in the interaction clearly and honestly (Hartnett et al., 2011).

The motivation found in students is categorized into extrinsic and intrinsic. Extrinsic motivation is operative when work is done for the outside rewards while intrinsic motivation deals with the work done for self-satisfaction and mastery (Deci et al., 1991). Students' meta cognition, self-efficacy, and motivation are important factors that affect students learning in an online environment (Hill et al., 2009; Lim and Kim, 2003; Oliver & Shaw, 2003). Song (2005) suggested that the learner's comfort with technology helps in imbibing these factors. Materials are being provided for the development of these factors but it is inadequate in inculcating the same in learners (Tripp and Roby, 1994). The studies have found that online learning is useful for learners having self-regulation. Self-regulation like self-efficacy is found to be positively correlated with accomplishment in an academic and optimistic attitude (Shapely, 2000; Lee et al., 2002). Song & Hill (2007) noted that the Self-Directed Learning (SDL) of students is influenced by the instructor's support, collaboration and communication with the companions.

Unfavorable comments from instructors may hinder the student's priority about studying and turn to teachers' wants. Whereas the right use of pedagogical tools by instructors has a positive effect on the learners (Lai, 2015). Intercourse with interface decides the mood of learners and negative interaction often leads to anxiety in them (Swan, 2004). Controlling learning context (i.e. engagement with the online community) to achieve the learning goals is crucial for learners to develop self-regulation (Brockett & Hiemstra, 1991; Candy, 1991; Garrison, 1997).

Technological compatibility

Technological compatibility (navigation and usability) has a direct impact on perceived learning, enjoyment, suitability, and usefulness in the context of mobile learning (m-learning). Suitability, ease of use, enjoyment motivate the learners to wield mobile learning at any place or time which is also an added advantage of m-learning (Cheng, 2015).

While making videos, it is to be assessed that instructors are giving relevant information in the right frame especially covering all the learning processes: Mayer's suggestions on designing multimedia for learning (Chiu & Churchill, 2015), bandwidth suitability for small screen viewers, and emotionally satisfying content for the viewers that enhance the perceived learning. The technological skills of the teachers along with a friendly environment on online learning platforms like using emoji and cheerful replies can create belongingness which is crucial for online

DOI: 10.9756/INT-JECSE/V14I3.668

learning. The timetables can be redesigned to subsume such suggestions in it like space for expressions of emotions of the students, online support groups, reducing evaluation, and increasing learning and interdisciplinary studies (Chiu, 2021).

Ghazal (2019) in the study on participation and interaction classified seven fundamental terms for mutual learning in online learning: quantity, quality, role, scaffolds, productive threads, presence, connectivity, social trait, and cognitive. Quantity signified participation and interaction of members with others in online settings. Quality means the value and relevancy in discussion and its continuity throughout the interaction.

Scaffolds are one tool that is valuable in enhancing learners learning capability and has been used "in the form of paper-and-pencil tools, technology resources, peer support or teacher-led discussions" (Puntambekar & Hübscher, 2002). Scaffolds in an online learning environment aid learners to communicate with each other and self-evaluate themselves along with learning concepts (Hong & Lee, 2008; Lin et al., 2017; Lock & Duggleby, 2017; Lin & Chan, 2018 a, b). Scaffolding is defined as an "adult controlling those elements of the task that are essentially beyond the learner's capacity, thus permitting him to concentrate upon and complete only those elements that are within his range of competence." (Wood et al., 1976). In online learning, the scaffold is effective in enabling learners to focus on routine tasks that encourage them to ascertain communication and interact with the learning community regularly. Scaffolds enable learners to have their viewpoint during the discussion which creates meaning for themselves and the group during the interaction.

The role of protocols in facilitating learning is the crucial one to help the online community to achieve the learning objectives set for the course. It is found that that the protocols aid in creating cognitive, social, and teaching aspects that enable to inhabit the discussion by the participants (Zydney et al., 2012). The use of the protocol is associated with a reduction in contribution from instructors and resources required for learners' training. Resources available at the disposal of students are fully used when employing protocols in online learning. Community of Inquiry (COI) is also able to establish from protocol besides even distribution of contribution of various learners in the group, which lead to shared cognition among participants (Zydney et al., 2012). Zydney et al. (2012) studying the effect of protocol on interaction in online learning suggested some points:

- Adoption of new protocols and face-to-face communication, wherever possible, can be included during the interaction between the participants.
- The study did coding of individual participating unilaterally and group participating in relation with others to see both individual and group contribution in the discussion which was missing in the previous COI model.
- Used convenience sampling and a small sample that denotes the lack of external validity of the study.

Table 1

Summary of factors, scope and framework for integrated online learning paradigm

Factors	Scope	Towards integrated online learning paradigm
Engagement	Positively affecting learning Dialogue among students and between teachers and students Syllabus oriented, structured and quality content Feedback from the instructor Negatively affecting learning Decreased frequency of occurrence of the same content Increased time lapse between the learner's query and instructor's response	Learner's engagement with the content and instructor is crucial Response time of teacher and learner for feedback and query need to be integrated in the online learning paradigm
Course structure	Positively affecting learning Well designed course content increase student satisfaction Flexibility of learning settings Learner and course content interaction in the form of articles, images etc.	Personal attributes of wide array of creative learners can focused upon while organizing online framework Proper interaction and responses by the instructor may help in perceived motivation for learning

DOI: 10.9756/INT-JECSE/V14I3.668

	Negatively affecting learning Connectivity and infrastructural issues Lack of content quality and the instructor competency Long hours of instruction without breaks	
Personal attributes of learner	Positively affecting learning Perceived usability of content and relaxed attribute Comfortableness with online technology Capability of problem solving by oneself or under instructor or peer comments Critical thinking and self-regulation	For enhanced online learning, technological skills and orientation programs may be organized for the learners and instructors Learner's satisfaction for the learning being taking place in online learning environment Cognitive load and frequent breaks need to be taken care for enjoyable learning experience
	Negatively affecting learning Increased degree of anxiety among learners Incapability in tapping of diverse creative force in the form of learners	
Motivation	Positively affecting learning Higher self-efficacy and self-regulation Self-satisfaction and mastery Positive attitude towards learning	
	Negatively affecting learning Negative comments by the instructor during online learning Improper interaction Perceived learning if not in accordance with learner's objectives	
Technological compatibility	Positively affecting learning Suitability and ease of use Mobile learning enjoyed by learners Online tools enable interaction and self-evaluation Optimum usage of technology for better learning experience	
	Negatively affecting learning Lack of technological skills of teacher Connectivity issues The over usage of protocols to mimic offline learning	

Theories

DOI: 10.9756/INT-JECSE/V14I3.668

The importance of employing theory in explaining the mechanism and underlying phenomena have been long stressed. Common theories used in online learning have been mentioned by Hew et al. (2019).

