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Development of an Iterative Model for Factors Influencing Online Learning (OL) and Open & Distance Learning (ODL)

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Abstract

This article studies the factors influencing online learning and distance learning. In this study we have established a framework of factors using Interpretative Structural Modelling (ISM) analysis. We have established nine (09) factors associated with online learning and distance learning from the extant literature in the domain. We further collected data from 20 participants of online learning and distance learning including faculties, students, and administrator. Detailed analysis of factors yields the ISM framework for factors categorizing those into autonomous, dependent, independent, and linkage factors. The results of the study show that ISM model has five (05) different levels where the bottom most level gives the key driving factor F9 (Course Design and Delivery) whereas the topmost level of the ISM model shows the highly dependent factor F1 (Personal and Professional Obligations) Rest of the factors are within these two levels. This study establishes a contextual relationship between factors

influencing online learning and distance learning. Our study contributes to the existing literature by providing a foundation to administrators to address the concerns related to various areas. Factors identified indicates the key decision areas and the analysis provided indicate the priorities to be considered for resource allocation towards those areas.

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KEYWORDS

student engagement, online learning, student participation and collaboration

Introduction

Online Learning (OL) and Open and Distance Learning (ODL) are dynamic and cutting-edge approaches to education that cuts beyond the walls of traditional classrooms and gives students the freedom to pursue their academic objectives without regard to time or location restrictions. Accessibility, inclusivity, and adaptation are prioritized in this revolutionary educational approach, making education available to a wide spectrum of people, including working professionals, non-traditional students, and those who live in remote places.

Fundamentally, OL and ODL allows students to interact with course materials generally called as self-learning material (SLM) or self-instructional material (SIM) at their own convenience and pace by utilizing a range of teaching strategies and technological tools to provide educational content. In contrast to traditional physical establishments, online learning (OL) and open and distance learning (ODL) institutions leverage digital platforms, online resources, and multimedia tools to establish a dynamic and interactive learning environment.

The dedication of OL and ODL towards removing obstacles to education is one of its distinguishing characteristics. OL and ODL institutions work to give educational possibilities to people who might have trouble accessing traditional forms of learning through open access rules.

Learners from all backgrounds and situations can pursue education at different times of their lives thanks to this method of learning, which promotes diversity and supports lifelong learning. One of the main reasons online learning and open and distance learning is so popular is the inherent flexibility it offers. With the ability to study from almost anywhere, students may manage their education with employment, family obligations, and other commitments. In today's fast-paced, globally linked society, when people look for opportunities to further their education, reskill, or upskill without upsetting their daily routines, adaptability is very vital.

Open and Distance Learning develops in tandem with technology, utilizing state-of-the-art resources like interactive simulations, online forums, and video conferencing. This not only improves the educational process but also encourages participation and teamwork among students, fostering the development of a lively online community. Online learning and Open and Distance Learning stand as a transformative force in the realm of education, providing a flexible, accessible, and inclusive approach to learning. As the educational landscape continues to evolve, OL and ODL remains at the forefront, empowering learners to shape their educational journeys according to their individual needs and aspirations.

This study highlights factors influencing Online learning and Open and Distance Learning. The study uses the ISM method, which will help in identifying the hierarchical structure of the factors, for Online learning and Open and Distance Learning. These factors, which are the results of the study using ISM as a method, are analyzed and discussed in detail to explain the findings.

1. Literature Review

Online learning and Open and Distance Learning are influenced by both personal and non-personal factors. We have identified following factors by reviewing the literature available in the domain of Online learning and Open and Distance Learning. Personal and Professional Obligations (F1), Lack of Support Services (F2), Personal or Financial Constraints (F3), Academic Preparedness (F4), Lack of Motivation (F5), Time Management Challenges (F6), Technological Barriers (F7), Limited Flexibility (F8) and Course Design and Delivery (F9) are the influencing factors considered for present study.

