Online Proctoring Services:

Insights from North America

A Swissnex in Boston report commissioned by HSLU, the Lucerne University of Applied Sciences and Arts.

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Introduction

Online remote proctoring has emerged in the last decade as one of the many technologies transforming learning in higher education.

The rise of online programs, increasing digitization of course materials, and above all the shift to remote learning during the pandemic have prompted universities to seek new solutions to ensure the integrity of assessments. In North America, dozens of commercial solutions have emerged promising to deter and catch cheaters taking exams remotely. By installing surveillance and control devices on student computers, or by hiring live proctors to watch students over webcams, these companies serve as outsourced proctors for exams. Many promise that their proprietary AI (artificial intelligence) algorithms are specially designed to catch forms of cheating.

Yet, in assessing the US landscape of online proctoring, it is clear that remote proctoring services are not a cure-all solution. Scientific evidence for their effectiveness remains

slim. The services have come under severe criticism for AI bias and loose privacy protections. Students and faculty have protested their use. Many universities, after adopting the software in 2020, have turned away from commercial proctoring.

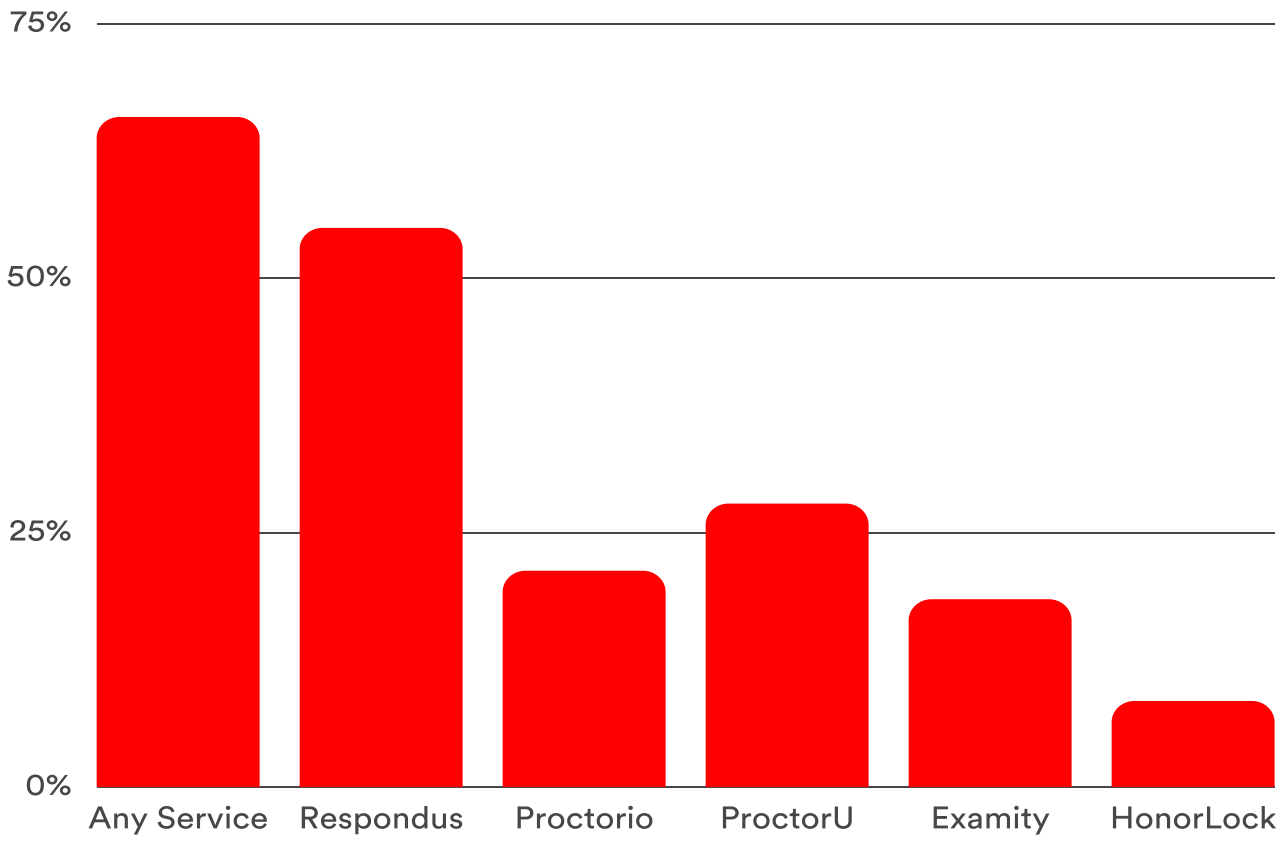
Even in cases where universities have found value in commercial online proctoring, they see it as one tool in a larger project of improving *processes and student outcomes*. Universities typically invest hundreds of hours in the technical and pedagogical setup and trainings necessary to support an online proctoring tool. **The ecosystem that supports the proctoring solution is just as important as the software itself**. Faculty must be trained on the uses and limitations of remote proctoring, students need clear instructions and rassurances, and procedures must be established for deciding cases of academic dishonesty. These structures determine the success or failure of remote proctoring. Introducing online proctoring software can – and should – be part of deeper discussions across the university about what constitutes academic dishonesty, and how to best prevent it through better pedagogy and procedures. Online monitoring software can only be one part of this solution.

