*Research Article*

# Models of E-learning Readiness in Higher Education: A Systematic Review

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**Abstract**

*The models of E-learning Readiness (ELR) are basically designed to understand the process of obtaining the basic information necessary for measuring ELR among participants. They help organizations to identify the requirements for designing, developing and implementing E-learning. These models not only help the organizations to identify the degree of ELR but also to identify the factors or areas where the organization is weak. The present study reviews the models of E-learning Readiness (ELR) with the help of a small-scale literature review on Models of ELR. The purpose of the current study was to make an analysis of the existing ELR models in the literature. The researcher visited various online databases to collect studies. In addition to that, the researcher also did a manual search in the reference list of various studies in the related field for the addition of additional studies. By following an appropriate strategy, the researchers selected 07 ELR models for the current study. The current study reveals that Technology, Skills, Attitude, resources and human resources, Infrastructure, Flexibility, Support, Pedagogy, Management, Evaluation, Continual Improvement, Culture, Budgeting, Curriculum, Awareness, Law and Regulation, Content and Policy have been used on a larger scale for the development of the ELR models. Further, majority of reviewed studies have used various statistical techniques like regression analysis, Confirmatory Factor Analysis (CFA) and Exploratory Factor Analysis (EFA) for developing the models.*

**Keywords:** Information and Communication Technology, E-learning, E-learning Readiness, E-Learning Readiness Models, Higher Education

## Introduction

The Higher Education system of India after independence has grown significantly and is now one of the world's largest education systems. After Independence, this sector has seen a remarkable increase in the number of Universities and colleges (Sheikh, 2017). According to the AISHE report 2019-20, the total enrolment in HEI stands at 3.85 crore as compared to 3.74 crore in 2018-19. This significant increase in enrolment leads to a high student-teacher ratio where the teacher is unable to cater to the needs of students and as a result, leads to significant deterioration in the quality of higher education. Imparting quality education empowers the nation in each and every aspect. There are many ways through which quality education can be imparted, and technology is considered the best and most effective medium for delivering quality education and increasing the learner's knowledge (McCombs and Liu, 2007; Gold, 2001; Bates, 2005). Without technology, the common masses and institutions

have very low chances of addressing the challenges and issues of the 21st century, like access to quality education, the increasing cost of education, the inability to communicate effectively, difficulties in collaborating with others, etc. Technology has transformed our classrooms and has removed the limitations of time and space. The use of Information and Communication Technology (ICT) has reformed the process of teaching and learning. It has expanded the opportunities for learning and increased the access to the educational resources (Talebian, 2014). Its use is considered as a new era in the field of education. It has changed the thought pattern and has improved the quality of existing educational models and has provided new training models for improving the quality of education. These models have suggested new methods of learning where the learner is playing an active role and the main emphasis is laid upon self-directed, flexible, and independent learning (Allahi & Sanayei, 2009). ICT consist of a set of technological tools and resources that are used in communicating, creating, disseminating, storing, and managing the information (Toro & Joshi, 2012; Ansah, 2013; Thamarana, 2015). It also help in recording and broadcasting the content, gathering, processing, storing, and presenting the information (Lubbe and Singh, 2009; Ansah, 2013). ICT enhances the learning environment and facilitates the active and collaborative learning. It is being recognised as a catalyst for change and has the ability to impact every aspect of the society (Amutha, 2020). The ICT based systems and various digital tools like discussion forums, digital portfolios, digital libraries, teleconferencing etc. has made E-learning a reachable approach to everyone today. E-learning is a flexible learning system suitable for distance learning, but it can be used in face to face mode also (Pavel et al., 2015). The success of it depends on the self-motivation of the learners to study effectively. During COVID19 pandemic especially in the lockdown period, the conventional mode of teaching was replaced by E-learning. E-learning played an important role in supporting the entire education system and became one of the best preferred approach for academics (Samir et al. 2014). Considering the time, location and health, E-learning was found to be the only feasible option during lockdown period. It increased the effectiveness of knowledge and skills by providing access to a massive amount of data, and by enhancing the collaboration and strengthening the teaching and learning (Maatuk et al., 2021).

