

Report on the use of Crowdmark for assessment and feedback at the University of Bath

James Foadi¹ (JF) and Joshua Lim² (JL)

This is the final report on a trial carried out between February 2022 and June 2024 on the suitability and effectiveness of the [Crowdmark](#) platform for assessment and feedback, at the University of Bath (UoB). Crowdmark is an online marking platform that aims to making it easier to deliver efficient, consistent grading and feedback on students work at scale (view [video demo of the key marking and feedback features](#)).

Many members of the UoB have participated in various degrees to the trial. They are all acknowledged in the following page. But we would like to thank in particular:

- **Tina Düren**, Chemical Engineering, for being the very first user of Crowdmark in this university and for devoting huge efforts to facilitate the extension of the trial.
- **James Arthur** and **Jenny While** of Academic Registry for allowing the in-person exams part of the trial. Jenny was very generous in devoting her precious time to facilitate all practical aspects of exam delivery and in answering numerous questions. She was also of great help with two in-person mock exams, done earlier in semester 1. And James explained at length the necessary steps for the adoption of new in-person-exam methodologies at university level.
- **Steve Hall** of UoB Print Services for producing booklets of excellent quality and scanning them after the exam session. Steve had the idea of stapling the booklets at the top left corner to retain individuality during the exam, and then cutting off the same top left corner after the exam to make the booklets ready for scanning.
- The **Teaching Development Fund** (TDF), the **Faculty of Engineering and Design** (FED), and the **Department of Mathematical Sciences** (DMS), for their financial contribution to the project.

¹ Department of Mathematical Sciences, University of Bath – jf850@bath.ac.uk

² Centre for Learning and Teaching, University of Bath - jajhl20@bath.ac.uk

Executive Summary

This report outlines the outcomes of a two-year trial (February 2022 - June 2024) of the Crowdmark platform at the University of Bath. The trial aimed to assess Crowdmark's effectiveness in facilitating efficient grading and feedback across multiple departments and varied assessment types.

Purpose

The primary goal of the trial was to evaluate Crowdmark as a tool for improving the consistency, quality, and timeliness of feedback, while addressing challenges such as large cohorts, marking team consistency, and staff workload. The platform was tested for coursework, in-class assessments, and both in-person and mock exams.

Key Findings

The trial demonstrated that Crowdmark provided several advantages for staff and students:

- **Efficiency and Timesaving:** marking with Crowdmark was significantly faster, with users reporting a reduction in marking to one-third of the time. The comment bank system allowed for streamlined feedback creation and dynamic adjustments during marking.
- **Consistency and Quality of Feedback:** Crowdmark enhanced the consistency of grading. Students appreciated receiving specific, detailed feedback directly on their work.
- **Insight and Monitoring:** the platform's tracking and analytics features enabled users to monitor grading progress, comment usage, and student performance, helping to identify common errors.
- **User Experience:** both staff and students found the platform intuitive, with a small learning curve. Submission and feedback processes were generally smooth, though minor challenges were reported in managing complex rubrics and long submissions.

Areas for Improvement

Several aspects of the platform could be improved:

- **Interface and Usability:** the interface could be streamlined, with better management of comment boxes and tools to avoid clutter.
- **Technical Limitations:** the platform's reliance on PDFs and limited flexibility for marking with tablets or styluses was noted as a drawback, particularly for disciplines where Word documents are more common.
- **Anxiety Over Cohort Comparison:** while many students appreciated seeing how their marks compared to their peers, some expressed concerns about the added anxiety this feature can cause.

In-Person Exam Trial

The trial also included in-person exams in May 2024 for two units in the Department of Mathematical Sciences. The use of pre-formatted booklets for answers was well received by both students and staff. Scanning and grading of the exams through Crowdmark proceeded smoothly, with minimal issues reported. Feedback indicated that the booklets improved the presentation of answers and facilitated easier marking.

Recommendations and Next Steps

Crowdmark has demonstrated potential as a valuable tool for improving assessment and feedback at scale. However, institutional adoption requires addressing several challenges, including:

- **Funding:** sustained financial support is needed for a lasting and effective adoption. This funding could be university wide or at the faculty or departments level.
- **Staff Engagement:** further engagement with academic staff and training is essential for wider use.
- **Technical Adjustments:** refinements to the platform's interface, rubric management, and submission formats would enhance usability.
- **In person exams:** Crowdmark has shown a viable way forward for this university. The online marking lightens up handling of exam scripts, speeds up marking time and enables marking with a high level of consistency. The in-person trial can be used by Academic Registry to think forward and explore alternatives.

Conclusions

The trial results indicate that Crowdmark is an effective platform for improving the grading and feedback process, especially for large cohorts. The platform saves time, promotes consistency, and offers a range of tools for detailed feedback. However, further refinement and university-wide support are necessary for its broader adoption at the University of Bath.

