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IT Industry Service Management Tools for Managing Large Classes

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Abstract—Innovation Paper: With ever-increasing numbers of students entering university, large classes are becoming the norm rather than the exception for universities in many parts of the world such as Australia and some areas of the USA. This is particularly true in technical degrees such as engineering and IT. Cohorts of around 700 or even 1000 students are no longer uncommon. With so many students it can be difficult for academics to manage the administration of these classes, taking time away from curriculum development and teaching duties. Hundreds of email enquiries grace the modern academics' inbox, and in addition, increasingly there are multiple communication channels to monitor such as Microsoft Teams, Slack, LMS discussion forums, LMS instant messaging, and many more.

The IT industry has had a long history of dealing with large volumes of enquiries or in the case of software development, 'bug' reports. Further, tools developed by the IT industry have increasingly been seen outside the IT sector to help with non-IT service delivery. This project sought to use IT industry knowledge and tools to manage the administration of our large first-year engineering class *Introduction to Engineering Projects*, a project subject that sees approximately 1000 students per year asymmetrically split between approximately 700 students in the first semester and approximately 300 students in the second semester. To that end, in the second semester of 2021 (July – November) we implemented a service management tool, Atlassian's Jira Service Management Cloud, to manage our large volume of student enquiries, replacing traditional emails and most other communication channels.

While we discovered these tools can be complex to set up, once set up they significantly improved academic-student communication and communication management. The tool allowed for emails to also feed into the enquiry portal, simplifying where students submit enquiries to coordination staff. Staff found it easier to respond to queries, clarity on which enquiries had been dealt with or who was responsible for responding to open enquiries, and students found we communicated with them in a timely manner. A further trial will be run in our larger first semester in 2022 (March – June). We would recommend academics consider IT service management tools for communication/query management of their large classes, especially where responsibility for responding to enquiries is delegated among a team and not just a single individual.

Index Terms—Engineering Education

I. INTRODUCTION

The ongoing challenge to manage the large student cohort in *Introduction to Engineering Projects* necessitated the team to investigate novel solutions to student query and communication management. Many in the team have significant IT

industry experience and thus industry solutions to customer management were investigated.

In the IT industry in particular, but increasingly in other areas, service management and customer management are vital to the delivery of services. These service teams can receive hundreds of queries per day that need to be allocated to team members, taken through various workflows and resolved in an efficient manner.

To manage the volume of queries and the workflows staff respond to queries through tools called service management or customer relationship management tools. These tools allow for the creation of forms for customers or for emails to be sent into the system where they form a queue of queries or jobs to be completed. The system or a staff member assigns queries to team members and team members work through their queue of queries. Each type of query has a predefined workflow that team members work through while keeping the customer informed of progress. Upon completion of a query, queries can be marked as resolved and the customer informed. These tools have the capability to also develop help articles related to common queries to speed up responses and to attach information to each customer such that the team member can see all interactions with the customer not just the current query.

In adopting IT industry service management tools into student communication management (where the above terminology of 'customers' are our students), this paper reports on our experience implementing Atlassian's Jira Service Management Cloud for managing student and tutor queries in our large first-year engineering subject *Introduction to Engineering Projects*.

II. BACKGROUND

The number of students commencing an engineering degree in Australia has doubled from 2001 to 2018 [1], prompting higher education institutions to increase student intake and adapt to larger classes of students. Empirical studies on large classes tend to define them as classes with more than 100 students, which are common for 'core' (compulsory) subjects of undergraduate degree programs that provide foundation level study [2]. However, most of these studies refer to 'class size' as the number of students in a classroom (physical or virtual), rather than the number of students enrolled in a subject. In the context of this paper, the latter definition is used to situate the case, which is a subject with a large student

cohort. Given the different definitions of ‘class size’, there is a need to clarify what counts as a large class. Hornsby and Osman [3] offers a useful argument that instead of a numerical threshold, large classes should be defined as classes where the quality of educational experience is negatively impacted by the number of students.

While educational experience encompasses aspects such as core business (teaching), facilitative or administrative services, support services and user interface [4], most studies on large classes focus on pedagogical aspects such as student engagement. Across teaching and administration, one common challenge is managing student queries. With large classes, the teaching team receives a high volume of time-sensitive queries that need to be managed consistently and effectively. To tackle this challenge, academics have experimented with various uses of technology drawn from fields such as customer service and healthcare [5]. Such systems typically involve automatic recognition of student questions and returning outputs that either 1) assist the teaching team by providing helpful context [6] or 2) answer student queries directly [5], [7]- [8], including the use of AI-driven chatbots [9].

While the question answering systems above come with many benefits, one key limitation is the reliability of automated responses. Furthermore, these systems are more appropriate for queries that relate to the teaching content (e.g., clarifying concepts or assessment requirements) and less useful for student-specific teaching administration (e.g., requesting for special consideration). Queries on teaching administration are typically handled through office hours or drop-in sessions [10]. Though less documented in academic sources, several educators have also opted to use online forms instead of emails to manage queries [11].