Cognitive Theories

The cognitive load theory of sweller (1988) focused on the information which is received and processed by learners. The theory suggests that overloading of working memory should be avoided and it generally happens when information is not presented adequately from information resources or students are unable to process the information appropriately.

Technology Acceptance Model (TAM) by Fishbein and Ajzen (1975) explain how users are influenced to use technology through perceived ease of use and usefulness along with social influence and cognitive instrumental processes (Davis, 1989; Venkatesh & Davis, 2000). The unified theory of acceptance and the technology model (UTAUT) used social impact, stimulating scenarios, performance, and effort expectancy to explain technology acceptance to the fullest by the student (Venkatesh et al., 2003). The cognitive theory of multimedia learning explains that learning can happen visually or in audio. The theory underpins the limitations of the channel that students learn more from words and visuals rather than from words alone (Mayer, 2009).

Another theory related to this is the cognitive-affective theory of learning with media (CATLM). It covered differentiation of channel capability in learning e.g. alone words or combination of visual and words. In addition, it included virtual reality and agent-based learning settings (Moreno, 2005). Technological pedagogical and content knowledge (TPACK) explains the kind of information required from teachers to include technology in teaching (Koehler & Mishra, 2009; Mishra & Koehler, 2006).

Connectivism theory

Connectivism theory while dealing with technology clarifies how learning and pedagogy can be examined and further improvement options of digital technology in learning. The theory deals with the amount of knowledge consumed by learners and the strategies of knowledge building and sharing employed during learning (Goldie, 2016). The connectivist approach focuses on knowledge gained by the students and evaluative processes utilized in learning. Connectivsm implies that due to the interaction or activation of two neural networks, neural patterns get formed in the brain. This neural pattern is strong when the participants are active at the same time and neural links are weak when participants are active at different times or simply inactive (Goldie, 2016). Analogous neurons are involved in the formation of disparate concepts such as "Agra is capital of India". Reese (2014) has given ways through which connectivism theory can provide light to online learning

- Learning and knowledge can be constructed from diverse viewpoints.
- Learning is connecting information sources and it can be from a non-human source.
- What is presently known is not enough and one should excel for knowing more.
- Maintaining and growing interconnection between information sources leads to continuous learning.
- Linking concepts, ideas, theories, and disciplines is the fundamental skill required during learning.
- Having up-to-date knowledge is one of the goals of connectivism.
- Taking decisions from oneself is learning.

User-generated web 2.0 has revolutionized human capability and reach to learn. Believers of online learning suggest that Web 2.0 must be embraced to grasp the constructive knowledge and creativity it offers. Limitations of Web 2.0 are the lack of engagement, rigor, and very demanding on the part of students that leads to failure (Bejerano, 2008; Reese, 2014). Moreover, students' isolation in an online environment is easy especially when the instructor is inactive and there is less opportunity for peers interaction. Therefore the instructor's role becomes crucial in such conditions for the success of the students (Young, 2006). Currently, Online education is molded to utilize synchronous and asynchronous communication to help students excel in creating, researching, and exploring the knowledge presented to them.

The vaster concept than Web 2.0 is mobile learning which is a phenomenon that is getting support in academics. Mobile learning and context-driven knowledge involve learning by exploring the world with the help of technology. Mobile learning is known for ending the barrier of being physically present at the spot to learn something as an expert can illustrate the concept by physically being there and the message can be received by learners in the comfort of their place (Sharples et al., 2007). It is found that technology-mediated interaction can be rich if it is in a context but it is believed that it can't replace formal education (Sharples et al., 2007).

Formal education is being challenged by MOOCs (massive open online courses) due to their wide adoption by universities around the world ("Introduction to Artificial Intelligence", a course from Stanford University registered 160,000 students from more than 190 countries). MOOCs are interactive platforms usually having pre-recorded lectures and MCQ questions provided by universities based on the traditional courses (Goldie, 2016). A certificate is given to the students attending the MOOCs after the course is completed but it comes generally in the paid version.

DOI: 10.9756/INT-JECSE/V14I3.668

Social learning theory in online learning

Social learning theory explains that knowledge is constructed from the interaction between participants and feedback received in a social setting (Henning, 2004). Knowledge and learning are considered as the consequence of interaction and the context in which discussion is happening (Hill et al., 2009). Human cognition is not seen as an individual process rather as a group. Hill et al. (2009) explored the role of the social learning perspective in enhancing, developing, and improving the efficacy of a web-based learning environment (WBLEs). The researchers discussed several applications of social learning in WBLEs to enhance learning. Increasing interaction from knowledgeable peers and augmenting peers' support; using class size to instill consistency in discussion; effectively utilizing and interpreting available resources are some of the applications of social learning in WBLEs. Creating and supporting relations between groups and promoting different formats for communication are applications of social learning in culture and community construct. Learner characteristics like reflective thinking, self-regulation, motivation, accommodation of different learning styles can be included in the WBLEs to make it preferable for learning (Hill et al., 2009).

Online social networking sites like Facebook affects students' behavior and can be used for learning purpose. Studies e.g. Vygotsky (1978) have concluded that negotiation and interaction can be a means of learning. Jonnavithula and Tretiakov (2012) gave a model of social learning and its probable learning. The study employs three theories i.e. social learning theory, social network theory, and planned behavior theory. Social learning theory has explained that individuals learn from observation and copying the behaviors of others (Bandura, 1977) or observation and interaction (Bandura, 1986; Merriam & Caffarella, 1999) and emphasizes the environment in which learning is taking place. While the theory of planned behavior (Ajzen, 1991) has noted that student behavior is influenced by the belief held by their peers concerning them. The model consists of the frequency and duration of online and offline contacts of learners along with learner structural role in social networks (Jonnavithula & Tretiakov, 2012). The structural role of individuals is explained in terms of centrality (number of students are connected online and offline) and betweenness (importance of learner in maintaining the connectivity of group) (Knoke, 2008). The quality dimensions in the model look to check the extent to which learning objectives are catered in the social networks online. And individuals are also evaluated by the level of engagement and learning and resilience towards achieving set learning goals. Following steps are recommended for creating facilitating environment in online settings:

- Changing how students introduce themselves and the way answer is given along with feedback.
- A non-scary environment should be created (e.g. hi Prakash, thanks for your comments and I will wish to listen from you again) during learning as new students may find the online setting intimidating.
- A gentle, cheerful, respectful, and open environment should be created for learning.
- Learning should be linked with the student's practices so that can be valuable for them (Sargeant et al., 2006).