## E-learning

E-learning is an innovative approach which is being used to provide well designed, learner-centered, interactive, and facilitated learning environment to anyone, anytime and at anyplace by using the resources and attributes of various digital technologies along with various forms of learning materials suited for open, flexible, and distributed learning environment (Khan, 2005). It refers to delivering instructions and information through electronic means which is supported by digital tools and media (Basak et al., 2018; Hoppe et al., 2003; Liu and Wang, 2009; Sharma and Kitchens, 2004). E-learning is considered as the intentional usage of networked ICT for learning purpose. "The term E-learning comprise of lot more than online learning, virtual learning, distributed learning, networked or web based learning" (Naidu, 2003). "E-learning is an effective learning mechanism created by combing digitally delivered content with (learning) support and services" (Mason & Rennie, 2006). It is being considered as a new version of learning in distance education which is applied via Internet technologies and involves the educational activities, which do not

require the physical presence of the teacher and learner at the same time and place (Nehru, 2013). E-learning has changed the way teaching and learning takes place in universities. The University Grants Commission recently announced to allow HEI's to teach 40 per cent of the course syllabus through online mode even after the COVID19 pandemic. For reshaping higher education, 900 autonomous colleges will be offering courses and degree in online mode from July 2022. The assessment for these courses will be carried out through online mode by National Testing Agency (NTA). This increasing acceptance and adoption of E-learning has given rise to development of many E-learning readiness (ELR) models.

The theory of cognitive research suggests that E-learning and various other multimedia modalities has the ability to enhance learning. It empowers the universities to deliver the enhanced learning opportunities through a variety of modalities that help in increasing the student access to and the success in higher education (Coopasami et al., 2017). E-learning has many features and components like "ease of use, interactivity, multiple expertise, collaborative leaning, authenticity and learner-control". These components and features continue to improve with the advent of development in internet (Khan, 2005). E-learning ensures that the learners are actively involved in the process of teaching and learning as the learning takes place with the combination of text, audio, video, collaborative sharing, and interactive graphics. It caters to a wide range of learning styles by employing a large amount of interactive content available on the internet (Songkram et al., 2015). E-learning has led to lower the cost per student while enhancing the quality of teaching and learning (Songkram, 2015). To improve the quality of teaching and learning and also to meet various challenges of higher education, the stakeholders should be ready to embrace E-learning. The readiness for E-learning i,e. E-learning Readiness (ELR) evaluates stakeholders' preparedness for accepting and using for E-learning in their day to day activities. It includes various factors like Technological, Psychological, Infrastructural readiness etc.

## E-learning Readiness

E-learning readiness (ELR) refers to the physical and mental readiness of an organization for an E-learning experience (Rohayani, et al. 2015; Borotis & Poulymenakou, 2004; Nwagwu, 2019). It implies the capability of an organisation and capacity of educational stakeholders for participating in an electronic environment (Khan, 2005). When introducing E-learning in an educational institution, it is expected that the educational institution should be prepared with adequate technological facilities, environmental and other facilities also (Nwagwu, 2019). For measuring the ELR of an institution, there are various factors that need to be assessed. Rohayani, et al. (2015) revealed in their study that there are various E-learning factors that determine ELR, i.e., technological, content, human, and the financial support. These factors should be taken seriously when an educational institution considers E-learning as a feasible choice for delivering the instruction and training (Eslaminejad, 2010). E-learning enables educational institutions for making them capable of training learners and the workforce spread over remote areas. It capacitate higher education institutions (HEI) with the dynamic knowledge and skills and increases efficiency that too at reasonable cost (Bailey & Chambers, 1996; Lane et al., 2014). There is a need to have a proper guidance to managers of institutions of higher learning to conduct readiness assessment before

adopting E-learning (Clark & Mayer, 2008). Before the institution starts to implement and take necessary benefits from E-learning, it should assess its readiness for E-learning (Saekow & Samson, 2011) and plan for training programmes that will help faculty members gain confidence in using this platform and increase their ELR (Vijaya Lakshmi, et al., 2020).