III. CASE STUDY

A. About Introduction to Engineering Projects

Introduction to Engineering Projects is a first-year professional skills development subject for undergraduate engineers. As a core (compulsory) subject for all engineering students, the subject had a student cohort of approximately 1000 students in 2021 (640 in the first semester, 360 in the second semester). Due to the complexity of the subject and the size of the cohort, and considering this is one of the first subjects new university students do, tutorial class sizes are capped at 35 students and there is a large teaching team that supports the students and the subject. The teaching team consists of two subject coordinators, 1-2 head tutors, and a team of approximately twenty tutors.

To develop professional skills in the cohort, the subject takes a problem-based learning approach with a focus on social good. To this end, the subject sees students complete the Engineers Without Borders (EWB) Challenge through a Design Thinking approach in teams. Through the process of empathising with the EWB Challenge community and developing potential solutions to their problems, students develop an understanding of engineering practice, social impact, communication and collaboration as engineers, and various

other professional skills vital to completing university and becoming professional engineers.

To manage the subject, we use a number of technology tools. The teaching content and assessment tasks are all managed in the Learning Management System (LMS) platform, Canvas [12]. Communication and online classes are provided for in Microsoft (MS) Teams, with each tutorial receiving its own ‘private channel’ in our class MS Team site [13]. Self and-Peer Assessment is conducted using SPARKPlus [14]. Online collaboration is facilitated using Microsoft Office365 collaborative documents and digital whiteboards from Mural.co [15]. And finally, personalised automated communications are sent to students using a university-developed system, OnTask [16].

Due to the size of the cohort and complexity of the EWB Challenge-based curriculum, managing the students is a significant challenge for the teaching team. With a cohort this size there are hundreds of student and tutor queries, and a sizable number of complex administrative tasks such as ensuring students are enrolled in all tools the subject uses, and that student teams and classes are in-sync across all those tools. This is exacerbated by the size of the teaching team, with several subject coordinators and head tutors managing the high-level components of the subject including student administration. Coordinating the teaching team to ensure no tasks or student enquiries are missed has been an ongoing challenge.

B. Implementing a Service Management Workflow

While we do not claim that large classes generate as many queries as an IT Help Desk, there are parallels between the two in terms of customer and query management. We posited that implementing a service management tool for our cohort would simplify where students ask queries, improve visibility to students of progress on queries, improve accountability of which teaching team member is assigned to each query and when queries are completed, improve consistency of responses through workflows and visibility of previous responses, and decrease the volume of queries that are missed or take significantly longer than our response-time goal of 24-48 hours.

For our second semester, we trialled Jira Service Management from Atlassian to fit this purpose. Below we outline the features of Jira Service Management and how they were used in our subject.

1) *Emails and Forms*: Jira service management allows for two methods for customers (in this case, students and tutors) to submit queries, a dedicated email address and online forms. *Introduction to Engineering Projects* has a university-provided shared email account that the subject coordination team has access to. This email address was set to forward all emails sent to it to the Jira system. In this way, students were able to use a friendly university email address to send questions which were then forwarded to Jira. Unfortunately in our setup, a less user-friendly email address provided by Jira is the email address that sends responses to students; however, this did not seem to confuse students. It should be noted that if implementing this with the university IT department’s support, it is possible

to set up a university email address as the email address Jira uses.

In addition to email enquiries, a number of forms were also created for students and tutors. These included:

- Academic Misconduct - For tutors to report plagiarism and other student misconduct to the subject coordinator for review
- Change Tutorial Allocation - For students to change tutorial classes after the university timetable was locked
- Request for Remark - For students to submit a query regarding their assessment marks
- Missing Student - For tutors to inform the subject coordinator of students who have not shown up to classes for pastoral care
- Incorrect Group Allocation - For students to report they have been allocated to the wrong team in our group project systems such as SPARKPlus

The forms allowed for the creation of all the fields we require for each type of enquiry. This improves communication efficiency: students cannot leave out information as often happens in a normal email, decreasing the back and forth communication with the students. Some forms such as for 'misconduct', which need to follow university processes, also had dedicated workflows attached which are discussed in the workflow section below.

2) *Queues*: Queues are used extensively in Jira Service Management and most service management tools. These are a list of all queries matching certain criteria. Common queues include a list of all open queries, a personal queue of all open queries assigned to you, and a list of all closed/resolved queries. Queues are a way to manage long lists of open queries, categorising them to make queries manageable.

In *Introduction to Engineering Projects*, we created a number of additional queues to help manage our workflow. For example, a queue was created for all queries that came into Jira via the 'missing student' form. This form was for tutors to report students who had missed several weeks at the beginning of class so the subject coordinators could check in with those students for pastoral care. We often find that these students have additional things going on, or are confused about the subject, and a simple conversation to discuss the challenges can bring the student back to class and participating in learning. In addition, a queue can be allowed to accumulate over a period of time (e.g., a few days, a week) to enable a subject coordinator to address the same issue with multiple students at once. This improves the efficiency of such administrative tasks.

Several other queues were set up for this sort of efficiency as well such as changing tutorials, misconduct etc. In the case of misconduct, this is also a useful queue for monitoring misconduct cases as in general these can be open for some time while the university investigates the claims.