List of participants

Members of the UoB who have played a direct role in the trial.

- **Tina Duren** (TD), Department of Chemical Engineering.
- **Anton Souslov** (AS) and **David Tsang** (DT), Department of Physics.
- **Veronique Fischer** (VF), Department of Mathematical Sciences.
- **Sabina Gheduzzi** (SG), Department of Mechanical Engineering.
- **Marie Salter** (MS), Centre for Learning and Teaching.
- **Ilaria Bussoli** (IB), Department of Mathematical Sciences.
- **Matthew Nunes** (MN), Department of Mathematical Sciences.
- **Jane White** (JW), Department of Mathematical Sciences.
- **Philip Shields** (PS), Department of Electronic and Electrical Engineering.
- **Tamsin Smith** (TS), Department of Mathematical Sciences.
- **Karen Angus-Cole** (KAC), Department of Education.

Members of the UoB who have played an indirect (but useful) role in the trial.

- **Abby Osborne, Dan Green, Yvonne Moore, Kate Mattacks, Liz Haynes**, Centre for Learning and Teaching.
- **Tony Shardlow, Antal Jarai, Ben Sparks, Waleed Ali, Mason Pember, Theresa Smith, Francis Burstall, Alastair Craw, David Calderbank, James Foster, Marcel Ortgiese, Thomas Cottrell, Kari Heine, Merrilee Hurn, Ben Adams**, Department of Mathematical Sciences.
- **Adrian Evans, Melusine Pigeon, Leen Jabban, Jonathan Graham-Harper-Cather**, Department of Electronic and Electrical Engineering.
- **Frances Laughton, Alessandro Narduzzo, Paul Snow, Yarden Brody**, Department of Physics.
- **John Benardis**, Department of Computer Science.
- **Sally Ann Prater, Lorenzo Caggiano**, Department of Life Sciences.
- **Ed Mason**, Faculty of Humanities and Social Sciences.

Initial application for a TDF

The project was initiated through a [Teaching Development Fund](#) in early 2022. The elements of the proposal are described in this section.

Rationale

Assessment and feedback are both a significant challenge and opportunity at the University of Bath. This is evident across various metrics, from local Unit Evaluations to NSS survey data, departmental action plans, and Curriculum Transformation principles. Timeliness of feedback is widely understood to be an important factor in student learning and experience, as well as in [QA16](#) statements. However, this often conflicts with staff workload pressures, consistency in grading, and the depth and quality of feedback. These challenges are exacerbated by large cohorts, which lead to self-consistency variations and discrepancies in feedback quality, especially across marking teams.

Ideally, graders would like to update feedback and marks consistently across all scripts during the grading process or following moderation. However, this is impractical, especially with a large number of scripts. Crowdmark offers solutions to these issues by providing tools that support collaborative annotation and grading, promising time savings for staff and more consistent grading and feedback for students.

These dynamic collaborative annotation and grading features are not available in Moodle (or Inpera) for grading coursework, particularly for larger cohorts. To realise some of the themes of Curriculum Transformation around assessment and feedback, it was important to evaluate alternative assessment solutions that are manageable and scalable to different cohort sizes.

The starting interest in the Crowdmark platform was prompted by an effective demonstration from teaching colleagues at UCL during the [EAMS 2021](#) (E-assessment in Mathematical Sciences) conference, followed by an introduction and a demonstration on Crowdmark.

The proposal

The proposal aimed to evaluate an effective and consistent feedback workflow. Crowdmark has introduced a series of digital tools, including flexible and easy-to-use annotation software and the creation of a shared feedback comments database. These features allow detailed and multimedia feedback to be quickly added to students' scripts, while consistently applying dynamic scoring across a marking team. This promises a better student assessment and feedback experience, alongside timesaving for staff, compared to existing methods.

The proposal planned to purchase licenses to test Crowdmark for assessment through individuals and teams of graders marking coursework to provide rich and consistent formative feedback on various units. They would make full use of Crowdmark for the preparation of the assessment, marking, and return of marked scripts to students with feedback. Students would submit and receive feedback through the Crowdmark platform. A follow-up consultation among graders and students would finalise the outcome of the feedback and grading experience. The findings of the project would be widely shared with the aim of delivering quality and timely feedback at scale.

Enhancement to teaching and learning

The desired enhancements to learning and teaching for those involved in the Crowdmark trial are:

- Improve the quality of feedback for students.
- Support the consistency of feedback comments and grading, both for individual markers and for teams of markers.
- Support markers to complete online annotation and grading more efficiently.

The wider aims and outcomes of this project for teaching and learning are to:

- Evaluate Crowdmark to understand how to transform marking into a coherent, consistent activity across all departments, deliverable at scale.
- From the perspectives derived from this seed project, make informed recommendations on the suitability of the Crowdmark platform for improving assessment and feedback to support the Curriculum Transformation project.
- Disseminate findings around the University to engage colleagues to explore and reflect on the use of technology to improve the marking and feedback process.

