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## Study of the Online Exam Proctoring; Illegal Attempts Identification and its Solutions at Higher Education Level in Bangladesh

Md. Sabbir Hossain<sup>1\*</sup>

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### ABSTRACT

Online learning is gaining the attention of educators at a rate never seen before. One of the trickiest aspects of online teaching is assessing students' work because of the risk of academic dishonesty introduced by a range of illegal practices in online tests. There are numerous articles about online learning, but none of them provide a comprehensive analysis of online exam illegal attempts, including the reasons for it, the different forms it can take, how it can be detected, and how students can best protect themselves from being caught. The research team in this study looked at the online test environment, a recorded online exam attempt, the best online exam proctoring solution, certain scholarly literature, and the perspectives of important stakeholders. With this information, we identify the many forms of illegal attempts that are most common in an online exam and the most effective ways to prevent them.

### INTRODUCTION

The field of online teaching and learning has made great strides in recent years. There has been an increase in the number of students enrolling in MOOCs and other forms of online credential programs. Many universities are moving their offerings online to better serve their students. In addition, more people are publishing their own training programs. Every one of these things affords pupils more chances to grow and develop as learners. (Li *et al.*, 2015). As a result of the pandemic that has been going on for the past year, virtually all schools have been compelled to switch to an online learning format (Moreno-Guerrero *et al.*, 2020). In universities, students can now take tests and participate in class discussions for any subject area entirely online. The COVID-19 Pandemic also disrupted written tests used in job and admissions processes. We agree that it is critical to protect the integrity of the examination process and academic integrity. The implications of the recent shift to online education vary across grade levels. A graduate student's degree of commitment and concentration will naturally be higher than that of a high scholar's.

Everyone in class would have their own unique capacity for learning, comprehension, and memory storage. This would lead to an increase in academic dishonesty of all kinds, including plagiarism and test-taking fraud. We think it's about time that an AIPS (Proctoring System Based on Artificial Intelligence) be put into place. We also anticipate that it will be common practice to implement similar systems for continuous monitoring of all types of online assessments (from massive open online courses to tests used in the hiring process). A person's online credential is only as good as the tests they had to go

through to earn it. Tests taken in an online environment should be proctored in the same way that in-person exams are supervised. As there are additional ways and opportunities for a student to cheat while administering tests online, an AIPS is required to keep a check on all pupils. There can't be as many teachers to pupils as there were when they were monitoring students' health through physicals. (Bilen and Matros, 2020) (Peterson, 201

### Objectives of this Study

The overall objectives of this paper is as follows:

1. Find out the reasons and different types of the illegals attempts of the online exam at higher education in Bangladesh
2. Identity the best way to protect the illegals attempts of the online exam at higher education in Bangladesh.

### LITERATURE REVIEW

Due in large part to the global spread of the COVID-19 epidemic, distance education has evolved into online settings today. After the COVID-19 triggered the end of traditional education around the world, 1.5 billion students and 63 million teachers abandoned classrooms in favor of digital platforms. The benefits and drawbacks of the digital transformation of education have been exposed by this situation (Valverde-Berrocoso *et al.*, 2020).

Assessment integrity is crucial for a school because of the impact it has on the school's standing in the community. It is important to apply both preventative measures and innovative digital monitoring and validation approaches to ensure the honesty of online examinations (Fluck, 2019). According to research conducted by Watson and Sottile

<sup>1</sup> Department of ICT Education, Daffodil International University (DIU), Bangladesh

\* Corresponding author's e-mail: [sabbir.ict@diu.edu.bd](mailto:sabbir.ict@diu.edu.bd)

(2010), students are far more inclined to share their answers with their classmates during online exams and quizzes than they are during live (in-person) examinations. Therefore, it is more difficult to ensure the security of online examinations. There are a few ways to reduce the prevalence of online exam illegal attempts, including administering exams in person, creating questions that are difficult to manipulate (by, for example, relying on subjective rather than objective metrics), and reducing the weight that exams have in determining final grades.

The most common ways that students cheat today are leaving the class, writing on their arms and hands, leaving the building, or hiding notes in objects like pencil cases or beneath rulers (Curran *et al.*, 2011). While new technologies and online education have benefited the field of education, they have also made it easier for students to plagiarize their work (Turner & Uludag, 2013). A candidate might, for instance, text a friend or family member to find out the correct answer during the exam. Although it would be challenging, some test-takers might be able to text without looking at their phone. Illegal attempts in offline examinations is facilitated by the use of scientific calculators, MP3 player calculators, and wireless equipment like earphones and microphones (Curran *et al.*, 2011).

