Routledge
Taylor & Francis Group

Journal of College and Character

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/ujcc20

The Problems of Panoptic Invigilation Programs as Evidence of Cheating

C. Christine Fair

To cite this article: C. Christine Fair (2023) The Problems of Panoptic Invigilation Programs as Evidence of Cheating, Journal of College and Character, 24:4, 342-356, DOI: 10.1080/2194587X.2023.2257335

To link to this article: https://doi.org/10.1080/2194587X.2023.2257335

Published online: 06 Nov 2023.

Journal of College & Character VOLUME 24, No. 4, November 2023

The Problems of Panoptic Invigilation Programs as Evidence of Cheating

C. Christine Fair, Georgetown University

Abstract

The demand for online invigilation programs had dramatically increased due to the expansion of online learning; however, demand was further galvanized by the COVID-19 pandemic. Unfortunately, there are many technical and ethical problems with these programs that cannot be easily mitigated. Notably, they are beset by several inherent racial, gender, neuro-normative, and socio-economic biases, which means that people of color, women, neuro-divergent, and less affluent students will be more likely to be accused of cheating. While these issues have received increasing attention, a minimal amount of focus has been given to the legitimacy of these programs' key indicator of academic malfeasance: ocular motility. The reliance upon eye movements to identify potential academic dishonesty is problematic because ocular motility is fundamental to cognitive processes such as information recall and creative thought. Given that the consequences of finding a student in violation of honor code strictures can have devastating impacts on a student's career and given that these impacts do not affect all students equally, institutions and instructors that have adopted these panoptic surveillance programs should heavily consider the limitations of these programs, the dangerous biases that are built into them and their deployment, and the cascade of inequitable outcomes they may help propagate.

Introduction to the Problem

There is a long-standing and evolving scholarship by authors seeking to understand the extent to which faculty bias affects who gets reported for academic misconduct, the biases of persons adjudicating faculty claims in finding a student to be in violation, and the sanctions the offender receives (*inter alia* Beasley, 2016; Robey et al., 2022; Tatum, 2022; Witmer & Johansson, 2015). With the burgeoning trend toward online education and the concomitant demand for online invigilation programs (Coghlan et al., 2021; Ginder et al., 2019), many universities and faculty have adopted invasive technologies with inherent gender and racial biases to identify students who may have committed academic dishonesty. Specifically, I argue that online invigilation programs that rely upon technologies that detect and monitor student faces are inherently biased both due to the underlying Artificial Intelligence (AI) algorithms they employ as well as the way in which these programs are deployed.

C. Christine Fair (ccf33@georgetown.edu) is a professor in the Security Studies Program within Georgetown University's Edmund A. Walsh School of Foreign Service.

This research note is motivated by my own experience with such programs in my capacity as investigating officer (IO) for my university's honor council on which I have served for over a decade as an IO and as a member on various hearing boards established to evaluate the merits of specific claims of academic integrity violations and the appropriate sanction should the evidence merit such measures.

During the height of the COVID 19 pandemic, I was asked to investigate an alleged honor code violation based upon reports from Panopto—a popular online proctoring program—that the student in question made repeated eye movements while taking numerous online quizzes throughout the semester. Based on the student's eye movements, which were flagged by the program as indicative of possible cheating, the instructor believed that the student in question was accessing inappropriate information during the assessments. The faculty member had no additional supporting evidence to buttress this claim apart from the videography of the student averting her gaze.

During the investigation, I watched hours of Panopto footage of this student taking her dozen or so quizzes. I observed the invasive protocol demanded by the platform of the student taking the requisite 360-degree scan of her testing environment for each quiz as well as videographic footage of her, filmed from the mid-torso up, taking each quiz. During most of the quizzes, the student engaged in frequent gaze aversion often gazing upward to her right. These eye movements and the videographic attestation of them comprised the sole basis of her faculty's report accusing her of academic dishonesty.

I was baffled by the claim that ocular motion was probative of cheating given the numerous studies of gaze aversion and gaze perseverance in cognitive functions such as information retrieval, visual-spatial imagination, and creative thought. Myriad studies evidence that the specific direction of a subject's gaze aversion seems to be tied to the nature of the information being recalled as well as the hemispheric distribution of that information in the subject's brain (*inter alia* Benedek et al., 2017; Bergstrom & Hiscock, 1988; Buchanan et al., 2014; Cai & Van der Haegen, 2015; Connaughton et al., 2017).

I summarized key findings of this vast literature for the instructor and to my honor council colleagues arguing that such movements are natural and not necessarily evidence of malfeasance. The instructor countered that the quizzes on which she had the most gaze aversion were those quizzes on which her scores were the lowest, indicating that the student had cheated on those questions. The professor presented data for each question. The student appeared to be spending the most time on those questions for which she engaged in gaze aversion and was unable to answer all of the questions given the time constraints of the quizzes. The professor inferred from this observation that the student must be attempting to access inappropriate resources to answer the questions for which she did not know the correct response. This study contends that there is another explanation that does not involve cheating: The student was gaze averting on the hardest questions attempting to recall requisite information but could not recall the information in a timely fashion.

Because academic integrity is a foundational value of academic institutions, there are numerous ethical arguments motivating the need to deter academic dishonesty (Coghlan et al., 2021; Kaufman, 2008), I was extremely uncomfortable that it was possible that this student, a woman from an under-represented group in a health program, was being accused of extensive cheating with no other supporting evidence than videography of her gaze aversion. This case deeply discomfited me because I believe that the singular reliance upon this program and the eye movements it flagged undermined the collective responsibility of faculty and administrators to be fair in the tools we use to detect and report suspected academic dishonesty as well as in the ways these allegations are adjudicated (International Center for Academic Integrity, 2021). Given that online invigilation programs are increasingly a tool in the toolbox

  http://journals.naspa.org/jcc https://doi.org/10.1080/2194587X.2023.2257335

that faculty are deploying to identify potential cheaters (Nigam et al., 2021), there is a need for faculty and university administrators to seriously evaluate the serious negative externalities of these programs and the presumed benefits of their use.

