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DESIGNING AN EFFECTIVE E-LEARNING SYSTEM DURING COVID-19: AN EMPIRICAL STUDY

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Abstract

The study aims to look into the factors of successful educational layout in colleges and institutions, adopted an e-learning system. Through an online survey link, researchers have collected the data from college and university students of Haryana. The findings of the study suggest that students have optimistic views toward e-learning. Students' perceptions of instructional design values include student involvement, feedback, user interface, interaction and course content. Feedback is found to be the most important aspect of an e-learning system while interaction was the least one. Moreover, the study found that students are facing strain to their eyes while using e-learning systems in their lifestyle.

Keywords: *E-learning, COVID-19, interaction, user interface, feedback, student's involvement.*

INTRODUCTION

With the advent of digital technologies, e-learning has been able to step away from lecture room metaphors and into more unconventional learning styles. Agile and transparent learning allows educators to integrate interactive experience activities into their classes that enable the teacher's comprehension levels to be highly accurate (Rapanta *et al.,* 2002). Learning materials are able to address individual needs, while promoting immersive learning styles in an agile and open learning environment. In the development of materials for a certain group of students, designers normally perform an analysis of their specifications or their profile to assess their prior expertise, motives, desires, attitude and experience (McLoughlin, 1999). The design of learning tools can be adapted closely to the needs of the learners using instructional experience and knowledge obtained from such needs review. Individual variations are commonly acknowledged by instructional designers in their designs and devise a strategy for tailoring instruction to the needs of individual students.

In several areas, COVID-19 has ushered in a period of transition and forced paradigm changes. It has compelled us to reconsider the conventional school model and challenge our teaching methods. E-learning has become a necessity due to these severe pandemic conditions (Dhawan, 2020). The subject of technology used in the classroom and awareness of how technology has been taken as advancement has increased interest in recent years (Parker, 1997). In response to the present situation (COVID-19), educators have helped to find new ways to ensure that students keep learning by developing online and offline learning materials; learning about how to create video-conferencing instruments to regularly meet students and performing mental and social well-being sessions at the start of their day at school and at closing (Verawardina *et al.,* 2020). The E-learning concept was common in the developed nations (Hussin, Bunyarit and Hussein, 2009) while virtual school in India may be relatively new but students and teachers both are experiencing a new trend to the mixed learning model. People must understand the fact that virtual school is not just a video lecture tool; it involves more. It includes a paradigm shift in pedagogy by understanding teachers, parents and students' blended learning model (Montgomery *et al.,* 2019). A critical aspect when designing the schedule and lesson plan is the balance of online and offline tasks. This model enables students to continue beyond the four walls of the classroom and to choose and learn flexibly at their own pace.

Research gap

Most of the previous studies rely majorly on the usage of offline system of learning. But looking at the ongoing COVID crises, the designing of e-learning system has become mandatory. But what are the determinants of effective e-learning system? To answer this research question, this particular study has been undertaken with the aim to identify the factors or elements of an effective e-learning design to cope up with an unprecedented change i.e., COVID-19 and to investigate the relationship between the factors of an effective instructional design and behaviour intention of learners. Moreover, no such study has been previously conducted in Haryana state, so there is scope for such research in the stated area.

LITERATURE REVIEW

E-learning utilises digital tools to optimize schooling, information and skills (Regmi and Jones, 2020), whilst providing professors and students with amazing opportunities. E-learning enables students to access educational study materials to accommodate their educational objectives and enables lecturers, outside of the course time, to administer guidance and engage with them. An e-learning system is essential to students in a simple, well-developed, accessible, reliable, flexible learning environment (Khan, 2003). If students exhibit the highest degree of participation and success in achieving the objectives and goals of a course, e-learning can be meaningful for teachers. If students benefit from all available support without

interruption, it makes technical staff happy in their effort to provide reliable and easy-to-use services. Adoption of an e-learning system is vital for colleges when it has a positive outcome, moderately to highly satisfied learners, both with their quality of education and with their support services, and low drop-out rates (Bhuasiri *et al.,* 2012).

Numerous studies have discussed education design elements which they consider to be important for e-learning (Siragusa, 2002). Training designers actively search for successful teaching elements and examine the best Internet features for e-learning. Based on earlier research, aspects of instructional design are often discussed.

Student's involvement

Most professionals believe that in order to understand, the learner must consciously process and make sense of the knowledge available. An active student incorporates existing insights more easily than a passive student. A teacher must offer performance and practise opportunities to encourage active involvement with the learning material (Khan, 2005). Involve the students by asking questions to them; taking inputs towards the topic, present with PPT slides, group discussion etc. in teaching learning process is the prime responsibility of an educator whether an instructor delivering lecture via online or offline mode (Littlejohn *et al.,* 2008; Yilmaz and Keser, 2016).