Despite the fact that the reasons for illegal attempts on online and offline exams are similar (Turner & Uludag, 2013), detecting and mitigating online illegal attempts may be more difficult. This is due to the fact that there are a variety of technological tools and procedures that can be used to facilitate illegal attempts in online tests, in addition to the more conventional ways of exam fraud. Examples include exploring the web for answers, utilizing social media, and employing remote desktop and screen sharing. To cheat on an online exam is more easier than on a paper one. Therefore, safeguards against and methods for identifying online illegal attempts are fundamental for online evaluation. As a result, this is one of the most difficult aspects of summative assessment for MOOCs (Massive Open Online Courses).

Based on recent studies, academic dishonesty and illegal attempts appear to be a major problem in the online learning environment. services that pretend to be students in online classes in order to verify their identities cost money today. identity identification, keyboard

recognition, and camera proctoring are all examples of proctoring technologies that have recently been applied to online exams to ensure their safety (Xiong & Suen, 2018). In addition to in-person proctoring, there are other methods that can be used, such as blocking access to certain websites, timing the exam, rearranging the order of questions and answers, etc. Illegal attempts, however, appears to be a frequent practice in online education (Dendir & Maxwell, 2020).

## METHODOLOGY

A mixed method research methodology is applied for this research procedure.

According to a study conducted between 2010 and 2022, online education publications have expanded steadily, with course evaluation emerging as a major area of study (Martin *et al.*, 2020). Since there is less opportunity to observe and evaluate student and teacher performance in online courses, grading them is more difficult.

## Data Collection

Bangladesh Open University (A) and Daffodil International University (B) data were used to compile this exploratory study. Both traditional distance education and face-to-face instruction are heavily utilized at University A, whereas face-to-face instruction and blended learning play more central roles at University B. In order to establish broadly held beliefs and to discover any discrepancies between the contexts, we aimed to collect data from four different settings. We expanded upon the preexisting evaluation tools for the online exam (questionnaires and interviews) to delve more deeply into the specific areas we were interested in, and we also included a larger subset of teachers who had participated in the online exam. Both university's Ethical Review Committees gave their stamp of permission to conduct the studies' research. There were English questionnaires and interview schedules translated into Bangla. The report focuses mostly on the replies from instructors, although it also includes data from administrators and students. Each university had three administrator interviewed to get a sense of the scope of illegal attempts on campus and the potential problems that may arise from more widespread adoption of online exams. Teachers filled

**Table 1:** Types Stakeholders Data Collection Method Number of participants

Stakeholders	Data Col-lection Method	University Group	Mode of In-struction	Number of participants
Teachers	Survey	A	Face-to-face	5
			Distance	10
		B	Face-to-face	50
			Blended	20
	Interview	A	Face-to-face	3
			Distance	2
		B	Face-to-face	2
			Blended	2

Students	Survey	A	Face-to-face	150
		A	Distance	250
		B	Distance	250
		B	Face-to-face	120
		A	Blended	25
		B	Blended	25
Administrators	Interview	A	Face-to-face	5
		B	Face-to-face	5

out surveys inquiring about the frequency and nature of illegal attempts in their classrooms, the reasons they think students cheat, and potential solutions to the problem.

We conducted in-depth interviews with two educators from each setting to inquire about the following topics: the prevalence of illegal attempts and plagiarism in their classrooms, the potential impact of the move toward more widespread use of electronic assessment, and how teachers might incorporate student authentication and authorship checking systems into their assessment design. Signing a consent form allowing the collection of data and answering questions about the frequency and character of unlawful attempts they have witnessed and their thoughts on the motivations for illegal efforts were required of students enrolled in a range of MOOCs.

### Data Analysis

Quantitative data from the questionnaires will be presented using descriptive statistics. Statistical analyses will be used to look at the distribution of answers across contexts when it is thought that doing so will shed light on issues raised by the data. All of the open-ended answers from the surveys and interviews were grouped into themes and looked at. The literature was used to come up with a first set of categories for the analysis, which were then presented in English to help with the analysis and make sure there was some consistency between the different language contexts. The first round of analysis was based on these classes, which were then translated into Bangla. During the analysis, new ways to group things and ways to make the ones that were already there better were suggested. The data from both countries was compared, and the classifications were changed to make sure they were all the same and covered as much as possible. Even though a few extra categories were made during the analysis, they were eventually folded into the main ones. The final categories used for the analysis were mostly the same as those that were first suggested, which shows that most of the topics covered in this paper fell into the same general areas. This similarity may have come from how the analysis was first set up, but if we hadn't taken this approach, it's possible that the two universities' classifications would have been too different to compare in a meaningful way.