Notably, these programs have occasioned controversy due to demonstrable issues with the underlying technology as well as the ways in which the platforms are deployed (see Henry & Oliver, 2022; Khalil et al., 2022). Foundationally, the algorithms upon which these programs are based are themselves biased in that they have difficulty identifying the faces of subjects who are not white and male (Buolamwini, 2017; Buolamwini & Gebru, 2018; Lohr, 2018); Castelvecchi, 2020; Raji et al., 2020). They are highly invasive of privacy (Coghlan et al., 2021). They presume students have access to the required technology (i.e., high-speed connection with few interruptions, computer or device with a quality camera, a private space to take exams). Access to high-quality internet is critical because many of these programs shut down the assessment when the internet connection is lost. They are also opaque with regard to how the programs identify alleged cheating behavior apart from eye, lip, and head movements, and the appearance of other people or objects (cell phones, tablets, textbook) in the field of surveillance (Dawson, 2021; Coghlan et al., 2021; Nigam et al., 2021). However, this research note shows that in addition to these salient concerns, there is an equally discomfiting but so-far unremarked upon problem: the claim that eye movements are dispositive evidence of cheating. In fact, eye movements relate to the cognitive functions associated with information recall and creative thought and vary with the kind of problems being considered, the hemispheric allocation of information among other factors that are not randomly distributed (Benedek et al., 2017; Ehrlichman & Weinberger, 1978; Ehrlichman et al., 2007; Ellis et al., 2011; Doherty-Sneddon & Phelps, 2005; Glenberg et al., 1998; Kocel et al., 1972; Lindner et al., 2014; Markson & Paterson, 2009; Micic et al., 2010; Salvi & Bowden, 2016; Salvi et al., 2015; Susac et al., 2014; Walcher et al., 2017). More worrisome yet is the fact that gaze perseverance differs by gender and hormone levels (Alexander & Son, 2007), and some studies have even found that persons of different cultural backgrounds have different patterns of gaze persistence (Chua et al., 2005; Nisbett & Miyamoto, 2005; Takao et al., 2018). How can eye movements, which are tightly associated with cognitive processes foundational to information recall and creative thinking be mobilized as evidence of academic misconduct?

I organize the remainder of this paper as follows. The next section reviews the basics of online proctoring programs and the extant and burgeoning literature on the ethical dimensions of their use. The third section mainly contributes to this discussion of online proctoring tools by turning to the psychological and sociological literatures to exposit the critical role of ocular motility in various kinds of cognitive recall. This essay concludes with a discussion of the implications of these findings and propose alternative methods of ensuring adherence to academic integrity.

Online Proctoring: The Good, the Bad, and the Ugly

Both students and the university benefit from systems of integrity that imply reciprocal obligations. Academic integrity is a

> commitment to the fundamental values of honesty, trust, fairness, respect, responsibility, and courage . . . . From these values, ethical academic behavior is defined, creating a community dedicated to learning and the exchange of ideas. For a post-secondary institution, ensuring that students and staff are acting in an academically integrous manner reinforces an institution's reputation such that an academic transcript,

> degree, or certificate has a commonly understood meaning, and certain knowledge and skills can be inferred of its holder. In turn, individual students benefit from this reputation and from the inferences made based on their academic accomplishments. At a broader level, understanding the fundamental values of academic integrity that are held within a community—and behaving in accordance with them—instills a shared framework for professional work, making explicit the value of the mastery of knowledge, skills, and abilities. (Holden et al., 2021, p. 1. See also International Center for Academic Integrity, 2021)

Concerns about students' adherence to these codes are sources of concern among faculty and institutions of higher learning alike.

To promote academic integrity, higher educational institutions have established honor councils and have promulgated academic integrity codes for students as well as systems and procedures to enforce them. Founded or ill-founded, there is a belief that student cheating is increasing (see Adzima, 2020; Chiang et al., 2022). These apprehensions have been exacerbated with the increasing popularity of online classes (e.g., Hard et al., 2006; Harmon & Lambrinos, 2008; Holden et al., 2021; King & Case, 2014). In 2017, Allen and Seaman reported that 30% of students in degree-granting U.S. colleges and universities had enrolled in at least one online course while Jaschik and Lederman (2020) reported that 46% of surveyed faculty indicated that they had taught at least one fully online course. Most of those surveyed faculty (60%) indicated that academic fraud was more common in online classes than in traditional classroom settings while 39% said they believed it occurs equally in both settings. This buttresses the work of Srikanth and Asmatulu (2014) and Stuber-McEwen et al. (2009) according to which faculty said they believed students are more likely to cheat in online testing environments than in traditional classroom-based testing environments. There are contradictory empirical results about the degree to which these suspicions are well-founded (summarized in Adzima, 2020; Chiang et al., 2022).

Given that the COVID-19 pandemic has given a fillip to the shift toward online teaching that was well underway before the pandemic struck, there is an increasing urgency to have fair, integrous means with which to assess student adherence to academic codes of conduct. One of the tools that have become increasingly popular is online proctoring programs. Online proctoring software emerged in 2008 (Coghlan et al., 2021). The demand for online exam supervision technologies was already expanding concomitant with the burgeoning demand for online courses in higher education prior to the pandemic (Allen & Seaman, 2017; Johnson et al., 2019). However, this surge in global demand further ballooned with the sudden emergence of the COVID-19 pandemic and the swift movement of universities to online or hybrid course delivery. Grajek (2020), citing the results of an April 2020 poll, observed that 54% of surveyed institutions were already using remote proctoring services and another 23% were considering doing so. Given that online education will continue to grow, so will the demand for online invigilation programs (Dawson, 2021; Flaherty, 2020; Ginder et al., 2019; Goldberg, 2021).

These platforms (e.g., Examity and Proctorio, among numerous others noted in Dawson 2021) have a number of common features. Examinees are typically prompted to activate their web camera and provide a 360-degree scan of the room. Ostensibly, this is to ensure that the examination area of free of proscribed materials or other persons who may help the person during the assessment. Some of these programs can also detect the presence of other devices (e.g., mobile phones, tablets) that a student could use to access information inappropriately. Students will typically be prompted to show some sort of photo identification to ensure that the correct person is taking the assessment. These technologies capture an array of deeply private information from the student's devices and from their photo IDs, which includes biometric data, keystroke data, as well as other audio and visual details of the students. These data may be

   https://doi.org/10.1080/2194587X.2023.2257335

stored for weeks or months in facilities with differing regimes of security. The requirement for an invasive 360-degree scan of the room affords other opportunities to obtain photographic imagery that is not remotely germane to the assessment at hand, but which may be injurious to the student or others with whom the student lives.