Alignment with institutional priorities at the UoB

This project aligns well with the institution's priorities around improving assessment and feedback, informed by feedback from Unit Evaluations to NSS survey data, departmental action plans, and Curriculum Transformation principles.

In what follows, we include a detailed description of how the current proposal maps onto the quality assurance code of practice statements (document QA16 – Assessment, marking, and feedback).

- **“Effective procedures to design, approve, monitor and review appropriate assessment”** - The plan is to use the platform’s tools to design an assessment and have it approved by the team involved. The project team will identify and support training on how the platform enables the other important elements of monitoring and reviewing.
- **“Implementing rigorous assessment policies and practices.”** - Both the setup of the assessment and the subsequent marking and feedback are channelled through the platform’s tools. These are transparent and shareable with internal and external examiners. Unlike other existing feedback/grading tools (e.g., Moodle, Inspira), manual feedback/grades can be easily dynamically updated (even after all scripts are graded) to reflect rigorous standards and quality assurance procedures.
- **“The information and guidance on assessment must be clear, accurate and accessible to all relevant parties.”** - Students will be informed at the start of their unit and in the Moodle space (the Essential Unit Information assessment tab) on how the assessment will be carried out and the rationale behind the project (in terms of benefits to students). Clear signposting and information, including clear student guides to support submissions in Crowdmark, will be provided.
- **“Evaluating how academic standards are maintained at the appropriate level.”** - Crowdmark has advanced facilities for compiling exam reports based on data analytics, which are automatically collected and compiled. Monitoring performance and determining the level of an exam are greatly facilitated by these tools. For example, educators can view the number of times a comment was used to identify common student errors. Detailed score reports, with granular scores for each question, can be downloaded as a CSV file for further analysis.
- **“Ensuring that assessment practice promotes effective learning by providing appropriate and effective formative assessment and feedback opportunities.”** - Crowdmark enables educators to leave richer, more personalised feedback for students. A key advantage is that the feedback is left directly on the students’ work to support their

understanding of errors. There is no limit to the amount of feedback that can be given, and typed comments are easier for students to read than handwritten comments. This helps students identify their strengths and provides suggestions for improvement. The shared comments database and associated timesaving are anticipated to enable staff to maintain better quality and consistency in their feedback.

The Crowdmark platform is largely digitally accessible and would benefit students with specific “access” needs, as well as all students. Typed and multimedia feedback (e.g., a video explanation) would support feedback for students with learning needs, DAPs, English as an additional language, and all students.

The first year

The pricing was negotiated with Crowdmark CEO, Michelle Caers to agree a trial lasting for the whole academic year 2022-23, where 500 users (students and graders) were allowed to use Crowdmark on any number of units and assessments, for 1500 Canadian Dollars (US Dollars were used for all later pricing). Three departments were involved in the first year (academic year 2022-23), Mathematical Sciences, Chemical Engineering and Physics. This spread of departments from two different faculties helped gain different perspectives and was beneficial to the spread of information across the university.

Preparation

Preparations started during Summer 2022. Initially, supporting staff in the TEL team received training from Crowdmark in the setup of the platform. Academic staff were also trained in three sessions provided by Crowdmark's support team on the use of the platform for marking and feedback in November 2022, February 2023, and May 2023. While there was a Crowdmark-Moodle integration via LTI, for this initial small pilot student accounts were instead manually created via csv and students provided with login credentials. This was easy to administer and there were no issues with students accessing the platform during the trial.

Some statistics for the trial year (both semester 1 and semester 2) were collected and made available in an end-of-trial presentation (see further down). Several teaching staff from the faculties of Science and of Engineering and Design made contact with us and with Crowdmark to try the platform, but most of them had no allocated time for a full formative or summative assessment. This is, in fact, a serious problem for the trial and adoption of any new technology or educational process at the UoB: a very limited amount of time is available to academic staff to develop the teaching and learning format.

Dissemination of results

Results from the 2022-23 trial were presented on the 29th of June 2023, via a university-wide Zoom session. The session was initially advertised to the two faculties of Science, and Engineering and Design, but also staff from across the university attended the event. The [recording of the Crowdmark Pilot Trial summary is available](#), with the [PowerPoint slides](#).

The session presented the experience from staff and students of the three departments directly involved in the trial. Here follows a summary of the feedback from the staff and students who tried Crowdmark for summative assessment (TD, JF, AS&DT).

❖ Efficiency and Timesaving

- *Faster Marking*. Marking with Crowdmark took roughly a third of the time compared to traditional methods.
- *Comment Management*. Time savings were achieved by pre-creating comments, creating them on the fly, and associating them with partial marks. The ability to dynamically change comments/point values mid-way through marking was particularly useful.
- *Rubric and Comment Reuse*. The platform allows copying comments and rubrics between assignments, which saves time and ensures consistency.