1. Personal and Professional Obligations (F1): Many students pursuing Online learning or Open and Distance Learning are working professionals or have personal commitments that compete with their study time. Balancing work, family, and other responsibilities can become overwhelming, causing students to even drop out from the program enrolled to prioritize other aspects of their lives (Verdesoto Cristina, 2017). Personal and Professional Obligations is the most basic factor influencing the Online Learning or Open and Distance Learning.
2. Academic Difficulty and Frustration: Some students may find the course material too challenging or struggle with specific subjects. Without immediate access to instructors or peers for clarification and support, they may become frustrated and discouraged, leading to a higher likelihood of dropping out (Verdesoto Cristina, 2017).
3. Lack of Support Services (F2): Open and Distance Learning institutions may have limited support services compared to traditional educational institutions. Students may struggle to find timely and adequate support for academic advising, counselling, or technical assistance, which can impact their overall learning experience of the students. Lack of Support Services influence the teaching and learning process in both online and ODL environment (Ubarhande, et al., 2022). In our study we have considered this factor as an influencing factor in OL and ODL environment.
4. Personal or Financial Constraints (F3): OL and ODL programs often come with their own set of costs, such as tuition fees, technology requirements, and study materials. Financial constraints can make it difficult for some students to continue their studies. OL and ODL programs are relatively priced lower than the conventional programs. It was evidenced that cost of OL or ODL programs is lower than the conventional program and hence this factor is emerged as an important influencer while selecting the mode of learning. Students pursuing ODL often have other personal or financial obligations that can interfere with their studies. Work, family responsibilities, financial constraints, or other life circumstances may make it challenging for students to commit to their education fully (Kamande & Mungara, 2023).
5. Limited Flexibility (F8): Flexibility in teaching and learning process is the magnet attracting students towards OL or ODL environment. While online learning and open and

distance learning offers flexibility, some students may find the lack of rigid schedules and deadlines challenging to manage. Procrastination or difficulty establishing a consistent study routine can negatively impact progress and result in dropout (Kamande & Mungara, 2023).

6. Time Management Challenges (F6): OL or ODL often requires students to manage their own time and schedule their study hours. This flexibility can be advantageous, but it also demands self-discipline and effective time management skills. Students who are unable to balance their academic responsibilities with other commitments may find it difficult to continue with their studies (Barclay C. et al., 2018).
7. Technological Barriers (F7): Access to reliable internet connections, necessary hardware, and software can be a challenge for some students. Technical difficulties or limitations in using the required online platforms and tools may hinder their ability to participate fully in ODL. These technological barriers can lead to frustration and discouragement, ultimately impacting teaching learning process (Kamande & Mungara, 2023). In OL and ODL technological barriers plays important role as most of the activities starting from enrolment into the program to completion of program is facilitated through technology platforms.
8. Personal or Financial Constraints: Students pursuing ODL often have other personal or financial obligations that can interfere with their studies. Work, family responsibilities, financial constraints, or other life circumstances may make it challenging for students to commit to their education fully (Verdesoto Cristina, 2017). These external factors can contribute to a higher dropout rate.
9. Academic Preparedness (F5): Some students may underestimate the level of self-discipline, independent learning skills, or prior knowledge required for ODL. The transition from a structured classroom environment to a self-directed learning format can be demanding (Barclay C. et al., 2018). If students are not adequately prepared for the independent learning approach, they may struggle academically and this will impact the teaching learning process in OL and ODL.
10. Course Design and Delivery (F9): The design and delivery of OL and ODL courses play a crucial role in student success and retention (Wu Peng et al., 2014). Courses that lack clear organization, engaging content, interactive elements, or meaningful assessments may fail

to keep students engaged and motivated. Poorly designed courses can contribute to student dissatisfaction and increase the likelihood of dropout. In our study this factor emerged as most important and foundation factor of online learning and open and distance learning.

It's important to note that these factors can vary depending on individual circumstances, cultural contexts, and the specific OL or ODL program or institution. Efforts to address these challenges include providing robust student support services, fostering an online community, offering orientation and study skills training, improving course design, and enhancing technological infrastructure.

