



# Technology Evaluation Report: Crowdmark

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**Note:** This report summarizes outcomes of a specific UBC pilot. Findings do not reflect broader or official UBC opinions about the learning technology evaluated.

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## Executive Summary

This evaluation sought feedback from UBC users piloting Crowdmark, an application for online grading. Six instructors, three teaching assistants (TAs), and three support staff who used (or assisted with) Crowdmark for marking quizzes, homework assignments, midterms, or final exams across UBC were consulted in June and July 2017.

The consultations revealed a split opinion on whether using Crowdmark improved the efficiency of paper-based marking or not. Some users noticed significant time savings from less paper handling (easier for a group of TAs to mark together, no need to hand papers back to students) and online marking options (e.g., reusable comments). Other users reported no time savings or a time loss due to new paper-related workflow issues (printing Crowdmark-altered files, scanning before marking, mapping scans to students) and inefficiencies with digital marking (e.g., slow-to-respond stylus).

While the majority of users expressed positive sentiments about team grading with Crowdmark (increased flexibility in marking times/locations, better TA feedback given to students), a minority noted a decrease in the quality of TA marking and feedback. It seems the freedom offered with online marking benefited more responsible or experienced TAs and hindered those who needed the accountability inherent in a focused, face-to-face team environment.

Based on these outcomes, recommendations for how Crowdmark could best be implemented at UBC include:

1. Picking appropriate settings for use: suggested to be courses with 25+ students and no TAs or course with 2+ TAs
2. Giving extra thought to structure of assessments / assignments to work within Crowdmark's grading-per-page limitations
3. Allowing time for planning and executing new paper-related workflows, if the department does not already have support for printing, scanning, uploading, and handing back

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4. Training TAs in efficiencies and expectations so they can take proper advantage of grading in the application
  5. Monitoring TA work for quality in addition to quantity, so TAs know they still need to be mindful in their work
  6. Enabling integration with the Learning Management System (LMS) to create a smoother workflow for instructors and students
  7. Providing support for the printing / scanning workflow when this is not available at the department level

Implementing Crowdmark with these recommendations may help resolve some of the concerns brought forward by instructional teams and students and improve future users' perceptions of the tool's pedagogical value.

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## Goal

This evaluation sought feedback from UBC instructors, teaching assistants (TAs), and staff piloting Crowdmark, an application for online grading. Instructors from various disciplines have tried Crowdmark over the past few years to manage quizzes, homework submissions, midterms, and final exams. This report will explore what problems they were trying to solve in using Crowdmark, the benefits and drawbacks experienced in using Crowdmark, and how Crowdmark could best be applied at UBC going forward.

Assessing impacts on learning was not part of the evaluation.

## Methodology

Six instructors and three support staff (including one co-op student) involved with piloting Crowdmark were consulted during one-on-one interviews in June of 2017. Three TAs from one course also responded to email questions in July of 2017. The participants had used (or assisted with) Crowdmark for a minimum of one assessment during a term, although nearly all had used it more than once.

Each interview consisted of eleven core questions with a final open-ended question to capture any other feedback not yet discussed (see Appendix A). The emailed questions for TAs consisted of a shortened version of these questions (also see Appendix A).

The types of courses covered by participants included Applied Science, Arts, Biology, Computer Science, Linguistics, Physics, and Political Science, with class sizes ranging from approximately 25-900 students and TAs ranging from 2-15. All courses had used Crowdmark for one or more of the larger course assessments, with the majority of participants marking midterms and finals in the application wherein the bulk of the questions were more open-ended. A few courses also used it for smaller assessments or homework assignments. Only one course went fully digital in its use of Crowdmark; the rest were paper-based and therefore required printing and scanning.

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All courses took advantage of team grading—TAs working with each other and/or the instructor to mark—and leaving student feedback in Crowdmark. A few courses also used individual grading (the instructor working alone) and assessment analytics regarding student performance (by question) in the application.

No trace data or classroom data was gathered, although two of the instructors provided reports that included financial and/or time estimates for using Crowdmark in their courses.