Online Proctoring Insights

Online Proctoring Goes Mainstream

While proctoring solutions have been growing throughout the last decade, the pandemic was a watershed moment. Amid the rapid shift to online learning, universities scrambled to secure new remote proctoring solutions. Proctorio, one of the largest companies, experienced a more than 500% increase in exams monitored, from 4 million in 2019 to 21 million in 2020. A competitor, ProctorU, nearly tripled from 1.5 million exams monitored in 2019 to 4 million in 2020. At the same time, live proctoring services were short-staffed by pandemic lockdowns, and some universities had to switch from live proctoring to AI-based proctoring.

By November 2020, a majority of US universities were using one or more remote online monitoring tools. A study that scraped internet pages from 1,923 college websites found engagement with these major proctoring services:



Source: EDUCase.com

The Commercial Market for Online Proctoring

Dozens of US companies have entered the lucrative online proctoring market, offering a mix of services. There are generally five levels of monitoring available, in order from least intrusive (and cheapest) to most intrusive (and most expensive):

1. **Lockdown browser.** A secure web browser that does not allow switching between programs or tabs. This is a basic level of security, and all of the below options (#2-5) also usually include a lockdown browser.

2. **AI monitoring.** Students are recorded via webcam while taking the exam, but no human surveillance is present. AI technology is used to flag 'suspicious' behaviors. All burden is placed on the course instructors to examine any flagged behaviors and separate the false positives from actually suspicious behavior.

3. **AI with human audit at end.** After a recording, a company employee watches 'flagged behaviors' to separate false positives from genuine issues of concern. The employee then sends suspicious cases to the instructor, who must make the final determination.

4. **Partial live proctoring.** A company employee monitors live at the beginning of the exam, generally to verify student ID and to check the room for forbidden materials. Then the rest of the exam is watched via AI software, which flags 'suspicious' behaviors. Sometimes a human employee audit can be added as an extra service.

5. **Total live human proctoring** from start to finish.

The five largest players in the US commercial market are:

Respondus: Founded in 2000, it is one of the oldest and most established businesses in assessment technology. They began by offering tools for creation of online tests and student study aids, before moving into browser security with their Respondus Lockdown Browser (Level 1). During the pandemic they rapidly expanded their offerings to include the AI tool Respondus Monitor (Level 2). They relied on their market power with the lockdown browser to secure business from universities looking for a quick solution. They remain the most used commercial solution.

ProctorU: The company, founded in 2008, began by using webcams and screen sharing technologies for exam monitoring. One of the more established and trusted names in the business, it offers AI, live proctoring at beginning, or from start to finish, all with human audit (Levels 3, 4 or 5). It announced in 2021 that it would include human audit in all its services after finding that AI-only proctoring was not reviewed properly by instructors.

Proctorio: Founded in 2013, Procorio has grown to become one of the best known names in online proctoring. They have expanded aggressively into Europe, and are the only top-5 company that promises native integration with ILIAS. They have also generated the most controversy and bad press of any software, due in large part to their aggressive CEO. They offer AI-only monitoring, AI monitoring with audit, or full live monitoring (Levels 2, 3, or 5).

Examity: The company started in 2013 by offering more tailored proctoring services rather than a single solution. They have a strong profile with corporates, licensing agencies as well as MOOC platforms. They offer all levels of AI and live monitoring, including employee auditing (Levels 2 through 5).

Honorlock: Honorlock was founded in 2014 by two students who won a competition at their university in Florida. It is currently in use by over 300 educational institutions. Honorlock offers AI-only proctoring (Level 2) and optional human audit. It is distinguished by a high level of customized options that can be easily turned on or off for each exam.

Pricing is often difficult to determine, as companies write custom contracts based on the number of users. However, some general trends can be noted:

- Lockdown browsers are typically purchased in bulk by the university. Some open-source solutions exist. Respondus Lockdown Browser costs about $4000-5000 per year for an entire campus.

- AI proctoring is generally $5 or less per exam. Students or the university can often purchase bulk or unlimited packages. These packages, if used heavily, can result in per exam costs that are less than $1. In the US, most universities pay for these subscriptions in bulk, providing the service free to students.

- Human audit of AI proctoring raises the price to around $5-8 per exam. A slightly higher cost can be expected for partial live proctoring.

- Full live proctoring is generally $15-20 for a 1 hour exam and more for longer exams. Some companies offer packages (usually bought by students) for unlimited monitoring in all classes.

Is Online Proctoring Effective?

Universities who flocked to online monitoring were responding to the perception that online learning would increase student cheating. But did it? There is some evidence to back up an increase in academic dishonesty in 2020. ProctorU reported that its cheating rate in the months before the pandemic (January-March 2020) was 1%, while from April-June 2020 the cheating rate skyrocketed to 8%. Some students likely saw an increased opportunity with remote exams, while others were probably overwhelmed with the stresses of the pandemic. In a general survey, students reported they would be four times more likely to cheat in online classes compared to in person.

