



Modeling and analysis of barriers to ethics in online assessment by TISM and fuzzy MICMAC analysis

Sonica Rautela¹ · Nehajoan Panackal¹ · Adya Sharma¹

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Abstract

The pandemic of COVID-19 has altered the world canvas forever. The education sector, too, has been impacted by the same. There has been a phenomenal rise in e-platforms for teaching, learning, and evaluation. Teachers and students had to train themselves overnight to embrace the changing dynamics of the education sector. The change has been marked with challenges. In this new education landscape, online exams have occupied center stage. While the idea of giving exams from any part of the world welcomes freedom, it also raises concerns among faculty and students about academic integrity. Thus, as online studies and online assessment continue to expand, the paper aims to identify the factors responsible for unethical practices in online assessment. The paper further identifies the association between the identified factors. The paper proposes a four-level model that focuses on the lack of training for both faculty and students, interpersonal barriers, technological barriers, time management, personal ethics, and design of assessment as underlying reasons for unethical behavior in online assessments. The paper further explains the linkages using fuzzy MICMAC analysis. The results have both practical and social implications. Understanding the factors and their relationship with each other can help the instructors and administrators in their decision-making process regarding online evaluations and formulate policies that would instill strong ethical values, such as academic integrity and honesty, in their students throughout their academic journey.

Keywords Online assessment · India · TISM and fuzzy MICMAC · Ethics

✉ Nehajoan Panackal
nehajoan.panackal@scmspune.ac.in

Sonica Rautela
sonicaonnet@gmail.com

Adya Sharma
adyaindia@gmail.com

¹ Symbiosis Centre for Management Studies-Pune, Symbiosis International (Deemed University), Pune, India

Introduction

The COVID-19 pandemic will leave an everlasting impact on different sectors of the global economy. The education sector is no exception; the pandemic has impacted and revolutionized this sector. It has forced institutions to think and explore beyond traditional classroom setup and incorporate technology usage in teaching–learning and evaluation (Murphy, 2020; Prabhu & Breen, 2021). Offline teaching used to dominate in pre-COVID times. However, all that changed during the pandemic of COVID-19. Online classes and evaluations have been the only way for the education sector in the COVID era. It has been a difficult journey, especially in developing nations like India, where online teaching and assessment is a relatively new concept. Teachers were forced to adopt technology overnight for teaching and assessment. This drastic change poses multiple challenges in front of teachers, such as “availability of technical knowledge and infrastructure, distraction because of the home environment, concerns related to assessment quality and confidentiality, lack of information concerning the pattern of online assessment and platforms to be used, no technical support and lack of guidelines” (Joshi, 2022). Due to the lack of appropriate technical infrastructure and availability of resources, many universities still use open-source sources. This affects the quality of teaching and raises concerns about the confidentiality and quality of assessments. The quality may also get compromised due to the unawareness of the teacher concerning the use of online platforms and the pattern of assessment. For educational policymakers, online exams are a necessary evil. Universities had no option but to turn to online exams and assessments. On one hand, it gave freedom and relief to students, but it also raised some concerns from parents, students, and educational staff. Concerns related to ethics in an online environment cannot be ignored. It is crucial to maintain high ethical standards and quality in evaluation and assessment as it addresses a fundamental need to validate education.

Ethics in online evaluation is important to protect the rights of all stakeholders involved, whether the students, faculty, administrative staff, or office bearers in educational institutions. There have been numerous studies that discuss the online evaluation, a study of existing literature shows that these studies have focused on techniques for online evaluation, infrastructure for online evaluation, and challenges associated with online evaluation (Ahmed, 2018; Amigud and Lancaster 2019a, b; Böhmer et al., 2018; Ellis, et al., 2020). To the researcher’s knowledge, there have been no studies that highlight the barriers to ethics in online evaluation through the TISM and fuzzy MICMAC analysis with an emphasis on the Indian context. Therefore, the present research study aims at understanding the ethics in online assessment in the Indian context. The study’s findings can aid the regulatory authorities and higher education institutions (HEIs) who seek future usage of online teaching and assessment.

In this study, researchers seek answers to the following research questions:

- RQ1: What factors are responsible for unethical practices in online assessment?
- RQ2: What is the association between the identified factors?

The above research question leads to the following objectives:

- O1: To understand the factors responsible for unethical practices in online assessment from existing literature.
- O2: To analyze the identified factors and understand their priority using total interpretative structural modeling and Fuzzy MICMAC analysis

The study is significant as it would help to pave the way for establishing standards, processes, and mechanisms to maintain ethics in the online evaluation. Unlike face-to-face evaluations, online evaluations pose numerous challenges, which results in the questioning of the authenticity of online evaluations. The study aims to identify the barriers that aid hampering ethics in the online evaluation. The identified barriers are then modeled using total interpretive structural modeling (TISM). TISM and fuzzy MICMAC analysis help in understanding the nature of linkages between the identified barriers. An understanding of these linkages will help policymakers, academicians; faculty members design online evaluations that would promote ethical practices and maintain the sanctity of online evaluations.

To achieve these objectives, the present paper is divided broadly into two sections. The first section discusses the concept of online evaluation and academic dishonesty, followed by a discussion of the identified factors. The literature review gives an insight into the factors that act as barriers to ethical practices in online evaluation. The next section of the paper discusses the relationship between the identified factors using the TSIM and MICMAC analysis. Finally, the results, discussion, and conclusion section reveal the inputs for further research.

Literature review

Online assessments

A vital part of the teaching–learning process is assessment. Assessment aids in understanding whether the learning outcome has been received or not. Also, it ensures the achievement of academic goals and an understanding of the effectiveness of teaching practices and pedagogy. The use of online assessment, also called online examinations or e-exams (electronic examinations), has escalated in the last few years. Studies in the past have tried to understand learners' perceptions of e-examination (Kerryn Butler-Henderson, 2020; Alsadoon, 2017; Hillier, 2014). Most of the studies confirmed the positive perception of learners and cited reasons such as ease of participation, quicker access to results, and advanced e-learning for the same. However, the conventional assessment generally involves offline classroom assessment or offline and online evaluation blends. The usage has drastically increased because of the pandemic of COVID-19. Most higher education institutions worldwide have adopted online assessments keeping in mind the safety and well-being of the students (Chakraborty et al., 2021).

The online assessment offers certain advantages such as assessment validity, effective use of teachers' time and effort, no geographical boundaries, analysis,

prompt feedback mechanism, and ease of participation from the student's point of view. However, concerns such as unethical practices adopted by students, security concerns, skill, and training required by teachers and students, time management, and the absence of human touch in the assessment process need to be considered and analyzed. These concerns act as barriers to online assessment.