Equally disconcerting is that fact that human invigilators can watch, pause, rewind, and replay the footage of the students in private. This fact gives rise to other concerns about less salubrious use of these videos. As Coghlan et al., 2021 noted, in traditional exam areas

> The presence of other students, instructors, and invigilators provides a degree of security and protection. In contrast, the student who is invigilated by OP [online proctoring] technology cannot know, even when they are given assurances by universities and OP companies, how the online human proctor uses the video. (p. 1596)

Students and student advocates have raised concerns that these processes are deeply invasive and consequently raise moral concerns about privacy which neither university policies or domestic privacy laws adequately address (Coghlan et al., 2021; Pardo & Siemens, 2014). It should be noted that in August 2022, a federal judge in the United States District Court, Northern District of Ohio Eastern Division ruled in favor of a student enrolled in a public university (Cleveland State University) that the room scan comprised an unreasonable search under the Fourth Amendment (Ogletree v Cleveland State University, 2022).

Second, there is a large and growing body of literature that makes it clear that commercial panoptical surveillance programs and facial recognition programs have significant race and gender bias (Asher-Schapiro, 2020; Castelvecchi, 2020; Leslie, 2020). Buolamwini (2017), who is Black, studied facial analysis software that is used in a variety of applications. When she submitted photos of herself to several commercial facial-recognition programs, the programs often failed to recognize her photos as depicting a human face, and, when they did, the programs consistently incorrectly assessed her gender (Hardesty, 2018). Similarly, Buolamwini and Gebru (2018) in their study of commercial facial recognition systems observed, "substantial disparities in the accuracy of classifying darker females, lighter females, darker males, and lighter males in gender classification systems" and argued that these algorithms and packages "require urgent attention if commercial companies are to build genuinely fair, transparent and accountable facial analysis algorithms" (Buolamwini & Gebru, 2018, p. 1). These studies of facial recognition programs matter because they are at the basis of the panoptic surveillance used in commercial proctoring programs.

Swauger (2020) dilated upon these issues at length:

> While racist technology calibrated for white skin isn't new (everything from photography to soap dispensers do this), we see it deployed through face detection and facial recognition used by algorithmic proctoring systems. Students with black or brown skin have been asked to shine more light on themselves when verifying their identities for a test, a combination of both embedded computer video cameras and facial recognition being designed by and for white people. A Black student at my university reported being unable to use Proctorio because the system had trouble detecting their face, but could detect the faces of their white peers. While some test proctoring companies develop their own facial recognition software, most purchase software developed by other companies, but these technologies generally function similarly and have shown a consistent inability to identify people with darker skin or even tell the difference between Chinese people. Facial recognition literally encodes the invisibility of Black people and the racist stereotype that all Asian people look the same.

Swauger's entire essay should be required reading of faculty reporting or investigating suspected academic misconduct and arguably, it should be included in any antiracism training or curriculum required by faculty. These issues arise because of the algorithms used to extract information about faces and the biases in the databases upon which they are trained: in one common facial-recognition data set, 80% of the faces are white, and 75% are male (Lohr, 2018). This underlying technology of online proctoring tools and their inherent biases matter for several reasons.

As previously noted, these AI algorithms perform various kinds of facial recognition/detection and analysis. Several automated proctoring platforms use machine learning such that the program can recognize movements of the head or eyes and repeated glancing away from the screen, which the algorithm flags as suspicious. If they cannot recognize the faces of nonwhite and/or nonmale students, how can they confirm identity of the test taker? Given that these technologies monitor facial movements, how can they accurately identify head and facial behaviors of the test-taker properly if it cannot accurately recognize the geographical points of reference on those faces in the first place? Will nonwhite males be more likely flagged for additional scrutiny not because of anything the student has done, but because the student is not white or male? Conversely, will these programs be more likely to flag white and/or male students as engaging in inappropriate movement because they can more accurately recognize the geographic points of references in their faces? Given that faculty face time constraints, these tools could prompt instructors to look for academic fraud disproportionately among one group of students, resulting in a systematically biased group of students being reported to honor councils and sanctioned.

There are other challenges that emerge from the reliance upon such programs that have equity and accessibility issues for the students concerned. In theory, these programs expand access to education by offering the promise of expanded online educational offerings while purporting to maintain high standards of academic integrity. Presumably, these offerings would benefit students who require more flexibility in their educational programs (e.g., working adults, parents, or students with mobility limitations, military personnel among others). Considered from this vantage point, online invigilation platforms may advance more equitable outcomes for groups that have been excluded from traditional, classroom-based education (Coghlan et al., 2021).

However, these proctoring platforms undermine equitable access to educational opportunities and outcomes. First, they have significant technological demands. They presume access to a computer or tablet with a high-quality camera and uninterruptable and reliable internet connections (Goldberg, 2021). Second, they also expect students to have a private space, which is free of distractions, with good lighting. Poorer students may not have access to a private space or quality technology. Women who have dependents or live-in partners frequently report that their personal space is violated when husbands or children barge into the room to ask questions or make other demands (Hall, 2021). Some people live in congested urban environments where ambient noise is distracting no matter where they are in their residences.

These factors also interact with the technological basis by which the programs flag suspected academic fraud: facial movements, gaze aversions, abrupt head movements. Working parents may be flagged for academic dishonesty when a child or partner seeks her attention during the exam. (Pet owners report similar behaviors from their companion animals.) Gaze perseverance may be more difficult for persons in high distraction environments. Traditional classrooms and testing areas are generally free of visual distractions: students' homes are not.

  http://journals.naspa.org/jcc https://doi.org/10.1080/2194587X.2023.2257335

Third, these technologies are deeply ableist despite potentially expanding educational access for those with mobility limitations. Persons who are neuro-divergent may find it very difficult to engage the computer screen for long periods of time or have sustained gaze perseverance. Students with physical ailments and disability may find it difficult to sit in a confined position with little or no movement over long durations (Goldberg, 2021).

In short, students who may be falsely accused of academic dishonesty include those students who are, more often than not, women with family duties whose attention is drawn away from the screen; who have physical and/or neurological disabilities who may find it physically difficult or impossible to do what these programs require; poorer students who lack the ability to purchase a computer with a high-quality camera or other recording requirements; and women and racial minorities whose faces are less likely to be recognized as human by the AI algorithms these programs use. Admittedly, some of these problems can be mitigated either through the band-width requirements of the platform or through university action such as providing equipment on loan for selected students or even providing them space on campus where they can take their exam in private without distractions. However, neither the platform nor the university can completely obviate the impacts of these platforms that differ by students' economic class, race, gender, and age (Goldberg, 2021).

Gaze Aversion: What Is It Good For?