Humanist theory

Humanist theory emphasis that learning should involve personal goals and values, and personal emotions and needs (Rogers, 1969; Maslow, 1970; Merriam & Caffarella, 1999). In online learning, personal goals and accomplishments are difficult to ascertain since the interaction takes place among individuals having different cognitive processes. Adult and lifelong learning are influenced by humanism but school and university education required a way through which the humanistic needs of individuals can be fulfilled. Some ways to include humanism in an online environment:

- Individuals can be persuaded to describe themselves and what experience and interests they found important personally.
- Name-calling and appreciation after work is done.
- Personal goals must be fulfilled from the given course e.g. it can be asked that how this course is helping you to achieve your life goals? or how your current practices can be improved by this course? (Sargeant et al., 2006).

Adult learning theory

Adult learning theory or instruction for adults is known as androgogy (Knowles et al., 1998). Hang (2002) discussed six principles required for adults in androgogy. The first principle is "how learning will be conducted, what learning will occur, and why learning is important" (Knowles et al., 1998). The second principle emphasizes the self-directed learning among adults that deal with the purpose and methods employed in learning. The third and fourth principles focused on prior knowledge of learning and willingness to learn to satisfy the needs respectively. The fifth principle deals with the direction of learning and the context in which the knowledge is presented. Adults are found to be eager to learn when real-life instances are recalled during learning. The last principle is motivation which is required in learning. To solve life problems, adults are usually motivated to study what is halting them.

DOI: 10.9756/INT-JECSE/V14I3.668

The social development theory of Vygotsky (1978) is a typically used theory and modern constructivism notion is derived from this theory. Vygotsky explained that social development happens from an interaction between people that lead to cognition development. Zone of proximal development (ZPD) is explained in the theory that is the distance between student ability to perform a task under instructor guidance or peers' support and to do that task independently.

Constructivism theory

Constructivism implies knowledge that is formed is flexible and subjective and can be formed from cultural or individual activities. Learning, according to constructivism, entails active cognitive processing (Doolittle, 1999). Doolittle (1999) opined that constructivism is a continuum rather than a unitary concept. The study divides the continuum into three parts: cognitive constructivism, radical constructivism, and social constructivism.

Cognitive constructivism deals with elements of cognition and its processes. It suggests that the independent reality exists in the world and is knowable to learners from internal cognitive systems. This trait is absent in social and radical constructivism. Radical constructivism recognizes that knowledge is acquired from the active mind and is a flexible process but the external reality can not be fully reflected by the internal cognitive system. Since it is believed that the senses are incapable of absorbing all that is happening around us (Von Glasersfeld, 1990, 1995).

Social constructivism indicates that knowledge is acquired from discussion and language practice, and it can't be formed individually (Prawatt & Fkoden, 1994). Additionally, it can be formed in a socio-cultural context and is a child of a particular time and place (Gergen, 1995; Vygotsky, 1978). Social constructivism, thus, is different from radical and individual constructivism as the experimental nature of reality is missing here and it emphasizes group, cultural and dialogic collaboration to obtain shared truth for everyone (Bakhtin, 1984) which is lacking in individual constructivism respectively. Puzzifero and Shelton (2008) have discussed the active mastery learning model incorporating constructivist and instructivist techniques.

From the instructivist approach, learners were told to fully understand the content and in the constructivist settings, learners applied the content they have to learn in collaboration and problem-solving activities. Evaluation of learning information is tested through the quality matters program of the US department of education.

Constructivism and behaviorism's role in online learning is widely discussed. Which theory is more suitable for solving the student's problem and raising student satisfaction in online courses is continuously meditated upon but the valid answer for this question remains unclear. The present scenario is more tilted towards constructivism due to the advent of digital technology, particularly in an online learning environment. But the practical view tends to adopt both constructivism and behaviorism in learning. As there are many factors like curriculum, content, evaluation, etc. that determine which theory can be adopted but still ambiguity can be seen while adopting one of these theories during instructions. Various educators adapt teaching methods according to their teaching needs and individual student style. Skinner (1958) is credited for starting behaviorism who introducing an instruction machine which is a replica of modern-day software comprising all the teaching instruction required for students to learn a particular topic. At that time, Robert Gagne also introduced behaviorism in military training through drills and practice which can be seen today also in military practice. Behaviorism became popular in the modern education system as it breaks a large course into small manageable tasks including regular evaluation of students (Satu, 2012). While Constructivism focuses on the student experiences for building knowledge. Multimedia use, problem-solving, collaboration, interactive learning are some of the features of constructivist learning. Previous studies have deduced that behaviorism learning has many advantages but learning involving problem-solving gives an edge to constructivism (Sutton, 2003).

Self-determination theory

Self-determination theory (SDT) is an online learning theory that consists of three factors i.e. relatedness, competence, and autonomy (Hew et al., 2019). Relatedness is the impression of connections with others. Autonomy is freedom in the action of learners and competence is perceived mastery in the task in which a person is involved. SDT addresses autonomy, competence, and association with peers and instructors that can motivate students to learn. Previous research found that SDT can be valuable in measuring course satisfaction, accomplishment, and resilience among students (Deci & Rayan, 1985). Xie et al. (2006) have assessed self-determination theory in the context of online learning concerning a discussion conducted online among students to measure motivation. Xie et al. analyzed perceived value (extrinsic motivation), choice (autonomy), perceived interest (intrinsic motivation), engagement (Number of posts and log-in by students), and attitude for the course. SDT components (autonomy, relatedness except for competence) correlated with online learners' engagement and attitude. Interview and survey on learners revealed the same fact that instructors' intervention positively correlated with the student's motivation.