## RESULTS AND DISCUSSION

This part of the article contains a presentation of the

findings that were obtained through the investigation. We will start by describing the fundamentals of the arena, and then we will discuss our findings regarding the perspectives of educators on topics such as how common illegal attempts in the online exams are about, what kinds of illegal attempts there are, and why students try to attempt the illegal activities. In the end, we will present our conclusions and recommendations. In addition, we are investigating what measures might be taken to lessen the problem, as well as the potential impact, if any, that transitioning to online examinations could have on the issue. Another significant discovery that we made was regarding the impact that student authentication and authorship verification could have on the format of examinations.

### Online Proctoring System

Online proctored examinations (OPE) are one of the most used types of online proctoring because they allow a proctor to monitor students taking an exam from a remote location, simulating a typical testing atmosphere. According to Northcutt *et al.* (2016), components of real exams can be employed in OPE, such as proctor involvement, exam timing, and different sorts of questions (multiple choice, open-ended questions, matching, theory, etc.). Corrigan-Gibbs *et al.* found that, while test illegal attempts may be more likely in OPEs, it may be reduced in a well-executed OPE (2015). This indicates that teachers are keeping a closer eye on students than they know, which may have an impact on how they do on the OPE.

Students at higher education institutions can use OPE to take exams at home while still being closely monitored and supervised (D'Souza & Siegfeldt) (2017). Because of this, OPE makes it possible for digital learning assessment to be more timely, reliable, and trustworthy. Assessment is "the act of appraising the merits of something or someone," as defined by Kyriazos (2018a) and Kyriazos (2018b) with reference to students' academic achievements. It was also said that the methods of assessment play a crucial part in guaranteeing the validity and reliability of the evaluation (Kotsou & Leys, 2016). According to Dawson (2015), who asserted that OPE is most effectively carried out through the use of monitoring software and online video pictures, this means that students' tests are automatically proctored via their videos, photographs, and log-in data. Some of the most prestigious schools in the world use OPE, including Harvard, UCI, Georgia Tech, ÉTP, MSU,



CalArts, HKUST, UCL, MIT, and many more (Siemens, 2015). Students at these institutions not only have access to state-of-the-art online classrooms, but they are also given the option to take tests at home under close parental supervision. There are similar repercussions for not complying with OPE laws as there are with open-book examinations. Both forms of exams have the same consequences for exam illegal attempts : either the exam is canceled, the exam is retaken, or the student is expelled (Manathunga, 2005; Sindre & Vegendla, 2015; Hovde & Olsen, 2015; Dawson, 2015).

Exam proctoring via the internet is not a novel concept in the academic world. Many educational institutions already used proctoring methods to ensure the safety of online students before the Pandemic. Exams like the Graduate Record Examination (GRE), the Graduate Management Admission Test (GMAT), and the College Admission Test (CAT) require the presence of a proctor. With online proctoring, data such as tab changes, timestamps, and background noise can be collected and utilized to evaluate students taking tests. Typically, these tests are administered online or at a neutral location, making them accessible to students all around the world. This is for the sake of ensuring a level playing field in the examinations (Caveon *et al.*, 2013).

Online proctored exams (OPE) can either be administered by a computer or by a human. According to Nie *et al.* (2020), live proctoring is the best form of open-proctored examination (OPE) since the proctor may observe the students directly. Anyone assigned to monitor a Live OPE test for a class or organization will have a clear view of the exam and student responses in real time. Proctors ensure that only the designated students are present and able to take the exam. Since proctors might not know their pupils well, it is standard procedure to take a photo of them with their ID card before each exam. The proctors are watching the exam takers very closely for any signs of illegal attempts or impersonation.

In contrast to an online proctored exam, the test taker must wait until the designated time to sit down and complete the exam. Kaiili *et al.* (2016) found that live exam proctoring becomes more feasible when students bring their own mobile/tablet devices, have access to a stable Wi-Fi network, and have the actual exam in front of them. For certain systems, the internet and local files are inaccessible during an exam, although familiar programs like Microsoft Excel can be used (2016).

According to Kubiato (2020), students can complete online tests at their own pace while still being monitored through the use of automated proctoring. Proctoring software that uses automation to streamline administrative tasks, make it easier to keep tabs on each student individually, and uncover instances of exam illegal attempts or malpractice is gaining popularity. This is possible, as stated in the Hastap Report About Global Self-Paced E-Learning Market (2020), due to the fact that any online examination is written via a mobile phone or computer system, and thus, cameras, applications, and

other devices on these gadgets allow for students to be monitored while writing their examinations online. Students can take tests online from any place, according to Atoum *et al.* (2017), because of automated Online Exam Proctoring. The study also found that using automated proctoring is a safe, effective, and efficient way to deliver examinations. Despite the fact that OPE has a lot of support among students, there are a lot of technological obstacles standing in the way of it being fully implemented (lgaz & Adanr, 2020).