❖ Consistency and Quality of Feedback

- *Consistency in Grading*. Crowdmark enables grading by question, improving the consistency of marking across scripts. The ability to batch-edit comments also helps maintain consistency when adjusting feedback.

- *Detailed Feedback*. Students appreciated receiving specific feedback directly on their work, highlighting both strengths and areas for improvement. Comments were seen as useful, detailed, and not general.
 - *Shared Comment Libraries*. The ability to share and prepopulate comment lists promotes consistency across multiple markers and allows for the development of program-wide feedback.
- ❖ **Insight and Monitoring**
- *Tracking and Analytics*. Crowdmark tracks the frequency of comment usage, helping identify common mistakes and misconceptions. It also provides an overview of results per question and tracks marking progress and time spent.
 - *Student Performance Insights*. Students found it helpful to see where they lost and gained marks, with some appreciating the distribution of cohort results. However, there were mixed feelings about this feature, with some students noting that it could lead to unnecessary comparison and anxiety.
 - *Director of Teaching Perspective*. The platform allows assessment of the sustainability of coursework by monitoring how much time is really spent on marking.
- ❖ **User Experience and Learning Curve**
- *Ease of Use*. Both staff and students found the platform easy to use. It had a small learning curve for faculty and administrative staff, and students found it straightforward and convenient.
 - *Student Accessibility*. Most students had no problem accessing Crowdmark and uploading their solutions, with only a few exceptions. Students also found the interface simple for submitting and viewing feedback.
 - *Assignment Creation*. While creating assignments and integrating submission pages into Moodle was not entirely intuitive, the platform is flexible enough to allow simple solutions.
- ❖ **Room for Improvement**
- *Assignment Setup*. Integrating submission pages into Moodle and splitting marking between multiple markers could be more intuitive.
 - *Feedback Options*. More options for sending back marks, including a separate marksheet file for additional information, would be beneficial.
 - *Cohort Comparison Feature*. While some students liked seeing how they performed relative to their peers, others felt it added unnecessary anxiety and suggested that the feature could be reconsidered.

Reception and interest

Attendance of the dissemination event was good, and many members of the university contacted JF and JL for further information or reached out directly to Crowdmark. A summary of comments, questions, and reasons to why people were interested is listed in the following points.

- The enthusiasm coming out of the reports and comments of the people in the presentation, was a good reason for people to be interested in the platform.
- Lecturers were genuinely impressed by the array of tools offered by Crowdmark for feedback and assessment.
- Can Crowdmark be interfaced with tools for generative AI?
- Will the university have an institutional account for it?
- Can Crowdmark be used for in-person exams? After having tried Inspira during Covid, some members of staff are weary to have gone back marking exam papers with actual ink.

Other questions related to technical details, while some were already answered in parts of the presentation.

The second year

More Funding

Following the wave of general interest after the first-year dissemination, we contacted management at faculty and administrative level, inquiring on the possibility to extend the trial to another year. Some incomplete answers were received, all pointing to the need of knowing more details on costs for the use of Crowdmark at a larger scale than the pilot project. Subsequently, a few meetings were held with Crowdmark staff and managers, to financially check their flexibility to extend the trial of another year.

Generous funding was eventually provided by TDF, the Faculty of Design and Engineering (thanks especially to the action of TD), and the Department of Mathematical Sciences. Crowdmark agreed to extend the trial to semester 1 2023-24 (until the 1st of February 2024), this time to all staff and students of the UoB for a one-off fee of 2500 USD. This was a very convenient offer, and we set up to enrol as many lecturers as possible to use Crowdmark to grade and give feedback in semester 1.

Statistics for semester 1, 2023-24

Accordingly, more staff joined the project and used Crowdmark both for formative and summative assessment. More specifically:

- 12 lecturers from 5 departments used it on 10 courses.
- The 5 departments were: Mathematical Sciences, Chemical Engineering, Electronic and Electrical Engineering, Mechanical Engineering, Education.
- 874 students were assessed and given feedback using Crowdmark.

We strived to enrol more users, but the busy schedule of all staff at the university and the uncertainty to spend time on new methods that might not be adopted meant that many lecturers decided not to commit to the trial, despite their initial enthusiasm. Here follows a summary of the feedback from all users, staff (JF, IB, SG, JW & TS, PS, TD, KAC) and students alike.

❖ **Efficiency and Timesaving**

- *Faster Marking.* Crowdmark significantly reduced marking time, with users noting it took roughly a third of the time compared to traditional methods.
- *Comment Management.* The comment bank system, which allows pre-creating comments and associating them with partial marks, was highlighted as a major time-saver. It also enables dynamic adjustments during the marking process.
- *MCQ Marking.* Marking multiple-choice questions was particularly efficient, with some users finding it easy and streamlined.

