CHAPTER 2
LITERATURE REVIEW

For understanding the various factors leading to acceptance of TEL by college students, we have reviewed the literature in relevant areas to develop a theoretical understanding of the phenomenon of acceptance of VLE. Although study on TEL is scarce but as TEL is also a VLE (used mostly for informal learning), studies on VLE/online learning were reviewed. This chapter first examines literature on VLE acceptance (mostly found for formal learning) and then it presents the factors of acceptance of VLE/’online learning’, as well as various theories used in IS literature for technology acceptance for learning. At the end, summary of the chapter will be provided.

2.1 Use of Technology for Learning

The term ‘TEL’ in this study is a broad term which includes all digital resources used by college students irrespective of types or availability online or offline on Institute’s local area network (LAN). TEL resources can be OERs (like MIT-OCW, NPTEL lectures), MOOCs (like courses launched on Coursera, edX), videos available on YouTube, eBooks and many other freely available educational artifacts on Net (like blogs, journals, articles etc.). As these digital resources / courses on Web are information systems, learning using these resources or courses is considered as ‘eLearning’ available in public domain on Net. Therefore, to find the factors of TEL acceptance, review of extant literature on factors for technology acceptance for learning (keywords used - eLearning, online learning, VLE, TEL, OER, MOOC etc.) was carried out in major IS journals.

As use of ICT promotes collaborative learning and sharing of resources on virtual learning environments, the researchers predicted its major benefits to the learner and the teacher in academia (Wheeler, 2001). Online course offerings transcend the boundaries of
time and space, creating new opportunities for students, faculty, and educational institutions (Mayadas, Bourne, & Bacsich, 2009). According to Clements and Smalley (2000), E-Learning can be used as a supplemental learning tool for supporting conventional teaching (e.g. face to face instruction) which is similar to the use of TEL by the college students in this study. Students use the web extensively to extend their understanding of concepts and supplement course material (Conole, 2008). Prensky (2001) and Lippincott (2005) called contemporary students as digital natives and Net generation students respectively and posited that these students prefer learning through digital media/contents than learning through books or printed media. We reviewed relevant studies on technology acceptance for learning in IS area which is presented in the following text.

In a comprehensive study Piccoli, Ahmad and Ives (2001) provided a framework of VLE research domain linking the main constructs of human dimension, design dimension and effectiveness. The authors further posited that, VLEs depart noticeably from traditional classroom due to their use of technology and the shift of control and responsibility to the learners that they promote. The authors proposed and tested various individual and technological factors for success of VLE acceptance in United States. Factors identified by them are students’ characteristics: - maturity, motivation, attitude, self efficacy, anxiety, excitement with the learning environment, duration of interaction with computer, past successful experience and technical characteristics of high levels of flexibility in terms of time, place, and space apart from teacher’s characteristics (efficacy, style of teaching, attitude and availability).

Keller and Cernerud (2002) examined students’ perceptions of e-learning in Sweden. They used survey method (both open and closed ended) and analyzed the results through regression as well as qualitative content analysis. Their study found that the students did not consider access to eLearning in campus as benefit and the implementation strategy of e-
learning was found more important factor affecting students’ perceptions than the individual characteristics.

Chiu and Wang (2008) in their study on the subjective task value of part time students of Web based learning in Taiwan. They found that performance expectancy, effort expectancy, computer self efficacy, utility value, attainment value and intrinsic value were significant predictors of individuals intentions to continue using Web-based learning. Some cost component in terms of the negative aspects of engaging in the task was also conceptualized. Anxiety had a significant negative effect.

Wan, Wang and Haggerty (2008) studied influence of psychological processes on e-learning outcomes of Chinese students opting online courses’. They found that virtual competence and ICT experience affect eLearning outcomes.

Keller(2009), studied factors influencing acceptance of VLEs by students and academic staff in blended learning environments through a case study at three universities providing master education of public health in Sweden, Norway and Lithuania. The study found that the contextual culture factor was powerful in influencing acceptance of VLEs, positively as well as negatively and high degrees of performance expectancy, social influence and results demonstrability affected acceptance of virtual learning environments positively.

Sumak (2011) carried out a ‘Meta Analysis’ of 42 eLearning literature which used TAM for analysis and found a large numbers of factors used as exogenous variables with TAM model in studies. The factors include perceived ease of use, perceived usefulness, behavioural intention, attitude, use, self-efficacy, satisfaction, social influence, compatibility, facilitating conditions, performance expectancy, flow, anxiety, confirmation, experience, system quality, computer self-efficacy and management support.