There is not much hard evidence, however, to prove that online proctoring reduces cheating. Increases in students caught cheating may simply reflect overall dishonesty rising at the same (or faster) rate, rather than a higher rate of discovery. Most evidence for effectiveness relies on anecdotes or the suspect claims of the companies themselves.

One of the few concrete pieces of independent, peer-reviewed research comes from a 2020 study of two large online courses (economics and geography). The instructors taught the courses without proctoring software for multiple terms, then introduced the software. They found that test scores went down on average by 10-20% after the software was introduced. In particular, they found a much higher standard deviation in proctored exams, with more very low scores. The lower average and higher proportion of failed exams indicate a likely decrease in cheating resulting from the proctoring software.

Alternatives to Online Proctoring

The COVID-19 pandemic also accelerated changes in pedagogy in response to remote learning. In particular, many universities pushed alternatives to timed exams, even in fields that traditionally were more exam-based. For example, universities encouraged:

- open-note, untimed exams
- final papers or project based learning
- many lower-stake assessments rather than one large final exam
- more emphasis on participation in the grade
- more creative media projects: videos, podcasts, journals

In addition, other technology solutions for exam security were sought out that did not involve remote proctoring software. Some examples include:

- live video proctoring on Zoom or other teleconferencing software
- subscription to plagiarism detection software

Why Do Students Cheat?

Meta studies suggest that most university students have cheated at least once. Cheating can erode the value of a diploma, disadvantage honest students, and foreshadow dishonest behavior in the workplace. But why do students cheat? Studies indicate these main causes:

- Students do not allow enough time for study. This is often a chronic condition that reflects **bad study habits**, poor time management skills, or overwhelming responsibilities (work, family, etc.).
- The **higher the stakes** of the exam, and the more competition or pressure, the higher the chance students will cheat. Examples include a test for limited admission to medical school, or a course based 100% on the final exam grade. The higher the benefit (or loss) from the exam, the more students are willing to break the rules.
- Students will tend to **follow the crowd**. If rumors spread that some students are cheating, more students will likely follow. Students only see a disadvantage against their peers by remaining honest. And if cheating is widespread, it becomes normalized, and students fear the consequences less.
- **Anonymity** is a driver of cheating. Students feel less ethically bound when being monitored by a stranger or an algorithm. This is most true for large classes or online courses. In contrast, developing a relationship with a professor who is considered trustworthy or likable makes students more likely to remain honest.
- Students will cheat more when there is a greater perceived **opportunity** for doing so.

Aside from decreasing the opportunities for cheating, **online remote proctoring does not solve most root causes of cheating**. In some cases (ex. anonymity), online proctoring can actually worsen the situation, by creating an 'us vs. them' mentality. Some other solutions pushed by universities which are more likely to address the core causes include:

- **Assignments**: Introducing many lower-stakes assignments so that no single exam decides a student's fate; encouraging more personalized learning projects that de-emphasize competition; using assessment monitoring that directly involves the instructor (ex. Live proctoring over Zoom).
- **Study habits:** Proactively pushing students to manage their time through draft assignments, study guides, or mandatory study groups.
- **Trust:** Cultivating a respectful and trustworthy professional teacher-student relationship whenever possible; creating a system where students can report classmates in a safe, anonymous way.

- use of LMS capabilities to randomize question order and/or answer order
- open-source software developed at the University of Illinois (PrairieLearn) generated randomized variations of questions, using the same difficulty but changing the wording of questions or the key variables. It has been used by 14,000 students at the university and is vastly preferred by students over Proctorio.

As the above evidence suggests, there has been no single response in the US to cope with remote learning. Many universities adopted commercial remote proctoring software, but the most successful implementations treated it as part of an ecosystem of changes. Universities also created new policies around academic dishonesty, pushed for changes in assessment, and introduced alternative technological tools. The case studies demonstrate these policies in greater detail.

Critical Perspectives

The meteoric rise of online proctoring software since 2020 has led to a serious public reckoning. Criticism of proctoring companies over ineffectiveness, alleged bias, and privacy violations has been loud, and fierce. The top Google searches for online monitoring software are almost all negative media reports. Universities have had to expend major efforts to defend the software. The result has been a major backlash against online proctoring, with many universities canceling contracts that they scrambled to sign in Spring 2020.

The effectiveness of the software, and its implementation, has been thrown into question. Determined cheaters can still defeat these systems, even live proctoring, often using hidden extra screens (ex. cell phone) or virtual machine software. One prominent article featured 10 students who had cheated with remote proctoring, and none had been caught. One of the students estimated that 90% of fellow classmates had cheated with the software. Many students reported that they felt more willing to cheat because the software created an us vs. them mentality that made them less invested in honesty.

The software also has a tendency to create many false positives. Despite claims of 'artificial intelligence,' the software is mostly just flagging loud noises, talking, or lots of facial and eye movement. These triggers can often be for completely innocent behavior. One software, ExamSoft, flagged one third of exams for the California Legal Licensing (Bar) exam (over 3,000 flagged). After review, 98% of the flagged cases were cleared. False positives included staring away from the screen for too long, background noises, or fidgeting. Claims of 'intelligence' in AI monitoring must be taken with extreme caution.