Online learning is entailed from issues such as students' motivation, satisfaction, and attrition. Support from instructors (Mills, 2003), peers, and performance evaluation are other issues that arise in online learning along with

DOI: 10.9756/INT-JECSE/V14I3.668

learning technical or engineering skills that need demonstration and laboratories (Howland & Moore, 2002). Chen and Jang (2010) stressed that instructors in online learning should avoid the classification of motivated and unmotivated groups because every individual has their reason for participation. Hrastinski (2008) drawing on Wenger's (1998) notion of participation argues that when formulating online learning theory as participative and interactive, the meaning of participation must be clear. Hrastinski (2008) concluded that learning is collaborative as it is a social process rather than individual (Bonk & Cunningham, 1998).

Collaboration is defined as the "construction of meaning with others and can be characterized by a joint commitment to a shared goal" (Littleton & Häkkinen, 1999) and it is the condition in which two learners try to learn together (Dillenbourg, 1999). But participation is not collaboration as participation may encompass "all kinds of relations, conflictual as well as harmonious, intimate as well as political, competitive as well as cooperative" (Wenger, 1998). Therefore participation is everything that we do like thinking, talking, cooking, feeling, etc. And participation is a mere feeling of engagement that one is connected with it.

Chiu (2021) notes that digital tools help in online learning that leads to student engagement. The studies (Lietaert et al., 2015; Roorda et al., 2011; Standage et al., 2005) relating to Self-Determination theory examine factors such as course structure, engagement, and instructor support that enhance student motivation and transform motivation from extrinsic to intrinsic motivation. Chiu (2021) noticed that the nature of the learning settings and learner academic capability decide student satisfaction in online learning. Autonomy is discussed in the study to be relevant in the offline classroom but insignificant for the online learning environment. Moreover, the psychological needs of students varied according to learning settings and the type of institution providing teaching.

Self-regulation theory

Self-regulated learning (SRL) theory is “the processes whereby learners personally activate and sustain cognitions, affects and behaviors that are systematically oriented towards the attainment of personal goals” (Schunk & Zimmerman, 2011, p. 1). SRL consists of the forethought phase (planning and goal setting), performance phase (self-control and self-monitor), and self-reflection phase (self-evaluation and complacency) (Zimmerman, 2000). Online learning involves social, electronic, and co-regulated learning that inferred that analysis of self-regulated learning can help analyze the extent of learning in online environments.

Bidjerano (2010) noted that during online learning, students first cooperated to understand the problem thereafter actively divided tasks and set goals and deadlines to finish the work. This can be used to infer the extent to which learners are "metacognitively, motivationally, and behaviorally" active participants in the online course (Winters & Azevedo,` 2005). Self-regulated learning is crucial for professional learners and those who study by themselves. Self-regulated learning finds application in mobile learning where access to information from electronic sources takes place and social learning where inner motivation is required to observe and learn (Zimmerman, 2008).

Bidjerano (2010) identified that self-regulation is a vital predictor in determining learner roles in online learning. Self-regulation is closely related to the self-efficacy of the learners while self-efficacy is the capability of learners to execute a task or behavior (Bidjerano, 2010). Self-efficacy is an excellent predictor of grit and academic performance (Robbins et al., 2004) that comes from the self-regulatory belief that even failure must be understood as a situation asking for work, a stimulus to raise measures and a time to get informed (Winne, 2005). Social and instructor presence help raise confidence among learners but to an extent only, to achieve significantly, high self-efficacy among learners is valuable.

Table 2

Summary of key theories and key concepts relevant to online learning and framework for integrated online learning paradigm

Theory	Key concepts	Relevant to online learning	Integrated online learning Paradigm
Cognitive load theory	Overloading of working memory hinders the processing of information	While designing online learning mechanism, concept of cognitive load and the respective processing can be taken care of	● Linking learner's goal and online course outcomes ● Regular evaluation of motivation and satisfaction level at the learner's end
Cognitive theory of multimedia learning	Usage of multiple channels increases learning	Multimedia learning has become an essential part of learning for the internet age people. How	● Segmentation of learners in accordance with their personal attributes and in

DOI: 10.9756/INT-JECSE/V14I3.668

		to and what to amalgamate in online learning modules and pedagogy need to be designed accordingly	turn organizing pedagogical mechanisms ● Online interfaces can be turned in peaceful and accessible learning operating systems
Connectivism theory	Interconnection between the information supplied leads to learning.	Active participation of learners is necessary to activate related neural networks and that can be evaluated for holding further course of information supply	
Social learning theory	Knowledge is constructed collectively and not individually by interactions between participants	Online social networks and interfaces can be designed accordingly to create an open and peaceful learning environment	
Humanist theory	Learning should involve personal goals and individual needs	Surveys can be conducted locating personal goals of students and online courses can be designed accordingly by segmenting learners on particular locus in the continuum; rewarding the students on small accomplishments	
Adult learning theory	Self-directed learning; prior knowledge of willingness to satisfy students needs; linking real life instances	Skill development courses for adults should cater the needs of the particular class of needs for them	
Constructivism	External world is knowable by internal cognitive systems; active and flexible mind capture the things around it; cultural and dialogic process adds to the knowledge	Regular assessment of evaluation along with facilitation of involvement of learners in the online learning environment is pre-requisite for knowledge building	
Self-determination theory	Relatedness in terms of connection with other learners; autonomy, competence in the taste where learner is involved	To measure motivation, satisfaction and zeal to learn in the online environment of learning	● Acknowledging human mind limitations of processing cognitive load, information can be supplies by activating related neural networks

DOI: 10.9756/INT-JECSE/V14I3.668

Self-regulation theory	Self activation and sustenance of cognition; planning, monitoring and evaluating	For professionals and self-paced learners especially for mobile learners, this theory provide insights in learner attributes and in accordance pedagogical mechanisms can be arranged	● Integrating knowledge of human mind and its functioning to the pedagogical mechanisms is field of further inquiry

Challenges and opportunities

In the traditional learning settings, meaning negotiation between instructor and learner is simpler, and confusion and fallacies of students get clear as they come (Swan, 2003). In online learning, the instructor's role is crucial to constantly support learners and solve any challenge that may come like the difficulty with the use of technology. The sense of the presence of the instructor in the mind of students and emotional connection is important for knowledge building (Picciano, 1995; Swan et al., 2000). However, online learning has the unique advantage of course design as it can be molded for individuals according to their style and needs of learning (Twigg, 2000). It is found that students having constructivist mindset tend to prefer the online learning environment where inquiry and critical thinking is encouraged (Tsai & Chuang, 2005). Learning styles vary among individuals having different learning expectations from the course in accordance of their skill sets. Therefore preferring certain instructional and learning techniques, consequently, course design can aim for covering diverse learning styles (Jonassen & Grabowski, 1995).