**Why Models in ELR?**

According to Gage & Berliner (1992), "a model is considered as a picture or visual aid where the main concepts and variables are highlighted in a process or a system". It makes easy to understand a domain of knowledge on the basis of its visual expression because the models have the ability to provide useful and accurate representation of knowledge which is required to solve problems in an area. The models can be defined as the representation that helps to define, analyse, and communicate a set of concepts. Chapnick (2000) states that a model helps in answering questions like "Can we do this?", "If we can do this, how.....are we going to do it?" & "What are the outcomes and how do we measure them?". The E-learning models are basically a theoretical construction that helps practitioners to design effective learning experiences for their students taking part in E-learning courses (Theriault, 2015)..

The theory of E-learning is based on the cognitive science principles that describes the usefulness of educational technology in enhancing the effective learning (David, 2015; Wang 2012). The models of E-learning play an important role for the development and enhancement of E-learning process (Suryawanshi & Suryawanshi, 2015). The learning theories and ELR models have significantly influenced the implementation of E-learning (Aguti, 2015) and they ensure the effectiveness of the educational process (Shurygin et al., 2021). The models of ELR are basically designed to understand the process of obtaining the basic information of participants necessary for measuring ELR. They help the organizations to identify the requirements for the designing, developing and implementing E-learning. These models not only help the organizations to identify the degree of ELR but also to identify the factors or areas where the organization is weak (Napitupulu et al., 2019). Identifying of the weak areas helps the organization to improve and to frame suitable policy and strategy for successful implementation of E-learning. The ELR models not only differ as per the method of implementation, effectiveness, and efficiency of education but it also differs on the basis of economic factors (Oketch, et al., 2014).

**Objectives**

Development of models to understand factors of ELR helps in increasing effectiveness of E-learning. Keeping this in mind, the purpose of the present study is to identify the factors of ELR and to find out the statistical techniques used to develop and test the models of ELR. The researchers studied the existing literature on ELR Models.

**Methodology**

The keywords "Models of ELR" "E-learning Models in Higher Education" were targeted on various research databases. These databases included Google Scholar, SSRN, Researchgate, Academia, JSTOR and ERIC. In addition to that, the researchers used snowball technique to explore more literature from references cited in various studies. By following this appropriate strategy, the researchers selected 07 ELR models for the current study. The details of all these models in presented in table 1.

**Table-1: Models of E-learning Readiness**

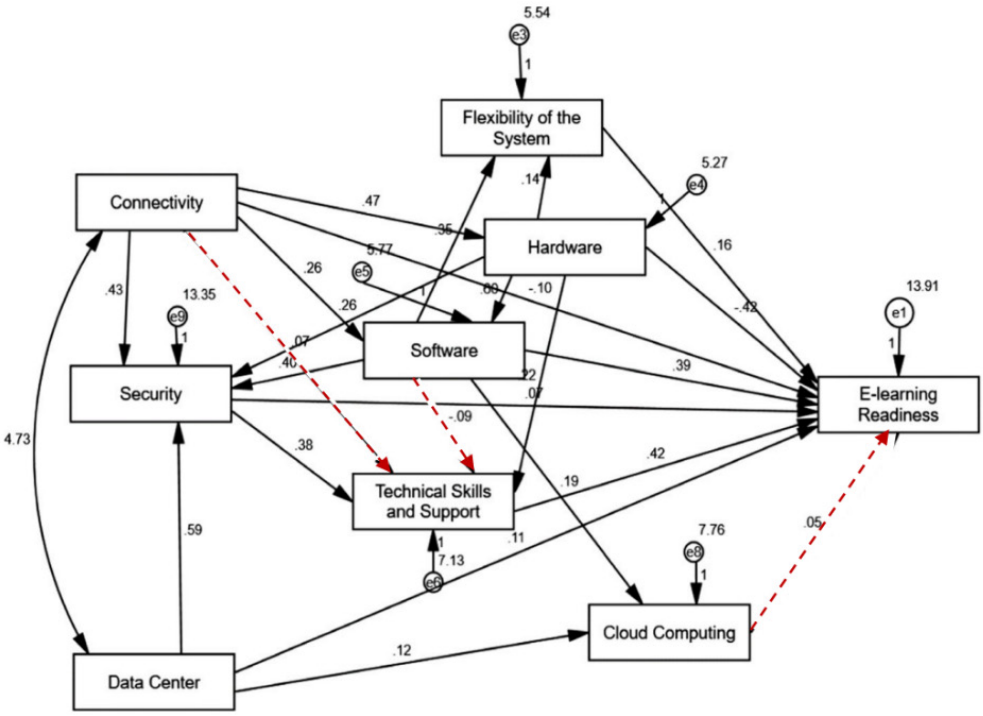
| Sl. No. | Author and Year of Publication | Title of the Study |
|---|---|---|
| 1. | Al-araibi et al., (2019) | "A model for technological aspect of e-learning readiness in higher education" |
| 2. | Alshammari & Adaileh (2018) | "E-Learning Readiness: A Scale Development in Saudi Higher Education Institutions" |
| 3. | Wibowo and Laksitowening (2015) | "Redefining E-Learning Readiness Model" |
| 4. | Oketch et al., (2014) | "E-Learning Readiness Assessment Model In Kenya's' Higher Education Institutions: A Case Study Of University Of Nairobi" |
| 5. | Darab and Montazer (2011) | "An eclectic model for assessing E-learning readiness in the Iranian universities" |
| 6. | Onyait & Lubega (2011) | "E-learning Readiness Assessment Model: A Case Study of Higher Institutions of Learning in Uganda" |
| 7. | Aydin & Tasci (2005) | "Measuring Readiness for e-Learning: Reflections from an Emerging Country" |