Academic dishonesty-unethical behavior in online evaluations

With the increase in virtual classes and online assessments to support online learning, it is essential to look at the unethical practices that dilute the learning process. A meta-analysis by Krou et al. in 2021 investigated academic dishonesty in various fields. They summarized the types of dishonesty as plagiarism and cheating. Plagiarism represented the educational material copied without giving credit to the author. It also included malpractices such as work done by a third party that the students present as their work. Cheating malpractices included copying, collaborating, exchanging work with friends without permission, surfing the net for answers during an evaluation, etc. Unethical practices include helping a friend with a solution, sharing answers within groups, taking the exam for someone else, and plagiarism (Yu et al., 2018). There has been increased academic dishonesty in online assessments due to the ease of access in the virtual classroom setup (Barbaranelli et al., 2018). Technology, an enabler for online evaluations, has often acted as a pocket full of holes for ethical practices in online assessments. There are many reasons behind this. Research has indicated misuse of technology to achieve higher grades, accessibility to a plethora of information, ease of connecting with peers, etc., as some of the reasons that prompted students to engage in unethical practices during online evaluations. Researchers have indicated that students get influenced by their peers. Students who witnessed academic dishonesty tend to get influenced and exhibit similar behavior (Ahmed, 2018; Kiekkas et al., 2020). There could be multiple reasons for this behavior ranging from lack of disciplinary implications, academic overload, and pressure, personal morals, time pressure, personal ambition, and access to technology (Amigud & Lancaster, 2019).

Barriers to ethics in online assessment

Teaching and assessment generally happen in a home environment setting in online mode. The home environment setting poses specific challenges and barriers compared to teaching and conducting assessments in the university or institute environment. The institute or university environment has all the necessary provisions that facilitate smooth and fair conduction of examination. However, this may not be the case in a home environment setting. This poses a significant concern related to ethics in online assessment. The following section presents insights into some of the important factors that hinder ethics in online evaluations. Identification of these factors was based on extant literature review. A study of these factors provided useful insight into the underlying causes of unethical behavior or academic dishonesty in online assessments.

Lack of training for both faculty and students (B1)

Online evaluation or assessment drastically differs from traditional assessment. The transition from conventional to online in higher education settings was agitated and bumpy. Online evaluation was mainly associated with the adoption and completion of Massive Open Online Courses (MOOCs). With the pandemic, teachers had to adopt online teaching and assessment technology within a very brief period. Faculty who were used to the traditional assessment methods had to switch to online assessments in a very brief period. There was hardly any time to prepare and get ready for this transformation. This was a major challenge faced by the Indian teachers. The assessments were required to be conducted online, which required training for both teachers and learners. Faculty members lacked formal training to design appropriate online evaluations, conduct them, grade students, and provide feedback online. Faculty members were unaware of effective evaluation strategies such as quizzes, collaboration, polls, and assignments in online evaluations. They lacked the skills to engage with students through evaluations to keep them engaged through appropriate feedback. On the other hand, students were inexperienced with the tools and platforms for the online assessment process. This further escalated the challenge. Learning management systems (LMS) are tools that enable the teacher to conduct evaluations, record marks, and share grades with students. These systems may be new to students and instructors. Training for both students and teachers to develop technological competencies in LMSs was important for online evaluations (Beschoner & Woodward, 2020). A strong need for training students was also felt to become familiar with online assessment. (Barbaranelli et al., 2018). Hands-on training and experience for both the teachers and students were necessary to ensure the effectiveness of online assessments. This would have helped to boost the confidence in employing effective assessments (Gopalan et al. 2018). Lack of training impacted the competency of faculty to design, monitor, and grade online assessments. It also impacted the ease of learners to participate in the online assessments. The social development theory emphasizes the need for adequate training for successful technology integration. Time and effort should ensure that all stakeholders are successfully trained before implementing technology (Fisher & Carlyon, 2014). However, due to the sudden transition to online evaluations caused due to the pandemic, both faculty and students did not have sufficient opportunities to be trained on online assessments. Lack of training for both faculty and students has been identified as a barrier that affected the ethics in the online evaluation.

Interpersonal barriers (B2)

One of the key benefits of an e-learning environment is the learner's diversity. Learners are welcomed without considering nationality, gender, or any other differences (Toprak et al., 2007). This also involves learners with different learning styles. Due to face-to-face interactions, it was easier to identify different learning styles in traditional classroom evaluations. However, in online assessments, there are no face-to-face interactions. Understanding the needs of learners, such as individuals with special needs, was another challenge for instructors (Khan, 2005). This posed

as a challenge for instructors to convey instructions, the purpose of evaluation and expected outcomes clearly and efficiently so that all students would understand. Another challenge was the inability to provide customized feedback to all students. Interpersonal barriers reflect the barriers related to addressing learner diversity, different learning styles, and different perceptions towards academic dishonesty. In the virtual environment, teachers may have to deal with many students. These students come from varied backgrounds and may differ in cultural, economic, and social backgrounds. Effective grading and feedback are a must for the assessment cycle to be completed. In the traditional environment, faculty were accustomed to writing feedback physically on the evaluated test paper or assessment (Toprak et al., 2010). Discussing this feedback face to face while returning the evaluation. Addressing student concerns happened immediately. However, the scenario changed entirely in online assessment. Depending on the tool and platform that the faculty was using to assess students, a mechanism to provide personalized feedback was very limited. This many times caused conflict among each other (Mukhopadhyay & James, 2019).

Technology barriers (B3)

Technology is the backbone of the online teaching and learning process. Access to technology is vital, and it acts as a facilitator in the entire teaching–learning and evaluation process. However, there exists a digital divide between individuals having access to technology and those who do not. Also, intermittent technology failure during an evaluation cannot be ignored. Thus, technology accessibility and failure concerns are barriers to ethical behavior in the online evaluation. Online proctored assessments are used to encourage ethical behavior in evaluations. However, proctored exams require adequate online infrastructural support which may not be readily available to all students (Milone et al., 2017). Many higher education institutions in India are not equipped with technologies that support ethics in online assessments (Joshi, 2022). Many higher education institutions in India also do not have proper LMS to conduct online assessments and grade students. Technological infrastructure for online assessments is also dependent on internet bandwidth (Bergeson & Beschorner, 2020). Many of the platforms and tools used for evaluations require a high internet bandwidth which is not always easily available in all parts of India. Another challenge posed due to technology is the ease at which the learners have access to information online and the ease of sharing answers with their classmates (Sarwar et al., 2018). This is a significant cause for unethical practices in the online evaluation. Due to the widespread of the internet, content copying has become easy. Technology has also enabled students to consult with their friends and share answers effortlessly online, which was more difficult than traditional in-presence evaluation (Peytcheva-Forsyth et al., 2018).