Immediate feedback and assessment are possible in online learning (Swan, 2003). Online interaction is considered a source of learning (Levin et al., 1990; Wells, 1992; Hiltz 1994). The advantages of online interaction are that it promotes divergent thinking, complex understanding, and experimentation. Whereas convergent and scientific thinking is less promoted online (Parker & Gemini, 2001; Picciano, 2002). Online discussion is considered more democratic, equitable, reflective, and mindful than offline discussion (Swan, 2003).

A challenge to online learning is a safe learning environment and collaboration with the learning community along with active participation which is valuable in forging knowledge but difficult to establish in an online environment. Cooperation with the community leads to an exchange of ideas that ushers connections between newly acquired information with old ones. Thus, aiding in retaining information for a longer time. This is also difficult to secure in online settings (Erichsen & Bolliger, 2010). Cacciamani (2017) noticed that learners averted participation as they don't have a sense of communication though they were interested in adding to the contributions of other participants.

Breen et al. (2001) defined failure as a verdict that happens from information sources or the learning tools used. Failure during learning can be many, for example, technical failure, learners failure, course structure failure, and interaction failure (Scanlon & Issroff, 2005). But one failure must not be seen in isolation from another. For instance, it is argued in a study, when the presentation tool of the teacher gets worn, students become active and move to fix the problem (Oliver & Issroff, 2001). Generally, it is expected that it is the teacher's responsibility to manage the content source but both rule and division of labor were altered from the participation of students. Similarly, in one case study, students' and teachers' opinions varied on what activity should be performed and what should be avoided. It was found that the students are ambiguous in their responses in different environments and online learning creates a new set of challenges concerning the duty of students and teachers that seems to be blurred (Scanlon & Issroff, 2005).

DOI: 10.9756/INT-JECSE/V14I3.668

References

Aditya, K. S., & Jha, G. K. (2020). Students' Perception and Preference for Online Education in India During COVID-19 Pandemic.

Ajzen, I. (1991). The theory of planned behavior. Organizational behavior and human decision processes, 50(2), 179-211.

Bakhtin, M. M. (1984). Problem of Dostoevsky's poetics. Minneapolis, MN: University of Minnesota Press.

Bandura, A. (1977). Self-efficacy: toward a unifying theory of behavioral change. Psychological review, 84(2), 191.

Bandura, A. (1986). Social foundations of thought and action. Englewoods Cliffs.

Barbera, E., Clara, M., & Linder-Vanberschot, J. A. (2013). Factors influencing student satisfaction and perceived learning in online courses. E-learning and Digital Media, 10(3), 226-235.

Beyth-Marom, R., Chajut, E., Roccas, S., & Sagiv, L. (2003). Internet-assisted versus traditional distance learning environments: Factors affecting students' preferences. Computers & Education, 41(1), 65-76.

Bejerano, A. R. (2008). The genesis and evolution of online degree programs: who are they for and what havewe lost along the way? Communication Education, 57(3), 408–414.

Boettcher, J. V. (2007). Ten core principles for designing effective learning environments: Insights from brain research and pedagogical theory. Innovate: Journal of Online Education, 3(3).

Bonk, C. J., & Cunningham, D. J. (1998). Searching for learner-centered, constructivist, and sociocultural components of collaborative educational learning tools. Electronic collaborators: Learner-centered technologies for literacy, apprenticeship, and discourse, 25, 25-50.

Bransford, J. D., A. L. Brown, and R. R. Cocking. 2000. How people learn: Brain, mind, experience, and school. Washington, DC: National Academies Press.

Breen R., Lindsay R., Jenkins A. & Smith P. (2001) The role of ICT in university learning. Studies in Higher Education 26, 95–114.

Brockett, R. G., & Hiemstra, R. (1991). Self-direction in adult learning: Perspectives on theory, research, and practice. New York: Routledge.

Cacciamani, S. (2017), "Experiential learning and knowledge building in higher education: an application of the progressive design method", Journal of e-Learning and Knowledge Society, Vol. 13 No. 1, pp. 29-38.

Candy, P. C. (1991). Self-direction for lifelong learning: A comprehensive guide to theory and practice. San Francisco: Jossey-Bass.

Chen, K. C., & Jang, S. J. (2010). Motivation in online learning: Testing a model of self-determination theory. Computers in Human Behavior, 26(4), 741-752.

Cheng, Y. M. (2015). Towards an understanding of the factors affecting m-learning acceptance: Roles of technological characteristics and compatibility. Asia Pacific Management Review, 20(3), 109-119.

Chiu, T. K. (2021). Applying the self-determination theory (SDT) to explain student engagement in online learning during the COVID-19 pandemic. Journal of Research on Technology in Education, 1-17.

Chiu, T. K., & Churchill, D. (2015). Exploring the characteristics of an optimal design of digital materials for concept learning in mathematics: Multimedia learning and variation theory. Computers & Education, 82, 280-291.

Chou, C., Peng, H., & Chang, C.-Y. (2010). The technical framework of interactive functions for course-management systems: Students; perceptions, uses, and evaluations. Computers & Education, 55(3), 1004-1017.

Collins, A., Brown, J. S., & Holum, A. (1991). Cognitive apprenticeship: Making thinking visible. American educator, 15(3), 6-11.

Costley, J., & Lange, C. (2016). The effects of instructor control of online learning environments on satisfaction and perceived learning. Electronic Journal of e-Learning, 14(3), pp169-180.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly, 13(3), 319–340.

Deci, E. L., R. J. Vallerand, L. G. Pelletier, and R. M. Ryan. 1991. Motivation and education: The self-determination perspective. Educational Psychologist 26:325–346.