Hu and Hui (2012) examined students’ satisfaction and learning effectiveness in technology-mediated learning for its influence on the learning engagement and learning
The participants of the study were 212 college students in ‘Hong Kong who were learning ‘Adobe Photoshop’. The study found a negative effect of technology-mediated learning on students engagement in learning and the result showed that the use of pre-programmed video contents for delivering learning materials negatively affected learning engagement leading to reduced learning effectiveness and satisfaction.

Chau et al. (2013) evaluated how a 3D virtual environment can facilitate students in achieving learning outcomes. Result showed that 3D virtual environments could indeed facilitate students in achieving learning outcomes through constructivist learning.

Kim, Lee, Lee and Shon (2015) studied acceptance of OER for lifelong learning among the university students at the Korea National Open University (KNOU) focusing the adult learners. They found that ease of use and job fit was important factors for acceptance.

Chu and Chen (2016) studied factors for acceptance of eLearning among eLearning students in Taiwan and found that attitude, perceived behavioral control, subjective norm, and group influences determine the intention to use eLearning.

The review of the literature reflects widespread use of eLearning in academia, albeit with mixed results. Many researchers have also challenged the claims being made for, digital natives’ students and the role of digital media in learning. O’Neill and Sai (2014) in their qualitative study on why college students do not opt online courses found that students prefer to opt face to face courses as they think they would learn better with this mode. Chen (2009) studied the institutional barriers of online education like development cost and faculty workload. Drop out from online courses are also reported in literature and it is found that online courses have a 10–20 percent less completion rate (Carr, 2000). Thus the literature review provides us mixed results about the acceptance of technology for learning and its impact and effectiveness. Also the critiques like Clark (1983, 1986, 1994) who posited that media will never influence learning and Bennett, Maton and Kervin (2008), Kennedy, Judd,
Churchward and Gray (2008), and Lea and Jones (2011) pointed to the need for more research in this area as empirical evidence for usage of technology for learning by Net generation students is lacking.

2.2 Factors for Acceptance of Technology for Learning (as per extant literature)

Extant literature in the field of eLearning explores the relationships of various exogenous factors on the intention to accept TEL/ eLearning based on various ‘technology acceptance theories’ of Information System (IS) area. Sumak (2011) in his Meta analysis found that TAM is the most used theory for eLearning acceptance. In the Table 2.2 we have presented some select studies with the factors of eLearning acceptance intention and the IS theories used in the studies for investigation. The major IS theories used for technology acceptance are TAM, UTAUT, TPB, SCT, TTF, and DOI. There are numerous factors found like perceived usefulness, ease of use, self efficacy, subjective norm, enjoyment, and attitude, past experience, quality, image, job fit, and motivation and perceived behaviour control. In the next section we will discuss few prominent theories of technology acceptance in IS literature.

2.3 Theories of Acceptance of Technology

Progressive development of information and communication technology during recent years has introduced a transformative shift in reading as well as learning manners (Lai and Ulhas, 2012). Ever evolving technology for learning is considered innovation by students. Understanding individual acceptance and use of IT is one of the most mature streams of information systems research (Agarwal, 2000; Benbasat and Barki 2007; Venkatesh et al. 2003).
**TABLE 2.1**
Select Prior Studies on eLearning with the Factors of eLearning Acceptance Found and the IS Theory Used in the Studies for Investigation.