Thus, proper use of monitoring software requires substantial labor by instructors to review flagged cases. This can take hours for an exam in a large course, and most flagged behaviors will be innocent. Unsurprisingly, many instructors do not invest this time, making the whole system ineffective. A University of Iowa study showed their instructors reviewed just 14% of AI proctoring reports. ProctorU company research showed that only around 10% of faculty reviewed their AI monitoring results. Because of this, in May 2021 ProctorU announced that all AI monitoring would be bundled with a human audit by a ProctorU employee.

Perhaps the loudest criticism over online proctoring software has centered on accusations of bias and privacy violations. Multiple articles have interviewed non-white students who claim the software would not recognize their faces and confirm their identities. This has resulted in students losing valuable time on tests. This fed into larger debates around racial bias in AI that were prominent in 2020-21. Additionally, the software is seen as biased against those with disabilities or other conditions (ex. neurological disorder) who may act differently during an exam, for example moving their faces or bodies more. Finally, the software creates a class bias against those without the adequate resources to take monitored exams. Not all students have access to a laptop with webcam, high-speed internet, and a quiet room without distractions.

On the privacy front, the Electronic Frontier Foundation has stated that much monitoring software "is effectively indistinguishable from spyware." To function properly, monitoring software must install tracking features on operating systems and collect personal biometric data (ID photos, etc.). Universities or proctoring companies then own this data, and policies over sharing or security are often unclear. Databases are also subject to hacking; ProctorU had data on 440,000 user records hacked recently. In the state of Illinois (home to Chicago), which has strict privacy laws, students recently sued multiple universities for improper storage of biometric data taken from online proctoring.

As may be expected, all of these criticisms (which have dominated the news) have resulted in a major backlash. Six US Senators sent a letter in December 2020 to major monitoring companies demanding answers on issues of equity, accessibility, and privacy. Student protests have been numerous; one student petition at City University of New York against Proctorio has gained over 29,000 signatures. Companies have aggressively defended themselves, sometimes unethically. Proctorio has been the worst offender. It requested that a peer-reviewed journal article critical of the company be retracted, and it sued a university official who wrote a critical post about the software.

The trend in the US right now is that many major universities are turning away from commercial proctoring. The Universities of Illinois, Washington, and Southern California all canceled their monitoring contracts in 2021. At the University of Illinois, they are instead relying on software produced at the university that generates randomized questions. At other universities, professors have vowed not to use the software. Elite universities with the most potential resources have been some of the loudest critics. Harvard University actively discourages its use on campus, while Stanford, UC-Berkeley, and McGill University have a complete ban on monitoring software. Instead, these schools actively encourage alternative assessment styles that de-emphasize a single, timed final exam. While many hundreds of universities still use monitoring software, it is clear that negative waves of public opinion have discouraged many from adopting remote proctoring.

Case Study 01

University of Nebraska, College of Business

ProctorU for Online MBA program

The University of Nebraska is the main public university in the state of Nebraska, with around 26,000 students. The College of Business at Nebraska offers several undergraduate and graduate majors, but their primary program is an online-only MBA, which enrolls around 500 students. The program appeals strongly to students who are working or in the military.

Until 2018, the MBA program had no online proctoring solution. Remote students were instead responsible for finding someone in the community who would agree to proctor their exams in person; that person then applied to become a proctor with the university. In 2017 a new Teaching and Learning Center was established at the College of Business, and discussions began to replace the old system with an online, commercial solution. The director of the new Center had positive experiences with ProctorU, and recommended deployment.

In 2018 the MBA program began using ProctorU. After some trial-and-error, the program decided to deploy a Level 4 service: a live person at the start to verify ID and check the security of the testing area, followed by AI recording, and then a human audit at the end by a ProctorU employee. There was little perceived advantage to Level 5 (full live proctoring), since the human audit at the end served a similar purpose. The human audit also saved the professors and Teaching and Learning Center significant time in needing to review cases. The majority of 'suspicious' cases sent by ProctorU auditors warranted further investigation, resulting in fewer false positives. ProctorU also had a very high rate of preventive corrections at the beginning of exams, for example, telling students to put away phones or notes.

The Teaching and Learning Center took several steps to ensure successful implementation. Professors received ample communication and training around the software: what it can and cannot detect, how to interface with tests on the learning management system (LMS), etc. The Teaching and Learning Center provided standardized language that professors were encouraged to put in syllabi or student emails. The Center also established a uniform procedure for pursuing cheating behavior. Both the Teaching and Learning Center and the professor received reports of suspicious behavior. The Center was proactive in urging professors to follow up, but final decisions were left to the instructor. This required significant time and effort from the Center, both in preparation and in ongoing maintenance of systems. The Center wished it could afford a full-time staff member to devote to managing ProctorU.