2. Research Methodology

Interlinks between various factors can be best studied using ISM (Warfield, 1974). It helps researchers to build a structural model among factors based on experts' inputs (Luthra et al., 2014). In this paper, we have used the ISM methodology to study the impact of various factors on Online Learning or Open and Distance Learning. Following points suggests the flow of activities in using ISM in this paper:

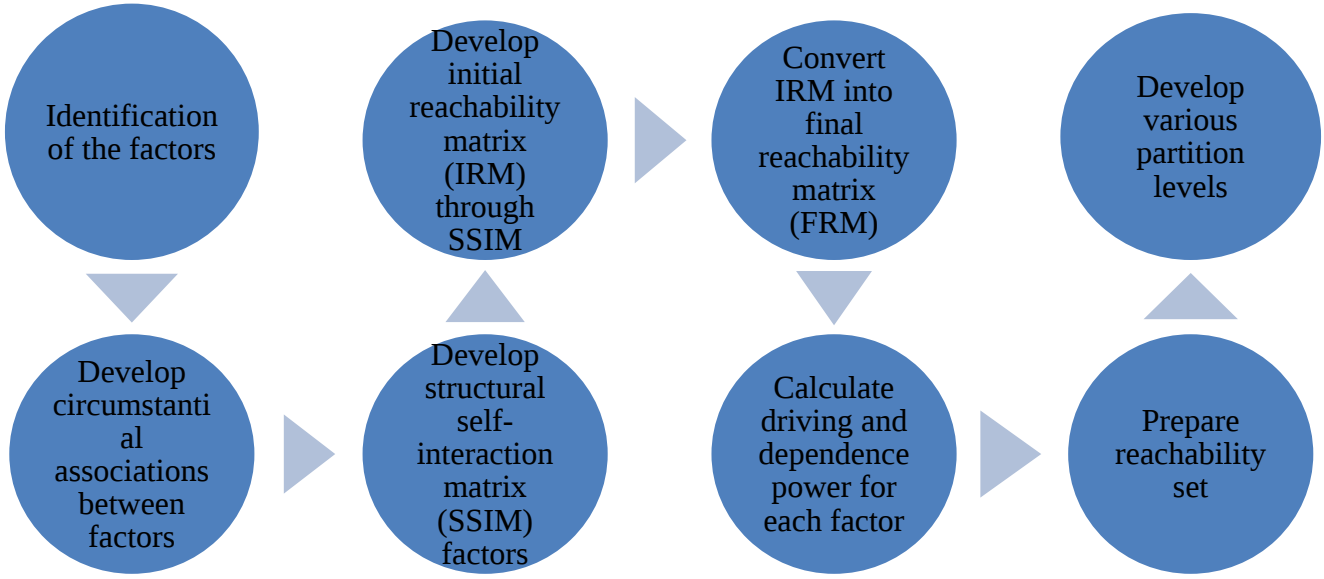

Figure 1: Steps in Research

3. Data analysis

Number of respondents were interviewed to collect the data related to interrelationship between factors identified. We used purposive sampling approach to select these respondents. The reason for using purposive sampling is the ease of availability of the unbiased information. Selecting the specific respondents those are related to the OL and ODL environment ensured the authentic and reliable data. The data analysis using ISM is divided in-to following sections:

3.1 Self-structured interaction matrix (SSIM)

Data related to interrelationships collected from the respondents is presented by developing a SSIM as shown in Table 1. In table 1, relationships between each pair of factors are represented using symbols V, A, X and O. Where V signifies, Factor i has influence on Variable j; A signifies

Variable j has influence on Variable i; X signifies Variables i and j influence each other; and O signifies Variables i and j are not related to each other (Hughes et al., 2016; Kumar et al., 2016)

Table 1: Self Structured Matrix

Factors	Influencing Factors	9	8	7	6	5	4	3	2	1
F1	Personal and Professional Obligations	O	A	A	A	A	A	A	A	
F2	Lack of Support Services	O	A	X	A	A	A	A		
F3	Personal or Financial Constraints	O	A	X	A	A	A			
F4	Academic Preparedness	A	A	V	A	A				
F5	Lack of Motivation	A	X	V	O					
F6	Time Management Challenges	A	O	O						
F7	Technological Barriers	A	A							
F8	Limited Flexibility	A								
F9	Course Design and Delivery									

3.2 Development of IRM and FRM

SSIM is further converted into IRM by assigning binary numbers to the relationship between factors represented in SSIM. Symbols used in the SSIM were converted into binary numbers by following steps:

a. For symbol “V” in SSIM use “1” in (i, j) entry and “0” in (j, i) entry;

b. For symbol “A” in SSIM use “0” in (i, j) entry and “1” in (j, i) entry;

c. For symbol “X” in SSIM use “1” in both (i, j) and (j, i) entries; and

d. For symbol “O” in SSIM use “0” in both (i, j) as well as (j, i) entries.