Deci, E. L., & Ryan, R. M. (1985). Intrinsic motivation and self-determination in human behavior. New York: Plenum.

Dillenbourg, P. (1999). Introduction: What do you mean by collaborative learning? In: P. Dillenbourg (Ed.), Collaborative learning: cognitive and computational approaches (pp.1-19). Pergamon: Oxford.

Doolittle, P. E. (1999). Constructivism and online education.

DOI: 10.9756/INT-JECSE/V14I3.668

Duffy, P. (2011). Facebook or Faceblok: Cautionary tales exploring the rise of social networking within tertiary eduction. In M. J. W. Lee & C. McLoughlin (Eds). Web 2.0-base e-learning: Appling social informatics for tertiary teaching (pp. 284-300). Hershey, PA:IGI Global.
Dwivedi, A., Dwivedi, P., Bobek, S., & Zabukovšek, S. S. (2019). Factors affecting students' engagement with online content in blended learning. Kybernetes.
Eom, S. B., Wen, H. J., & Ashill, N. (2006). The determinants of students' perceived learning outcomes and satisfaction in university online education: An empirical investigation. Decision Sciences Journal of Innovative Education, 4(2), 215-235.
Erichsen, E. A., & Bolliger, D. U. (2011). Towards understanding international graduate student isolation in traditional and online environments. Educational Technology Research and Development, 59(3), 309-326.
Fishbein, M. A., & Ajzen, I. (1975). Belief, attitude, intention and behavior: An introduction to theory and research. Reading, MA: Addison-Wesley.
Garrison, D. R. (1997). Self-directed learning: Toward a comprehensive model. Adult Education Quarterly, 48(1), 18-33.
Gergen, K. J. (1995) Social construction and the educational process. In: Steffe, L. P. and Gale, J. (eds.), Constructivism in Education. Hove, New Jersey: Lawrence Erlbaum Associates, Inc, 17–39.
Ghazal, S., Al-Samarraie, H., & Wright, B. (2019). A conceptualization of factors affecting collaborative knowledge building in online environments. Online Information Review.
Goldie, J. G. S. (2016). Connectivism: A knowledge learning theory for the digital age?. Medical teacher, 38(10), 1064-1069.
Gray, J. A., & DiLoreto, M. (2016). The effects of student engagement, student satisfaction, and perceived learning in online learning environments. International Journal of Educational Leadership Preparation, 11(1), n1.
Greenhow, C. (2011). Online social networks and learning. On the horizon.
Greenhow, C. and Robelia, E. (2009a), ''Old communication, new literacies: social network sites as social learning resources'', Journal of Computer-mediated Communication, Vol. 14, pp. 1130-61.
Greenhow, C. and Robelia, E. (2009b), ''Informal learning and identity formation in online social networks'', Learning, Media and Technology, Vol. 34 No. 2, pp. 119-40.
Hara, N., & Kling, R. (1999). A case study of students' frustrations with a web-based distance education.
Hartnett, M., St George, A., & Dron, J. (2011). Examining motivation in online distance learning environments: Complex, multifaceted, and situation-dependent. International Review of Research in Open and Distributed Learning, 12(6), 20-38.
Henning, W. 2004. Everyday cognition and situated learning. In Handbook of research on educational communications and technology, 2nd ed., ed. D. Jonassen, 143–168. Mahwah, NJ: Erlbaum.
Hew, K. F., Lan, M., Tang, Y., Jia, C., & Lo, C. K. (2019). Where is the "theory" within the field of educational technology research?. British Journal of Educational Technology, 50(3), 956-971.
Hill, J. R., Song, L., & West, R. E. (2009). Social learning theory and web-based learning environments: A review of research and discussion of implications. The Amer. Jrnl. of Distance Education, 23(2), 88-103.
Hillman, D. C. A., Willis, D. J., & Gunawardena, C. N. (1994). Learner-Interface Interaction in Distance Education: An Extension of Contemporary Models and Strategies for Practitioners. The American Journal of Distance Education, 8(2), 30-42.
Hiltz, S. R. (1994). The virtual classroom: Learning without limits via computer networks. Intellect Books.
Hodges, C. B. (2008). Self-efficacy in the context of online learning environments: A review of the literature and directions for research. Performance Improvement Quarterly, 20(3-4), 7-25.
Hong, K.-S. and Lee, J.A.C. (2008), "Postgraduate students' knowledge construction during asynchronous computer conferences in a blended learning environment: a Malaysian experience", Australasian Journal of Educational Technology, Vol. 24 No. 1, pp. 91-107.
Howland, J. L., & Moore, J. L. (2002). Student perceptions as distance learners inInternet-based courses. Distance Education, 23(2), 183–195.
Hrastinski, S. (2009). A theory of online learning as online participation. Computers & Education, 52(1), 78-82.
Huang, H. M. (2002). Toward constructivism for adult learners in online learning environments. British journal of educational technology, 33(1), 27-37.
Hübscher, R., & Puntambekar, S. (2002, May). Adaptive navigation for learners in hypermedia is scaffolded navigation. In International Conference on Adaptive Hypermedia and Adaptive Web-Based Systems (pp. 184-192). Springer, Berlin, Heidelberg.