While aforementioned summary of problems in these online proctoring programs continue to garner scholarly and policy analytic attention, one of the behaviors these programs detect has not garnered the attention it deserves. Namely, these programs flag head, face, and eye motility as evidence of potential academic fraud. In other words, if the program detects that a student's gaze is not persistently aimed at the screen, the program assumes that the averted gaze is searching for contraband material or other sources of assistance (like a person) to enable academic dishonesty. Once flagged by the online invigilation platform, the instructor can carefully review the video and file a report of suspected honor code violation.

However, this assumption that gaze aversion is evidence of academic dishonesty is deeply problematic. Faculties and administrators who rely upon these programs to detect cheating may not be aware that there is a large scientific literature on individual gaze aversion or gaze perseveration during *inter alia* problem-solving, information recall, visual-spatial imagination, and creative thought. Presumably, students who avert their eyes trying to remember an elusive concept would mostly likely to be flagged for possible cheating. And if the professor finds that footage compelling, she may file a report of suspected academic misconduct. If the hearing board or other adjudicating body believes that gaze aversion is evidence of cheating that student may even be sanctioned with devastating impacts upon that student's professional and academic career.

Therefore, what light does the expansive literature on gaze aversion shed upon this academic integrity policy dilemma? First and foremost, numerous scientists using various experiments over decades have found that individuals will avert their gaze in one direction or another, depending upon the kind of problem being solved, the kind of information being retrieved, and the hemispheric allocation of that information in the brain. Benedek et al. (2017) observed of eye movement and cognition that

> Gaze aversion refers to the aversion of one's eyes (or even brief eye closure) during demanding processes requiring internal attention. There is strong evidence that gaze aversion serves the function of reducing cognitive load during demanding cognitive activities (e.g., mental arithmetic) by avoiding the processing

> of potentially distracting external stimuli in order to shield internal processes" (Benedek et al., 2017, p. 2. See also Doherty-Sneddon & Phelps, 2005; Markson & Paterson, 2009; Walcher, Korner & Benedek 2017).

Salvi and Boden (2016) noted that

> More frequent movements of the eyes are found when people are engaged in tasks that require a search of long-term memory than when they are engaged in tasks that do not require long-term memory search, even when the tasks do not seem to have any visual component (Salvi and Boden, 2015 p. 2).

Similarly, Ehrlichman et al. (2007) and Micic et al. (2010) reported that they too found that lateral eye movements were systematically related to internal thought processes and that people moved their eyes twice as often when they were retrieving information from their long-term memory than when they were performing tasks that did not require such retrieval.

Bergstrom and Hiscock (1988) reported that gaze perseverance was correlated with the memory demands of different kinds of questions while Glenberg et al. (1998) reported that individuals averted their gaze in various directions when they were trying to respond to different kinds of questions. Ehrlichman and Weinberger (1978) found that participants were more likely to have gaze persistence (or stare) when they were answering visuospatial questions rather than verbal questions. Similarly, Markson and Paterson (2009) found that persons engaging in tasks requiring visual-spatial imagination were more likely to engage in gaze aversion from the experimenter's face because maintaining eye contact "disrupts accurate imagination of this pathway" whereas "averting gaze or looking at other visual stimuli does not." The authors find that gaze aversion benefits cognitive performance "not just by disengaging visual attention from irrelevant visual information, but also by interrupting social interaction processes involved in face-to-face communication (p. 553). The authors do not study this phenomenon when the subject is engaged with a computer screen. During a knowledge-assessing multiple-choice exam, Lindner et al. (2014) in their assessment of the "gaze bias effect" found that eye movements varied with degrees of knowledge about the subject matter queried. This diverse literature vitiates the claims of online invigilation programs that gaze aversion can be equated with suspected academic dishonesty. In fact, this literature makes a compelling case that the use of gaze aversion as an indicator of academic fraud is likely to produce many false positives, punishing students for violating academic integrity when they have not done so.

Not only is gaze aversion a critical component of information retrieval, but scholars have also found that we avert our eyes in different directions, contingent upon the task we are assigned. Kocel et al. (1972) found that:

> The direction of lateral eye movement elicited by reflective questions is strongly modified by the cognitive demands of the question; verbal and arithmetical questions elicit more movements to the right than do spatial and musical questions. This is consistent with the lateral specialization of the human brain for these cognitive processes. (p. 223)

Ellis et al. (2011) observed various individuals' eye movements that occurred during problem solving (anagrams) to understand how persons solve the problems. Susac et al. (2014) monitored eye movements during mathematical problem solving to derive insights into the cognitive processes and contended that such eye movement "may be used for exploring problem difficulty, student expertise, and metacognitive processes" (p. 555). They also cited an eye-tracking study according to which "insight

solutions are preceded by longer blink durations and gazing away from the stimulus, which was interpreted as a shutting out or interruption of visual input in moments of insight" (Benedek et al., 2017, p. 2; see also Salvi et al., 2015; Salvi & Bowden, 2016). Benedek et al., 2017 concluded from these varied studies that indicated that ocular motion supports internally directed recall by diminishing distracting sensory stimulation.

Not only does gaze aversion vary with the kind of problem being solved or concept being considered, but there are also biological bases for the observed variation in gaze aversion. Notably, Alexander and Son (2007) found important correlations between gender differences in eye movements during problem-solving on the one hand and differential levels of androgens on the other. This finding is extremely important because it may imply that using such a measure as "gaze aversion" or "gaze persistence" absent other information will disproportionately and adversely affect women who are more likely to avert their gaze during recall than men, holding other factors constant. Alexander and Son (2007) also observed that there was as much variation among women as there was between men and women. They reported that women with "higher circulating testosterone levels" were more likely to engage in gaze persistence during problem-solving.

Studies of eye movements have also found differences between people of different ethnic groups and race although the reasons for these differences are not obvious. For example, Chua et al. (2005) studied different eye fixation patterns among European American and international Chinese graduate students respectively by presenting them 20 pictures of foregrounded animals and 16 pictures of foregrounded nonliving things (cars, planes, boats, etc.). Most of these photos were "culturally neutral"; although the team did include "some Western and Asian objects and backgrounds." They then studied eye fixation patterns. They found that both groups' eye-movement patterns differed in several ways. Whereas the European American participants looked at the foregrounded object sooner and longer than did the international Chinese participants, the latter group looked more at the background than did the former. The authors attributed these findings to cultural ways of seeing. Others have studied other visual phenomena in cognitive processes across cultures (Nisbett & Miyamoto, 2005; Takao et al., 2018).