Some positive benefits came from implementing ProctorU. First, the Teaching and Learning Center used the opportunity to write a new College-wide academic integrity policy. This helped to standardize practices around cheating. Second, the use of ProctorU pushed many faculty to take exam design more seriously. They discovered the value of randomized question order, sample questions from banks, rewriting of questions, etc.

Students did express some complaints about switching to the online proctoring system:

- Many were using company or military laptops that did not allow them to install the ProctorU software.
- Some lacked stable internet connections.
- The window for taking online proctored exams was usually shorter than the old, in-person proctored ones.

- Many were skeptical about security, and worried that the programs were spying on their computers, reading files, etc.

- Cost was an issue, especially when students had to pay per exam.

In March 2020, the pandemic did not fundamentally alter the MBA program, which was already 100% online. ProctorU, however, quickly became overburdened by new users and it became difficult to secure in-person proctoring. The College switched in part to AI-only proctoring out of necessity. Also, the College experimented with online proctoring for its on-campus BA programs, but students were very dissatisfied with the sudden, new proctoring solutions.

While it is impossible to know how many students were deterred from cheating, the ProctorU system did catch cheaters. According to the Teaching and Learning Center, most students readily admitted to cheating when confronted with evidence. Most cited stress or lack of preparation time. After students were caught, overall cheating levels generally diminished for several months (as students heard gossip about cheaters being punished).

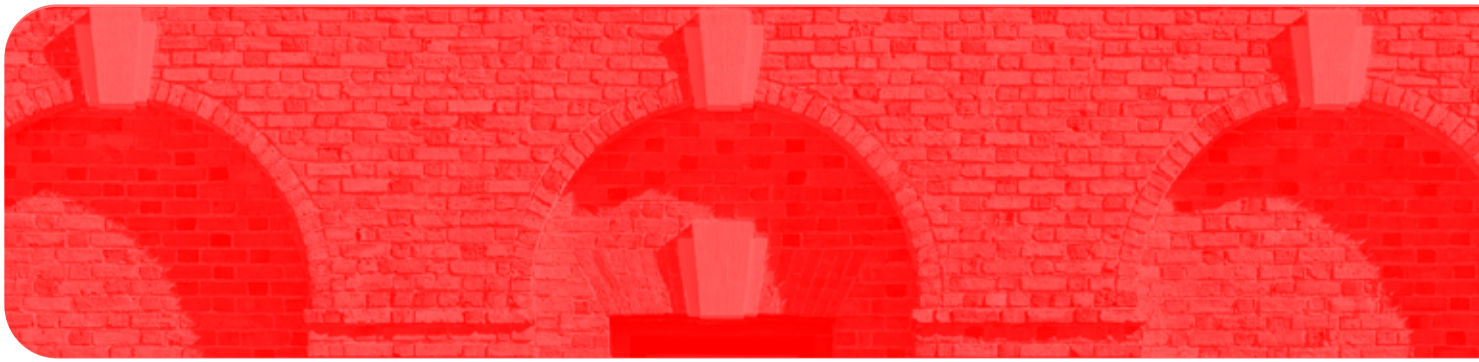
Lessons from Nebraska College of Business:

- ProctorU (AI monitoring using human audit) is generally seen as a successful tool for monitoring online MBA exams. But implementation and ongoing management of the system require great communication and time commitment from the Teaching and Learning Center.

- Faculty must still devote time and energy to reviewing suspicious cases, but human auditing by ProctorU decreases that time commitment.

- Students need clear communication and assurances. They prefer a cost structure that builds in the cost to the course overall, or their tuition rates, rather than paying per exam.

- Implementing proctoring for on-campus Bachelors students during the pandemic proved far harder. Expectations were difficult to create compared to a pre-existing online program.