Time management/feedback (B4)

With the transition to online assessment, another challenge that promotes unethical behavior in online assessment is time management. This includes the amount of time and effort involved in providing effective feedback to online students. Due to

the nature of online learning, the number of students in a class has increased considerably. The academic calendar is tightly packed for a faculty, and in many cases, a faculty could be handling more than one course. The number of online assessments in each course could vary. Many students and components make it difficult for the teachers to manage feedback from every individual. A faculty often struggles with time to design a proper evaluation. Whether an assignment, project, test, or quiz, a good assessment component needs sufficient time to design. As information is easily available from the internet, an evaluation that does not give readymade answers to students requires dedicated faculty time (Böhmer et al., 2018). It is also important not to neglect how and when the online evaluation component is embedded into the lecture to ensure learner engagement and effective learning. This is especially important since teaching–learning is online, and it is not easy to judge student learning online accurately (Balkis et al., 2013). Unlike traditional evaluation, monitoring and evaluation online are challenging. Time management also includes the duration given to students to complete the evaluation. Short duration, especially in areas with insufficient infrastructure, is difficult for students. Assessment of longer duration could promote academic dishonesty or unethical behavior as students get a longer time to cheat. Faculty need to consider the nature of evaluation to determine the allotted time to prevent malpractices in the online evaluation (Elsalem et al., 2021). As discussed, feedback is crucial in the evaluation process. Once the evaluation is completed, the faculty must provide adequate feedback as quickly as possible as the evaluation would still be fresh in students' minds (Octoberlina & Muslimin, 2020).

Increased learner responsibility and accountability/personal ethics (B5)

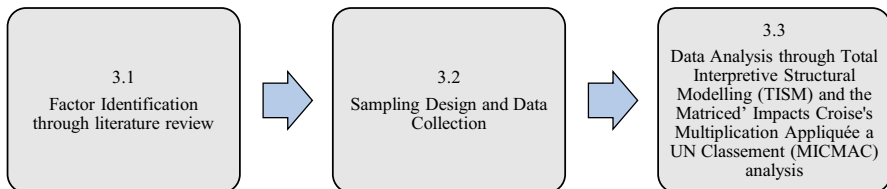
“Ethics is about what people should do. So it is about the concerns on morality, value, and justice. It is evaluated regarding the goodness of things and justness of institutions” (Toprak et al., 2007). Online assessment involves accountability on the part of the student or learner. Personal ethics play a huge role in deciding whether or not a learner indulges themselves in unethical behavior. Cheating and other malpractices have become much more accessible in an online environment (Khan et al., 2021). Also, the concern regarding students' sincerity in completing the assessment (Joshi et al., 2020; Martin et al., 2019). Perceptions towards cheating differed among faculty and students. Faculty and student perceptions towards cheating in online evaluations also vary. Faculty perceive dishonesty in evaluations more severely as compared to students. Both faculty and students consider cheating in online assessments easier than physical assessments (Blau et al., 2020). For a student helping a friend during an exam with an answer or allowing work to be copied may not be considered a big deal, especially since they are online. However, it is regarded as unethical from a faculty's point of view (Ellis et al., 2020). Personal motivators that encourage unethical behavior in the online assessment include fear of failure, strong desire to succeed, overload of studies, lack of self-discipline, impulsiveness, low moral development, etc. (Amigud & Lancaster, 2019; Bretag et al., 2019).

Design/type of assessment (B6)

Online assessment differs from traditional assessment and therefore requires tools that are feasible for online assessment. Also, the methods and tools used for the online assessment will vary depending upon the nature of the learning outcome and the teacher designing or facilitating the online course or subject (Conrad & Openo, 2018). The online assessment can include traditional and contemporary tools and techniques; however, this requires “careful attention to student and group progress with frequent checkpoints and opportunities for both peer- and instructor-feedback cycles” (Martin et al., 2019). This strongly reinforces the need for practice and knowledge from both teachers and learners. Concerning the Indian scenario, most teachers lack knowledge and expertise related to the online assessment tool and thus prefer to use traditional assessment tools (Joshi et al., 2020). Multiple online methods such as discussion forums, peer reviews, online quizzes, self-assessments, and so on have evolved with time. Few researchers have also advocated using formative assessment in online teaching–learning environments (Vonderwell & Boboc, 2013; Crisp & Ward, 2008). However, teachers and researchers are concerned about the quality and validity of the online assessment methods (Kirkwood & Price, 2015). Designing online assessments thus poses a vital challenge for teachers and facilitators.

Research method

The research design is divided into three parts.



Application of TISM and MICMAC analysis

The TISM approach aids the understanding of the direct relationship between the variables and develops a hierarchal structure and MICMAC analysis helps us understand indirect relationships among all the variables. It gives a model, comprehensive and simple to understand the complexity of factors interrelating to each other. It is used to answer the simplest and most complicated questions with the assertion of logic which is based on the input. Together, the TISM and MICMAC analyses help us understand the system properly.

With reference to the 2 objectives proposed in the study, TISM is most suitable as a methodology to achieve these objectives. TISM is a well-established and well-accepted technique that helps to study complex issues and represent them in a manner that is easily understandable. The methodology is also well suited when there are numerous factors exist that define a situation, it becomes difficult for the mind to recognize the relation between the existing factors. TISM as a technique helps to establish a hierarchy among the identified factors, this hierarchy helps to understand the significance and linkages between the identified factors. TISM helps to structure a set of directly or indirectly related factors into a comprehensive model. The MICMAC analysis helps to further analyze the relations between the factors by categorizing them into driving variables, dependent variables, autonomous variables, and linkage variables. In the current study, the researchers have used TISM to model the identified barriers to ethics in online evaluation namely lack of training for both faculty and students (B1), interpersonal barriers (B2), technology barriers (B3), time management/feedback (B4), increased learner responsibility, and accountability/personal ethics (B5), design/type of assessment (B6). MICMAC analysis helped to further understand the nature of linkages between these identified barriers.