User interface

The importance of user interface design in providing ease of navigation, a sense of personal communication, as well as generosity and accessibility to the needs of students studying in a relevant data, self-complacent (Brown, 1997). The Overall effectiveness of hyperlinks, online social communication networks, and traditional teaching approaches was based on an adequate interface design that allowed for effortless and simple access. Students must be assured that they know where they are in the course at any given time and that they can effectively communicate with others when necessary. The text elements like font, scale, and type, as well as screen layouts, screen pictures, animations, and symbols, elicited a response (Siragusa,

2002). The effective use of animation drew the attention of the majority of students (Lowe and Schnotz, 2008). The accuracy of the graphics, the paragraph formatting of the screens, and the way the materials are assembled are all factors in determining the quality of technology-based instructional materials. For example, the website should provide tools that encourage students to participate in comprehensive exploration and coordination. Internet learning is just as simple as clicking a button (Ritchie and Hoffman, 1996). Web pages designers have spent much time understanding what attracts and holds the interest of the casual browser. Animation, sound, audio and visuals have all been used to inspire pupils for years as external stimuli and can all be used on web pages. Some associations are awarded annually, on a weekly or even monthly basis for aesthetic, technically advanced and generally innovative websites.

Interaction

Interactivity is a key component of conventional face-to-face instruction (Chou, 2003). The nature of mediated educational strategies such as computer-assisted instruction (CAI), machine learning, World Wide Web learning, and web-based learning places a premium on interactivity. It is an essential feature of technology-supported educational environments since it describes the type of contact that a platform facilitates, allowing dialogue between the learner and the teacher (Oliver *et al.,* 1997). Online resources like e-mail, bulletin boards, chat, and virtual conferencing via Zoom meetings, google meet and many more options are there to interact with the students by the educators, as well as for students to communicate with one another. Interaction is a vital element of online learning. Interactivity leads to learner-centred learning, in which the student's experience is similar to interacting with the teacher in person (Nganji, 2018). Students' achievement and attitudes toward learning strengthen as a result of increased engagement (Smithrim and Upitis, 2005).

Interactions between instructors and students, as well as interactions among students, form the foundation for a group of learners (Ragan, 1999). The instructional design should include methods and tactics

for cultivating a learning environment. To make the meaningful communication among the students, appropriate teaching material, technology and the teachers all form a part of a successful learning environment. Interactions boost the learning environment, and instructional design should encourage them (Noor-Ul-Amin, 2013; Rapanta *et al.,* 2020). Electronic communication systems can only be used to create and sustain a learning community. To achieve the goal, creative ideas should be used.

Feedback

The most common concern expressed by online students is feedback. Students can get a lot of useful feedback in an online world. Instructors may offer students individual or community input in the discussion forum. Students may also comment on each other's work online. Students will get instant feedback from online quizzes, as well as links to relevant materials for further research. Create a community online platform for the class and submit daily notes on class activities, allow learners to convey private e-mail messages or phone the teachers as necessary, or forward notes during the distance-learning to mimic the casual conversation that often occurs at the starting of an offline or conventional class are just a few of the common feedback options. Faculty must keep track of those who answer and those who do not respond in a class where responses are expected. One way to do this is to have the students mark their answers in a precise sequence. This allows the instructor to keep track of how the students are interpreting the material. Encourage students to finish their course evaluations. Experience is strengthened by timely and sufficient critics and becomes information. The successful implementation of e-learning offers input that improves experiential learning and makes it possible for students to increase their knowledge and skills (Brown and Voltz, 2005).

Course content

All of the materials that the students might need are included in the content, and they are available in various formats. The non-sequential arrangement of information material and the ability to connect conceptually relevant information are two of the most

teaching-learning process effective, there should be important features of web-based instructional systems (Graff, 2003). Since the interrelationships between units of information can be clearly illustrated within the web framework, such a system could have the potential to present instructional information more efficiently than conventional linear methods of delivery. Concentrating on web navigation depletes the user's mental energy, leaving them less available to interpret the instructional content. Alternatively, concentrating more on the instructional material and less on navigation can cause the user to become disoriented. The greater the user's disorientation, the more time she or he may spend navigating rather than processing information, decreasing the amount of learning that occurs. Moore *et al.,* (2011) characterise today's learning model as "knowledge transfer," defines learners acquire the factual information that their educators wish to convey to them. The degree to which the material is meaningful and purposeful, as well as the learner's ability to monitor their access to that knowledge, are two areas that need to be addressed more specifically in online instructional design. It's not that a classroom experience isn't useful; rather, because of the environment's reliant existence, students prefer to sit through classes and let the teacher set the pace and relevance. While learners in class may be aware of the content's general intent and length, the majority of learner control ends there. Because of the essence of the classroom, students embrace and, in certain cases, tolerate these conditions.