Case Study 02

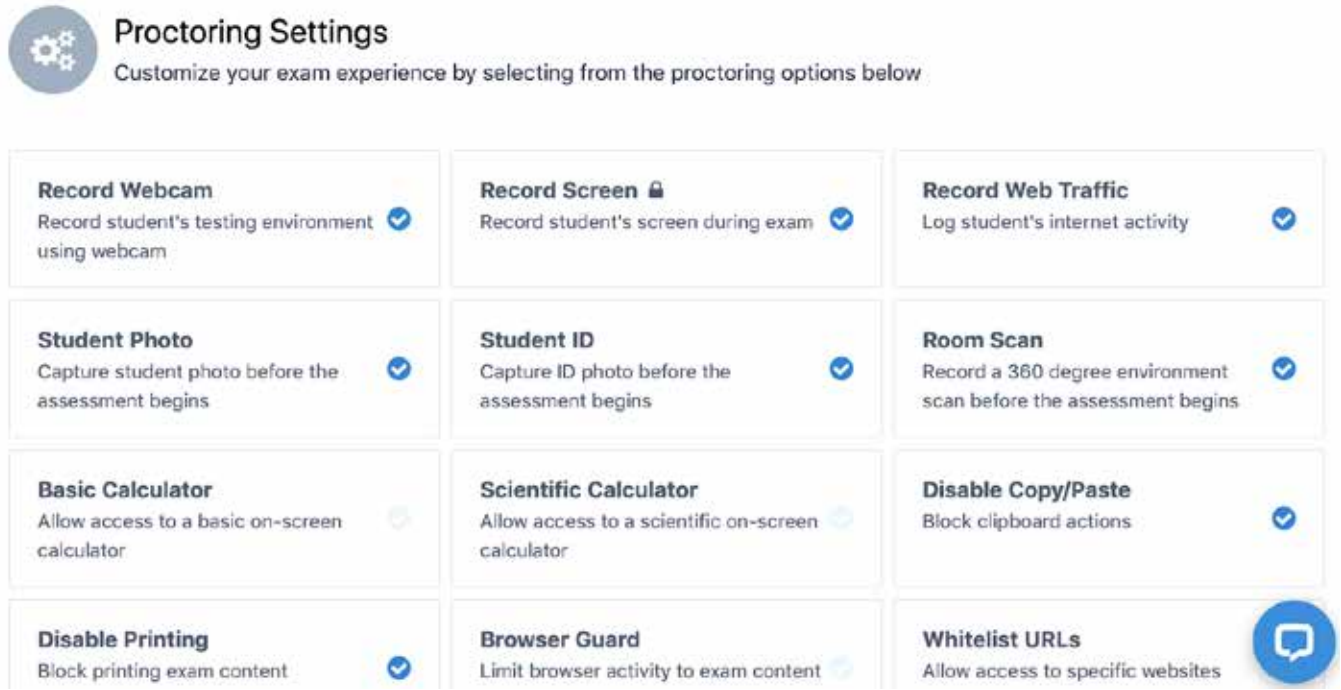
University of Wisconsin-Madison

Honorlock in University-Wide Deployment

University of Wisconsin-Madison (UW-Madison) is the flagship public university in the midwestern state of Wisconsin and is regularly ranked among the top 20 public universities in the US. It educates approximately 30,000 Bachelor's students and 10,000 graduate students. It is a major research university, but nonetheless operates within significant public funding constraints. The university is highly decentralized, with 20 different colleges and schools.

In 2018 UW-Madison formed a committee to evaluate online proctoring on campus. It had no centralized solution. It found at least six different online programs being used in various colleges, including some implemented by professors acting on their own. In order to provide a more uniform student experience, the university issued a request for proposals, and after a competitive process selected Honorlock commercial software in 2019. Honorlock provides AI-based monitoring and human audit, but does not offer live human proctoring.

UW-Madison settled on Honorlock for the whole university because it was seen as the most flexible of the major offerings. It has a simple 'on/off' toggle system for instructors to select the best combination of technologies for each exam. These include a lockdown browser, webcam and screen recording, or a photo ID and room scan. Here is an example of the settings dashboard:



Honorlock settings. Photo courtesy of Honorlock

UW-Madison felt that Honorlock's maximal customization respected the decentralized nature of the university, where each college or unit could adapt the software to its needs. Also, in 2019, the university was not primarily concerned with remote instruction. Rather, a key goal was to move to paperless exams, with students taking tests on their laptops in a controlled classroom setting. In this environment, only some features of Honorlock were needed.

Because of bureaucratic issues, the implementation of Honorlock was delayed until summer 2020 – just as the pandemic was raging and physical classrooms were shut down. A summer pilot project was implemented. It generated controversy: students in one class at UW-Madison claimed (based on many news reports) that the AI software was racially biased. They staged a protest and refused to take the final exam. The controversy made a splash in the media. In Fall 2020, UW-Madison students created an online petition demanding that the software be banned on campus, and collected over 2,000 signatures. Student government also demanded it be eliminated, and several critical news stories were published.

Nonetheless, the university pushed ahead with the rollout of Honorlock. With the pandemic and remote teaching, usage was very high. In Fall 2020, around 250 professors and 26,000 individual students used the software, taking over 116,000 tests combined on Honorlock. Student protests generally died down over time. The university did make one change in April 2021: it requested that Honorlock disable the feature where the exam is 'paused' if a student's identity can't be verified. This was out of concern that racial bias in facial recognition would prevent some students from starting their exams.

The cost of Honorlock, which is paid by the university, is around $267,000 yearly for 20,000 registered users, who may take unlimited exams. Only students who register with Honorlock and take at least one exam count towards this number. UW-Madison reports this is a modest cost compared to other academic technologies, and that Honorlock provides excellent customer service relative to the price.

UW-Madison has built an extensive ecosystem around the software. It maintains one of the most thorough documentation systems for Honorlock anywhere. Its main Honorlock page and its Online Knowledge Base are full of information for students and faculty, including LMS integration, professors' best practices, and data/privacy concerns. The Teaching and Learning Center also coordinates regular trainings. They have created standardized language about Honorlock that instructors can place on syllabi and course webpages. These measures take hundreds of hours of labor to construct and maintain. UW-Madison has one full-time IT employee dedicated to the technical performance of Honorlock, as well as multiple people who work part-time on Honorlock in the Teaching and Learning Center.