❖ **Consistency and Quality of Feedback**

- *Detailed Feedback.* Students and staff appreciated the ability to provide specific feedback directly on the script. Comments were detailed, helping students understand exactly where they gained or lost marks.
- *Consistency in Grading.* Grading by question and batch editing of comments helped maintain consistency across scripts. The shared comment libraries ensured uniform feedback, especially when multiple markers were involved.
- *Rubric Management.* Some users found it challenging to manage complex rubrics, particularly when multiple categories of assessment were involved. There were

suggestions to allow keeping rubrics separate from feedback comments to avoid confusion.

❖ **Insight and Monitoring**

- *Tracking and Analytics.* Crowdmark's tracking features allowed users to monitor marking progress, time spent, and the frequency of comment usage, which helped identify common student mistakes.
- *Student Performance Insights.* While some students found it helpful to see where they stood relative to their peers, others felt that this feature added unnecessary anxiety. There were mixed feelings about showing the distribution of results.

❖ **User Experience and Learning Curve**

- *Ease of Use.* Both staff and students found Crowdmark relatively easy to use, though there were some initial learning curves, particularly in setting up assignments and integrating them with Moodle.
- *Student Accessibility.* Most students found the platform straightforward for submitting assignments and receiving feedback. However, some noted that the submission format (PDF) was less familiar and caused minor issues.
- *Challenges with Long Submissions.* For longer or more complex submissions, some users found the platform less suitable, particularly with managing rubrics and annotating lengthy text.

❖ **Room for Improvement**

- *Interface and Usability.* Several users mentioned that the interface could be cluttered, with tools like the overview grid taking up too much space on the screen. Comment boxes could be difficult to position without obscuring the text, and there were issues with resizing and moving annotations.
- *Assignment Setup.* Integrating Crowdmark with Moodle and splitting marking between multiple markers could be more intuitive. Users also suggested improvements in the flexibility of the comment bank and rubric management.
- *Technical Limitations.* Some users experienced issues with certain functionalities, such as zooming in/out, rotating pages, and using a tablet with a stylus. The platform's reliance on PDFs was noted as a limitation, especially in disciplines where Word documents are more common.

❖ **Student Feedback**

- *Positive Experiences:*
 - Students found Crowdmark easier and more convenient than Moodle.
 - They appreciated the detailed feedback directly on their work and the ability to see the distribution of results.
 - The interface was user-friendly, making it easy to submit assignments and review feedback.
- *Challenges Noted by Students:*
 - Some students expressed discomfort with the new format, particularly those with anxiety about grades. They prefer receiving feedback in a familiar format.
 - There was a desire for more email communication, in relation to deadlines and submissions, similar to what is provided with Moodle.
 - A few students noted that the visibility of cohort ranking could be anxiety-inducing, though others appreciated this feature.

Approaching the end of trial

At the end of semester 1 2023-24, during the extended trial period, funding to prolong it to semester 2 could not be secured. Discussions with all interested parties were held for a few weeks and it was felt that, although still many staff of a few departments had not tried Crowdmark, yet a decision for university-wide adoption had to be taken soon. Unfortunately, the financial constraints currently plaguing UK universities meant that funding for the adoption at university level was not possible any time soon. Therefore, it was felt that individual faculties or departments had to be involved to pay for the platform, according to needs.

In-Person Exam Trial at the University of Bath

Introduction

The last part of this report focuses on the in-person exam trial conducted in May 2024 for two units at the Department of Mathematical Sciences: Time Series (MA30085) and Analytic and Geometric Theory of Differential Equations (MA40048). The trial aimed to evaluate the effectiveness of Crowdmark in facilitating grading, with a special eye at finding out any major problem arising from the different setup, compared to the standard in-person exams.

Background

PS approached Academic Registry inquiring whether it was possible to carry out a small-scale trial with Crowdmark during the in-person exam session of semester 2. JF was also interested in the trial. Both PS and JF had used Crowdmark for in person mock exams in December and January. During that trial, a few features of the process could be assessed, but it was felt that only a trial at the real in person exam session could provide a serious and realistic assessment. A meeting with Academic Registry was held at the end of March in which both JA and JW showed their interest by providing their support to try Crowdmark for semester 2 exams. They agreed to accommodate a few units in the small-scale trial.

Eventually PS opted out of the trial, after having verified no funding options with the head of his department. JF decided that it was very important to proceed with the trial, given that there would be no more possibilities of extending funding for the trial period. So, two units were singled out (see above and further down) and preparations for the trial started.

Preparation

The trial focused on in-person exams for two units at the Department of Mathematical Sciences:

- Time Series (MA30085): 60 students. Unit convenor: JF
- Analytic and Geometric Theory of Differential Equations (MA40048): 13 students. Unit convenor: VF

JF and JL worked closely with Academic Registry, especially with JW, to ensure compliance with university policies. The format for the exam questions was left unchanged, while the format for the answers was changed. The following main points should be noted on the in person Crowdmark exams:

1. The students write their answers in a pre-formatted booklet that dedicates a fixed number of blank pages to each answer.
2. The unit convenor decides the number of pages for the booklet and takes care of producing the necessary number of booklets as a single PDF file.
3. Each booklet's cover page includes space for the student to write first and last name, and student ID (9 digits). This cover page is automatically removed by the Crowdmark platform, so to enable blind marking.

