RESEARCH ARTICLE

Prioritizing Student Support Factors in Online Learning Environments: An Analytical Hierarchy Process (AHP) Approach

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Abstract

E-Learning is an essential activity as witnessed by many experts for competitive advantage in university systems now. Many universities across the world want to progress in their e-Learning creativities and LMS platform, which would be very useful to achieve the gross enrollment ratio (GER) as targeted by their counties Student support in the e-Learning course setting has a significant role and is an essential component(Chen et al.2010). Sener and Humbert (2003); learner fulfillment in these settings is a vital component. Students' contentment finally leads to completion of the course in any format of the learning. This paper ranks the essential elements of student support in e-Learning courses using the AHP model based on the results. This model ranks five important attributes taken from literature: Student Attributes, Technology Attributes, Economic Attributes, Design Attributes, and Interactivity Attributes. The findings of this study suggest that appreciating student variables like self-confidence, inspiration, and perceived value about courses are very significant. The results of this study reveal that the system's Student Attribute is seen as the most important, followed by the system's Technology Attribute. The Interactivity Attribute is ranked 3rd, and Design and Economic Attribute is at 4th and 5th place. These results infer that to improve the effectiveness of learner provisions, variables like self-confidence of the learner, stimulus to join the course, and perceived worth of the system in the learner's mind is vital. This study is helpful for institutions and e-Learning Course developers to design Student Support based on a hierarchy of the attributes and formula tea strategy to improve the student support for better results.

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Introduction

E-learning is the electronic delivery of education or training over the Internet, aided by digital technological advancements. It is the category of teaching and learning supported by any of the currently available electronic gadgets and ICT technologies. Based on Huba, M., &Kozák, Š. (2016), academia worldwide wants to expand the usage of their online Learning initiatives for the business world and college students [1]. Thus, some studies designate this revolution as university 4.0which appraises the use of online, blended learning opportunities in a significant percentage of course delivery (Panda, S., & Mishra, S., 2007).
"LearningforSkills" has a broad and vital role to play inthisIoT based corporate world (Veeramanickam, M. R. M., &Mohanapriya, M., 2017). These development and eLearning requirements areconstantlychangingLearning and Development activities at large for academicians worldwide. In this situation, leading universities in the western world have started eLearning on a large scale [2]. The Remaining also want to begin their eLearning initiatives as early as possible, as revealed by literature. Universities that offer such e-Learning courses want to improveeffectiveness and inclusion at all levels. There is a competition to provide online courses to the corporate world among many academies. But proper support is the primary concern for many in the online format of education. These working students also wantonline education to upgrade their knowledge and skills and remain competitive with new joiners [3].
Therefore, Student Support is a significant focus in many eLearning initiatives(Anderson, T. (Ed.), 2008). Student Support is going to become extremely important for online learningshortly. Student Support should address the real issues of the students within time, which would help students to get more output after studies as revealed by Choudhry etal. (2008) cited by Cook, D. A., & McDonald, F. S. (2008) [4].

Literature Review

E-Learning is electronic learning (Roffe, I., 2002). E-Learning is the evolving instructional method enabled by fast-emerging digital technology platforms known as LMS systems (Govindasamy, T., 2001). Moore et al.(2011) also defined e-learning as "the provision of training electronically by the Internet". It is the type of teaching and learning supported by any current electronic gadgets and ICT technologies (Naismith et al., 2004). Researchers have reviewed many articles on different perspectives on Student Support in eLearning courses designed and used for working people worldwide [5].However, it is observed from the literature review ranking of student support-related variables in the latest years are not available. Such scale will bring clarity, linkage, and causal relations will help to improve the system. To explore the nature of possible hierarchy that exists among such variables, the research objectives are defined as -

- Identify Key Dimensions for actively Support the Learner in eLearning Courses and
- To explore credible hierarchs and linkage among these dimensions and observed variables.

Roffe (2002) consolidated many definitions of-Learning given by many experts in many ways in his research work. E-Learning is defined with many approaches by many experts, as argued by Stein et al. (2011) also. Online Learning Consortium (OLC) is an active community in the education field. OLC is dedicated to quality and leadership in digital education (Bourne et al. 2005) [6]. The trainers, study material creators, and other stakeholders from the educational field, corporate firms are highly active on this platform. They have comprehensively defined e-learningas "All course activity is done online; no face-to-face assemblies are needed for course delivery and no necessities for on-campus activity" [7].
Hence to understand the scope and variations in eLearning methods and approaches, some important e-Learning definitions stated by different experts are mentioned below.