Honorlock's effectiveness can be hard to gauge. Cases of academic dishonesty rose during the pandemic, from 317 in 2019-20 to 608 in 2020-21. However, it was hard to establish a direct causal link between using Honorlock and catching cheating. The most common form of academic misconduct was plagiarism, not exam cheating. Even more difficult to measure is the deterrent effect: it is impossible to say how many students chose not to cheat because Honorlock was in place. However, one positive side effect has been that implementing Honorlock has sparked deeper campus discussion around what constitutes cheating (for example, sharing notes or posting previous tests on websites) and how to prevent it. Rolling out Honorlock gave the Teaching and Learning Center opportunities to engage more deeply with faculty about academic honesty.

Usage of Honorlock at UW-Madison has decreased from its pandemic peak: In Fall 2021 around 12,000 students used the software, compared to 26,000 the previous year. Nonetheless, UW-Madison expects to maintain the software for the medium-term future. Even in a post-pandemic world, they still see utility for summer courses (which are mostly online), for adult learners and professional certification exams, and for paperless exams in classrooms.

Lessons from UW-Madison:

- The rollout of the software in the middle of the pandemic was not ideal. Administrators wished they had more time to inform curriculum committees and train faculty.
- The university had to spend countless hours with students and the media to defend software that was accused of racial bias.
- Creating an effective ecosystem for software like Honorlock requires many hours of administrative time, both for technical challenges (integration with LMS, etc.) and to properly train faculty and inform students.
- The university sees many long-term uses for Honorlock beyond the pandemic, especially in a shift towards paperless exams in the classroom taken on laptops.
- Implementing a new technology provides the opportunity to engage with faculty about academic dishonesty and how to best prevent it, beyond just the use of remote proctoring software. Many forms of dishonesty were not solved by Honorlock.

Case Study 03

Bentley University

Respondus Browser and Monitor in Limited Deployment

Bentley University is a mid-sized private university located in Waltham, a suburb of Boston. It has about 5,100 full-time students (4,000 Bachelors and 1,100 graduate), with strengths in business, accounting, and finance.

Bentley had been engaged in forms of hybrid instruction for well over a decade, focused mainly on its MBA program. Students have long been able to take MBA courses remotely, even as the primary mode of instruction was in person. To aid with the hybrid format, Bentley employed technology associates (TAs) who worked to assist the professors with technology. Within this format, remote students still generally took exams using in-person proctors or certified proctoring centers.

Around five years ago Bentley began an asynchronous MBA program. Some professors began using ProctorU with students for remote proctoring (student paid). But the software was never encouraged at the university-wide level, and usage decreased over time until the software was discontinued before the pandemic.

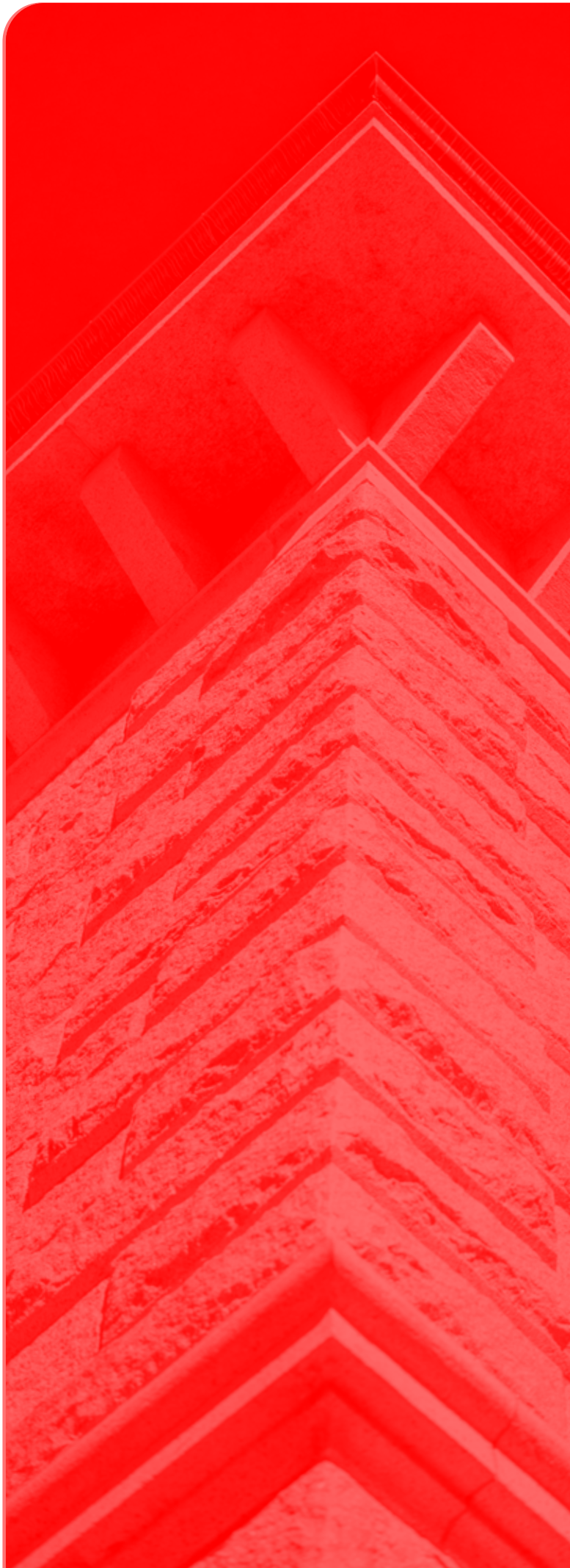
Instead, the focus at Bentley has long been on alternative forms of assessment beyond standard exams: essays, take-home and open-note tests, project-based learning, or student portfolios. Professors are encouraged to move beyond the multiple-choice or fill-in exam, even in subjects that are more traditionally bound to such metrics.