## Findings

### Instructor motivations

#### Eliminate inefficiencies of paper-based grading

All Crowdmark users were looking to decrease or—in the case of the fully online example—circumvent the management of physical papers as part of the marking process. Particularly in large courses, often *“there are multiple TAs that are focusing on a particular question”* in marking assessments, which means *“they start passing things around”*. This creates *“an administrative nightmare”* in trying to set up an efficient system for team grading, where TAs *“had to sign out the papers”* they were marking, *“trade exams through a locker”* or other secure means, and *“come in on the weekend”* or at other inconvenient times to make the swaps or work together. Crowdmark seemed to offer a *“reduction in paper handling”* overall, as well as increased security; *“instead of carrying around a small pile of exams”* vulnerable to exposure, markers would *“go on to the application and mark it digitally”*.

#### Improve turnaround time for students

An equally important reason for most users choosing Crowdmark was the potential to improve turnaround time in marking. With the current issues around physical paper management, especially for larger courses *“the marking takes a lot longer”* and *“students complain ‘why aren’t I getting my marks?’”* sooner. Improving the efficiency of the process was seen as one way of expediting assessment return. Additionally, some instructors saw an

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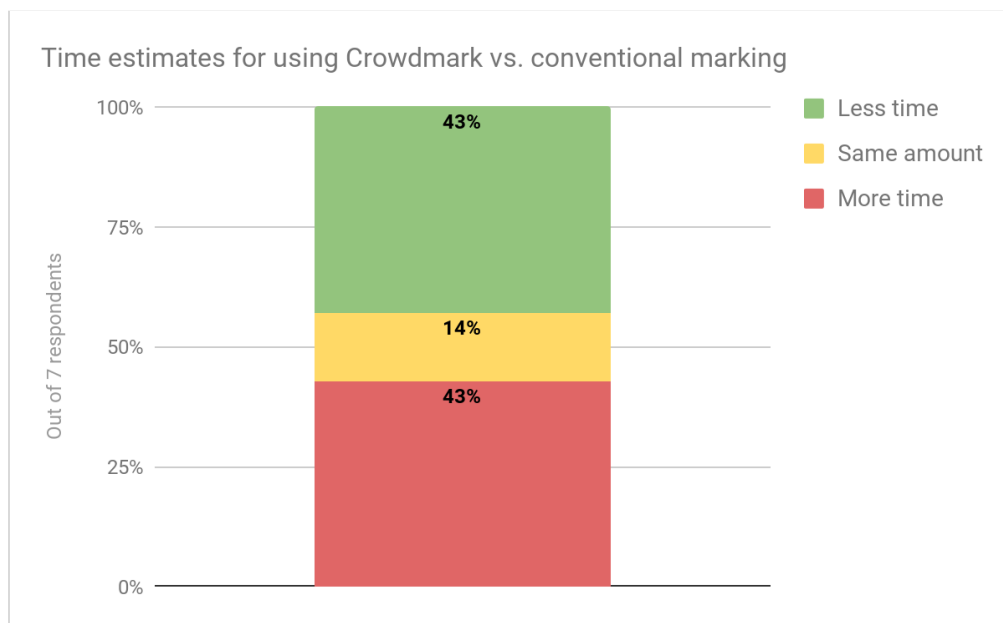
opportunity with increased efficiency to “reaffirm students’ learning” by leaving more detailed feedback (themselves or via TAs), so “students can learn and study from the mistakes they’ve made”. Essentially, since markers might free up time, they could give not only more immediate but richer feedback to “promote more reflection from the students”.

### Better monitor TA grading

A lesser but notable additional motivation for several Crowdmark users was the application’s ability for “addressing the issue of what is happening with TAs”. Many instructors wanted a better means of tracking TA work over time, “to see if TAs graded reasonably or not”, “how many [exams] each TA has done” at any given point, and “how much time they’ve spent” in marking. Crowdmark provides basic built-in views of these kind of stats.

### Instructor and TA response to using Crowdmark

Crowdmark users were roughly split between those who said they experienced better efficiency in managing papers and marking, and those who did not. (Time included printing, scanning, and software training of any TAs, in additional to marking itself.)



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## Less paper management streamlined grading

For those who did perceive a savings in time, this added up in part because of all the small efficiencies that came from working online—*“paper management is a huge win”* going from analog to digital for these users. TAs didn’t need to *“worry about who’s going to hand off when”, “pick up piles”, “find the exams that need to be marked”* or *“physically flip the pages”* (for multi-page assessments). Furthermore, physical papers did not need to be handed back to students, which meant teaching teams *“didn’t have to alphabetize exams”* before class, *“take time out of lecture to distribute exams”,* or *“have students coming to your office”* to pick up assessments later, if they missed class. Instead, instructors could simply *“push the button and send the marks out to students”,* and then *“students can have their own digital copy”* of the marked assessment to access immediately (via an individualized URL<sup>1</sup>).