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Authors</th>
<th>Technology Used for Learning</th>
<th>Factors</th>
<th>Participants</th>
<th>IS Theory Used for Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Chu and Chen(2016)</td>
<td>E-Learning</td>
<td>User attitude, Perceived behavioural control, Subjective norms, and Social bonds</td>
<td>College Students</td>
<td>Theory of Planned Behaviour(TPB)</td>
</tr>
<tr>
<td>2</td>
<td>Merhi (2015)</td>
<td>Podcast</td>
<td>Usefulness, Relative advantage, Enjoyment, Mobility, Self-efficacy, Ease of use and Image</td>
<td>Higher Education Students</td>
<td>Technology Acceptance Model(TAM ) and Diffusion of Innovation(DOI)</td>
</tr>
<tr>
<td>3</td>
<td>Kim, Lee, Lee and Shon (2015)</td>
<td>OER for lifelong learning</td>
<td>Ease of use, Job fit</td>
<td>Adult learners ( university students)</td>
<td>Technology Acceptance Model(TAM )</td>
</tr>
<tr>
<td>4</td>
<td>Waha and Davis (2014)</td>
<td>Blended learning</td>
<td>Flexibility and the Convenience</td>
<td>College Students</td>
<td>Qualitative Content Analysis</td>
</tr>
<tr>
<td>5</td>
<td>D'Ambra, Wilson &amp; Akter (2013)</td>
<td>E-Book</td>
<td>Annotation, navigation, and output as the core dimensions of tech. fit</td>
<td>Faculties of Medicine, Science, and Engineering</td>
<td>Task Technology Fit(TTF)</td>
</tr>
<tr>
<td>6</td>
<td>Lin(2012)</td>
<td>Virtual learning system (VLS)</td>
<td>Perceived fit and Satisfaction</td>
<td>University Students</td>
<td>Task Technology Fit(TTF)</td>
</tr>
<tr>
<td>7</td>
<td>Bhattacherjee, Limayem, Cheung (2012)</td>
<td>Web browser</td>
<td>Relative advantage; Personal innovativeness; Satisfaction with prior IT</td>
<td>College Students</td>
<td>Own Proposed Model</td>
</tr>
<tr>
<td>8</td>
<td>Ward and Dodd(2011)</td>
<td>Moodle</td>
<td>Flexibility, full participation</td>
<td>College Students</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Author(s) (Year)</td>
<td>Methodology</td>
<td>Constructs</td>
<td>User Group</td>
<td>Theory</td>
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<tr>
<td>9</td>
<td>Keller (2009)</td>
<td>VLE</td>
<td>Contextual factor of culture, performance expectancy, results demonstrability and social influence</td>
<td>University Students</td>
<td>Unified Theory of Acceptance and Use of Technology</td>
</tr>
<tr>
<td>11</td>
<td>Chiu, Chiu and Chang (2007)</td>
<td>Web based learning</td>
<td>Distributive fairness, procedural fairness, interactional fairness, service quality, satisfaction</td>
<td>University Students</td>
<td>IS success model and fairness theory</td>
</tr>
<tr>
<td>13</td>
<td>Piccoli, Ahmad and Ives (2001)</td>
<td>Web based VLE</td>
<td>Maturity and motivation, flexibility of time, place and space, computer self-efficacy/anxiety, technical characteristics</td>
<td>Undergraduate Students</td>
<td>Own Model</td>
</tr>
<tr>
<td>15</td>
<td>Bates and Khasawneh (2007)</td>
<td>Online learning</td>
<td>Self-efficacy/anxiety, fixed/acquired skills, training, previous success</td>
<td>Students</td>
<td>Social Cognitive Theory (SCT)</td>
</tr>
<tr>
<td>16</td>
<td>Sumak (2011)</td>
<td>E-Learning</td>
<td>PEOU, PU, BI, Attitude, use, self-efficacy, satisfaction, compatibility, facilitating conditions, performance expectancy, confirmation, social influence, experience, system quality, anxiety, computer self-efficacy, management support and flow.</td>
<td>Meta-Analysis</td>
<td>Technology Acceptance Model (TAM)</td>
</tr>
</tbody>
</table>
Although firms (corporate organizations) mandates that certain systems be used for some tasks (Mathieson, 1991) by employees but in personal use cases system use is voluntary. There are numerous theoretical models, mainly developed from theories in psychology and sociology (Venkatesh et al., 2003), are in use to explain adoption, acceptance and use of technology and the prominent theories are explained in brief in following texts:

**Social Cognitive Theory (SCT) (Bandura, 1977, 1989)**

SCT, also called ‘model of of causation’ involving triadic reciprocity in which three factors operate as co-determinants of each other; and these factors are: 1) behavior, 2) cognition and personal factors, and 3) environment (see Figure 2.1) which influence each other bidirectional (Bandura, 1989). The type and strength of the interactions differ based on the individual, the behaviour, and the environment.

![Figure 2.1: Triadic Reciprocality (Source: Bandura, 1977; 1986)](image)

The Self-efficacy theory: is a component of SCT which focuses on the interrelationships among self-efficacy, outcome expectancy, and behavior (Bandura, 1977) as shown in Figure 2.2. Bandura (2004) defined perceived self-efficacy as personal judgments of one’s capabilities to organize and execute courses of action to attain designated goal.
Strength of perceived efficacy denotes the amount of one’s certainty about performing a given task. Self-efficacy is behavior dependent; for example, self-efficacy to drive a car is independent of someone’s self-efficacy to operate a computer and it is involved with *perceived* capability rather than *actual* capability (Bandura, 1977).

![Self Efficacy Model of Bandura](image)

*Figure 2.2 Self Efficacy Model (Source: Bandura, 2004)*

Outcome expectancy is defined as a person’s estimate that a given behavior will lead to certain outcomes on the other hand efficacy beliefs play a central role in the self-regulation of motivation through goal challenges and outcome expectations (Bandura, 1977). For example students’ beliefs of self efficacy in using TEL can motivate them to use TEL and can enhance their outcome expectations from TEL.