## Discussion

### I. Al-araibi et al., (2019) model of ELR

The researchers aimed to test and propose a model of ELR and explore the technological factors that impact ELR. For this purpose, they proposed a model of ELR by conducting the study on 374 academic staff members of 06 Malaysian Public Universities. For the development of the model, the researchers used 08 technological factors like Software, Hardware, Security, Cloud Computing, Connectivity, Data Center, Flexibility of the system and Technical Skills & Support. The researcher used Systematic Literature Review (SLR) and Delphi technique for identifying the factors. Upon testing the model, the researchers revealed that the final model consisted of 07 technological aspects i,e. "Software, Hardware, Security, Connectivity, Data Center, Flexibility of the system and Technical Skills & Support" which have significant effect on ELR while the aspect of 'Cloud Computing' doesn't have significant effect on ELR. The developed model of ELR will highlighted the technological factors which must be considered for assessing the ELR. Besides this, the model will be helpful for understanding the technological requirements for implementation of E-learning.

**Figure-1 : ELR model proposed by Al-araibi et al., (2019)**




## II. Alshammari & Adaileh (2018) model of ELR

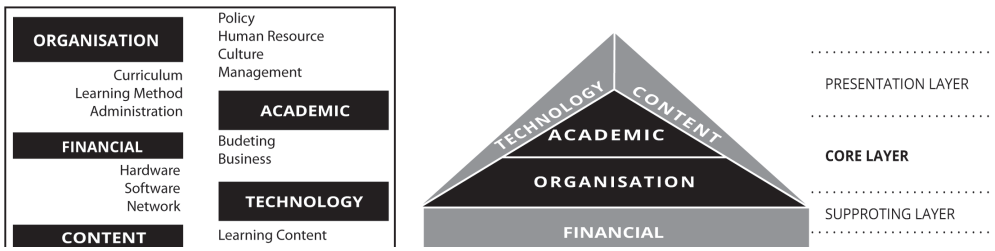
Alshammari & Adaileh (2018) developed a model of ELR on the basis of attributes of teachers, students, and administrators. For the development of ELR model, the researchers used various factors like "Institutional Policy and Business Strategy, Pedagogy, Technology, Interface Design, Management, Administrative and Resource Support, and Evaluation and Continual Improvement". For testing the model, a research tool was developed and to confirm its items "Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA)" were conducted. Besides that, they also calculated construct and discriminate validity, reliability and composed reliability, and average variance extracted (AVE). The researchers also used KMO for sampling adequacy and Bartlett test of Sphericity. Upon testing of the model and its factors, the researchers revealed that 05 dimensions i,e. "Pedagogy, Technology, Interface Design, Management, Administrative and Resource Support" are capable of measuring the ELR in higher education institutions. These dimensions/factors serve as aspects for measuring ELR.