Identification of factors

In the study, researchers have followed the steps laid down by interpretative structural modeling (ISM) by Warfield in 1974, which was extended into the total interpretative structural modeling (TISM) by Sushil (2012). ISM is a qualitative analysis approach that attempts to provide a hierarchical model based on a series of iterations interpreted through expert opinion (Warfield, 1974; Kumar & Rahman, 2017). The TISM takes this method a step forward by interpreting the direct and indirect relationships between each identified factor and answering how and why the factors are related (Sindhvani & Malhotra, 2017). The ISM method begins with the study and classification of factors associated with the study under consideration (Attri et al., 2013). Following the same, in the current study, in the first phase, factors related to academic dishonesty and unethical practices in online evaluation were identified through an extant literature review. These factors were categorized into six categories and termed as barriers to ethics in online assessment. The factors were identified through extant literature review by studying papers published in Scopus-indexed journals, J Stor, Ebscohost, Emerald Insight, and Taylor and Francis. Table 1 depicts the extant literature review with the source for the study.

Sampling design and data collection

Data was collected through expert opinion. The main stakeholders, i.e., faculty and students, were considered experts for the study to understand the barriers that affect ethical practices in online assessments. Fifty-one experts were identified for the study, of which 26 were faculty members, and 25 were students.

The sampling framework for identifying faculty was as follows:

Table 1 Factors identified through extant literature review

Sr No	Factor	Source	Key issues identified
1	Lack of training for both faculty and students(B1)	Joshi, 2022; Beschormer & Woodward, 2020; Baranelli et al., 2018; Gopalan et al. 2018; Fisher & Carlyon, 2014	<ul style="list-style-type: none"> -Lack of training to faculty to design appropriate evaluations -Lack of training to faculty to conduct evaluations online -Lack of training for faculty on mechanisms to provide grades and feedback online -Lack of training to students to undertake online evaluations
2	Interpersonal barriers(B2)	Toprak et al., 2007; Khan, 2005; Toprak et al., 2010; Mukhopadhyay & James, 2019	<ul style="list-style-type: none"> -Interpersonal barriers reflect the barriers related to addressing learner diversity, different learning styles, different perceptions towards academic dishonesty -Huge learner diversity made it challenging to identify learning styles -Due to lack of face-to-face interactions it was challenging to provide customized feedback and map learner reactions and understanding -Understanding the needs of learners such as individuals with special needs was another challenge for instructors
3	Technology barriers(B3)	Milone et al. 2017; Joshi et al., 2020; Beschormer and Woodward 2020; Sarwar et al., 2018; Peytcheva-Forsyth et al., 2018	<ul style="list-style-type: none"> -There exists a digital divide between individuals having access to technology and those who do not -Online evaluations are prone to intermittent technology failure -There also exists the challenge of lack of infrastructure for proctored exams in online evaluations -Technology also permits access to information which prompts unethical behavior -Technology also aids ease of sharing material among the students which again promotes unethical behavior

Table 1 (continued)

Sr No	Factor	Source	Key issues identified
4	Time Management(B4)	Böhmer et al. 2018; Balkis et al. 2013; Elsalem et al. 2021; Octaberlina & Afif Ikhwanul Muslimin	<ul style="list-style-type: none"> -Due to high numbers of learners and students taking the online evaluations, faculty struggle with time management -Providing customized feedback to large number of online learners after an evaluation is time-consuming and faculty may face challenges of time to provide feedback -The number of online assessments in each course could vary this would make it challenging for faculty to provide feedback on time
5	Increased learner responsibility and Accountability/personal ethics(B5)	Toprak et al., 2007; Khan et al., 2021; Joshi et al., 2020; Martin et al., 2019; Blau et al., 2020; Ellis et al., 2020; Amigud & Lancaster, 2019; Bretag et al., 2019	<ul style="list-style-type: none"> - Online assessment involves accountability on the part of the student or learner -Cheating and other malpractices have become much more accessible in an online environment -Perceptions towards cheating differed among faculty and students -Peer pressure is another issue identified that results in unethical behavior in online evaluation
6	Design/Type of Assessment(B6)	Conrad & Openo, 2018; Martin et al., 2019; Joshi et al., 2020; Vonderwell & Boboc, 2013; Crisp & Ward, 2008; Kirkwood & Price, 2015	<ul style="list-style-type: none"> -Online assessment requires tools that are feasible for online assessment -There is a need for "careful attention to student and group progress with frequent checkpoints and opportunities for both peer- and instructor- feedback cycles" -Most teachers lack knowledge and expertise related to the online assessment tool

- Faculty should have been involved in the design, implementation, grading, and feedback online evaluation process for at least one year.
- Faculty should have the experience of conducting evaluation in the traditional classroom (offline mode) and online mode.

The sampling framework for identifying students was as follows:

- The student should have given online assessments as a part of the regular online learning process and received grades and feedback for a few courses for at least one year.
- Students should have the experience of giving evaluation in the traditional classroom (offline mode) and online mode.

This prerequisite was essential so that faculty and students could help interpret the relationship between the identified factors based on their own experience. They needed to experience both the offline and online evaluation process to compare and note down their experiences. Accordingly, the identified faculty were associated with teaching and evaluating undergraduate students. These faculty were teaching in reputed business schools in India. The identified students were undergraduate students located at different parts of India. The students were pursuing a bachelors in business administration degree and were located in different parts of India. The study was conducted through expert opinion from faculty and students who were associated in the teaching–learning bachelors in business administration program. The experts were spread across PAN India to get a better understanding from an Indian Perspective. The experts were specifically from undergraduate business schools in India. The sample size was selected in line with the theory proposed by O’Cathain et al., (2015) for qualitative studies. As per O’Cathain et al., (2015) expert opinion should be of limited size to get deep insights on the topic under consideration by adopting methods such as semi-structured interviews, personal interactions, diary reflections, and focus group. The experts were contacted during the period from November 2021 to January 2022. Consent was taken before collecting data.

Data collection was done in two phases.

Phase 1

In the first phase, the researchers conducted semi-structured interviews and in-depth discussions with faculty members. The demographic profile of faculty members is shown in Table 2.

The six identified factors were discussed with the faculty members. They were given a semi-structured interview to fill in their responses highlighting their interpretation of the identified factors based on their experience of ethics in the online evaluation. The interview was monitored online followed by an online discussion. The following rule laid down by ISM to develop the structural self-interaction matrix was explained for collecting data:

Table 2 Demographic Profile of Faculty members

Variable	Category	Respondents
Age in years	26–50	23
	Above 50	03
Gender	Male	12
	Female	14
Designation	Assistant professor	15
	Associate professor	9
	Professor/head of department/director	2

V: This symbol denoted the relation that *i* corresponds to *j* but *j* does not correspond to *i*

A: This symbol denoted the relation that *i* does not correspond to *j* but *j* corresponds to *i*

X: This symbol denoted the relation that both *i* and *j* mutually affect each other

O: This symbol denoted that there exists no relation between *i* and *j*.