DATA AND METHODOLOGY

Research objective

Aim of this study is to identify elements of instructional design of E-learning system and its influence on continue usage intention.

Research design

The study used descriptive cum analytical (quantitative) research design and randomly collected data from students of colleges and university of Haryana state of India.

Hypothesis: H1: There is a positive influence of elements of instructional design on continue usage intention.

A structured questionnaire was drawn among students of undergraduates and post graduates' students of Haryana state. Data was collected from 185 students. A Questionnaire was adopted from the research conducted by Hussin *et al.,* (2009) and modified according to the dynamics of the education sector of Haryana students and used 15 items for measuring the instructional design elements which include five constructs namely, students' involvement, course content, interaction, user interface and feedback and all were measured with three items each. All constructs were found to be reliable, the value of which ranged from 0.885 to 0.914, measured through Cronbach alpha via SPSS. Another section includes the demographic profile of respondents and challenges faced during the e-learning system.

Demographic analysis

Concerning the demographic profiles, researchers found male participants were less than female participants in terms of gender distribution, with 29.6 percent and 70.4 percent respectively. Undergraduate

DISCUSSION

The mean responses of students' perceptions of online learning course material are shown in Table 1. The average response with a range of 3.22 to 3.45. The high mean scores suggest that the respondents suggested a high number of responses on the scale nearest to five. The response towards the debates and discussion engaged more the learners have the highest mean score of 3.45 while the response towards "The lecturer is really enthusiastic about students using discussion areas" has the lowest mean score of 3.22. From the table 1, the study has found that majority of the students agreed with all three statements.

students were more than the post graduate students and their percentages were 58.1 and 41.9 respectively. The students from government institutions i.e., 39.8 percent were greater than private university students i.e., 54.8 percent while the rest were semi-government students. A sudden outbreak led to 83.9 percent adopting an e-learning system. 59.7 percent of the students were using What's App as a commonly platform adopted for sharing notes, PPT's and other education material. The frequency of providing notes was 34.4 percent once a week, 26.9 twice a week, and 24.7 thrice a week. Before COVID-19, 36 percent of the sampled population were aware of the various platforms of e-leaning, but they were up to 83.9 because of the sudden pandemic.

Continued Usage Interface (CUI) was adopted from the reference of (Liao and Lu, 2008). The statements were measured on a five-point rating scale. Statements include I intended to continue using e-learning system for knowledge construction, I intended to continue using e-learning system for my coursework in current semester and I will frequently use the e-learning system in the next semester.

Therefore, it is concluded that the e-learning system involves the students more as compared to the traditional mode of delivery; it is such because the techniques are most appropriate to involve the students through discussion, debate, and opportunities to ask. Table 2 represent that majority of the students were agreed for all three statements of "user interface" and the mean response lies same nearest to 3.2, which indicates that students have no issue with the layout of the screen and integration between text, voice and graphics. The layout of the screen is attractive & good integration between text, voice and graphics and web-based learning is easy and found response's speed is quite fall in acceptable zone.

Table 1: Students' Involvement (Respondents Percentage)

Statements	S.D.	D	N	A	S.A.	Mean
The lecturer is really enthusiastic about students using discussion areas	7	16.8	33	33.5	9.7	3.22
I think being engaged in debate and discussion with other	3.8	14.1	29.2	39.5	13.5	3.45

	S.D.	D	N	A	S.A.	Mean
lecturers helps me to learn more						
The group provides an opportunity to ask questions about the course at any time	5.9	15.1	23.2	40	15.7	3.44

Source: Author's Calculation

Table 2: User Interface (Respondents Percentage)

Statements	S.D.	D	N	A	S.A.	Mean
The layout of the screen is attractive & good integration between text, voice and graphics.	6.5	20.5	29.7	31.9	11.4	3.21
I find navigation in the web-based learning easy	6.5	15.7	34.1	36.8	7.0	3.22
The speed of response of the web-based learning is acceptable	6.5	18.9	29.7	36.8	8.1	3.21

Source: Author's Calculation

Table 3: Interaction (Respondents Percentage)