Definitions with Technology Approach

In these definitions, Student Support is mainly mentioned as Learner Support with the help of new technologies. These definitions hardly talk about Learning Support.
"Taking an online course via a modem, wireless, or cable connection to access academic course content from a computer, phone, or portable device is referred to as e-learning." (Governors' State University, 2008). Other experts who defined the eLearning from a technology perspective are González-Videgaray(2007), Marquès, (2006), Guri-Rosenblit (2005) and Derek Stockley (2003) [8].

Definitions with Systems Approach

In these definitions, Student Support is mainly mentioned as Learner Support with the help of systems and new technologies. These definitions hardly talk about Learning Support. Liet al. (2009) state, "E-learning is the electronic transmission of a learning, training, or education program". On similar lines, Liao & Lu (2008), Lee (2006), and Koohang& Harman (2005) mentioned eLearning from the system's viewpoint [9].

Definitions with Communication Approach

These definitions talk about Student support as Learner Support mainly with the help of better communication and technologies for such interactivity. These definitions hardly talk about Learning Support. "New Zealand's Ministry of Communications and Technology (2008) described eLearning as E-learning is described as learning that is assisted by the use of digital tools and materials and includes some sort of interactivity, such as online contact between the student and their instructor or peers". González-Videgaray (2007) and Bermejo (2005) have supported this approach in their studies [10].

Definitions with Pedagogy Approach

The Definitions with Pedagogy Approach talks about Learner support with new technologies and Learning Related Support for better learning and better results. Thus the pedagogical approach of eLearning and student support is much more comprehensive and result-oriented. Elliset al. (2009) stated, "E-learning is defined as the use of information and communication technology to assist students in improving their learning". In the same way, we can found other literature from Jereb&Šmitek (2006) and Alonso et al.(2005), which talks of the pedagogy approach [11].
In above all definitions, Student Support is mainly mentioned as Learner Support with the help of new technologies. These definitions hardly talk about Learning Support. The working people need different Support Attributes in their eLearning courses than full-time learners, as revealed by many experts. The needs and requirements are different based on time, Price, Pace, Schedule, Pedagogy, etc. [12].

E-Learning and Importance of Student Support

"Student Support is the collection of amenities and events that are planned to make the learning method easier, more appealing and stimulates to fruitfully complete the course," as argued by Roffe, I. (2002). It still fits well after 18 years. The main aim is to engage students for better output. Student support is one of the central facets of any online or offline/face-to-face learning process. A learning outcome is directly impacted by the level of student support, as mentioned in various studies. The achievement of such online programsis mainly affected by Student Support for online mode (Zhang et al.., 2006). In traditional face-to-face environments, as there is direct contact between the main stakeholders of the system, the support activities do not require any special efforts and happen naturally. But, in eLearning settings, there is a need to have special efforts and attention for such support, as mentioned by many studies worldwide [13].
The basic definitions of Student Support from various kinds of literature referred to for this study are as follows.

Research Methodology

The AHP approach was utilized to prioritize the attributes for this investigation. Using characteristics and associated items, a support hierarchy is created based on the literature. The dimensions and data collecting are the next steps that have been completed. A group of experts is assembled based on literature references, and a pair-wise comparison of characteristics and variables is performed. Comparative scores were calculated using a nine-point scale. This comparison confirmed that the results were consistent. An expert team of 11 persons was created for this aim. These professionals were chosen because they have 5 years of experience in eLearning. Five of the experts were from the industrial industry, while the other six were academic academics from online courses. According to Satty, a survey instrument was created to collect pair-wise comparison judgments on a nine-point scale1980 [14].
All pair-wise assessment matrices determine the normalized weights. In pair-wise appraisals, the consistency ratio (CR) is used to determine the degree of consistency. It is found that the CR value is < 0.1. It implies that expert

decisions are accepted. Five components and 22 variables are taken into account when creating the AHP hierarchy model [15].

Results And Discussion

Student Support Definitions

Table 1 shows the student's support definitions. After going through these definitions, it can be said that "Student Support guarantees active learning and fruitful accomplishment". It provides added efforts for the learner to improve contentment which eventually raises achievement rates in e-Learning courses.