An excerpt from the data collection from faculty (Participant 6):

B1-lack of training for both faculty and students (*i*)

B6-design/type of assessment (*j*)

What according to you based on your experience on ethics in online evaluation is the relation between B1 (*i*) and B6 (*j*)?

Reply: “I think the relation is V, i.e., lack of training for faculty would impact the design of assessment” “If faculty members are not trained and do not have the skills needed for online evaluation they would be unable to design a suitable assessment using online tools. An improperly designed assessment could increase chances of unethical behavior in the assessment.”

The type of questions asked is represented in a tabular format in Table 14 Annexure 1. The respondents were briefed about V, A, X, and O and the semi-structured interview helped the researchers to map the responses for developing the structural self-interaction matrix. Table 3 and 5 represents the data collected for the SSIM based on faculty opinion.

Phase 2

In the second phase, data was collected from 25 undergraduate students in different parts of India through online focus group discussions. Three rounds of focus group discussions with various students were conducted. Consent was taken from students before conducting the focus group discussions. The demographic profile of students is shown in Table 4.

During the discussions, the researchers posed questions related to students' experiences and perceptions around the six factors and their relation to unethical behavior

Table 3 Data collected from faculty members

Question Participant	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
1	V	V	A	A	X	O	O	X	A	O	A	V	X	X	A
2	V	V	V	A	X	A	O	X	A	O	A	V	X	X	A
3	V	O	O	V	X	V	V	X	X	V	V	V	V	X	A
4	X	V	V	O	X	O	X	V	O	X	X	X	O	X	X
5	V	O	O	V	X	A	V	X	V	V	V	V	V	X	A
6	V	V	V	V	X	O	X	V	O	X	V	O	O	X	V
7	V	V	X	A	X	A	V	X	A	V	V	V	X	X	A
8	V	V	X	A	X	A	X	X	A	V	V	V	X	X	A
9	V	V	X	A	X	A	X	X	A	X	V	V	X	X	A
10	O	V	X	A	A	A	X	X	A	X	V	V	X	A	A
11	V	V	X	A	X	A	X	X	A	X	V	V	X	X	A
12	V	O	V	A	X	A	X	X	A	X	V	V	X	X	A
13	X	V	V	A	X	A	V	X	A	X	V	V	V	X	A
14	V	V	X	A	X	A	X	X	A	X	V	V	V	X	A
15	V	V	X	A	X	O	X	V	O	V	V	V	V	X	A
16	O	O	O	X	O	X	O	X	X	X	X	O	X	X	O
17	V	X	V	O	A	V	X	X	O	X	A	O	V	V	V
18	V	O	O	A	X	X	X	O	O	O	X	X	X	O	X
19	V	X	V	V	O	O	X	A	O	V	V	V	O	O	V
20	V	V	X	A	X	A	X	X	A	X	V	V	X	X	A
21	V	V	V	A	X	A	X	X	O	X	V	V	X	X	A
22	O	V	X	X	O	V	A	V	A	O	O	V	O	O	V
23	X	V	X	O	X	A	X	X	A	X	V	V	X	X	A
24	V	O	X	A	X	X	X	X	O	X	V	V	X	X	A
25	V	X	X	X	X	A	X	O	A	X	A	V	X	X	O
26	O	V	V	A	O	A	V	X	A	X	V	V	X	X	A

Table 4 Demographic profile of students

Variable	Category	Respondents
Age in years	16–20	23
	Above 20	02
Gender	Male	17
	Female	8
Designation(Year of study in the undergraduate program)	First-year students	0
	Second-year students	16
	Third-year students	9

in online assessments. The prompts for the focus group discussions included student’s perceptions regarding time allotted for evaluation and how it impacted their behavior, technology access and related malpractices that they may have experienced, student perceptions on what is correct and acceptable behavior during

Table 5 Data collected from students

Question Participant	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
Focus Group 1(8 students)	V	V	X	A	X	A	X	X	A	X	V	V	X	X	A
Focus Group 2(8 students)	X	V	X	A	X	A	X	X	A	X	V	X	X	X	A
Focus Group 3(9 students)	V	V	X	A	X	A	X	X	A	X	V	V	X	X	A

online assessments, and how that impacted other factors. An excerpt from the group discussion.

“I think if too much time is allotted (B4) to complete component students are tempted to seek answers from their friends, WhatsApp helps to ease this process (B3).”

Further prompts were given to identify the nature of the relation which were then translated into the structural self-interaction matrix.

Data analysis

Structural self-interaction matrix (SSIM)

The SSIM represents the final expert opinion based on their interpretation of V, A, X, and O discussed in the previous section. The final SSIM is arrived at by giving importance to the maximum expert understanding of the nature of the relation. Table 6 represents the final SSIM derived from expert opinion.

Reachability matrix

The rules given by ISM are used to arrive at the initial reachability matrix by substituting the SSIM variables by 0 and 1. The (i, j) value for V is 1, and (j, i) is 0, for A the (i, j) value is 0, and (j, i) value is 1. For X, both the entries become 1, and for O, both become 0. The table is then checked for the principle of transitivity (Sushil, 2005), and the final reachability matrix shown in Table 7 is derived.

Level partitioning

The antecedent and reachability set can be established from the final reachability matrix. The intersection of the antecedent and reachability set helps to identify the most recurring factor that is the base to perform a series of iterations. Tables 8, 9, and 10 demonstrate the level partitioning to identify different model levels. Time Management (B4) was identified as level 1 of the TISM model. Interpersonal barriers (B2) were identified as level 2 for the TISM model.