The foundation of the online proctoring system is a webcam that records footage of the student taking the test, which can then be viewed by the examiner or proctor. Examiners and proctors are authorized to investigate any behavior that raises suspicion, regardless of whether or not it constitutes illegal attempts . In the second section, titled “Locking,” pupils are prevented from opening new tabs in their web browsers. Computer or browser lockdown refers to this same concept (Alessio *et al.*, 2017).

### Basic Features of the Online Exam Proctoring System Camera

Cameras are common input devices on laptops and desktops. The webcam shows the invigilator the user live. The user can be observed to ensure they are giving the exam attentively and to detect illegal attempts . Face recognition technology ensures that only the registered user takes the exam, preventing imitation (Joshy *et al.*, 2018; Sinha *et al.*, 2020). Webcams may check for cheaters in the background (Raj *et al.*, 2015).

### Mic

Mic is another system input. Mics record and analyze audio. The analysis can tell if the user is being helped by someone out of camera view or via a call on another device (Sinha *et al.*, 2020). Background noises can be deemed dishonest, thus the software must be educated to prevent false positives (Prathish *et al.*, 2016; Raj *et al.*, 2015).

Human Proctor systems aren't 100% accurate. False positives and grievance remedies require human oversight (Li *et al.*, 2015). So, the systems can continuously train the backend AI. The invigilator will also review the AIPS report to determine malpractice (Metzger & Maudoodi, 2020). AIPS processes audio, video, and application data. In case of a false positive, the invigilator might compare all inputs to gain a better picture before declaring a copy case. AI could mistake a calculator for a phone and label the user a “copy case” Human oversight is needed to avoid mistakenly accusing a learner.

### Screens Hare/Recording

Invigilator shares the user's screen. The proctor can check the student's open tabs to verify they aren't using other websites or notes to cheat (Beust *et al.*, 2018). This can be recorded by the AIPS in case of a dispute over a suspicious activity flag. This also works with Application Lock by recording illegal attempts apps (Slusky, 2020).

## Lock App

Application lock ensures no one accesses other apps during the exam. The AIPS blocks all communication apps and documents throughout the test. The “secure browser” strategy prevents tab switching (Chua *et al.*, 2019). This strategy prevents users from looking up answers online (Slusky, 2020). The system will flag any copy cases (Metzger & Maudoodi, 2020). Use a standard browser to flag the user when they switch tabs (Raj *et al.*, 2015). Biometrics: Using biometrics, the system can detect impersonation. It adds security to a simple User ID and password that can be shared. This can be used during the paper to ensure the user doesn’t move places (Joshy *et al.*, 2018). Facial recognition can be used throughout the exam (Ghizlane *et al.*, 2019; Zhang *et al.*, 2016).

## Eye-Tracking

Using gaze tracking, student copying from notes or textbooks can be monitored. Using a gaze tracker, the student may be tracked (Atoum *et al.*, 2017; Li *et al.*, 2015). You may also train the AIPS to detect when the user looks away (Prathish *et al.*, 2016; Zhang *et al.*, 2016). The system must allow tiny user movements because it’s unrealistic to anticipate they’ll sit still for the entire paper.

## Types of Online proctoring Systems

### Proctoring in Real Time

- 1.1. System that verifies students in real time.
- 1.2. There is a human proctor engaged.
- 1.3. Appropriate for theoretical tests as well as tests that last a lengthy time (two to three hours).
- 1.4. A human proctor is able to monitor students’ eye movements, recognize their faces, and raise an alarm if

any students are caught illegal attempts or engaging in malpractice.

- 1.5. Requires a level of expertise in the use of various technological advances.

### Recorded Proctoring

2.1. Recorded Proctoring is a form of proctoring that involves video recording of the candidate while they are taking the exam as well as other log details.

2.2. During post proctoring, several tasks such as tracking eye and face movements, detecting objects and faces, doing log analysis, etc. are carried out.

2.3. It is necessary to involve human assistance, yet doing so is both time-consuming and expensive.

### Proctoring that is Fully Automated

3.1. A more advanced version that does not involve human proctors.

3.2. Full-time automated proctoring, with the only human intervention being a review of the report.

3.3. Using a variety of techniques and technologies, the system can detect fraudulent activity and illegal attempts .

3.4. Because there is no need for human proctors, the price is significantly reduced.

3.5. Designing a system with such characteristics is more difficult.

Each of these online proctoring systems offers unique advantages and challenges. The choice of which system to use often depends on the scale of the exam, the stakes involved, the available resources, and the comfort level of both the institutions and the students with technology