TABLE 1. Shows student support definitions

Sl. No.	Definition
1.	"The wide range of human and non-human assets that will guide and allow the educational contract" (Garrison, 1997).
2.	"Student support is extra assistance needed by distance / online learners" (Rashid, T., & Asghar, H. M., 2016).
3.	"The actions beyond the design and transfer of course material for the students in their studies. This includes intellectual, rational and information issues of specific courses in online mode" (Boyle et al.., 2010).
4.	"The primary functions of student support include different course material elements and affective includes environment and motivational aspects and systemic include administration supports which should be effective, transparent and student-centric" (Tait, 2014).
5.	"Learner support in a large-scale online training is vital for the effective accomplishment" (Zuhairi, 2007).
6.	"Student support helps to concentrate more on studies" (Farajollahi, M., &Moenikia, M., 2010).

Key Dimensions for Student Support

Based on Literature Review, 22 Variables are categorized into 5constructs called attributes as listed below. We have defined each of these 5 critical Attributes based on literature as follows [16].

Student Attributes

Student attributes constitute his needs, expectations, and his abilities with learning from online platforms. Following is essential literature referred for this variable to define. Table 2 shows the students' attributes with references.

TABLE 2. The attributes, items, references

Attributes	Items	References
Student Attributes	Student Needs (ND)	Drennan et al. (2005), Seymour and Fourie (2004), Lourillard (2004), Abel (2005), Choudhry et al. (2008), Palmer and Holt (2009), Michele T. (2015)
	Sense of Responsibility to Learn (SoR)	Sewart (1993), Seeman (2001), Tait (2000), Drennan et al. (2005), Sahin (2007), Zuhairi (2007), Choudhry et al. (2008), Letseka and Pitsoe (2013), Allen and Seaman (2013),
	Study Motivation (SM)	Tait (2000), wp4style, Sener and Humbert (2003), Seymour and Fourie (2004), Abel (2005), Drennan et al. (2005), Alias (2005), Bollinger and Erichsen (2013), Letseka and Pitsoe (2013), Allen and Seaman (2013), Michele T. (2005),
	Clarity of Expectations (CoE)	Alias (2005), Abu Hassan Assari (2005), Upko (2006), Sahin

		(2007), Zuhairi (2007), Choudhry et al. (2008), Allen and Seaman (2013), Michele T. (2015)
	Self-Assessment and Growth (SAnG)	Abel (2005), Drennan et al. (2005), Choudhry et al. (2008), Palmer and Holt (2009), Letseka and Pitsoe (2009), Sewart (1993), Seymour and Fourie (2004), Lourillard (2004)
	Learning Style (LS)	Sener and Humbert (2003), Seymour and Fourie (2004), Lourillard (2004), Sahin (2007), Palmer and Holt (2009), Jumani et al. (2009), Allen and Seaman (2009) (2013)
	Perceived Value (PV)	Lourillard (2004), Abel (2005), Drennan et al. (2005), Alias (2005), Sahin (2007), Zuhairi (2007), Bollinger and Erichsen (2013), Letseka and Pitsoe (2013),
	self-discipline (SD)	Seeman (2001), Sener and Humbert (2003), Seymour and Fourie (2004), Drennan et al. (2005), Letseka and Pitsoe (2013), Allen and Seaman (2013), Michele T. (2015)
	self-confidence (CN)	Alias (2005), Abu Hassan Assari (2005), Jumani et al. (2005), Lourillard (2004), Abel (2005), Drennan et al. (2005),

Technology Attributes

The use of technology is also very imperative to encourage the students. The awareness of the student about the use of technology has foremost importance. If the student's comfort levels with technology interfaces are good, then the student is confident about the use of technology. Following literature referred for this variable to define. Table 3 shows the attributes with references [17].

TABLE 3. Shows the attributes, items with references

Attributes	Items	References
Technology Attribute	Technology Platform (TP)	Reeves (1999), Tait (2000), Bollinger (2004), Lorenziet al.(2004), Anderson (2010), Hardaker, G., & Singh, G. (2011), Singh, G., & Hardaker, G. (2014)
	Comfort Level (CL),	Laurillard (2002), Twigg (2003), Strachota (2003), Bollinger (2004), Lorenziet al.(2004), Abel (2005), Hardaker, G., & Singh, G. (2011), Ngubane-Mokiwa (2013)
	Positive perceptions about technology (PP),	Reeves (1999), Tait (2000), Laurillard (2002), Twigg (2003), Abel (2005), Hardaker, G., & Singh, G. (2011), Ngubane-Mokiwa (2013), Singh, G., & Hardaker, G. (2014), Mbatha (2014)

Interactivity Attributes

For practical student support, interaction with stakeholders is essential. Technology improvements are less significant than human interactions, argued by many researchers. The faculty promise that communication with the learner helps to engage and understand a subject. Constantappraisalis important. Following literature referred for this variable to define. Table 4 shows the attributes with references [18].