## Online grading increased efficiency

Some users felt the grading itself went more quickly too. TAs *“could mark anytime and anywhere with internet access”, “move from student to student really quickly”,* and *“quickly annotate a page with the marks”,* which *“made tallying marks a lot faster”*. Instructors could also monitor and move the process along, using application stats to *“see where TAs were and...give them a nudge”* if they fell behind. Additionally, regardless of overall time savings or loss perceived from using Crowdmark, nearly all users commented positively on the efficiency of reusing feedback comments in the application. *“The fact that the commenting remembers what you wrote is great”,* so all markers had to do was *“type the first two letters”* and *“the same comment will come up and you just press enter”* to apply it to the current page.

## Smoother process improved turnaround times

The overall more streamlined process for some users meant that students *“got the exam so quickly”* in their courses, especially compared to traditional marking timeframes, with one instructor *“returning an exam in under 24 hours”* for a large class. Unsurprisingly, instructors

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<sup>1</sup> Technically, since students do not currently log in to Crowdmark to see exams, this is a publicly visible link. But the address is intentionally built to be obscure and long, and the file itself should not contain any personally identifiable information.

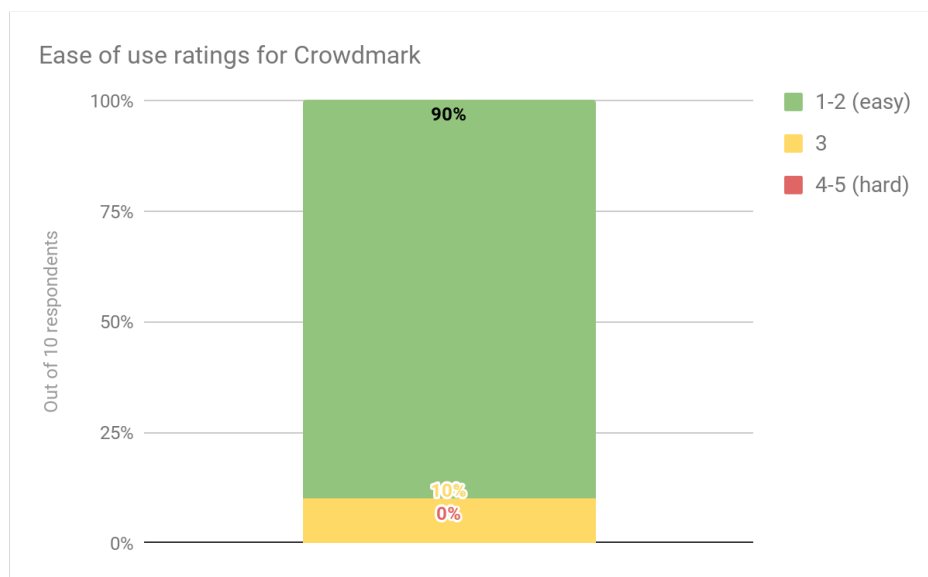
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of these courses reported *"largely they [students] were quite happy"* about this outcome, and a couple instructors also felt *"they [students] get more feedback"* this way. In fact, one instructor heard directly from third-year students that *"this was the most feedback they've gotten on exams"* so far at UBC.

One of the support staff who attended an interview was a Learning Technology Rover (LTR) co-op student who had directly experienced Crowdmark in a course for a midterm. The LTR echoed the instructor comments about the student experience. *"When exams take 2-3 weeks to grade, I forget what's on the exam"*, whereas with Crowdmark this took closer to one week. *"It's nice to have the immediate feedback"* while the exam material was still fresh, and the LTR received *"really nice feedback"* that clearly explained the marks.

### Good ease-of-use

While the positive sentiments around paper handling, grading efficiency, and assessment turnarounds were not shared by all users, there was overall group consensus on the high usability of the Crowdmark interface. *"In terms of the interface, it's incredibly intuitive"*, taking an estimated 10-15 minutes to learn to use. *"It's really really easy"* to get started, in part because *"it doesn't try to do too much"*, so *"there's very little barrier to using the software"*. In rating how easy or hard it was to use Crowdmark on a scale of 1-5, only one user selected "3", while the rest were "1" or "2", further reinforcing this perception.