Bandura’s SCT and Self Efficacy Model has been extensively used in various fields like Education, Health, Medical Sciences, Sports, ICT and others for predicting and controlling desired behaviors. Self efficacy construct is widely used in studies on acceptance of
information technology (e.g. Compeau and Higgins, 1995; Agarwal and Prasad, 1998; Hasan, 2006; Torkzadeh, Chan and Demirhan, 2006; Hu and Hui, 2012).

**Diffusion of Innovation Theory (DOI)**

(Rogers, 2003) stated that an innovation is an idea, practice, or project that is perceived as new by an individual or other unit of adoption and it may have been invented a long time ago, but if individuals perceive it as new, then it may still be an innovation for them. DOI describes the innovation-diffusion process as an uncertainty reduction process where uncertainty is an important obstacle to the adoption of innovations (Rogers, 2003). Prethought of the outcome of adoption in a user induces uncertainty and to reduce it, s/he should be well informed about advantages and disadvantages of it to make her/him aware of the innovation in totality. Five attributes that affect the diffusion of an information technology (IT) innovation are: - relative advantage, compatibility, complexity, observability and trialability (Rogers, 1995). Moore and Benbasat (1991) empirically assessed the effect of these characteristics on information system adoption by measuring users’ perceptions of adopting an IT innovation.

*Relative advantage:* Rogers (2003) defined it as the degree to which an innovation is perceived as being better than the idea it supersedes.

*Compatibility:* Rogers (2003) stated that compatibility is the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters.

*Complexity* refers to the difficulty in usage that the innovative information system would introduce.

*Trialability* refers to the amount of experimentation that could be done with the innovative information system before adoption.
Observability refers to how easy it is to observe the results or output of the IT innovation.

To summarize, innovations which offer more relative advantage, compatibility, simplicity, trialability, and observability will be adopted faster than other innovations (Rogers, 2003). Students considers the new mode of study like MOOCs and other educational resources on Net as innovations in learning and they may make a choice of acceptance or rejection of a TEL based on these five characteristics of innovations. DOI theory is the most suitable for study the adoption of technology in higher education and educational environments (Medlin, 2001). Innovation diffusion theory has been empirically applied in a variety of situations to explain the diffusion of IT innovations, including the acceptance of mobile technology (Kim and Ammeter, 2014), Smartphone usage (Chen, Yen, Chen, 2009) acceptance of EDI (Premkumar, Ramamurthy and Nilakanta, 1994).

Task-technology Fit (TTF)

Goodhue and Thompson (1995) linked task-technology fit with performance impact, and they defined task-technology fit as “the degree to which technology assists an individual in performing his or her portfolio of tasks, where technology refers to tools used by individuals in carrying out their tasks, and tasks are defined as the actions carried out by individual in turning inputs into outputs”. In IS research, the study of fit has focused on the effects of task and technology on task performance or information system performance (Goodhue and Thompson, 1995; Lin and Huang, 2008). As we are not measuring impact of usage of TEL on students learning this model is unlikely to serve our purpose.

Technology Acceptance Model (TAM)

‘TAM’ is proposed by Davis (1989) based on expectancy value theories like (TRA) (Fishbein and Ajzen, 1974) and the theory of planned behaviour (Ajzen, 1991). TAM
proposes two beliefs about a new technology, perceived usefulness (PU) and perceived ease of use (PEOU), which influence attitude toward using that technology, and in turn determine intention to use it (Davis et al., 1989). PU is the degree to which one believes that using the technology will enhance performance and PEOU is one’s beliefs that using the technology will be free of effort (Davis et al., 1989). PEOU also influences perceived usefulness. TAM is most validated model in prior studies in a various context like eLearning (Ong, Lai and Wang, 2004; Kim, Lee, Lee and Shon, 2015; Roca and Gagne, 2008; Liaw, 2008; Wang and Wang, 2009; Sumak, 2011; e-commerce (Pavlou, 2003); m-commerce (Wu and Wang, 2005), eBanking (Lee, 2009) and e-Shopping (Ha and Stoel, 2009).

Although TAM is found robust by studies but research has also shown inconsistent and insignificant relationships of PEOU on attitude for experienced users e.g. Lee, Cheung and Chen (2005), Chau and Hu (2001) reported insignificant effect of PEOU on attitude and intention. This leaves TAM with only one predictor construct PU in the model for experienced users. With our CA findings of large numbers of categories and concepts, TAM seems too parsimonious to handle all the factors for TEL acceptance.