Among the tools that Bentley has long offered is Respondus Lockdown Browser. It was a relatively small cost for the university and was primarily used as a tool for students to take exams on their laptops in the classroom. Laptops are required for all Bachelor's students at Bentley. There was essentially no remote proctoring software before 2020, aside from limited use of ProctorU.

During the pandemic, Bentley's primary response was to encourage even more non-exam assessments (open-note tests, projects, etc.). At the same time, Bentley began subscribing to Respondus Monitor, the AI-monitoring service offered by Respondus. They picked this software because of convenience, as they already subscribed to the Lockdown Browser. However, there was no university-wide effort to push this service. Instead it was offered as one tool among many. One very common method at Bentley is for instructors or assistants to monitor students live over Zoom while taking an exam. This is seen as less intrusive by students than remote monitoring, as many are used to the Zoom format and know their instructors.

Bentley deploys an 'Academic Technology' unit that sits between the pedagogy side of the administration and the technology side. Within this unit, they are responsible for managing all the software used in instruction, and for training faculty and students on their use. Their unit holds regular workshops on 'assessments in teaching' that summarizes the tools available, and also emphasizes creative assessments that do not require monitoring. In addition, they offer monthly faculty 'tech talks' where a faculty member who has used a particular technology presents their experience to other faculty. This has proven highly successful.

Bentley has refrained from widespread use of monitoring software in part because of concerns over racial bias and equity. Reports of AI software being unable to recognize dark-skinned faces were a major concern. So, too, was the need for everyone to possess the correct hardware (webcam), high-speed internet, and a quiet location where they could work uninterrupted. Many students have families, roommates, or other intrusions that make monitoring software more likely to flag their behaviors.



Since the shift to online learning in 2020, academic honesty violations have increased at Bentley. Nonetheless, the university remains satisfied with its laissez faire approach to remote proctoring software. It offers Respondus Monitor AI monitoring for the few professors who wish to take advantage, but does not push its adoption. Instead, it emphasizes the range of online tools available, such as Zoom and GradeScope (AI-assisted grading software). Its primary goal remains to shift as many tests as possible away from timed exam format, towards more holistic learning assessments.

Lessons from Bentley University:

- It is possible to offer remote proctoring as one tool for the select few who wish to use it, but not to push it as a university-wide solution.
- Bentley instructors in the last several years have moved a large portion of their assessments from traditional, closed-book exams to projects, open-note tests, or other assessments that do not require monitoring.
- For live proctoring, Zoom is seen as a sufficient tool that students are already familiar with and the university already subscribes to.
- When conducting trainings, faculty often prefer to hear directly from other faculty who have used the tool, rather than from administrators or IT experts.

Conclusions and Recommendations

The future of online proctoring software remains unclear. The last two years of teaching amid the pandemic proved a critical test – and in many ways commercial proctoring did not stand up well to scrutiny. The tide of public opinion in the media and politics has turned strongly against proctoring software, with accusations of AI bias and privacy violations dominating headlines. Deploying commercial proctoring software means being prepared to defend the software against student or public criticism. Many universities, especially those that rushed to adopt online proctoring, are now reconsidering the value of the software.

Nonetheless, online proctoring software remains widespread across the US and Canada. For many universities it remains a temporary 'bandage' to cope with pandemic remote learning. But with the rise of online-only programs, the digitalization of classrooms, and the expansion of 'asynchronous' models of learning, commercial remote proctoring still has a value proposition even in a post-pandemic environment. It can be used to facilitate online programs, professional certifications, or paperless exams in classrooms.

The most successful deployments consider these use cases carefully, and choose the software to meet the school's specific needs. Most importantly, success depends on treating online remote proctoring not as a magic cure, but rather as one tool in a much larger process. To deploy online proctoring software not only requires significant technical investment and training, but also pedagogical training. Instructors must understand the limitations of these systems, and how much time they should invest reviewing exams. Standardized procedures should be established for communicating to students, managing workflows, and investigating potential cheating. It requires significant time and resources to build this ecosystem.

Many US universities have used this moment to launch a broader discussion and revision of their pedagogical practices around assessment. Introducing monitoring software can be an opportunity to have trainings about different assessment and integrity tools, and to refine university procedures around academic dishonesty. Universities in the US are rapidly shifting away from traditional timed exams, towards a mix of open-note exams, essays, projects, portfolios, shorter assignments, and other more holistic assessments. They are embracing active participation and active learning models to create a more personalized journey of learning. In so doing, they are working to embrace a future in which online proctoring software may be of less relevance.

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