DOI: 10.9756/INT-JECSE/V14I3.668

Jonassen, D. L., and B. L. Grabowski. 1993. Handbook of individual differences, learning and instruction. Hillsdale, NJ: Erlbaum.
Jonnavithula, L., & Tretiakov, A. (2012). A model for the effects of online social networks on learning. Future challenges, sustainable futures. Proceedings ascilite Wellington, 1(30), 435-437.
Keller, J. M. (1987). Development and use of the ARCS model of instructional design. Journal of Instructional Development, 10(3), 2–10.
Knoke, D., & Yang, S. (2008). Social network analysis: Sage Publications, Inc.
Knowles, M. S., Holton III, E. F., & Swanson, R. A. (1998). The Adult Learner 5 edition Houston. Texas: Gulf Publishing Company.
Koehler, M., & Mishra, P. (2009). What is technological pedagogical content knowledge (TPACK)? Contemporary Issues in Technology and Teacher Education, 9(1), 60–70.
Kuo, Y., Walker, A. E., Belland, B. R., & Schroder, K. E. E. (2014). A predictive study of student satisfaction in online education programs. The International Review of Research in Open and Distance Learning, 14(1), 16-39.
Lai, K. W. (2015). Knowledge construction in online learning communities: A case study of a doctoral course. Studies in Higher Education, 40(4), 561-579.
Lee, J., Hong, N. L., & Ling, N. L. (2002). An analysis of students‟ preparation for the virtual learning environment. Internet and Higher Education, 5(3), 231-242.
Levin, J. A., Kim, H., & Riel, M. M. (1990). Analyzing instructional interactions on electronic message networks. Online education: Perspectives on a new environment, 185-213.
Lietaert, S., Roorda, D., Laevers, F., Verschueren, K., & De Fraine, B. (2015). The gender gap in student engagement: The role of teachers' autonomy support, structure, and involvement. British Journal of Educational Psychology, 85(4), 498-518.
Lim, D. H., and H. Kim. 2003. Motivation and learner characteristics affecting online learning and learning application. Journal of Educational Technology Systems 31 (4): 423–439.
Lin, F. and Chan, C.K. (2018a), "Examining the role of computer-supported knowledge-building discourse in epistemic and conceptual understanding", Journal of Computer Assisted Learning, Vol. 34 No. 5, pp. 567-579.
Lin, F. and Chan, C.K. (2018b), "Promoting elementary students' epistemology of science through computer-supported knowledge-building discourse and epistemic reflection", International Journal of Science Education, Vol. 40 No. 6, pp. 668-687.
Lin, P. Y., Chang, Y. H., Lin, H. T., & Hong, H. Y. (2017). Fostering college students' creative capacity through computer-supported knowledge building. Journal of Computers in Education, 4(1), 43-56.
Littleton, K. & Häkkinen, P. (1999). Learning together: Understanding the processes of computer-based collaborative learning. In P. Dillenbourg (Ed.), Collaborative Learning: Cognitive and Computational Approaches (pp. 20-33). Pergamon: Oxford.
Lock, J. and Duggleby, S. (2017), "Authentic learning in the social studies classroom: connecting globally", One World, Vol. 4 No. 1, pp. 20-27.
Maslow AH. Motivation and personality. 2nd ed. New York: Harper-Collins, 1970.
Mayer, R. E. (2009). Multimedia learning (2nd ed.). Cambridge, NY: Cambridge University Press.
Merriam, S. B., & Caffarella, R. S. (1999). Learning in Adulthood. San Francisco: Jossey-Bass.
Mills, R. (2003). The centrality of learner support in open and distance learning. In A. Tait & R. Mills (Eds.), Rethinking learner support in distance education: Change and continuity in an international context (pp. 102–113). London: Routledge.
Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. Teachers College Record, 108(6), 1017–1054.
Moisey, S. D., Ally, M., & Spencer, B. (2006). Factors affecting the development and use of learning objects. The American journal of distance education, 20(3), 143-161.
Moreno, R. (2005). Instructional technology: Promise and pitfalls. In L. PytlikZillig, M. Bodvarsson, & R. Bruning (Eds.), Technology-based education: Bringing researchers and practitioners together (pp. 1–19). Greenwich, CT: Information Age Publishing.
Munoz-Carril, P. C., Hernández-Sellés, N., Fuentes-Abeledo, E. J., & González-Sanmamed, M. (2021). Factors influencing students' perceived impact of learning and satisfaction in Computer Supported Collaborative Learning. Computers & Education, 174, 104310.
Muthuprasad, T., Aiswarya, S., Aditya, K. S., & Jha, G. K. (2021). Students' perception and preference for online education in India during COVID-19 pandemic. Social Sciences & Humanities Open, 3(1), 100101.

DOI: 10.9756/INT-JECSE/V14I3.668

Oliver M. & Issroff K. (2001) Teaching quality enhancement fund making effective use of large teaching spaces. Unpublished report, University College London.
Oliver, M., & Shaw, G. P. (2003). Asynchronous discussion in support of medical education. Journal of Asynchronous Learning Networks, 7(1), 56-67.
Parker, D., & Gemino, A. (2001). Inside online learning: Comparing conceptual and technique learning performance in place-based and ALN formats. Journal of Asynchronous Learning Networks, 5(2), 64-74.
Peltier, J. W., Schibrowsky, J. A., & Drago, W. (2007). The interdependence of the factors influencing the perceived quality of the online learning experience: A causal model. Journal of Marketing Education, 29(2), 140-153.
Picciano, A. G. Developing an asynchronous course model at a large, urban university. Journal of Asynchronous Learning Networks, 2 (1), 1998.
Picciano, A. G. (2002). Beyond student perceptions: Issues of interaction, presence, and performance in an online course. Journal of Asynchronous learning networks, 6(1), 21-40.
Prawatt, R. S. and Floden, R. E. (1994) Philosophical perspectives on constructivist views of learning. Educational Psychology, 29 (1): 37–48.
Puzziferro, M., & Shelton, K. (2008). A model for developing high-quality online courses: Integrating a systems approach with learning theory. Journal of Asynchronous Learning Networks, 12, 119-136.
Ramirez-Arellano, A., Acosta-Gonzaga, E., Bory-Reyes, J., & Hernández-Simón, L. M. (2018). Factors affecting student learning performance: A causal model in higher blended education. Journal of Computer Assisted Learning, 34(6), 807-815.
Reese, S. A. (2015). Online learning environments in higher education: Connectivism vs. dissociation. Education and information technologies, 20(3), 579-588.
Robbins, S., Lauver, K., Le, H., Langley, R., Davis, D., & Carlstrom, A. (2004). Do psychosocial and study skill factors predict college outcomes? A meta-analysis. Psychological Bulletin, 130, 261–288.
Rogers CR. Freedom to learn. Columbus, Ohio: Merrill, 1969.
Roorda, D. L., Koomen, H. M., Spilt, J. L., & Oort, F. J. (2011). The influence of affective teacher–student relationships on students' school engagement and achievement: A meta-analytic approach. Review of educational research, 81(4), 493-529.
Said, M. N. H. M., & Tahir, L. M. (2013). Towards identification of students' holistic learning process through Facebook in higher education. Procedia-Social and Behavioral Sciences, 97, 307-313.
Sargeant, J., Curran, V., Allen, M., Jarvis-Selinger, S., & Ho, K. (2006). Facilitating interpersonal interaction and learning online: Linking theory and practice. Journal of Continuing Education in the Health Professions, 26(2), 128-136.
Scanlon, E., & Issroff, K. (2005). Activity theory and higher education: Evaluating learning technologies. Journal of Computer Assisted Learning, 21(6), 430-439.
Shapley, P. (2000). On-line education to develop complex reasoning skills in organic chemistry. Journal of Asynchronous Learning Networks, 4(2).
Sharples, M., Taylor, J., & Vavoula, G. (2010). A theory of learning for the mobile age. In Medienbildung in neuen Kulturräumen (pp. 87-99). VS Verlag für Sozialwissenschaften.
Shea, P., & Bidjerano, T. (2010). Learning presence: Towards a theory of self-efficacy, self-regulation, and the development of a communities of inquiry in online and blended learning environments. Computers & education, 55(4), 1721-1731.
Siragusa, L, Dixon, K and Dixon, R (2007). "Designing quality e-learning environments in higher education". Paper preseted at the Proceedings ascilite, Singapore.
Skinner, B. F. (1958). Teaching Machines: From the experimental study of learning come devices which arrange optimal conditions for self-instruction. Science, 128(3330), 969-977.
Song, L. 2005. Adult learners' self-directed learning in online environments: Process, personal attribute, and context. Unpublished doctoral dissertation, The University of Georgia, Athens.
Song, L., & Hill, J. R. (2007). A conceptual model for understanding self-directed learning in online environments. Journal of Interactive Online Learning, 6(1), 27-42.
Song, L., Singleton, E. S., Hill, J. R., & Koh, M. H. (2004). Improving online learning: Student perceptions of useful and challenging characteristics. Internet & Higher Education, 7(1), 59-70.
Standage, M., Duda, J. L., & Ntoumanis, N. (2005). A test of self-determination theory in school physical education. British journal of educational psychology, 75(3), 411-433.