TABLE 4. Shows the attributes, items with references

Attribute	Items	References
Interactivity Attribute	Faculty Interaction (FI)	Sewart (1993), Simpson (2000), Tait (2000), Swan (2001), Kretovics (2003), Usun (2004), Sahin (2007), Sher (2009), Allen and Seaman (2013), Brindley (2014), Brindley (2014)
	Peer Interaction (PI)	Tait (2000), Power et al. (2000), Carswell et Al. (2000), Swan(2001), Laurillard (2002), Twigg (2003), Kretovics (2003), Bollinger (2004), Usun(2004), Kransow (2013), Allen and Seaman (2013), Brindley (2014)

	Staff Interaction (SI)	Power et al. (2000), Carswell et al. (2000), Swan (2001), Laurillard (2002), Twigg (2003), Kretovics (2003), Sher (2009), Hardaker, G., & Singh, G. (2011), Kransow (2013), Allen and Seaman (2013), Mbatha (2014), Brindley (2014)

Design Attributes

Couse design and course length have a direct impact on the achievement and fulfillment rates in online courses. The course design must have "synchronous and asynchronous" components. This helps to involve and break the boredom in the delivery. Following literature referred for this variable to define. Table 5 shows the attributes with references [19].

TABLE 5. Shows the attributes, items with references

Attribute	Items	References
Design Attribute	Course Duration (CD)	Power et al. (2000), Laurillard (2002), Twigg (2003), Usun (2004), Kleinman (2005), Upko (2006), Singh, G., & Hardaker, G. (2014), Mbatha (2014)
	Synchronicity (Sync)	Tait (2000) , Power et al. (2000), Laurillard (2002), Lorenziet al.(2004), Usun (2004), Kleinman (2005), Upko (2006), Benson and Samarawickrema (2009)
	Course Content (CC)	Sewart (1993) , Simpson (2000) , Tait (2000) , Power et al. (2000), Kleinman (2005), Upko (2006), Makoe (2012), Singh, G., & Hardaker, G. (2014), Mbatha (2014)

Economic Attributes

Scalability and economies of scale need to be understood sensibly to design such online courses. This makes them financially feasible and famous in the long run. Following literature referred for this variable to define. Table 6 shows the attributes with references [20].

TABLE 6. Shows the attributes, items with references

Attribute	Variables	References
Economic Attribute	Scalability (SCL)	Tait (2000), Roffe, I. (2002), Simpson (2008), Barney Pityana (2009), Brindley (2014)
	Economies of Scale (EoS)	Rumble (2000), Roffe, I. (2002), Hullsman (2004), Simpson (2008), Brindley (2014)
	Course Cost (CO),	Rumble (2000), Roffe, I. (2002), Hullsman (2004), Barney Pityana (2009), Brindley (2014)

Based on the hierarchy of factors, AHP priority Table 7is as shown.

TABLE 7.AHP prioritization table for attributes

Factors	Global Weight
Student Attributes	0.489
Technology Attributes	0.249
Interactivity Attributes	0.141
Design Attributes Attributes	0.054
Economic Attributes	0.021

Conclusion

This research used the AHP hierarchy methodology to understand the importance of attributes for creating student support in online learning courses. Student Attribute (0.489) has arrived as most important, followed by the Technology Attribute (0.249). The next level is Interactivity Attribute (0.141), followed by Design Attribute (0.054). The last in the hierarchy is Economic Attribute (0.021). As Student Attribute has a top rating and Second position is of Technology Attribute; these findings imply that to enhance the value of student support variables concerning Learner Characteristics like their confidence, self-motivation, and realized the importance of the course are very crucial. The use of e-learning as learning and teaching technology is quickly gaining traction in education. The correct technology choices will help you prevent technological issues and restrictions. The study aims to offer an e-learning evaluation strategy that considers a wide range of challenges and criteria related to e-learning systems. The study's findings highlighted many important challenges and measures for selecting e-learning technology. It may be argued that student and teacher concern significantly influence determining the best e-learning technology.

Future Scope

For understanding the cause and effect of these attributes on each other, DEMATEL can be used. This would help to understand the cause and influence group of features, which would be helpful to design a practical e-learning course in the future.

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Conflict of Interest
The authors declare that there is no conflict of interest regarding the publication of this paper.

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