Print Services was tasked with producing and scanning the Crowdmark booklets. The final cost was £158.56 (paid by the Department of Mathematical Sciences).

JF was previously enrolled as chief invigilator for the MA30085 and gave his availability to be present as support for the MA40048 exam, invigilated by another colleague. JW made sure invigilators for DAP students had all relevant instructions for the two exams.

The Director of Teaching (DoT) and the Directors of Studies (DoS's) in Mathematical Sciences raised concerns about approval, communication, potential scanning errors, anonymity, and rubric adjustments. These concerns were addressed at a meeting and detailed responses were provided. More specifically:

1. **Data released to students.** It was agreed that Crowdmark would be used only to make it easier and effective for graders to mark the scripts. So, no feedback was going to be released from the platform directly to students, even if this is, in fact, possible. The rationale for this decision is that the two units would provide an approach to feedback different from the other units of the department.
2. **Anonymous marking.** Even if the first page of each booklet contains name and student ID, this is removed when booklets are scanned and imported in Crowdmark. Furthermore, JL was scheduled to become the sole instructor for both exams, thus “degrading” VF and JF to the role of “graders”, which in Crowdmark have no possibility at any time to view students’ information.
3. **Special training for invigilators.** As JF was booked to be chief invigilator for MA30085 and close to the chief invigilator for MA40048, no special concerns were noted with this. JW made sure that invigilators for DAP students received the necessary instructions in relation to booklets.
4. **Students running out of writing space.** As the number of pages for a booklet is limited, it was agreed that students who requested it would be given a white, standard booklet of blank pages. This poses problems for the later scanning and import into Crowdmark. As it turns out, no students requested extra booklets because the pre-planned number of pages in the prepared booklets was sufficient to include all answers. Students were also told that if the space available to answer one question was not sufficient, space in another question could be used, provided it was clearly marked.
5. **External examiners.** Given that marking with Crowdmark is done on the online platform, a question was asked as to how external examiners can access the scripts for checking. This can be done, in fact, in two ways. The first is by including each external examiner’s email address in the Crowdmark’s team for the specific exam. The second, probably easier, is to download all marked scripts in a single PDF file that can be kept in a university folder for the examiners’ inspection.
6. **Information to students.** Prior to the exam taking place, all students were informed of the different format for the answers. This was done at a lecture that was video recorded. Later, an email was sent to clarify that students could write the official answer only to white booklets (Crowdmark ones and standard-university ones, if needed), and that yellow booklets had to be used only as scrap paper.
7. **Scanning errors.** It is possible that errors occur when the scripts are scanned prior to be imported into Crowdmark. This instance is rare with the new scanning machines acquired by Print Services, but it is still a possibility. It is important to know that all pages of all booklets include a unique QR code. Therefore, missing pages after import in Crowdmark are automatically revealed by the platform and missing pages (always available as all paper booklets are stored and kept for checking) can be scanned for import. In the current trial, only one page did not scan; Crowdmark software automatically warned about the missing page, and this was scanned and imported

straight away. It is of interest to learn that that page included no handwritten answer by the relevant student (basically, it was blank).

8. **Original scripts.** All paper booklets will be available in the maths office for anyone (external examiners included) to view them.

Execution

Both exams sessions proceeded without major problems. The only question asked to chief invigilators was whether the 9-digits student ID as opposed to the standard candidate number had to be written on the first page of the Crowdmark booklet. The question makes sense as the trial was taking place amidst normal exam rules in which it is the candidate number to be written on the script. No extra standard white booklets were requested by students as the number of available pages in the Crowdmark booklet was sufficient. It is worth noting that most students wrote within the assigned space in a tidier fashion than that normally occurring in standard university booklets. The resulting scripts were, therefore, easier to mark.

One DAP student used a tablet to write her answer. The tablet content was later printed on paper by UoB IT and grouped with the other scripts. JL, acting as guarantor of blind marking for this trial, scanned this document and pasted it into a Crowdmark (PDF) booklet. Accordingly, this script could be marked as the others, without it being recognised as coming from that student. This does not normally happen because this student's documents are handed in separately.

Before taking the scripted booklets to Print Services, JF left them at the maths admin office so that all booklets, including those coming later from DAP students, could be grouped together. Booklets from the MA30085 exam were taken to Print Services on the same day of the exam, the 16th of May, those from MA40048 on the following day (MA30085 exam was held in the morning and MA40048 in the afternoon).