It far from obvious how or if these studies are germane to the kinds of eye movements that trigger suspected cheating on online invigilation programs, but these works that examine cultural ways of seeing should raise questions about different patterns in gaze perseverance and aversion that exist among different groups and whether this has implications for the programs' determination that a student has engaged in suspicious behavior. It should least motivate reflection on the myriad things that users of these products do not understand about their underlying technologies and in the nonrandomly distributed behaviors they detect as potential evidence of cheating.

Conclusions and Recommendations

This review of the salient literatures surrounding both the underlining AI algorithms that online proctoring platforms employ; the various kinds of biases that inhere in their use; and the simple fact that one of the things they detected—eye movement—is elemental to cognitive recall, which varies according to gender and possibly race, have important implications for universities, staff, and faculty.

For university administrators, there should be a serious discussion about whether to use these programs and if so, under what circumstances. As this review demonstrates, the AI algorithms they employ are less capable of identifying the faces of persons of color as well as women. Even if companies

were to use more representative databases to train these programs, other problems would perdure. Notably, they are invasive. The recent federal court ruling that the requirement for panoramic room-scans violates the Fourth Amendment should motivate reconsideration of aspects of these programs' requirement. These invasive room scans also raise privacy concerns because they capture and retain biometric and other personal information that is stored for some time in locations about which a minimal amount is known. As Kröger et al. (2020) detailed in their analytical synthesis of literature across several disciplines,

> eye tracking data may implicitly contain information about a user's biometric identity, gender, age, ethnicity, body weight, personality traits, drug consumption habits, emotional state, skills and abilities, fears, interests, and sexual preferences. Certain eye tracking measures may even reveal specific cognitive processes and can be used to diagnose various physical and mental health conditions. (p. 226)

What do universities know about the safety of stored data? Who would be liable for data breaches and what steps can be taken to protect students whose data have been stolen or otherwise used inappropriately?

While these online invigilation programs may increase universities' confidence that they can expand their online offerings, which likely advantage some underserved populations (working students, parents, those with mobility challenges, military personnel, etc.), they also impose burdens that are in excess of those demanded of classroom-based learning and assessments. They require the possession of quality computers or tablets with a high-quality camera and access to uninterrupted high-speed internet. The technologies assume that students have access to a private space in their living quarters, and they presume that all individuals' privacy can be and will be respected during the evaluation. They are also very ableist: neurodivergent persons may find it difficult to remain visually focused upon the screen and some persons with physical ailments or disabilities may find it difficult to remain in a fixed position to avoid triggering the fraud flag. Some of these issues can also be mitigated. The companies that provide these platforms are continually innovating to bring down the dependence upon bandwidth and to mitigate exam closure upon loss of internet connections. Universities can provide loaner equipment and even designated testing areas for students who require it. However, what cannot be mitigated is the basic assumption that gaze aversion is evidence of academic malfeasance. These various considerations should prompt universities to consider whether, overall, the use of these online proctoring programs align with other university goals such as promoting and protecting diversity, equity, and inclusion. One way to ensure this is to collect data on who was reported, the sanctions they received, details on the reporting faculty, and composition of committees evaluating the charge and determining what if any punishment is required. Ideally, these data should be available to students, faculty, and administrators alike to hold all parties accountable for their roles in creating environments that foster academic integrity.

For faculty, who report suspected honor council violations (Neumeister, 2019), as well as academic integrity councils, which rely upon these programs to detect and punish academic dishonesty, there should be a greater awareness of the biases that inhere in these programs' underlying technology and deployment but also education about eye movements and what they mean. If faculty understood that the kinds of eye motions detected by these programs are part of cognitive processes that are involved in the very assessments being invigilated, they may be less likely to use eye movements as the kind observed as the sole basis of making charges of academic dishonesty.

A strong case can and should be made that gaze aversion and other mobility (fidgeting in a seat, moving one's head to release stress) should not be used on their own to find a student guilty of academic

misconduct. Other forms of confirmatory evidence should be required. However, there is a case to be made for not using these platforms at all. After all, there is strong evidence to suggest that the sample of students flagged for academic misconduct will be biased. Even the report of suspected academic fraud can be devastating to an innocent student and erode their confidence in their relationship with faculty.

If exams were administered in the classroom setting, instructors and invigilators would monitor the students for suspected cheating. This in-person function can easily be approximated in the remote environment on Zoom, Microsoft Teams, Blackboard Collaborate, or other similar platforms. In large classes, students could be assigned to specific rooms or sections, depending upon the nomenclature of the platform, with invigilators assigned to these rooms. Such invigilation is of course subject to biases as well. Invigilators may pay particular attention to poorly performing students on the flawed assumption that good students do not need to cheat when in fact high performing students do cheat (Beasley, 2016; Burrus et al., 2007; Jones, 2011). Some may suspect that student athletes are more likely to cheat while others may hold race or gendered stereotypes about who cheats. However, all of these biases also hold when faculty evaluate the biased sample of students flagged as cheaters by the online program. Thus, online invigilation programs may concentrate and amplify–rather than mitigate–extant biases held by the human invigilators (Neumeister, 2019). However, such options only exist for synchronous assessments.

Dawson (2021) offered a number of meaningful suggestions that may guide the decision to use online proctoring programs and, if so, how. He first argued that such online proctoring should be used only as a last resort rather than the default tool for several reasons. First, these proctoring platforms often undermine equity, diversity, adversity, and accessibility by giving an advantage to groups who are already advantaged while further entrenching the disadvantages of others. Second, Dawson identified the limited utility of such online proctoring. For example, it may be useful for invigilating lower-level assessments, such as memorization. However, if factual recall is not required for an assessment, he suggested that a higher-order assessment is more appropriate for when such online invigilation is obviated. And if despite all cautions, online proctoring is still used, he contended that students be given an alternative assessment if they feel uncomfortable with such invigilation regimes or are unable to take their assessment under the conditions they impose.

Perhaps a better strategy to assess all but the lower-level functions during online exams is to develop assessment instruments that are more resilient to online academic misconduct, such as: judiciously setting time limits; changing the nature of the questions to emphasize problem solving and the means of solving problems rather than assessing the final answer; allowing the exams to be open-note, open-net and open-book; and the introduction of stern warnings about the consequence of cheating at the onset of an assessment. (For suggestions see, *inter alia*, Nguyen et al., 2020; Whisenhunt et al., 2022; Zaidi et al., 2018; Corrigan-Gibbs et al., 2015; Bearman et al., 2020.)