### Illegal Attempts Prevalence

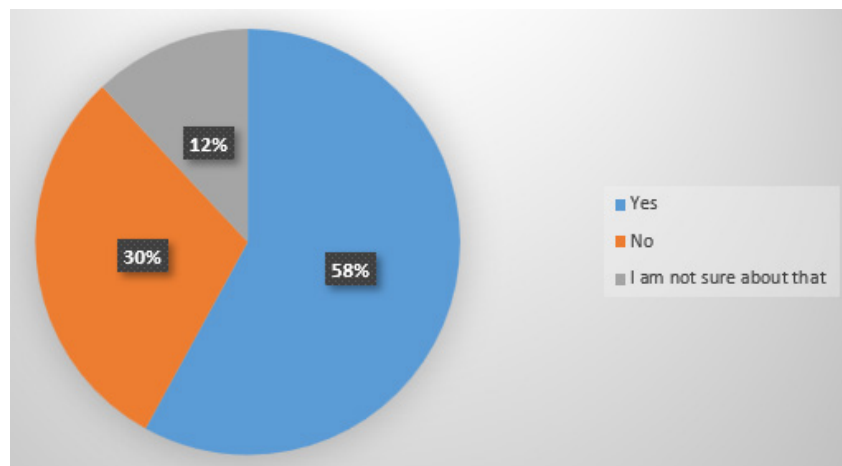
**Table 2:** Types of Online Proctoring Systems advantages and disadvantages

Type of Proctoring	Description	Advantages	Disadvantages
1. Live Online Proc-toring	A real person monitors the test taker in real-time through webcam and screen sharing.	- Immediate in-tervention possi-ble	- Requires high bandwidth
	Proctors can stop the exam if any suspicious activity is de-tected.	- Human judg-ment involved	- Can be more expen-sive due to human involvement
2. Recorded Proctoring	The student's test session is recorded through webcam and screen. The recording is re-viewed later by proctors.	- Flexible sched-uling	- Delayed detection of malpractice
	Any suspicious activities are reported post-facto.	- Less bandwidth intensive	- No real-time inter-vention
3. Advanced Automated Proctoring	Uses advanced AI algorithms to monitor and analyze student behavior during the exam.	- Immediate de-tection using AI	- Potential for false positives
	If any anomalies or suspicious activities are detected, alerts are raised.	- Scalable for large student numbers	- Lacks human judg-ment

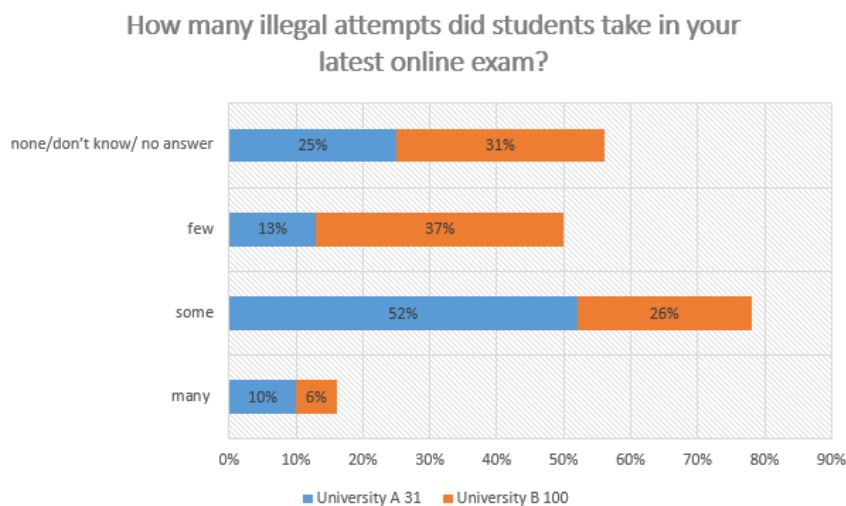
4. Blended Proctoring	Combines live online proctor-ing and automated proctoring. A human proctor assisted by AI tools.	- Combines strengths of live and automated	- Can be expensive
	This offers a balance between human judgment and AI capabilities.	- Improved accuracy	- Requires adequate technical infrastructure

Figure shows how often teachers reported Illegal Attempts and how many students they thought had Illegal Attempts. Both questions are open to interpretation, which may alter the quality of the answers. The responses to these questions should reflect both the prevalence of Illegal Attempts and the influence of institutional circumstances. These numbers should not be taken

as true estimates of illegal attempts levels, but as indicators that teachers in both universities felt there was a lot of Illegal Attempts and plagiarism in their classes. Interviews were used to learn how teachers viewed illegal attempts . Are students taking illegal attempts in your latest online exam?



**Figure 1:** Ratio of the students are taking illegal attempts in online exam.



**Figure 1:** Ratio of the illegal attempts did students take in online exam.

### Types of Illegal Attempts

In the questionnaires, teachers and online exam manager were asked to rate the frequency with which they encountered 14 types of Illegal Attempts. To facilitate comparison of the frequency of types of illegal attempts

, a mean score for the teachers' responses was calculated, allocating a mark of 4 for 'often', 3 for 'sometimes', 2 for 'occasionally', 1 for 'rarely', and 0 otherwise, these are shown for each university in Figure 3.