Table 6 Structural self-interaction matrix (SSIM)

	B6	B5	B4	B3	B2	B1
B1	V	V	X	A	X	
B2	A	X	X	A		
B3	X	V	V			
B4	X	X				
B5	A					
B6						

Table 7 Final reachability matrix

	B1	B2	B3	B4	B5	B6
B1	1	1	0	1	1	1
B2	1	1	0	1	1	0
B3	1	1	1	1	1	1
B4	1	1	0	1	1	1
B5	0	1	0	1	1	0
B6	0	1	1	1	1	1

Table 8 Level partitioning level 1

Variable	Antecedent Set	Reachability Set	$AS \cap RS$	Level
B1	(1,2,4,5,6)	(1,2,3,4)	(1,2,4)	
B2	(1,2,4,5)	(1,2,3,4,5,6)	(1,2,4,5)	
B3	(1,2,3,4,5,6)	(3,6)	(3,6)	
B4	(1,2,4,5,6)	(1,2,3,4,5,6)	(1,2,4,5,6)	Level 1
B5	(2,4,5)	(1,2,3,4,5,6)	(2,4,5)	
B6	(2,3,4,5,6)	(1,3,4,6)	(3,4,6)	

Table 9 Level partitioning level 2

Variable	Antecedent set	Reachability set	$AS \cap RS$	Level
B1	(1, 2, 5, 6)	(1, 2, 3)	(1, 2)	
B2	(1, 2, 5)	(1, 2, 3, 5, 6)	(1, 2, 5)	Level 2
B3	(1, 2, 3, 5, 6)	(3, 6)	(3, 6)	
B5	(2, 5)	(1, 2, 3, 5, 6)	(2, 5)	
B6	(2, 3, 5, 6)	(1, 3, 6)	(3, 6)	

Table 10 Level partitioning level 3 and 4

Variable	Antecedent set	Reachability set	$AS \cap RS$	Level
B1	(1, 5, 6)	(1, 3)	(1)	Level 4
B3	(1, 3, 5, 6)	(3, 6)	(3, 6)	Level 3
B5	(5)	(1, 3, 5, 6)	(5)	Level 4
B6	(3, 5, 6)	(1, 3, 6)	(3, 6)	Level 3

Technology barriers (B3) and design and type of assessment (B6) were identified as level 3 of the model. Finally, Lack of training for both faculty and students (B1) and personal ethics (B5) were identified as level 4 of the model.

The levels identified based on the iterations are depicted in Table 11. This forms the basis for developing the TISM model.

Table 11 Final level matrix

Variable	Name	Level
B4	Time management	1
B2	Interpersonal barriers	2
B3	Technology barriers	3
B6	Design and type of assessment	3
B1	Lack of training for both faculty and students	4
B5	Personal ethics	4

Results and discussions

TISM results

Through the study, the researchers have tried to identify the barriers that pose a challenge to ethical practices in online assessments. As discussed in the previous sections, the study was divided into three phases following the framework laid down by TISM. In the first phase of the study literature review was conducted to identify factors that contributed to the study, which were clubbed into six factors. Data was collected in the next phase from experts who have relevant experience in online assessments. The opinion was interpreted to develop the model and fuzzy MICMAC analysis was used to identify the nature of linkages. Focus groups and semi-structured interviews were used as research tools to gather expert opinions. The analysis from the study has been divided into two sub-sections that discuss the TISM model on barriers to ethics in online assessments (Fig. 1) and fuzzy MICMAC analysis of the factors that help to classify the factors and further explain the nature of the relationship between the factors.

Discussion on the TISM model on barriers to ethics in online assessments

Figure 1 represents the TISM model on barriers to ethical practices in online assessments. The model has significant importance in understanding the causes for academic dishonesty or unethical practices in online assessments.

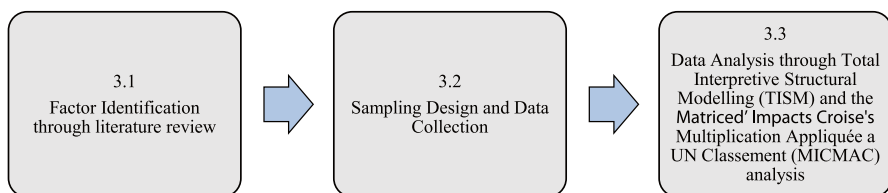


Fig. 1 Steps in the research process

Time management

Time management is crucial and it occupies level 1 in the model. A study by Ali and Dmour, 2021 showed that students and faculty find time management in online assessments more complex than in physical assessments on campus. The assessment cycle needs sufficient time to be allotted for designing the component, implementation, grading, and feedback. A good assessment component needs adequate time to design (Böhmer et al. 2018) so that students can think and apply their knowledge. As gaged from the group discussions with students, time is a crucial factor that decides a student's determination to act responsibly and exhibit ethical behavior or engage in unethical behavior. Extended duration deadlines and timelines give students more time to engage in unethical practices. However short time frames put pressure on students. They fall prey to this pressure and engage in unethical sharing to complete the evaluation on time (Kearns, 2012).

Interpersonal barriers

Interpersonal barriers identified as level 2 reflect the barriers related to addressing learner diversity, different learning styles, different perceptions towards academic dishonesty. There is a two-way relation observed between time management and interpersonal barriers Due to the lack of face-to-face interactions in online assessments, it is crucial for faculty to cater to different student learning styles and provide customized feedback effectively (Khan, 2005). However, faculty are generally pressed for time considering the number of courses, students, and components that they need to evaluate.

Technology barrier

Technological barriers and the type of assessment significantly impact interpersonal barriers. There is a clear divide on accessibility to technology and tools required for effective online assessments which further increases interpersonal barriers. Technological infrastructure for online assessments is dependent on the availability and bandwidth of internet. Due to technology, it is easy for students to connect with each other during evaluations and share answers easily, unethical practices also include using other's content or projects by copying from the internet (Peytcheva-Forsyth et al., 2018).

Design/type of assessment and training for faculty/staff

Technology also supports designing effective evaluations and aids in completing the evaluation cycle from conduction to grading to feedback. The assessments must be designed to reduce plagiarism and related malpractices, they should prompt students to think and apply their learning. For this, it is important to train both students and

Table 12 Associability of values

Associability	No	Very low	Low	Medium	High	Very high	Complete
Value	0	0.1	0.3	0.5	0.7	0.9	1

Table 13 Fuzzy reachability matrix for barriers to ethics in online assessment

	B1	B2	B3	B4	B5	B6	Driving power
B1	0	0.7	0.6	0.9	0.6	0.8	3.6
B2	0.9	0	0.4	0.6	0.6	0.8	3.3
B3	0.5	0.3	0	0.4	0.7	0.5	2.4
B4	0.7	0.4	0.5	0	0.5	0.5	2.6
B5	0.6	0.5	0.8	0.7	0	0.4	3
B6	0.7	0.5	0.5	0.5	0.4	0	2.6
Dependence power	3.4	2.4	2.8	3.1	2.8	3	

faculty and enable them with the required skills needed for online assessments. Students should also be trained on the disciplinary consequences of unethical practices in online assessments. There is a clear divide on faculty and students' perception of unethical practices. Often, students do not realize that their behavior is unethical and may continue to engage in such practices. For a student helping a friend during an exam with an answer or allowing work to be copied may not be considered as a big deal, especially since they are online. However, it is regarded as unethical from a faculty's point of view. (Ellis et al., 2020). Personal values and ethics are critical to differentiate between ethical and unethical behavior.