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## Benefits to archiving assessments and monitoring outcomes

Though not a Crowdmark-specific benefit, users also agreed on the usefulness of having digitized assessment files on hand. This prevented the issue of *"keeping piles of exams around in your office"* for a year or more and ensured *"an authoritative copy"* after exams were returned to students. Knowing *"there wasn't an issue with respect to handing back and [students] altering the exams"* gave some instructors *"peace of mind"*, as well as opening up *"potential for educational research"* down the road.

Other, less emphasized pros of Crowdmark included seeing assessment analytics immediately (without the need to enter question-by-question outcomes in an external spreadsheet), the option to do exam day sign-in with the Crowdmark app (which is principally for expedited matching of anonymous assessments with student identities), and less ergonomic issues (hand and back pain) for TAs.

## Time lost in new print workflow

For those who perceived no savings or a loss of time in using Crowdmark, this was largely attributed to paper management issues arising from the new external workflow—*"it wasn't because of the interface, but because of everything around it"*. First, in order to properly identify completed assessments later, instructors needed to upload the original file to Crowdmark to have unique codes inserted into each student copy. Then *"you'd get one big file back"* containing all the assessments together. Because assessments were multi-page, not all instructors felt they had in-house resources to print, sort, and staple these from one file—*"when we have 1,000 20-page exams, we don't have capacity for that"*. As a result, some instructors outsourced the process instead, which took additional time and planning<sup>2</sup>.

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<sup>2</sup> While all instructors using paper-based assessments faced this issue, for some it did not take additional time because they already outsourced printing. Others were able to find workarounds (i.e., using software and writing scripts) to break apart the combined file into single-exam files they could more easily process in house.

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## Problems with scanning paper assessments

Likewise, in order to upload assessments into Crowdmark, physical papers must obviously be scanned. Again, not all instructors felt they had the proper technical support for this locally. One instructor had problems with *"scans not working because of a completely stupid printer"* in the department. Others encountered issues when *"students would write quite lightly"*, so *"some of the exams did not scan well"* (requiring the instructors/TAs to either adjust contrast on the digital file or find and consult the hard copy). For instructors choosing to outsource this step, *"we have to package and ship exams"*, which took more time, and *"it was a bit iffy at the time whether this was okay from a privacy standpoint"*.

## Technical issues slowed down grading

Regardless of paper handling outcomes, some instructors felt the grading itself was slower. *"It was more time to use Crowdmark...even not taking into account the extra time for scanning"* because of various technical issues that don't apply in the paper-based setting. For example, *"they have a button that says go to the next exam"*, but clicking this did not always take the marker to the next exam in the sequence<sup>3</sup>. Also, *"it's a little bit hard to write and read"* comments made with a stylus in Crowdmark, and *"the interface was not fast"* in responding to input from these devices (especially compared to using a regular pen and paper). For one instructor, *"this resulted in a lot of people not scribbling the way they would on paper"*, and therefore some TAs never discovering the reusable comments feature.

## Challenges with mapping anonymous assessments to students

Assessment return was also delayed for some due to identity-mapping issues. Since Crowdmark is meant to use email to both match and share marked assessments with students, instructors should have an accurate address for each student in the application. This had to be obtained from the students themselves, since Crowdmark was not integrated for the pilot and *"you can't get emails from Connect or FSC [Faculty Service Centre]"*.

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<sup>3</sup>There are multiple buttons for navigating through exams in the Crowdmark interface. The one for "Next ungraded" may move the user outside the sequential order due to the algorithm used.

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When students didn't comply or mistyped their address, instructors/TAs had to spend extra time matching up missing students with unclaimed assessments to distribute marks<sup>4</sup> —*"that's the big headache"*.

### Lower quality of TA grading

Aside from workflow issues, another external pain point of some users was *"inconsistency of the grading"* by TAs. This was an unexpected flipside of the added flexibility in moving online: that TAs could mark outside the team environment *"on their own time, while watching television or something else"*, and this seemed to increase variation in grading—even, in one case, for straightforward multiple-choice questions. Some instructors also noticed a decrease in student feedback from TAs. *"There were complaints about the lack of feedback"* from some students, although it was possible expectations were heightened; Crowdmark *"gives an opportunity to give rich feedback, so students notice when they're not getting it"*.