Statements	S.D.	D	N	A	S.A.	Mean
Interact a greater number of times with my faculty in online course than in face to face format	14.1	24.9	27.6	25.9	7.6	2.88
My interaction with faculty in an online course is of a higher quality than interaction in face-to-face.	14.1	30.3	24.3	22.7	8.6	2.82
I'm highly satisfied with the interaction I have with faculty about course/technical problem	9.7	21.1	27.0	31.9	10.3	3.12

Source: Author's Calculation

Table 4: Course content respondent Percentage (%)

Statements	S.D.	D	N	A	S.A.	Mean
The audio-visual provided by faculty are helpful to my learning.	5.9	14.6	25.4	42.7	11.4	3.39
There are many examples and illustrations used in the module	6.5	14.6	31.9	35.1	11.9	3.31
The materials provided by faculty are both interesting and engaging.	8.1	10.8	32.4	34.1	14.6	3.36

Source: Author's Calculation

Table 5: Feedback respondent Percentage (%)

Statements	S.D.	D	N	A	S.A.	Mean
Clear doubt quickly by faculty.	4.3	17.3	24.9	36.8	16.8	3.44
The lecturer marks and returns my assignment within a two-week period.	4.9	13.5	28.6	36.2	16.8	3.46
The lecturer support with respect to web-based learning was very good.	4.3	14.6	27	36.2	17.8	3.49

Source: Author's Calculation

Table 3 represent that majority of students were neither agree nor disagree towards the statement frequency of web-based interaction than face to face interaction or even they have disagreed about the quality of web-based interaction than traditional. To make e- learning system effective there should be more interaction and also should be good quality of interaction between students and teachers. For this, learners and teachers both must have high internet connection but this study has found that a majority of students belong to rural areas and there is no bandwidth or poor internet facility. Table 4 indicates that mostly students were agreed that the material is being providing them is quite interesting, engaging and there are many examples in the module which is provided by their teachers. The most frequently

expressed concern among online students is feedback. The majority of respondents were pleased with the input they received from the lecturers, as shown in Table 5, the average rates of responses was higher than 3.0, ranging from 3.44 to 3.49. In terms of reviews, the results show that educators play a critical role in web-based learning. This result is consistent with Siragusa's findings (2002).

Findings consistent with Funaro and Montell (1999), Hussin *et al.,* (2009) who discovered that the discussion forum, defines that where both learners and teachers can interact and communicate with one another. This forum motivates the students, complementing the institutional activities of lecture

and segment. The forum allows a large number of students to lead a debate without jeopardising the progress of in-class discussion. It's possible that a section won't have enough time to teach students how to lead a discussion while still covering the course materials. Students may start a subject on the forum and create their own discussion guidelines. Due to the lack of time constraints and the ability to lead an intellectual discussion, a forum can be a valuable learning ground for leading an intellectual discussion. Forum also gives students their own room where they can learn from one another. They will talk about what they're thinking and provide feedback on each other's ideas.

Table 6: Constructs with Average Mean

No.	Constructs	Average mean
1	**Students' involvement**	3.37
2	**Course content**	3.35
3	**Interaction**	2.94
4	**User interface**	3.21
5	**Feedback**	3.46

Source: Author's Calculation

Feedback (average mean 3.46) was found to be the most important aspect of instructional design in e-learning systems, as shown in Table 6, and Interaction found the least important (average mean 2.94). The

methods used by the various elements of instructional design differed only slightly by previous study (Ling *et al.,* 2007).

Table 7: Means, S.D and correlation with Continue Intention Behaviour

Constructs	Mean	S.D.	Correlation
ST	10.11	2.86	0.532
Course content	10.06	2.92	0.550
Feedback	10.394	2.98	0.486
User interface	9.64	2.92	0.60
Interaction	8.81	3.16	0.623
Continue usage intention	9.65	3.00	1.00

Source: Author's Calculation

Table 7 provides mean, standard deviation and correlation of factors affecting instruction design with continue usage intention. The overall mean score of continue usage intention was 9.65 (S.D = 3) for the three-item instrument, indicating slightly above from the moderate level of behaviour intention of learners towards the effecting e-learning system. Elements,

interaction has a high moderate relationship with the continue usage intention behaviour compared with the other factors and also other factors followed ranging from 0.60 to 0.486 which shows significant relationship with the behaviour intention of learners. Out of them feedback showed a comparatively lower association.