An IRM is developed using above information and given in table 2. Further, the driving and dependence power for each driver were calculated by adding the entries of “1” across both rows and columns from FRM as shown in table 3.

Table 2: IRM for Influencing Factors

Elements	F1	F2	F3	F4	F5	F6	F7	F8	F9
F1	1	0	0	0	0	0	0	0	0
F2	1	1	0	0	0	0	1	0	0
F3	1	1	1	0	0	0	1	0	0
F4	1	1	1	1	0	0	1	0	0
F5	1	1	1	1	1	0	1	1	0
F6	1	1	1	1	0	1	0	0	0
F7	1	1	1	0	0	0	1	0	0
F8	1	1	1	1	1	0	1	1	0
F9	0	0	0	1	1	1	1	1	1

Table 3: FRM for Influencing Factors

Elements	F1	F2	F3	F4	F5	F6	F7	F8	F9
F1	1	0	0	0	0	0	0	0	0
F2	1	1	1*	0	0	0	1	0	0
F3	1	1	1	0	0	0	1	0	0
F4	1	1	1	1	0	0	1	0	0
F5	1	1	1	1	1	0	1	1	0
F6	1	1	1	1	0	1	1*	0	0
F7	1	1	1	0	0	0	1	0	0
F8	1	1	1	1	1	0	1	1	0
F9	1*	1*	1*	1	1	1	1	1	1

3.3 Partitioning of levels

Using IRM and FRM further, all the factors were separated into various levels. Different sets such as reachability set, antecedent set and intersection set are formed to divide these factors into different levels. For example, reachability set is constituted of a variable itself and the other variables affected by it. Antecedent set constitutes of a variable itself and other variables that affect this. Intersection set is a juncture of reachability and antecedent sets. In present study based on the data five interactions occurred to exhaust all factors.

Factors were marked as Level I, II and so on where both reachability and intersection sets become equal. Total of five such interaction of factors influencing OL and ODL is represented in tables 4-8.

Table 4: First Interaction of Influencing Factors

S. No.	Reachability Set (R_i)	Antecedent Set (A_i)	$R_i \cap A_i$	Level
F1	1	1	1	I
F2	1,2,3,7	1,2,3,4,5,6,7,8,9	2,3,7	
F3	1,2,3,7	2,3,4,5,6,7,8,9	2,3,7	
F4	1,2,3,4,7	2,3,4,5,6,7,8,9	4	
F5	1,2,3,4,5,7,8	4,5,6,8,9	5,8	
F6	1,2,3,4,6,7	5,8,9	6	
F7	1,2,3,7	6,9	2,3,7	
F8	1,2,3,4,5,7,8	2,3,4,5,6,7,8,9	5,8	
F9	1,2,3,4,5,6,7,8,9	5,8,9	9	

Table 5: Second Interaction of Influencing Factors

S. No.	Reachability Set (R_i)	Antecedent Set (A_i)	$R_i \cap A_i$	Level
F2	2,3,7	2,3,4,5,6,7,8,9	2,3,7	II
F3	2,3,7	2,3,4,5,6,7,8,9	2,3,7	II
F4	2,3,4,7	4,5,6,8,9	4	
F5	2,3,4,5,7,8	5,8,9	5,8	
F6	2,3,4,6,7	6,9	6	
F7	2,3,7	2,3,4,5,6,7,8,9	2,3,7	II
F8	2,3,4,5,7,8	5,8,9	5,8	
F9	2,3,4,5,6,7,8,9	9	9	

Table 6: Third Interaction of Influencing Factors

S. No.	Reachability Set (R_i)	Antecedent Set (A_i)	$R_i \cap A_i$	Level
F4	4	4,5,6,8,9	4	III
F5	4,5,8	5,8,9	5,8	
F6	4,6	6,9	6	
F8	4,5,8	5,8,9	5,8	
F9	4,5,6,8,9	9	9	

Table 7: Fourth Interaction of Influencing Factors

S. No.	Reachability Set (R_i)	Antecedent Set (A_i)	$R_i \cap A_i$	Level
F5	5,8	5,8,9	5,8	IV
F6	6	6,9	6	IV
F8	5,8	5,8,9	5,8	IV
F9	5,6,8,9	9	9	

Table 8: Fifth Interaction of Influencing Factors

S. No.	Reachability Set (R_i)	Antecedent Set (A_i)	$R_i \cap A_i$	Level
F9	9	9	9	V

3.4 Development of ISM model

The information from above tables is used to construct the ISM model for factors influencing OL and ODL and is represented in following figure.