### Limitations on setting up multiple questions per page

While issues around paper processing, identity mapping, and grading efficiency were not encountered in every course, nearly all users found Crowdmark limiting in how marking was set up. While annotations could be left throughout each page, official marks were given on a per-page basis<sup>5</sup>, so there was *"no per-question resolution"*. This meant instructors had to choose between foregoing a *"per-question breakdown on the analytics"* in the application (in using multiple questions per page) or structuring their assessments *"so it's one question per page"*. For larger assessments, this latter approach was impractical, as it would result in exams of 15-60+ pages, which adds to resource costs and is *"not environmentally-friendly"*.

Other, less frequently reported drawbacks to Crowdmark included limits on marking assignments before the official deadline had passed, no ability to customize instructions on

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<sup>4</sup> This issue would mostly be solved by integrating with UBC's learning management system, which would automatically send student emails to Crowdmark. Crowdmark has recently moved its service to Canada, making this option potentially compliant with FIPPA. However, Crowdmark still requires manual matching between the anonymous code on each assessment and a student identifier (i.e., email), though updates are expected that will better automate this process in a future version.

<sup>5</sup> Crowdmark is aware of this as an issue and does plan to roll out more flexible grading in a future version. This will allow for multiple questions per page as well as multiple pages per question.

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the student-facing interface, and having to enrol students per assessment/assignment (vs. at the course level).

## Recommendations

Based on this pilot's outcomes, these are some recommendations for how Crowdmark could best be implemented at UBC to maximize its perceived benefits and minimize its perceived shortcomings.

### 1) Pick appropriate settings for use

While most Crowdmark users agreed that *"for a larger course, there's more benefit to Crowdmark"* (or at least potential for benefit), instructors using it for smaller courses also found it worthwhile. Crowdmark seems most appropriate for two contexts:

1. **Courses without TAs with 25+ enrollment:** where instructors are grading a significant number—around 25 or more—of paper-based assessments or assignments (or any number of digitally-submitted assessments or assignments), especially ones with open-ended questions that they want to provide detailed but common feedback to students on.
2. **Any courses with 2+ motivated TAs:** where grading of assessments or assignments, especially ones involving longer-form answers, is split up amongst a team of peers. It's also important these TAs have strong capacity for self-directed work or will otherwise be held accountable for their marking through check-ins with the instructor or a lead TA.

### 2) Give extra thought to structure of assessments / assignments

Instructors should start by considering the structure of Crowdmark assessments and assignments. While the application can be used to mark any type of question, *"we know software that exists to do this"* automatically for multiple-choice questions, so Crowdmark

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may be *"better suited to questions that [are] open-ended"* like short answers<sup>6</sup>. Instructors should also think about the layout of questions, given that Crowdmark currently allows for official marks on a per-page basis only<sup>7</sup>. This may require an alternative system for leaving marks on multi-question pages (especially when marking in a team context), as well as tracking the per-question outcomes (if desired) outside the application.

### **3) Allow time for planning and executing new paper-related workflows**

Using Crowdmark introduces changes to the current paper-related workflows, in which instructors add a code to assessments before printing and scan the assessments after completion. Users will want to find out the capacities of their in-house printers and scanners ahead of time, and *"look at going off-site or outside their own department"* for one or both of these processes, if local tools won't suffice.

The workflow also requires users to *"make sure you're on top of it"* and not leave printing or scanning to the last minute. For those working with TAs, *"having a head TA or senior TA to take over the bulk of the scanning and uploading would be extremely beneficial"* in this regard. Including counting and sorting completed assessments (by number) before scanning can help ensure a smoother process, providing a check on the final uploaded count and a faster way to reference hard copies, if needed. Additionally, tasking a TA with assessment matching on exam day (using the free Crowdmark mobile app) can expedite the manual mapping process, until such time as this is more or fully automated in the application.

### **4) Train TAs in efficiencies and expectations**

Users working with TAs should show them not just how to mark in Crowdmark but explicitly how to save time in marking. *"Although it was quite intuitive, it was faster to get a quick 10-minute training session"* for TAs upfront. In particular, *"alert them to [the] help button that shows all the hot keys"* and *"show them the workflow and how to enter comments"*, especially

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<sup>6</sup> Crowdmark has been working to accommodate multiple-choice questions so that these can be marked automatically in conjunction with manual marking of longer-form questions. This feature is expected to roll out in a future version.

<sup>7</sup> As noted earlier, this should change in a future version, so instructors can assign marks more freely.