Fuzzy MICMAC (matriced' impacts Croise's multiplication appliqué a UN Classement) Analysis

MICMAC analysis is a method of classifying identified factors into four categories depending on the nature of driving and dependent powers. The traditional MICMAC analysis was based on binary digits. An up-gradation to the traditional approach is the fuzzy MICMAC analysis. This analysis defines a scale from 0 to 1 (shown in Table 12) that defined the level of associability. The group of experts was approached to rate the factors on this scale based on the Boolean matrix multiplication (Kandasamy et al., 2007). The table derived based on expert opinion is shown in Table 13.

In MICMAC analysis, factors are divided into four clusters with respect to the driving power and dependence power. These clusters are as follows:

Cluster I: Autonomous Factors—factors that are relatively cut off from the system and have weak or no dependence on other factors;

Cluster II: Dependent Factors—cluster II factors are primarily dependent of other factors;
 Cluster III: Linkage factors—the connecting factors that are unstable and most influence others; and
 Cluster IV: Independent or driver Factors—these factors have weak influence from others factors and have to be paid maximum attention owing to the strong key factors.

The fuzzy MICAMC analysis shown in Fig. 2 is discussed below.

1st cluster: the variables in this cluster have weak dependence and weak driving power. This reveals that the variable may have many indirect relations with the other variables in the study. Technological barriers (B3) is an autonomous

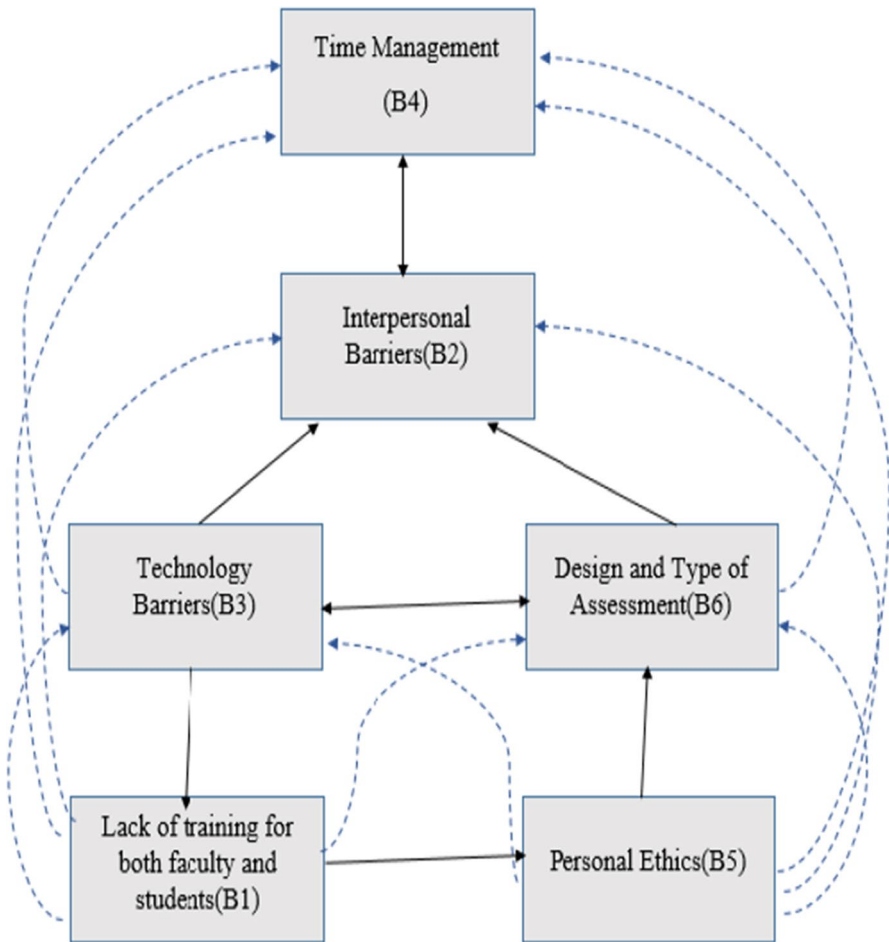


Fig. 2 TISM model on barriers to ethics in online assessments (Authors contribution)

variable that has indirect relations with all other factors and needs to be handled independently.

2nd cluster: this is the dependence cluster where the dependence power, i.e., enabler, is strong and the driving power is weak. Time management (B4) and personal ethics (B5) are the dependent factors. These factors have a high dependence on the other identified factors.

3rd cluster: lack of training for faculty and students (B1) is the linkage factor. This is a very important factor as it acts as both the driver and dependent factor.

4th cluster: interpersonal barriers (B2) and design and type of assessment (B6) are the drivers of the model. These are the factors that have very high driving power and drive other variables and should hold significance in the model.

The results of the fuzzy MICMAC analysis show that interpersonal barriers and design and type of assessment are important factors in the model. These are the key factors that drive the model. In order to maintain ethics in online evaluation and prevent unethical behavior it is important for faculty and institutions to focus on these factors. Efforts should be driven towards identifying and understanding different learning styles and accordingly designing different assessments to suit these learning styles (Khan, 2005). Proper training for both faculty and staff is the linkage factor that binds the entire model together. Investment in training faculty members to design effective online assessment, mechanisms to provide feedback, mechanisms to grade students, and monitor online evaluations is important so that faculty develop the required competence (Beschoner & Woodward, 2020). Similarly, it is important to train students on different tools to give online evaluations. When faculty and students have the required skill set, chaos can be avoided. They become more confident in online assessments and this would help reduce unethical practices. Time management and personal ethics are weak drivers but they strongly depend on and influence each other. As discussed in the previous section, time is a crucial factor that decides a student's determination to act responsibly and exhibit ethical behavior or engage in unethical behavior (Böhmer et al., 2018). Educational institutions should accord significant priority to these factors. Technological barriers are autonomous variables which indirectly affect all other factors (Joshi, 2022). The impact of this factor may not be visible directly but it indirectly has an effect on all other factors (Fig. 3).