**Unified Theory of Acceptance and Use of Technology (UTAUT)**

Unified Theory of Acceptance and Use of Technology (UTAUT) model is proposed by Venkatesh et al. (2003). In this model, performance expectancy (PE) and effort expectancy (EE) were used along with social influences (SI) and facilitating conditions for using the technology. The UTAUT model also proposes three moderators (age, gender and experience) influencing the relationships between Intention and ‘PE, EE and SI’ in attempts to explain how individual differences influence technology use. For example, the relationships between PE and Intention vary with age, gender and experience (e.g. it is more significant for male and young workers). Voluntariness can be perceived as a continuum from completely
mandatory to completely voluntary, such that in organization setting voluntariness is less for individual than in acceptance of technology for personal use which in turn is likely to moderate the effect of SI on intention. The UTUAT study mainly covered large organizations with users differing in wide range of age, experience and in voluntariness but for acceptance of TEL in voluntary mode by technical students a very narrow range of age and experience is expected where the impacts of these moderators might not be effective.

**Decomposed Theory of Planned Behavior (DTPB)**

Taylor and Todd (1995a) proposed a model for technology acceptance as the Decomposed theory of planned behavior which is based on the Theory of planned behavior (TPB) by Ajzen (1991) and various other technology acceptance models like Diffusion of Innovation (DOI) by Rogers (1995). The DTPB model consists of three main predictors which influence behavioral intention and actual behavior (adoption). The predictors are attitude, subjective norms and perceived behavioral control. According to Taylor and Todd (1995a), DTPB offers the advantage of easy applicability to a variety of situations; and is easier to operationalize as the three main constructs are decomposed into specific beliefs constructs like compatibility, relative advantage, self efficacy, subjective norm and facilitating conditions. This makes one free from eliciting items for measurements for each behavior under study as suggested in TPB by Ajzen (1991).

**2.4 Summary of Literature Review**

The review of literature reflects that usage of technology for learning is prevalent mostly in form of formal online courses offered by universities. We located a number of studies investigating for causal factors of TEL/ eLearning / online learning acceptance and its impact. However, in general it is found that there is a paucity of studies on usage of
technology for academic learning from learners’ perspective. Although understanding learners’ psychological processes is essential for institutions to provide effective e-learning programs (Alavi and Leidner, 2001), but discussions, or even knowledge, about e-learning from the student perspective seem to be very sparse (Keller and Cernerud, 2002). Bacsich, Phillips and Bristow (2011) also concluded in their Meta analysis on usage of OERs, that the literature on learner use of online educational resources is very immature and there is still a great deal to be researched about learners’ views and use of OER and online resources, generally. Also it is observed that most of the prior studies have investigated institution-implemented online courses and acceptance of it by students in formal course and most of the studies are from economically developed states. In another study Lindshield and Adhikari, (2013) posited that research on students’ use and perception of OERs that are used to replace traditional textbooks/e-textbooks is sparse. The authors further quoted that the price of college textbooks going high as an alternative to textbooks, OERs can be accessed for free which can be revised, remixed, reused, and redistributed by others too (Wiley & Green, 2012). A survey has found that 57% of students indicated that OERs were a technology that they wished instructors used more (Lindshield and Adhikari, 2013). Unfortunately, we could not locate any empirical study in major IS journals investigating use of TEL (OERs and other open resources and courses on Net) by college students in voluntary mode to supplement learning from face to face (F2F) classes.

We believe that as the situations for accepting formal mandatory online courses is not same as that of acceptance of TEL courses for informal learning the perceptions and beliefs of the students of these courses will not be same. Formal courses are offered and managed by institutions through admission criteria, fees, duration, classes schedules, examination, certificates etc. whereas TEL are educational resources offered free of cost without any admission criteria and other formalities of formal course. Bandura’s triadic reciprocity also
states that situations of a person, her/his beliefs and behaviors affect each other’s reciprocally which means that under different situations (like voluntary vs. mandatory acceptance of TEL, formal vs. non-formal courses and different socioeconomic demographics), factors for acceptance of technology are likely to differ due to changes in beliefs and behaviors of the students. Kim and Ammeter (2014) also posited that personal acceptance of IS and acceptance of IS by individual in Organization (e.g. Institutional VLE) differ in the acceptance process. Hence, an acceptance of TEL is different than acceptance of an online formal course and as there is a paucity of research on TEL acceptance, this study tries to fill these gaps in the literature. We also reviewed major technology acceptance theories in IS literature in this chapter.

We decided to conduct a qualitative exploratory study to elicit the details of the phenomenon to meet our objective of finding the factors of acceptance of TEL by students in Indian context which will be discussed in the next chapter.