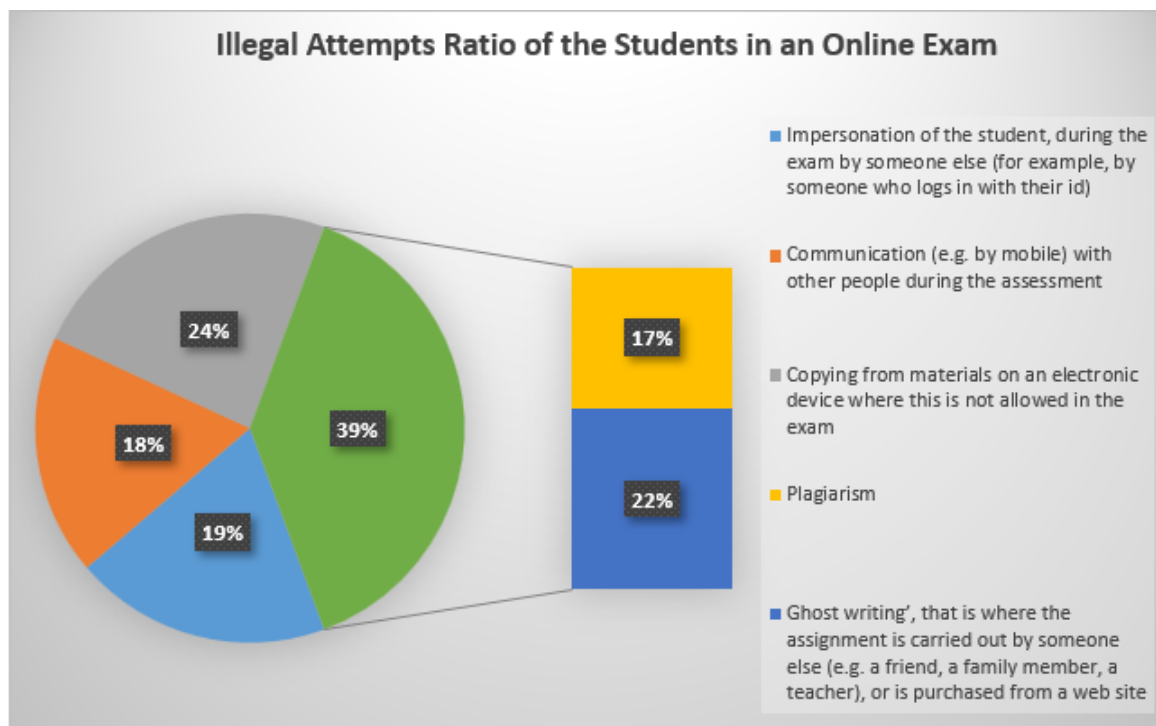


Figure 3: Illegal attempts ration of the students in online exam.