The scanned scripts resulted in two PDF files. These were uploaded on a secure university folder and made available by SH to JL for inclusion into Crowdmark.

Grading

Prior to receiving the scanned scripts, JL assumed the role of "instructor" in Crowdmark and degraded both VF and JF to "graders". This was important for blind marking as only instructors can see students if they want to, while graders can see the scripts and mark them, but cannot see students information at any time.

Later, JL imported the two PDF documents into Crowdmark and started the automated matching process to assign each booklet to its unique student. For MA30085, 51 out of 58 booklets were automatically matched, while 7 had to be matched manually, a very straightforward process. In the end, only two sides of one page were signalled as missing scans; this page was later found in the stored paper booklets and scanned for import. The page contained no handwritten notes from the relevant student.

Both JF and VF found the marking process using Crowdmark smooth and efficient. More specifically:

JF:

- Used both positive and negative rubrics. In a positive rubric, comments with partial positive marks are created for each question and their sum coincide with the total mark for that question. In a negative rubric, comments with partial negative marks are created for each question and their addition is subtracted by the total mark for that question. There are pros

and cons with the use of these two approaches. It is also possible to assign a mark without using partial addition/subtraction and add ticks and manual handwriting to the script.

- The real time spent marking each question is calculated and showed by Crowdmark. This is very useful, especially at the beginning of the marking process, because the marker can figure out how much time is needed to complete marking.
- Once a question is fully marked, statistics for that question appear in a “results” section in Crowdmark. The total statistics for all questions are also available. The distribution of grades is useful to individuate outliers and act on them, if needed.
- Filtering is also available to extract groups of scripts with specific comments, specific partial marks, etc. This is extremely useful as it enables the marker to check mistakes or bias.

VF:

- The marking on Crowdmark was efficient. It suited my exam quite well and ensured consistency.
- Beside the ease of use of Crowdmark online, this is because in my exam, one question is usually divided in 2 or 3 sub questions, and I was marking each sub question through all the scripts. It would have been more difficult if I had divided each question into more sub questions, but it was not the case.
- Having been through marking an exam once on Crowdmark, I would present an exam slightly differently if I knew it was going to be marked on Crowdmark, but it would not change the questions, it would change the presentation of the points per sub question.
- The checker for this exam, TB, and I think that it is important to have a tool like Crowdmark for marking and checking exams, especially large ones. Indeed, we are asked more and more to do support marking in teams with extremely short deadlines. As a result, exams in paper have to be ferried in large piles between several markers in record times. Each marker has to rely on the other markers to be as dedicated as them and have a similar rhythm and schedule over very few specific days. This puts a lot of pressure on the markers, and this is unsustainable. With an online tool, the marking can be done in parallel without much coordination.
- With crowdmarks, the students’ scripts tend have a better presentation. This is because the students answer questions in designated places in the booklet. This is beneficial for both students and markers. The booklets can be improved slightly at the preparation stage by adding lines on each answer sheet and adding spare pages at the end. These improvements would be easy to implement (the preparation stage is under the control of the lecturer).
- All in all, I think Crowdmark is a good tool. I would certainly use it again if I am allowed to do so. I have some improvements in mind, some under my control with Crowdmark (e.g. for the presentation of the booklet and the exam), others regarding the procedures (e.g. for anonymisation) that should be decided by e.g. DoS and TEL.

Admin

Grades can be released to students directly from Crowdmark, simply by pushing a button. This was not the case for this trial, as previously mentioned. Rather, all grades for each exam were exported to Excel spreadsheets for the admin office to process. The csv format downloadable by Crowdmark includes detailed information on all questions. It was therefore necessary to use simple Excel formulas to aggregate and extract grades in the format preferred by the admin office. This is no more complicated than the work done currently with the standard exams procedure. There was one mistake, where one student ID was repeated twice, but Mathematical Sciences admin (RC) spotted

the mistake and corrected it. This was a transcription mistake, possible in normal exam settings, not specifically to be associated with Crowdmark.

Moderation

The checkers for the two different units carried out grades checking and moderation from within Crowdmark. Moderation was done differently and was based on how the unit convenors handled it. The moderation process can be improved as this was the first time both unit convenors faced the process with Crowdmark.

JF:

- To enable MN to moderate the exams, his role was changed from "grader" to "instructor" within Crowdmark. With later insight, moderation could have happened in the downloaded PDF copy of all scripts, the same to be made available to external examiners.

VF:

- TB has a positive opinion on Crowdmark. He could navigate the scripts quite intuitively, and the checking did not take him more time than for paper scripts.
- There was one negative point: he found it difficult to link the grades I had given with the scripts. This was due to his permissions being the ones of a tutor. Retrospectively, we should have asked for him to have a role with higher permissions, but we were pressed for time. New procedures regarding permissions and roles on Crowdmark through the process of marking and checking and anonymisation have to be thought through for future exams, especially large ones (JF had not made this clear to VF in advance: apologies!).