Limitations and future research directions

The TISM methodology has its own drawbacks as it is based solely on expert opinion. Biasness in opinion is a challenge that cannot be ignored. The study has focused on undergraduate students and faculty members. The study can be further extended to postgraduate level to better understand the topic under study. The derived model can be further validated by statistical analysis. The experts, i.e., faculty and students,

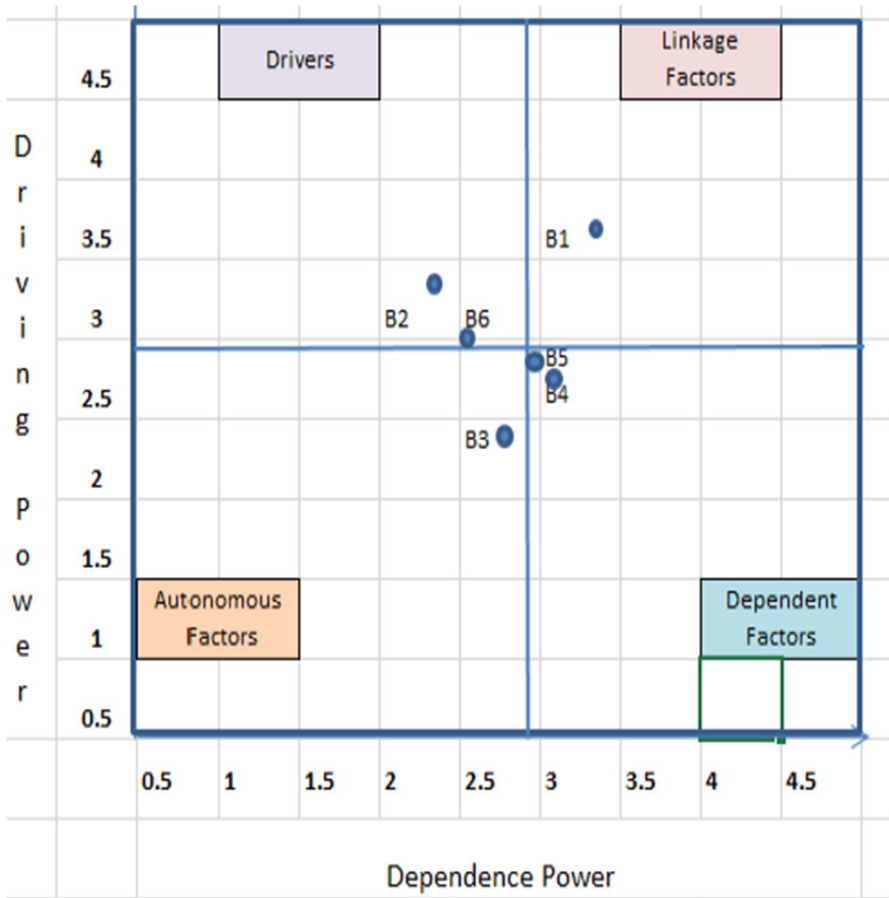


Fig. 3 Fuzzy MICMAC analysis of the barriers to ethics in online assessments (Authors contribution)

could be studied independently, assigning different weights to each sub-group in the model. The study can also be further extended to online evaluations specifically designed for business ethics course.

Implications of the study

The study provides a sound basis for understanding the barriers that pose as challenges for ethical practices in online evaluation. From an organizational and managerial point of view, the study provides a perspective for management to consider while setting up policies, procedures, systems for online evaluation. From the TISM model and MICMAC analysis, it can be noted that institutions need to invest

in technology that supports effective online evaluation. Institutions should invest resources in training faculty and students to effectively conduct online evaluations. There should be a rule book where penalties for unethical practices should be laid out and discussed with stakeholders. The study has implications for faculty members who need to be cautious about the manner in which online evaluations are designed. The model shows that interpersonal barriers are a major challenge, faculty should consider effective mechanisms to provide customized and comprehensive feedback to students after the evaluation has been completed. Understanding the factors and their relationship with each other can help the instructors and administrators in their decision-making process regarding online evaluations and formulate policies that would instill strong ethical values, such as academic integrity and honesty, in their students all throughout their academic journey.

Conclusion

The study attempted to identify the barriers that pose as a challenge for ethical behavior in online assessment. The model proposed is a four-level model that focuses on lack of training for both faculty and students, interpersonal barriers, technological barriers, time management, personal ethics, and design of assessment as underlying reasons for unethical behavior in online assessments. Ethics in online assessment is influenced by many factors. ISM hierarchy will provide academicians with a holistic view of interdependency among the factors and the MICMAC analysis categorizes these factors in terms of their driving power and dependence power. The multilevel hierarchy revealed that time management (B4) is the most governing factor that triggers unethical practices in online assessment. Driving power provided more insights. Thus, factors with high driving power i.e., interpersonal barriers (B2) and design and type of assessment (B6) should receive extra attention from evaluators. The model developed in this study brings forth the complex relationships between the factors. The model further demonstrates the direct and indirect relationships between the factors that influence the unethical practices in online assessment. The nature of linkages was further explained using fuzzy MICMAC analysis. Focusing on these factors would enable teachers and higher education institutions to deal with unethical practices in online evaluations. Understanding these factors would help policy-makers and the examination board make decisions that would enable fair and ethical practices. This would encourage students who work hard and are honest to stay motivated and engaged. This, in turn, would reflect as good practices and impact the institution's goodwill.

Annexure 1

Table 14 Questionnaire for respondents in Tabular Format

Sr No	Question: In your opinion based on your experiences with online evaluations	V	A	X	O
1	What is the nature of relation between Lack of training for both faculty and students (B1) and type of assessment(B6)?				
2	What is the nature of relation between Lack of training for both faculty and students (B1) and learner accountability(B5)?				
3	What is the nature of relation between Lack of training for both faculty and students (B1) and time management(B4)?				
4	What is the nature of relation between Lack of training for both faculty and students (B1) and Technology Barriers (B3)?				
5	What is the nature of relation between Lack of training for both faculty and students (B1) and Interpersonal Barriers (B2)?				
6	What is the nature of relation between Interpersonal Barriers (B2) and type of assessment(B6)?				
7	What is the nature of relation between Interpersonal Barriers(B2) and learner accountability(B5)?				
8	What is the nature of relation between Interpersonal barriers (B2) and time management(B4)?				
9	What is the nature of relation between Interpersonal Barriers(B2) and Technology Barriers (B3)?				
10	What is the nature of relation between Technological Barriers (B3) and type of assessment(B6)?				
11	What is the nature of relation between Technological Barriers(B3) and learner accountability(B5)?				
12	What is the nature of relation between Technological Barriers(B3) and time management (B4)?				
13	What is the nature of relation between Time Management (B4) and type of assessment(B6)?				
14	What is the nature of relation between Time Management (B4) and learner accountability(B5)?				
15	What is the nature of relation between Learner accountability (B5) and type of assessment(B6)?				

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