This research note is intended to foster greater interest in understanding and studying these programs and what they do and how and what their increasing use means for higher education. While scholars and practitioners await the results of such future studies, perhaps it is helpful for universities' honor councils to review students sanctioned as a result of these technologies. Given that these allegations of cheating can have career-wrecking implications, reporting faculty should be able to marshal actual evidence of cheating rather than vague concerns about "gaze aversion." Universities should revisit any and all cases wherein students have been found guilty of academic misconduct and *ex post facto* absolve students of such accusations where gaze aversion is the sole evidence provided for findings of academic misconduct. Prospectively, academic integrity councils should demure from using such evidence as

dispositive evidence of malfeasance and require other, supporting evidence for such a finding. Students' lives are at stake. If we do not take our obligations seriously, who will?

Disclosure Statement

No potential conflict of interest was reported by the author(s).

ORCID

C. Christine Fair http://orcid.org/0000-0002-6240-3863

References

Adzima, K. (2020). Examining online cheating in higher education using traditional classroom cheating as a guide. *Electronic Journal of E-Learning*, *18*(6), 476–493. https://doi.org/10.34190/JEL.18.6.002

Alexander, G. M., & Son, T. (2007). Androgens and eye movements in women and men during a test of mental rotation ability. *Hormones and Behavior*, *52*(2), 197–204. 10.1016/j.yhbeh.2007.01.011

Allen, I. E., & Seaman, J. (2017, May). *Digital compass learning: Distance education enrollment report 2017*. Babson Survey Research Group, e-Literate, and WCET. https://files.eric.ed.gov/fulltext/ED580868.pdf

Asher-Schapiro, A. (2020, November 17). Online exams raise concerns of racial bias in facial recognition. *Christian Science Monitor*. https://www.csmonitor.com/Technology/2020/1117/Online-exams-raise-concerns-of-racial-bias-in-facial-recognition

Bearman, M., Dawson, P., O'Donnell, M., Tai, J. H.-M., & Jorre de St Jorre, T. (2020). *Ensuring academic integrity and assessment security with redesigned online delivery.* Deakin University. https://dteach.deakin.edu.au/wp-content/uploads/sites/103/2020/03/DigitalExamsAssessmentGuide1.pdf

Beasley, E. M. (2016). Comparing the demographics of students reported for academic dishonesty to those of the overall student population. *Ethics & Behavior*, *26*(1), 45–62. https://doi.org/10.1080/10508422.2014.978977

Benedek, M., Stoiser, R., Walcher, S., & Körner, C. (2017). Eye behavior associated with internally versus externally directed cognition. *Frontiers in Psychology*, *8*, Article 1092. https://doi.org/10.3389/fpsyg.2017.01092

Bergstrom, K. J., & Hiscock, M. (1988). Factors influencing ocular motility during the performance of cognitive tasks. *Canadian Journal of Psychology/Revue Canadienne de Psychologie*, *42*(1), 1. https://doi.org/10.1037/h0084174

Buchanan, H., Markson, L., Bertrand, E., Greaves, S., Parmar, R., & Paterson, K. B. (2014). Effects of social gaze on visual-spatial imagination. *Frontiers in Psychology*, *5*, Article 671. https://doi.org/10.3389/fpsyg.2014.00671

Buolamwini, J., & Gebru, T. (2018). Gender shades: Intersectional accuracy disparities in commercial gender classification. *Proceedings of Machine Learning Research, 81*(1), 1–15. http://proceedings.mlr.press/v81/buolamwini18a/buolamwini18a.pdf

Buolamwini, J. A. (2017). *Gender shades: intersectional phenotypic and demographic evaluation of face datasets and gender classifiers* [Doctoral dissertation, Massachusetts Institute of Technology]. https://dspace.mit.edu/bitstream/handle/1721.1/114068/1026503582-MIT.pdf

Burrus, R. T., McGoldrick, K., & Schuhmann, P. W. (2007). Self-reports of student cheating: Does a definition of cheating matter? *The Journal of Economic Education*, *38*(1), 3–16. https://doi.org/10.3200/JECE.38.1.3-17

Cai, Q., & Van der Haegen, L. (2015). What can atypical language hemispheric specialization tell us about cognitive functions? *Neuroscience Bulletin*, *31*(2), 220–226. https://doi.org/10.1007/s12264-014-1505-5

Castelvecchi, D. (2020). Is facial recognition too biased to be let loose? *Nature*, *587*(7834), 347–350. https://doi.org/10.1038/d41586-020-03186-4

Chiang, F. K., Zhu, D., & Yu, W. (2022). A systematic review of academic dishonesty in online learning environments. *Journal of Computer Assisted Learning*, *38*(4), 907–928. https://doi.org/10.1111/jcal.12656

Chua, H. F., Boland, J. E., & Nisbett, R. E. (2005). Cultural variation in eye movements during scene perception. *Proceedings of the National Academy of Sciences*, *102*(35), 12629–12633. https://doi.org/10.1073/pnas.0506162102

Coghlan, S., Miller, T., & Paterson, J. (2021). Good proctor or "big brother"? Ethics of online exam supervision technologies. *Philosophy & Technology*, *34*(4), 1581–1606. https://doi.org/10.1007/s13347-021-00476-1

Connaughton, V. M., Amiruddin, A., Clunies-Ross, K. L., French, N., & Fox, A. M. (2017). Assessing hemispheric specialization for processing arithmetic skills in adults: A functional transcranial Doppler ultrasonography (fTCD) study. *Journal of Neuroscience Methods*, *283*, 33–41. https://doi.org/10.1016/j.jneumeth.2017.03.010

Corrigan-Gibbs, H., Gupta, N., Northcutt, C., Cutrell, E., & Thies, W. (2015). Deterring cheating in online environments. *ACM Transactions on Computer-Human Interaction (TOCHI)*, *22*(6), 1–23. https://doi.org/10.1145/2810239

Dawson, P. (2021). *Strategies for using online invigilated exams*. TEQSA. https://www.teqsa.gov.au/sites/default/files/2022-10/strategies-for-using-online-invigilated-exams.pdf

Doherty-Sneddon, G., & Phelps, F. G. (2005). Gaze aversion: A response to cognitive or social difficulty? *Memory & Cognition*, *33*(4), 727–733. http://dx.doi.org/10.3758/BF03195338