Student Feedback

[So far, only four students left feedback]

While marking, it was evident that most students wrote within the allocated question space, indicating that constraining the answer is an acceptable feature of exams.

- **Booklet Format:** Some students suggested that the booklet be printed with staples down the middle, like a book, to reduce the need for flicking back and forth.
- **Space Allocation:** While one student felt the booklet restricted space, another found that there was plenty of space for each question and preferred it over the previous mock exam format.
- **Overall Experience:** Students generally found the Crowdmark booklets to be good, with positive comments on space and clarity. While students found this reasonable, staff found the feature greatly beneficial for marking scripts.

Concluding Remarks

The two-year trial of Crowdmark at the University of Bath has provided significant insights into the potential of this platform to transform the grading and feedback process across departments. The results from both coursework and in-person exam trials demonstrate clear benefits in terms of time savings, consistency in grading, and the overall quality of feedback provided to students. However, as with any new system, the experience has also highlighted areas that require refinement before the platform can be adopted on a wider scale.

One of the most notable successes of the trial was the significant reduction in marking time. Staff who used Crowdmark consistently reported that the platform substantially saved grading time. The comment bank system, which allows markers to pre-create feedback and dynamically adjust it across all scripts, contributed greatly to this efficiency. Additionally, the ability to grade by question helped to improve consistency (a feature particularly useful in assessments with multiple markers), which is notoriously difficult to achieve, as maintaining uniform standards is known to be challenging.

Students responded positively to the detailed, individualised feedback provided directly on their scripts. Crowdmark enabled staff to give more targeted and constructive feedback, highlighting specific strengths and areas for improvement. This is a marked improvement over traditional methods, where feedback can sometimes be too general or inconsistent, especially across large cohorts.

From an administrative perspective, Crowdmark's tracking features allows departments to monitor grading progress, time spent marking, and common student errors. This provides valuable data for evaluating both the assessments and the overall teaching effectiveness. These features support the university's broader goals of ensuring transparency, maintaining high academic standards, and improving the student learning experience.

However, the trial also revealed several areas for improvement. Crowdmark's reliance on PDF submissions, while effective for some disciplines, proved limiting for others where Word documents are more commonly used. The platform's interface, although user-friendly in many respects, was seen as cluttered and in need of better management tools—particularly for resizing and moving annotations. Additionally, the inability to effectively use tablets or styluses for grading was a concern for some staff who are accustomed to this method of annotation.

Another area requiring attention is the feature that shows students where they stand in relation to their peers. While students in general appreciated this feature, some of them found it anxiety-inducing, raising concerns about whether this aligns with the university's approach to assessment for learning. More research and consultation are needed to determine whether this feature should be adapted or removed entirely.

The in-person exam trial, conducted in May 2024, further highlighted the platform's strengths and limitations. The use of pre-formatted answer booklets improved both the presentation of answers and the marking experience. Scanning and processing the booklets for online marking went smoothly, and staff found the grading process efficient. However, logistical issues such as the need for clearer instructions on booklet formatting and stapling were noted, providing valuable lessons for any future use of the platform in exam settings.

Moving forward, several recommendations have emerged from the trial. First and foremost, sustained financial support is necessary for the platform's broader adoption. While the trial has

shown that Crowdmark can be a powerful tool for grading and feedback, securing long-term funding will be essential for ensuring its integration into the university's systems and wide staff engagement. Ideally, university-wide funding would support assessment and feedback for all students. Alternatively, faculty or department funding would be a way of optimising feedback for course teams. Here, Directors of Teaching and Directors of Studies can be involved more extensively to guide in the appropriate use of Crowdmark.

Additionally, further staff engagement is critical. Training and support must be expanded to ensure that all potential users are comfortable with the platform's functionalities. The small learning curve experienced by staff during the trial suggests that, with the right resources, adoption rates could increase significantly.

The in-person exam trial has shown that the exam format can be changed and improved in the foreseeable future. While scripts scanning adds work to the printing services, this brought huge benefits to the marking process. The speed of marking is increased (less load for staff), overall consistency is enhanced, and delays in paper scripts handling (especially where teams of markers are involved) are reduced to zero. Academic Registry was involved in the in-person exams trial, where their input found viable ways to allow these changes to the in-person exams process at the UoB.

Finally, some technical adjustments are required. Improving the platform's interface, addressing the limitations of PDF-only submissions, and enhancing the usability of features such as the comment bank and annotation tools will be key to making Crowdmark more versatile and adaptable to the needs of all departments.

In conclusion, Crowdmark has proven to be a valuable tool for improving the grading and feedback process at the University of Bath. We deem it to be a strong candidate for further adoption. However, to fully realise its potential, the platform will need ongoing support, refinements, and broader buy-in from the academic community. With these adjustments, Crowdmark could play a pivotal role in the university's efforts to modernise assessment practices and improve the student learning experience.