Table 8: Regression effect of instructional design elements on continue usage intention of learners

Constructs	Unstandardized coefficient		Standardized coefficient beta	t-value	Sig
	Beta	**Std. Error**			
Students' involvement	0.233	0.090	0.221	2.58	0.011*
Course content	0.20	0.113	0.020	0.180	0.857
User interface	0.307	0.084	0.298	3.633	0.000*
Interaction	0.327	0.067	0.344	4.89	0.000*

Source: Author's Calculation

Table 8 shows that R^2 =.733, adjusted R^2 =.537, F= 41.510, which is highly significant. This shows that hypothesis is accepted that signifies that there is positive influences of factors of instructional design on continue usage intention of learners. Regression model was used to characterize the relationship between elements of instructional design with continue intention behaviour. The results of regression are shown in table 8. Of the total variation in behaviour intention, 73.3 percent is explained with four elements namely, students' involvement, course content, interaction and user interface. The overall effect of elements on behaviour intention was highly significant. An analysis of the effect of individual factors of instructional design element on behaviour intention shows that one standard deviation increase in student's involvement leads to a 0.221 increase in behaviour intention of learners. Interaction has a higher significant impact on behaviour intention of leaners among all elements.

Table 9: Reliability Analysis

No.	Constructs	Cronbach alpha
1	Students' involvement	0.878
2	Course content	0.885
3	Interaction	0.885
4	User interface	0.914
5	Feedback	0.907

Source: Author's Calculation

Table 10: Challenges faced by Students

Statements	SD	D	N	A	SA	Mean
Strain to eyes	7	2.2	17.8	41.6	31.4	3.88
Network issue	3.8	4.9	22.2	34.6	34.6	3.91
Mind diversion due to pop up apps	5.4	4.9	25.4	31.4	33.0	3.82
Over burdened	3.8	15.1	29.2	30.8	21.1	3.50
Lack of seriousness	7.6	7.0	26.5	33.5	25.4	3.62
Unavailability of devices	4.9	16.8	28.6	31.9	17.8	3.41
Unclear concepts	4.3	11.9	29.7	34.6	19.5	3.53

Source: Author's Calculation

Table 10 indicated that students are facing too many challenges while using e-learning system. Majority of students were agreed that they are facing problems like strain to eyes, mind diversion due to pop up apps, overburdened, lack of seriousness, unavailability of devices, unclear concepts, and network issue. The mean score towards the perception of challenges was highest for network issue that is 3.91. The biggest limitation for the students who are living in rural areas where network connectivity is the major issue. The

study has acknowledged that transition from tradition learning to virtual learning has positively and

CONCLUSION

People were aware more about the concept of e-learning system due to COVID-19. They have accepted the change because change has become necessity. This study concluded that to make the e-learning system effective, there should be proper instruction design so as to understand better the environment and respond positively this pandemic. Study has identified factors out of them feedback should be there to maintain the proper balance between the learner and educator. And interaction has a high

CONTRIBUTION AND IMPLICATIONS OF THE STUDY

The present study is helpful for both the students and educators. It will help them to interact intellectually with the material they can find, develop a critical perspective on it and enhance their teaching and learning. The study will prove beneficial for the government, universities, colleges and schools in designing an effective E-learning system. The COVID-19 will have a long-term impact on colleges and universities. For this, higher authorities need to focus on relevance of improving the quality education. Students will be able to take online courses at most colleges in the future. If the pandemic continues, schooling may shift from offline to online. The quality of the E-learning system, as well as the quality of information, will have an impact on user satisfaction and system use, leading to E-learning portals. It will lower the cost of education and provide access to education beyond the border. In 5 to 10 years, education will be cross-border. This study suggests

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challenging for the students.

correlation with the behaviour intention to the learners. When there is high interaction among students and teachers then there should be positive impact on continuous intention of learners. Students and teachers will bring e-learning system in their life if there is effective instruction design of this system. But adoption of this system has negative impact to students' life such as; students are facing strain to their eyes, mind diversion due to pop up ads while reading e-material, this cause irritation or disturbance. Moreover, in the survey questionnaire, it was asked whether the districts of Haryana have issues with internet connection and Mewat and Nuh were identified as poor connectivity of internet.

some ideas to higher education sector, such as all-time access to the E-learning systems, fault-free information, quality content, server, reliability, updated wisdom, user-friendly configuration of the platform, and timely feedback will increase the longevity and social acceptance of the E-learning portal.

LIMITATIONS OF THE STUDY

The study has certain limitations also. First, it is cross-sectional in nature. The data has been collected between a limited time period. A longitudinal study would have depicted quite satisfactory results. Though, the adoption of e-learning system was quite good but the respondents those have not adopted the e-learning system might be included in the category if they would have provided an adequate level of training. Secondly, the sample area was restricted to one state only i.e., Haryana. For further studies, entire country could be taken for analysis of adoption of e-learning system or a comparative analysis could be undertaken.

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