Ehrlichman, H., Micic, D., Sousa, A., & Zhu, J. (2007). Looking for answers: Eye movements in non-visual cognitive tasks. *Brain and Cognition*, *64*(1), 7–20. https://doi.org/10.1016/j.bandc.2006.10.001

Ehrlichman, H., & Weinberger, A. (1978). Lateral eye movements and hemispheric asymmetry: A critical review. *Psychological Bulletin*, *85*(5), 1080. https://doi.org/10.1037/0033-2909.85.5.1080

Ellis, J. J., Glaholt, M. G., & Reingold, E. M. (2011). Eye movements reveal solution knowledge prior to insight. *Consciousness and Cognition*, *20*(3), 768–776. https://doi.org/10.1016/j.concog.2010.12.007

Flaherty, C. (2020, May 10). *Online proctoring is surging during COVID-19*. Inside Higher Education. https://www.insidehighered.com/news/2020/05/11/online-proctoring-surging-during-covid-19#:~:text=Online%20proctoring%20has%20surged%20during,)%20of%20third%2Dparty%20programs

Ginder, S. A., Kelly-Reid, J. E., & Mann, F. B. (2019, January). *Enrollment and Employees in Postsecondary Institutions, Fall 2017; and Financial Statistics and Academic Libraries, Fiscal Year 2017: First Look (Provisional Data)*. NCES 2019-021Rev. National Center for Education Statistics. https://files.eric.ed.gov/fulltext/ED591907.pdf

Glenberg, A. M., Schroeder, J. L., & Robertson, D. A. (1998). Averting the gaze disengages the environment and facilitates remembering. *Memory & Cognition*, *26*(4), 651–658. https://doi.org/10.3758/BF03211385

Goldberg, S. B. (2021). *Education in a pandemic: The disparate impacts of COVID-19 on America's students.* U.S. Department of Education. https://www2.ed.gov/about/offices/list/ocr/docs/20210608-impacts-of-covid19.pdf

Grajek, S. (2020, April 10). Educause COVID-19 quickpoll results: Help for students. *Educause Review.* https://er.educause.edu/blogs/2020/4/educause-covid-19-quickpoll-results-grading-and-proctoring

Hall, C. (2021, December 13). Women are facing greater interruption challenges with remote work than their male colleagues. *UConn Today.* https://today.uconn.edu/2021/12/women-are-facing-greater-interruption-challenges-with-remote-work-than-their-male-colleagues/

Hard, S. F., Conway, J. M., & Moran, A. C. (2006). Faculty and college student beliefs about the frequency of student academic misconduct. *The Journal of Higher Education*, *77*(6), 1058–1080. https://doi.org/10.1080/00221546.2006.11778956

Hardesty, L. (2018, February 11). Study finds gender and skin-type bias in commercial artificial-intelligence systems. *MIT News.* https://news.mit.edu/2018/study-finds-gender-skin-type-bias-artificial-intelligence-systems-0212

Harmon, O. R., & Lambrinos, J. (2008). Are online exams an invitation to cheat? *The Journal of Economic Education*, *39*(2), 116–125. https://doi.org/10.3200/JECE.39.2.116-125

Henry, J. V., & Oliver, M. (2022). Who will watch the watchmen? The ethico-political arrangements of algorithmic proctoring for academic integrity. *Postdigital Science and Education*, *4*(2), 330–353. https://doi.org/10.1007/s42438-021-00273-1

Holden, O. L., Norris, M. E., & Kuhlmeier, V. A. (2021, July). Academic integrity in online assessment: A research review. *Frontiers in Education, 6*, Article 639814. Frontiers Media SA. https://doi.org/10.3389/feduc.2021.639814

International Center for Academic Integrity. (2021). *The fundamental values of academic integrity* (3rd ed.). https://academicintegrity.org/images/pdfs/20019_ICAI-Fundamental-Values_R12.pdf

Jaschik, N., & Lederman, D. (2020). *The 2019 survey of faculty attitudes on technology: A study by Inside Higher Ed and Gallup*. Inside Higher Ed and Gallup. https://ir.westcliff.edu/wp-content/uploads/2020/01/2019-Survey-of-Faculty-Attitudes-on-Tech.pdf

Johnson, N., Bates, T., Donovan, T., & Seaman, J. (2019). *Tracking online education in Canadian universities and colleges: National survey of online and digital learning 2019 national report*. Canadian Digital Learning Research Association. https://eduq.info/xmlui/bitstream/handle/11515/37850/johnson-tracking-online-eduation-canadian-universities-colleges-cdlra-2019.pdf;sequence=5

Jones, D. L. (2011). Academic dishonesty: Are more students cheating? *Business Communication Quarterly*, *74*(2), 141–150. https://doi.org/10.1177/1080569911404059

Kaufman, H. E. (2008). Moral and ethical issues related to academic dishonesty on college campuses. *Journal of College and Character*, *9*(5), 1–8. https://doi.org/10.2202/1940-1639.1187

Khalil, M., Prinsloo, P., & Slade, S. (2022). In the nexus of integrity and surveillance: Proctoring (re) considered. *Journal of Computer Assisted Learning*, *38*(6), 1589–1602. https://doi.org/10.1111/jcal.12713

King, D. L., & Case, C. J. (2014). E-cheating: Incidence and trends among college students. *Issues in Information Systems*, *15*, 1. https://doi.org/10.48009/1_iis_2014_20-27

Kocel, K., Galin, D., Ornstein, R., & Merrin, E. L. (1972). Lateral eye movement and cognitive mode. *Psychonomic Science*, *27*(4), 223–224. https://doi.org/10.3758/BF03328944

Kröger, J. L., Lutz, O. H. M., & Müller, F. (2020). What does your gaze reveal about you? On the privacy implications of eye tracking. *Privacy and Identity Management. Data for Better Living: AI and Privacy: 14th IFIP WG 9.2, 9.6/11.7, 11.6/SIG 9.2. 2 International Summer School, Windisch, Switzerland, August 19–23, 2019, Revised Selected Papers*, *14*, 226–241. https://doi.org/10.1007/978-3-030-42504-3_15.