## III. Wibowo and Laksitowening (2015) model of ELR

Wibowo and Laksitowening (2015) proposed an ELR model to identify factors of ELR that need to be prioritized in the implementation of E-learning. For the development of the model, the researchers used 14 factors i,e. "Administration, Budgeting, Business, Culture, attitude, Curriculum, Hardware, Human Resource, Learning Content, Learning Method, Management, Policy, Network and Software." For testing the model, 109 participants were selected consisting of faculties, education experts, policyholders and E-learning

enthusiasts. Correlation analysis was used to see the relationship and interdependence among the factors of ELR. The model categorizes ELR factors into 05 domains and 03 layers based on institution. Core layer included organization and academic domains, the supporting layer covered the financial domain and the presentation layer included the technology and content domain. This model of ELR was tested by using Product Moment Correlation and Pearson Correlation Factor (PCF) was used to pair each factor with all other factors. PCF was tested in between "Learning methods and Curriculum", "Learning methods and learning content" and "Culture and human resource". The researchers claimed that when the institution starts to implement E-learning and prepares for one factor, it should also consider the readiness of correlated factors. The developed model of ELR is effective to those institutions who have implemented E-learning but haven't tested the effectiveness of E-learning in improving the quality of education.

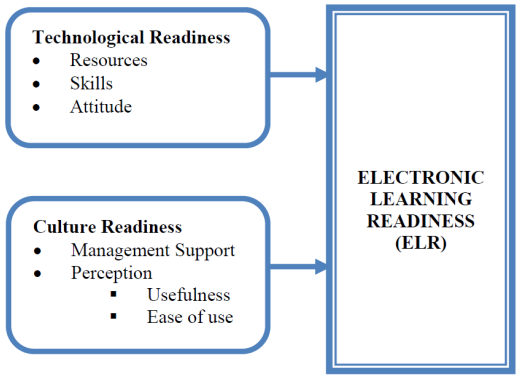
**Figure-2 : ELR model proposed by Wibowo and Laksitowening (2015)**




## IV. Oketch et al., (2013) model of ELR

Oketch et al., (2013) developed a model of ELR for assessing the ELR of faculties in HEI's of Kenya. The University of Nairobi was used as the sample of the study. The aim and objective was to carry out diagnostic assessment of ELR among faculties and to determine the factors that influence ELR. For development of the model, the researcher used four main parameters which are "technological readiness (Chapnick ,2000) with sub factors as resources, attitude and skills; (Aydin and Tasci, 2005), culture readiness (Borotis and Poulymenakou, 2004; Kaur and Abas 2004), content readiness (Borotis and Poulymenakou,2004 ; Chapnick ,2000; Psycharis, 2005)". The demographic variables include age, gender, and level of education. Multiple linear regressions were used to develop the ELR model. For testing the model, regression analysis, coefficient of determination and Analysis of Variance was used. According to the regression equation established, when technology readiness, content readiness, culture readiness, gender, age, and education level were a constant of Zero, the ELR was 2.082. Further, while taking all the independent variables at zero, a unit increase in technological readiness, content readiness and culture readiness will increase the ELR to 0.450, 0.000 and 0.163 respectively. At 95 per cent level of confidence and 5 per cent level of significance, technological readiness, content readiness and culture readiness had 0.000, 0.993 and 0.009 level of significance. The model revealed that Technological and Cultural Readiness are important factors for determining ELR. The Content Readiness and the demographic factors have no significance in determining ELR. The developed model was found to be statistically significant in determining the ELR of faculties.

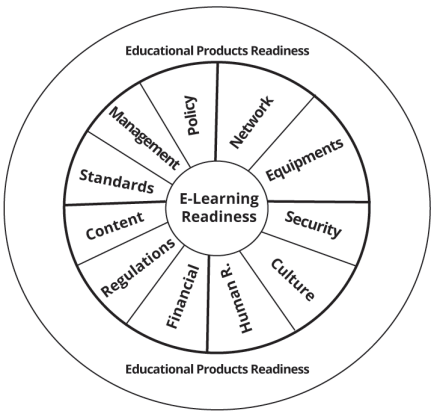
**Figure-3 : ELR model proposed by Oketch et al., (2013)**