DOI: 10.9756/INT-JECSE/V14I3.668

Swan, K., Shea, P., Fredericksen, E., Pickett, A., Pelz, W., & Maher, G. (2000). Building knowledge building communities: Consistency, contact and communication in the virtual classroom. Journal of Educational Computing Research, 23(4), 359-383.
Swan, K. (2003). Learning effectiveness online: What the research tells us. Elements of quality online education, practice and direction, 4(1), 13-47.
Swan, K. (2004). Relationships between interactions and learning in online environments. The Sloan Consortium, 1-6.
Sweller, J. (1988). Cognitive load during problem solving: Effects on learning. Cognitive Science, 12(2), 257–285.
Sutton, M. J. (2003). Problem representation, understanding, and learning transfer implications for technology education.
Tripp, S. D., and W. Roby. 1994. The effects of various information resources on learning from a hypertext bilingual lexicon. Journal of Research on Computing in Education 27:92–103.
Tsai, C. C., and S. C. Chuang. 2005. The correlation between epistemological beliefs and preferences toward Internet-based learning environments. British Journal of Educational Technology 36 (1): 97–100.
Twigg, C. A. (2001). Innovations in Online Learning: Moving beyond No Significant Difference. The Pew Symposia in Learning and Technology (4th, Phoenix, Arizona, December 8-9, 2000).
Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. Management Science, 46(2), 186–204.
Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. MIS Quarterly, 27(3), 425–478.
Von Glasersfeld, E. (1990). Environment and communication. Transforming children's mathematics education: International perspectives, 30-38.
Von Glasersfeld, E. (1995). A constructivist approach to teaching. In L. P. Steffe & J. Gale, Constructivism in education (pp. 3-16). Hillsdale, NJ: Erlbaum.
Vygotsky, L. S. 1978. Mind in society: The development of higher psychological processes. Trans. M. Cole. Cambridge, MA: Harvard University Press.
Vygotsky, L. (1986). Thought and language. Cambridge, MA: MIT (A. Kozulin, trans.).
Wang, C. M. 2007. Cultural considerations in online education: Implications for design and evaluation for Taiwanese international students. Unpublished doctoral dissertation, University of Georgia, Athens.
Weegar, M. A., & Pacis, D. (2012, January). A comparison of two theories of learning--behaviorism and constructivism as applied to face-to-face and online learning. In Proceedings e-leader conference, Manila.
Wells, R. (1992). Computer-Mediated Communication for Distance Education: An International Review of Design, Teaching, and Institutional Issues. ACSDE Research Monograph Number 6. American Center for the Study of Distance Education, Penn State University, 403 S. Allen St., Suite 206, University Park, PA 16802-5202.
Wenger, E. (1998). Communities of practice: Learning, meaning, and identity. Cambridge: Cambridge University Press.
Winne, P. H. (2005). A perspective on state-of-the-art research on self-regulated learning. Instructional Science, 33, 559–565.
Winters, F. I., & Azevedo, R. (2005). High-school students' regulation of learning during computer-based science inquiry. Journal of Educational Computing Research, 33(2), 189–217.
Winne, P. H. (2005). A perspective on state-of-the-art research on self-regulated learning. Instructional Science, 33, 559–565.
Wood, D., Bruner, J.S., & Ross, G. (1976). The role of tutoring in problem solving. Journal of Child Psychology and Psychiatry, 17(2), 89-100.
Xie, K., Debacker, T. K., & Ferguson, C. (2006). Extending the traditional classroom through online discussion: The role of student motivation. Journal of Educational Computing Research, 34(1), 67–89.
Young, S. (2006). Student views of effective online teaching in higher education. American Journal of Distance Education, 20(2), 65–77.
Zimmerman, B. J. (2000). Attaining self-regulation: A social cognitive perspective. In Handbook of self-regulation (pp. 13-39). Academic press.
Zimmerman, B. J. (2008). Investigating self-regulation and motivation: historical background, methodological developments, and future prospects. American Educational Research Journal, 45(1), 166–183.
Zimmerman, B. J., & Schunk, D. H. (2011). Handbook of self-regulation of learning and performance. Routledge/Taylor & Francis Group.

DOI: 10.9756/INT-JECSE/V14I3.668

Zydney, J. M., deNoyelles, A., & Seo, K. K. J. (2012). Creating a community of inquiry in online environments: An exploratory study on the effect of a protocol on interactions within asynchronous discussions. Computers & Education, 58(1), 77-87.

DOI: 10.9756/INT-JECSE/V14I3.668