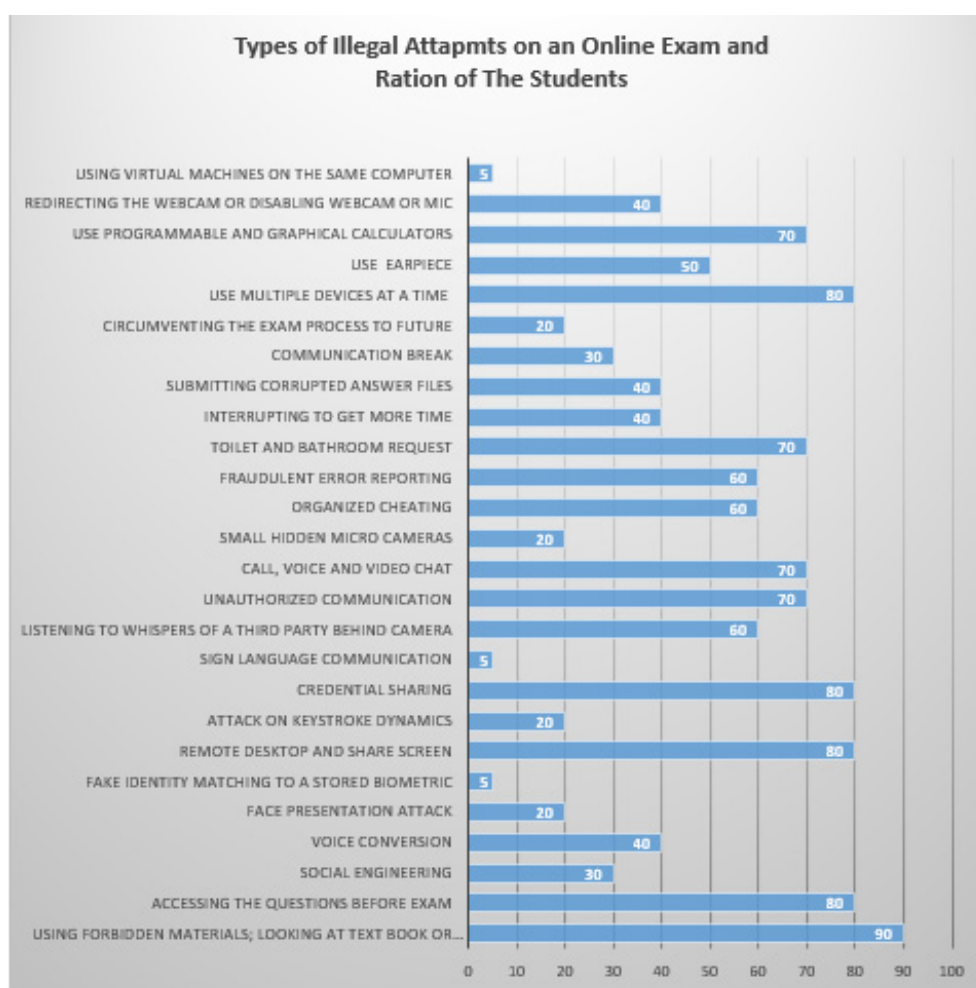


Figure 3: Type of Illegal attempts on an online exam and ration of the students.



Table 3: Illegal attempts detection and protection process		
Illegal Attempt	Detection Process	Protection Process
1. Use of cheat sheets	- Webcam monitoring and AI to detect eye movement	- Prohibit paper and other items in test area
	- Random checks/asking students to show their surroundings	- Proactively inform students of consequences
2. Browsing the web for answers	- Lockdown browsers that restrict web access	- Use timed exams to limit search time
	- AI detection of browsing patterns	- Use question pools to ensure variety
3. Use of mobile phones	- Webcam monitoring and AI to detect off-screen glances	- Randomly generated questions
	- Random checks to ensure no phones are on the desk	- Strict instructions on phone placement
4. Getting help from someone else	- Webcam and microphone monitoring	- Randomize question order for each student
	- AI to detect additional faces or voices	- Timed questions to reduce communication time
5. Use of electronic devices/tools	- Webcam monitoring to detect unauthorized devices	- Clear instructions about allowed devices
	- AI to analyze unusual patterns	- Random checks to show the surroundings
6. Screen sharing or remote control	- Monitoring software to detect unusual access patterns	- Lockdown browsers
	- AI-based system to detect screen sharing software	- Constant monitoring of software processes
7. Multiple logins	- IP address and login pattern monitoring	- One-time use tokens for exam access
	- Software to detect simultaneous logins	- Alert notifications for suspicious logins
8. Copying from others	- AI analysis for similar answer patterns	- Randomize questions and answer choices
	- Monitoring software to detect messaging apps	- Strict consequences for collusion
9. Using translation tools	- Monitoring software to detect opened applications	- Use of proctoring services
	- Webcam monitoring to see tool utilization	- Random checks to ensure no software is open

### Illegal Attempts in Online Exams: Detection and Protection Mechanisms

With the rise in online education and examinations, ensuring academic integrity has become increasingly challenging. A variety of illegal methods have emerged, ranging from traditional cheat sheets to the more technologically advanced like screen sharing and remote access.

#### Cheat Sheets

Students often attempt to use physical notes or cheat sheets during exams. Advanced webcam monitoring and AI algorithms that track eye movements are now used to detect such practices (Smith *et al.*, 2022). To combat this, educators are advised to prohibit any extraneous items in

the examination area and employ random checks.

#### Web Browsing

The internet is a treasure trove of information and answers. Lockdown browsers and AI systems that detect browsing patterns are used to catch students searching for answers online (Doe & Johnson, 2022). Timed exams and using a variety of question pools are protective measures against this.

#### Mobile Phone Use

Advanced webcam monitoring can detect off-screen glances indicative of mobile phone usage (Raj & Lopez, 2023). Regular checks and clear instructions on phone placement can deter this.

### External Assistance

Some students seek help from others during exams. Monitoring both video and audio streams can detect an additional person or external inputs (Nguyen *et al.*, 2022). Randomizing questions and timing them is a preventive approach.

### Electronic Devices/Tools

Unsanctioned electronic aids, like calculators or other devices, can be detected through webcam streams and AI analysis (Kumar, 2021). Educators can prevent this by providing a list of allowed devices.