## V. Darab and Montazer model of ELR

Darab and Montazer (2011) developed a model to assess ELR in HEI's of Iran. The model was developed by reviewing various models in the literature. A comparison of models was carried out and a model was prepared. The ELR model consisted of 08 factors divided into two sections i.e., educational processes and educational products. These 08 factors were "Law and Regulation readiness, Management readiness, Supervision readiness, Communication network readiness, Cultural readiness, Content readiness, Support readiness, Assessment readiness, Human resources readiness, Educational Policy readiness, Standards readiness, financial readiness, Security readiness and Equipment readiness. The E-learning model developed by the researchers was sent to 100 national experts for the purpose of validation. The researchers developed a research instrument for testing the model which was tested for the reliability aspects and EFA was also carried out to determine the value of each indicator for the proposed model. In the final phase of model development, the researchers determined the weight of each criteria and index for the model by applying Fridman's non-parametrical variance analysis. The proposed model was validated, and it was found that the factors significantly help in determining ELR. However, the developed model has been tailored with the local characteristics of the country.

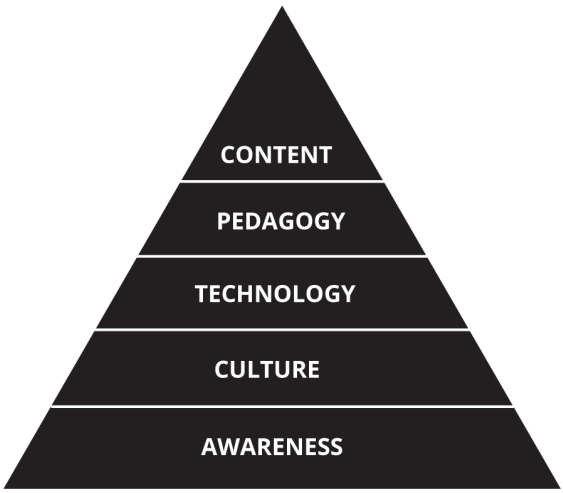
**Figure-4 : ELR model proposed by Darab and Montazer (2011)**



## VI. Omoda-Onyait and Lubega (2011) model of ELR

Omoda-Onyait and Lubega (2011) investigated the ELR of Ugandan HEIs. The researchers aimed at developing a model for ELR assessment which will be benefiting the other developing countries which were exploring the use of E-learning. The model was developed by reviewing the existing ELR models. To develop the ELR model, the researchers applied a questionnaire having 04 attributes i,e. "Availability of resources, Attitude towards E-learning, Resistance to change and Usefulness of the new technology" on 100 respondents. These 100 respondents comprise of students and staff members selected from distance education and ICT departments. For data analysis, Wilcoxon signed rank test was used to identify interaction and interrelationships within the variables. The analysis of data and review of existing ELR models led to the development of ELR model. The developed model consisted of 05 factors of ELR "Content, Pedagogy, Technology, Culture and Awareness". The developed ELR model is five layered triangle, and its each layer represents an attribute which can be used to measure the readiness of an institution towards E-learning. The proposed model has Awareness at the base which is considered as an important factor for ELR. It is followed by Culture of the educational institution. This is followed by Technology available in educational institution then Pedagogy which can match the technology and at the top of the model is Content. The developed model has been found effective on Ugandan HEI's. This model of ELR assessment will work like a guide for institutions and organizations in embracing the E-learning technology.

**Figure-5 : ELR model proposed by Omoda-Onyait and Lubega (2011)**

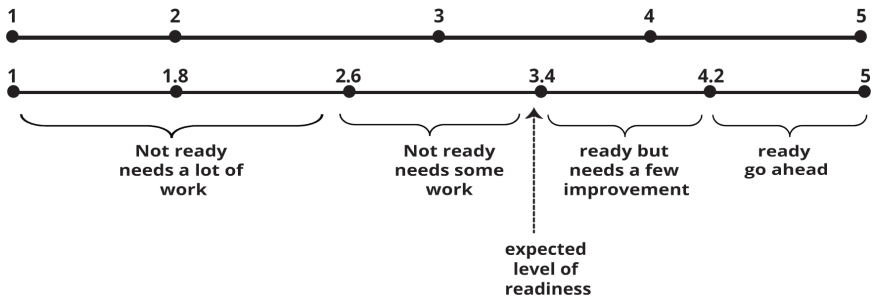



## VII. Aydin & Tasci (2005) model of ELR

Aydin & Tasci (2005) carried out a study to measure the ELR in companies of Turkey. The study aimed at identifying the factors that can be used to assess the ELR in the companies. To assess the ELR of companies, the researcher's used four factors i.e., Technology, Innovation, People and Self Development. Further, each factor had three different constructs i.e., resources, skills and attitude. On the basis of these 04 factors of ELR, the researchers developed a five point likert scale consisting of 30 items. The instrument developed by the researchers was used on 100 companies. The researchers identified 3.41 mean score as the expected level of