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how to best reuse comments with “key identifying words” unique to each<sup>8</sup>. *“Have that full hour together in the beginning”* for everyone to show up with the device they will use in marking, discuss strategy, and get started. TAs may also want to try marking on both a laptop and tablet early on to decide which better streamlines their personal workflow.

Instructors should be extremely clear during these sessions about expectations around student feedback, *“making sure there are sufficient comments”* left, *“so students have an idea where they lost marks in a question”*. It may help for instructors to bring example comments or have a list of links they’d like TAs to include in certain types of comments.

## **5) Monitor TA work for quality in addition to quantity**

Instructors with TAs will also want to rely on more than the basic Crowdmark stats to see how TAs are doing, once the official marking period begins. The stats can help *“in terms of counting the numbers, tracking who did the work early, who did the work late”*, but using the application to dig in and *“see how the different TAs [are] marking”* is key to ensuring expectations set in the beginning are being met. In the case of working with novice TAs in particular, it may help for each TA to *“grade a few exams and then go talk to the instructor”* or head TA before proceeding.

Crowdmark also offers an API (application program interface) and related [documentation](#), so users with more technical skill sets (or access to technical support staff) could explore programmatic ways to monitor TA work quality using this data.

## **6) Enable integration with the Learning Management System (LMS)**

As noted earlier, associating students with email addresses created a significant barrier for some instructors, taking *“a very big 5-6 hours of your time”* for larger classes (e.g., 750 students). *“It would be easier if that was integrated”* with the LMS, *“so we don’t have this email problem”*. Crowdmark already supports integration with Canvas. Although, it should be cautioned, even with the integration enabled, errors may still occur if students have different email addresses in the LMS itself, and the teaching team will still need to make

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<sup>8</sup> A future version of Crowdmark is expected to include increased management for comments, so instructors will also be able to write standard comments for all TAs to apply and bulk edit these.

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time for manually matching paper-based scans with individual students (at least until Crowdmark releases automation for this process).

## **7) Provide support for the printing / scanning workflow**

Supporting Crowdmark almost inevitably means supporting the external workflow for printing and scanning paper-based assessments and assignments. While for some instructors *"getting the pros to do it makes so much more sense"*, others may want on-campus help. This could encompass a range of options, from offering full printing/scanning services at designated spots to simply documenting and sharing printing/scanning best practices (e.g., suggested workarounds, recommended device settings) when using Crowdmark<sup>9</sup>.

Above all, users need clear guidance for how to streamline the logistics around these tedious tasks, *"removing that from our worry"* when trying Crowdmark, so the focus can be on the pedagogical use of the tool instead.

Implementing Crowdmark with these recommendations may resolve some of the concerns brought forward by the instructional teams and students and improve future users' perceptions of the tool's pedagogical value.

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<sup>9</sup> Crowdmark itself already provides basic [scanner settings](#) on its help site and additional [scanning guidance](#) (including contacts at other universities) that may inform an institutional support decision.

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# Appendices

## Appendix A - Instruments

### A.1) One-on-one interview questions

1. What inspired you to use Crowdmark?
2. Explain the course and context in which you used Crowdmark.
  - a. Which of these applies: individual grading, team grading, student feedback, assessment analytics?
3. How did Crowdmark help with your course?
4. What were the downsides or inconveniences of using Crowdmark?
5. What kind of training did you require or need to give graders? Students?
6. Overall, did grading with Crowdmark (including printing, scanning, and training) require: more time, less time, or about the same amount of time as grading without Crowdmark?
7. How would rate your experience of using Crowdmark on a scale of 1-5, with 1 being "very easy" and 5 being "very challenging"?
8. What have TAs said about the overall experience? Students?
9. When you needed help with using Crowdmark, how did you get it?
10. Do you plan to continue using Crowdmark? Why or why not?
11. What advice would you give instructors who may be considering using Crowdmark?
12. Any other feedback you'd like to provide?

### A.2) TA email questions

1. On a scale of 1-5, how would you rate your experience of using Crowdmark, with 1 being "very easy" and 5 being "very challenging"?
2. What worked well in Crowdmark?
3. What didn't work so well?
4. For future grading, would you prefer:
  - a. Crowdmark grading



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- b. Some type of online grading (but not Crowdmark itself)
  - c. Traditional paper grading
5. What advice would you give TAs getting ready to use Crowdmark?