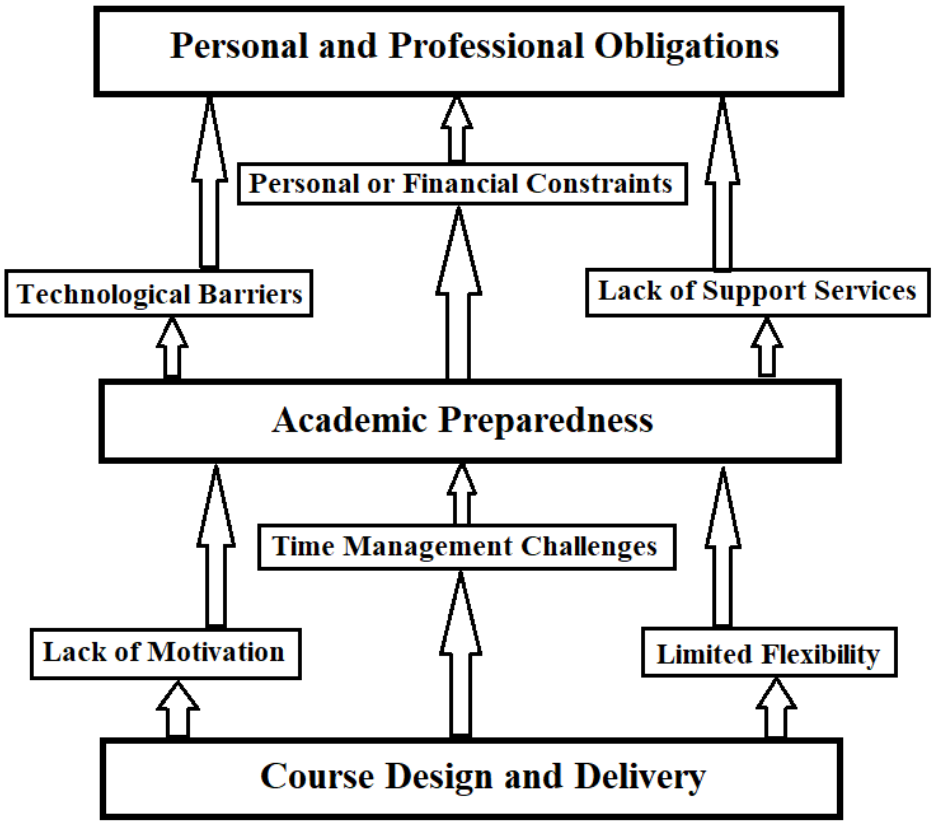

Figure 1: ISM Model for Influencing Factors

4. Discussions and Interpretations

ISM model given in figure 1 represents the contribution of 'Course Design and Delivery (F9)', this factor also forms the foundation for other factors in the process of teaching learning in OL or ODL. This suggests that to address the concerns of OL or ODL learning existence of sound course design and delivery system is vital.

It can be observed in figure 1 that the factors such as 'Lack of Motivation (F5)', 'Time Management Challenges (F6)' and 'Limited Flexibility (F8)' influence each other interdependently and act as major influencing factors in OL and ODL. F5, F6, F8 and F9 impacting a third level factor 'Academic Preparedness (F4)' in turn this factor influences three other factors viz. 'Lack of Support Services (F2), 'Personal or Financial Constraints (F3)' and 'Technological Barriers (F7)'. F2, F3 and F7 influences each other interdependently. All these factors are collectively influencing 'Personal and Professional Obligations (F1).

This research provides an insight into the factors and their levels of impact on OL and ODL. In this it was found that, 'Personal and Professional Obligations (F1) is at the top among others whereas 'Course Design and Delivery (F9)' is found to be the foundation factor leading to all other factors in the factors influencing teaching and learning in OL and ODL. Using ISM methodology, the study has sought to construct a contextual relationship between the factors; however, because the model was created based on a review of literature and opinions of experts, it may be biased. Further studies can be conducted to verify the model's accuracy and the inclusion of the original data. The hierarchical structure of the challenges, which a particular sector is facing, could be another area of future research.

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