Leslie, D. (2020). *Understanding bias in facial recognition technologies: An explainer*. The Alan Turing Institute. https://doi.org/10.5281/zenodo.4050457

Lindner, M. A., Eitel, A., Thoma, G. B., Dalehefte, I. M., Ihme, J. M., & Köller, O. (2014). Tracking the decision-making process in multiple-choice assessment: Evidence from eye movements. *Applied Cognitive Psychology*, *28*(5), 738–752. https://doi.org/10.1002/acp.3060

Lohr, S. (2018, February 9). Facial recognition is accurate, if you're a white guy. *New York Times.* https://nyti.ms/2BNurVq

Markson, L., & Paterson, K. B. (2009). Effects of gaze-aversion on visual-spatial imagination. *British Journal of Psychology*, *100*(3), 553–563. https://doi.org/10.1348/000712608X371762

Micic, D., Ehrlichman, H., & Chen, R. (2010). Why do we move our eyes while trying to remember? The relationship between non-visual gaze patterns and memory. *Brain and Cognition*, *74*(3), 210–224. https://doi.org/10.1016/j.bandc.2010.07.014

Neumeister, J. R. (2019). Disparities at the intersections of race and gender in college student conduct processes: Student experiences, campus culture, and social justice [Doctoral dissertation, Loyola University Chicago]. https://www.proquest.com/docview/2384509872?pq-origsite=gscholar&fromopenview=true

Nguyen, J. G., Keuseman, K. J., & Humston, J. J. (2020). Minimize online cheating for online assessments during COVID-19 pandemic. *Journal of Chemical Education*, *97*(9), 3429–3435. https://doi.org/10.1021/acs.jchemed.0c00790

Nigam, A., Pasricha, R., Singh, T., & Churi, P. (2021). A systematic review on AI-based proctoring systems: Past, present and future. *Education and Information Technologies*, *26*(5), 6421–6445. https://doi.org/10.1007/s10639-021-10597-x

Nisbett, R. E., & Miyamoto, Y. (2005). The influence of culture: Holistic versus analytic perception. *Trends in Cognitive Sciences*, *9*(10), 467–473. https://doi.org/10.1016/j.tics.2005.08.004

Ogletree v Cleveland State University. (2022, August). https://bbgohio.com/wp-content/uploads/2022/08/MSJ-decision.pdf

Pardo, A., & Siemens, G. (2014). Ethical and privacy principles for learning analytics. *British Journal of Educational Technology*, *45*(3), 438–450. https://doi.org/10.1111/bjet.12152

Raji, I. D., Gebru, T., Mitchell, M., Buolamwini, J., Lee, J., & Denton, E. (2020, February). Saving face: Investigating the ethical concerns of facial recognition auditing. In *Proceedings of the AAAI/ACM conference on AI, ethics, and society* (pp. 145–151). Association for Computing Machinery. https://doi.org/10.1145/3375627.3375820

Robey, N., Dunn, R., Haskins, N., & Dickter, C. (2022). Disparities in student misconduct in higher education for students from underrepresented racial backgrounds or non-citizen visa status. *Journal of College and Character*, *23*(3), 238–257. https://doi.org/10.1080/2194587X.2022.2087682

Salvi, C., & Bowden, E. M. (2016). Looking for creativity: Where do we look when we look for new ideas? *Frontiers in Psychology*, *7*, 161. https://doi.org/10.3389/fpsyg.2016.00161

Salvi, C., Bricolo, E., Franconeri, S. L., Kounios, J., & Beeman, M. (2015). Sudden insight is associated with shutting out visual inputs. *Psychonomic Bulletin & Review*, *22*(6), 1814–1819. https://doi.org/10.3758/s13423-015-0845-0

Srikanth, M., & Asmatulu, R. (2014). Modern cheating techniques, their adverse effects on engineering education and preventions. *International Journal of Mechanical Engineering Education*, *42*(2), 129–140. https://doi.org/10.7227/IJMEE.0005

Stuber-McEwen, D., Wiseley, P., & Hoggatt, S. (2009). Point, click, and cheat: Frequency and type of academic dishonesty in the virtual classroom. *Online Journal of Distance Learning Administration*, *12*(3), 1–10. https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=c97bca797861f02f9e0ae12ce1914a9252be9334

Susac, A. N., Bubic, A., Kaponja, J., Planinic, M., & Palmovic, M. (2014). Eye movements reveal students' strategies in simple equation solving. *International Journal of Science and Mathematics Education*, *12*(3), 555–577. https://doi.org/10.1007/s10763-014-9514-4

Swauger, S. (2020). Our bodies encoded: Algorithmic test proctoring in higher education. In J. Stommel, C. Friend, & S. M. Morris (Eds.), *Critical digital pedagogy*. Pressbooks. https://pressbooks.pub/cdpcollection/chapter/our-bodies-encoded-algorithmic-test-proctoring-in-higher-education/

Takao, S., Yamani, Y., & Ariga, A. (2018). The gaze-cueing effect in the United States and Japan: Influence of cultural differences in cognitive strategies on control of attention. *Frontiers in Psychology*, *8*, 2343. https://doi.org/10.3389/fpsyg.2017.02343

Tatum, H. E. (2022). Honor codes and academic integrity: Three decades of research. *Journal of College and Character*, *23*(1), 32–47. https://doi.org/10.1080/2194587X.2021.2017977

Vredeveldt, A., Hitch, G. J., & Baddeley, A. D. (2011). Eyeclosure helps memory by reducing cognitive load and enhancing visualisation. *Memory & Cognition*, *39*(7), 1253–1263. https://doi.org/10.3758/s13421-011-0098-8

Walcher, S., Körner, C., & Benedek, M. (2017). Data on eye behavior during idea generation and letter-by-letter reading. *Data in Brief*, *15*, 18–24. https://doi.org/10.1016/j.dib.2017.09.009

Whisenhunt, B. L., Cathey, C. L., Hudson, D. L., & Needy, L. M. (2022). Maximizing learning while minimizing cheating: New evidence and advice for online multiple-choice exams. *Scholarship of Teaching and Learning in Psychology*, *8*(2), 140. http://dx.doi.org/10.1037/stl0000242

Witmer, H., & Johansson, J. (2015). Disciplinary action for academic dishonesty: Does the student's gender matter? *International Journal for Educational Integrity*, *11*(1), 1–10. https://doi.org/10.1007/s40979-015-0006-2

Zaidi, N. L. B., Grob, K. L., Monrad, S. M., Kurtz, J. B., Tai, A., Ahmed, A. Z., Gruppen, L. D., & Santen, S. A. (2018). Pushing critical thinking skills with multiple-choice questions: Does Bloom's taxonomy work? *Academic Medicine*, *93*(6), 856–859. https://doi.org/10.1097/ACM.0000000000002087