### Screen Sharing & Remote Control

Tools that allow for screen sharing or remote access to a student's computer are a grave concern. Software has been developed to detect such patterns, and lockdown browsers can restrict such functionalities (Lee & Park, 2023).

### Multiple Logins

Some platforms detect simultaneous logins, and IP address monitoring can also highlight suspicious activity (Torres & Malhotra, 2023). One-time use tokens are a deterrent against this.

### Copying

AI analysis can compare answer patterns to determine if copying has occurred (Zhang *et al.*, 2022). Randomizing questions and answers can act as a preventive measure. Translation Tools: These can be detected through software monitoring, especially during language exams (Sanchez, 2022). Proctoring services are effective against such attempts.

In conclusion, the world of online examinations is in an arms race against cheating methodologies. As highlighted by Watson & Brown (2023), it's essential for educators and institutions to stay updated on both detection and prevention techniques to maintain academic integrity in this digital age.

### Addressing Illegal Attempts in Online Exams: Solutions at the Higher Education Level in Bangladesh

In Bangladesh, as with many nations worldwide, the pivot to online education has been swift, largely catalyzed by the COVID-19 pandemic. This transition, while necessary, has come with its challenges, notably the risk of academic dishonesty during online exams. As Bangladesh works towards becoming a digitalized nation, addressing these challenges, especially at the higher education level, becomes crucial. Here's a detailed exploration of the issue and potential solutions:

#### Contextual Understanding

In Bangladesh, higher education institutions (HEIs) vary widely in terms of resources, infrastructure, and digital readiness. While top universities might have access to sophisticated tools, many colleges in more rural areas might not. Hence, any solution must be adaptable, scalable, and sensitive to these disparities.

### Key Challenges

- **Limited Infrastructure:** Not all institutions have the capability to implement high-end proctoring solutions.
- **Digital Divide:** Some students might not have stable internet or the necessary devices.
- **Cultural Concerns:** Privacy concerns and unfamiliarity with online exams can hinder their acceptance.

### Comprehensive Solutions

#### Training and Awareness

Start by inculcating a strong sense of academic integrity. This includes:

- **Faculty Workshops:** Engage faculty members, ensuring they're adept at creating online exam content and are aware of potential malpractices.
- **Student Orientation:** Familiarize students with online exam etiquette, emphasizing the consequences of academic dishonesty.

#### Tech-Assisted Solutions

- **Adopt Adaptive Examinations:** Questions can change based on the student's response, making it difficult for students to cheat.
- **Open-Book Examinations:** Given the online environment, it's realistic to adopt exams that allow students to use resources, focusing on their analytical rather than memorization skills.
- **Time-Boxed Examinations:** By limiting the time students have for each question, you reduce the window they have to look up answers or ask for help.

#### Proctoring Solutions

- **Live Online Proctoring:** Although resource-intensive, institutions with the requisite infrastructure can employ real-time monitoring of students.
- **Recorded Proctoring:** Suitable for institutions with limited resources. The session can be recorded and reviewed later.
- **AI-Driven Proctoring:** While more expensive, AI tools can detect unusual patterns or behaviors and can be a solution for premier institutions.
- **Mobile-Based Solutions:** Considering the proliferation of mobile devices in Bangladesh, solutions that use mobiles as a tool for proctoring might be beneficial.

#### Infrastructure Development and Support

- **Government Subsidies:** The government can offer subsidies to universities for procuring necessary software and training personnel.
- **Public-Private Partnerships:** Tech companies can collaborate with universities, offering their tools at discounted rates or even for free as part of their CSR initiatives.

#### Student-Centric Solutions

- **Mock Exams:** Before the actual exam, conduct mock exams to acclimatize students to the online system.
- **Feedback Loops:** Allow students to provide feedback on the online examination process, using this to

continuously refine and improve.

### Policy Measures

- **Strict Code of Conduct:** Define a strict code of conduct regarding online exams. This includes penalties for malpractices and procedures for reporting any discrepancies.
- **Collaborative Platforms:** Encourage universities to share best practices, challenges, and solutions on a shared platform. This collective knowledge can help institutions that are struggling.

### Cultural Shift and Community Engagement

- **Engage Parents:** Universities can conduct online sessions with parents, informing them about the importance of academic integrity.
- **Promote Academic Integrity:** Launch campaigns, posters, and online content emphasizing the value of genuine academic achievements.

### CONCLUSION

While challenges exist, they are not insurmountable. By combining technology, policy reforms, and a community-driven approach, Bangladesh's higher education sector can successfully curb illegal attempts in online exams. The essence lies not just in surveillance but in fostering an environment of trust, understanding, and integrity. As the proverb goes, "It takes a village to raise a child"; similarly, it will take a collective effort of institutions, government, tech partners, and the community to uphold academic integrity in this digital age.

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