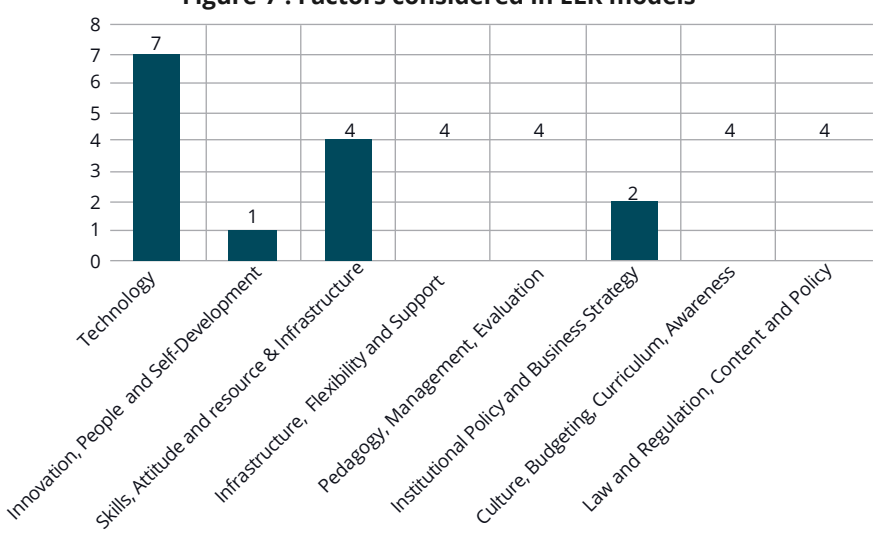
readiness. On the basis of the study, the researches generated an assessment model of ELR which is coded into 1, 2, 3, 4, 5 as in a five point likert scale. The researchers reveal the mean score of respondents between 1 – 2.59 indicates 'not ready needs a lot of work', the mean score of 2.6 – 3.3 indicates 'not ready needs some work', the mean score of 3.4 – 4.1 indicate 'ready but needs a few improvement' and mean score of 4.2 – 5 indicate 'ready go ahead'.

**Figure-6 : ELR model proposed by Aydin & Tasci (2005)**




The Figure 7 provides a brief description of factors considered for development of ELR models. From the 07 reviewed ELR models, it was found that there are many factors which were considered for development of ELR models. The studies used " Technology, Innovation, People Self-Development, Skills, Attitude, Human resource, Infrastructure, Flexibility, Support, Pedagogy, Management, Evaluation, Continual Improvement, Institutional Policy, Business Strategy, Culture, Budgeting, Curriculum, Awareness, Law and Regulation, Content and Policy" as various factors of ELR. After reviewing the ELR models, the current study concludes that Technology, Skills, Attitude, Human resource, Infrastructure, Flexibility, Support, Pedagogy, Management, Evaluation, Continual Improvement, Culture, Budgeting, Curriculum, Awareness, Law and Regulation, Content and Policy have been used on a larger scale for the development of the ELR models.

**Figure-7 : Factors considered in ELR models**



## Conclusion

The current study was conducted to examine and review the existing models of ELR. The ELR models developed during the period of 2005-2019 were included in the present study. Various statistical techniques like regression analysis, CFA, EFA were used to develop the models. In these models, various dimensions like Technology, Innovation, People and Self-Development, Organization, Academic and Financial, Content, Policy, Culture, Regulation, Management, Standards and Security, Administrative and Resource Support, Assessment, Supervision and Environment, Training and Acceptance, Business, Resource and Human Resources and Awareness & Awareness were considered to be significant in studying the ELR of stakeholders.

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