3) *Workflows*: The final major feature of Jira Service Management incorporated into *Introduction to Engineering Projects* is workflows. Workflows can be seen as a predefined

step-by-step process a query is taken through. This process can vary dependent on the type of query.

In *Introduction to Engineering Projects* many of our queries followed a standard workflow as shown in Figure 1, as they were not complex enough to warrant developing custom workflows for the trial. This included queries such as queries via email, the 'ask a question' form, 'missing student' form, 'remark request' form etc.

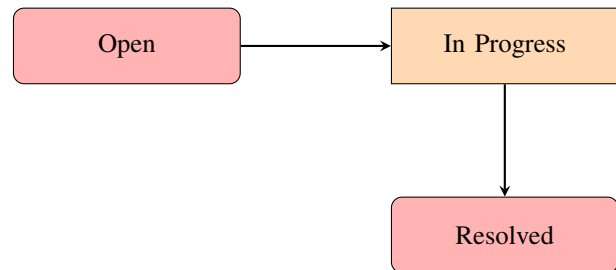


Fig. 1. Simplified workflow diagram for standard Jira queries

There were, however, some custom workflows developed such as for misconduct and tutorial class allocation. These queries were considered more complex than other queries and were good test cases for workflow management. An example of the workflow for tutorial allocation is provided in 2. Tutorial allocation changes involve multiple steps and multiple stakeholders and thus are ideal for workflows. As seen in 2, the workflow includes the coordinator updating the teaching tools and sending a request to the faculty administrator for officially updating students' university class timetables.

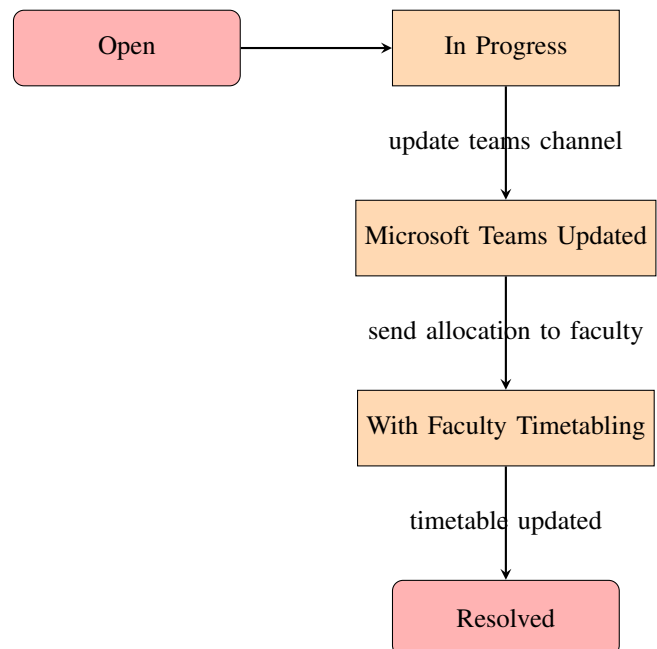


Fig. 2. Simplified workflow diagram for changing tutorial cases

C. Cost

During the trial of Jira Service Management the pricing was as follows:

- 1 - 3 users: Free
- 4+ users: \$20 per user per month (inclusive of the first 3)
- 50% discount for academic institutions

As we used the tool at an academic institution we qualified for the discounted pricing. We had 4 staff who needed to access the tool so in total we paid \$40 per month.

While the tool could be prohibitively expensive for larger teams, where your use case sees a need for less than 4 users it is free and thus could be beneficial to smaller teams. We are currently seeking greater buy in from the faculty after the successful pilot to provide ongoing funding.

IV. FINDINGS

A. Student Satisfaction

In the final pre-class work for the semester, students were asked the following question:

We implemented a new online system to manage student queries this semester - do you feel that your queries have been answered and within a reasonable time frame?

The responses were open-ended. An analysis of the sentiment of each response was conducted. Few students wrote more than a few words with most responses being yes, no, or yes or no with a short comment. Tables I and II outline the student response. Table I shows the full breakdown of categorised student responses. Table II is a summary that shows only responses that indicated an opinion, of those students that indicated an opinion 93% indicated a positive opinion. The number of students who claimed to have not used the system is interestingly high, it is suspected that the system was so frictionless (particularly as emails are forwarded to Jira and thus it may not be immediately obvious those emails are being handled in any special way) for these students that they may not have realised they had used it. In particular, the name 'Jira' was deliberately not used in naming the platform to avoid confusion amongst students that yet another technology platform was being used. 'No response or not valid' in Table I indicates where students submitted a blank response or the response was about something other than the question asked, the majority of these were the former.

TABLE I
SENTIMENT OF STUDENTS TOWARDS RESPONSE RATE OF STAFF

Response	Percentage
Positive	43.19%
Negative	3.50%
Didn't use it	11.67%
Did not submit enquiries	8.17%
No response or not valid	33.46%

TABLE II
SENTIMENT OF STUDENTS TOWARDS RESPONSE RATE OF STAFF
EXCLUDING STUDENTS WHO DID NOT PROVIDE A POSITIVE OR NEGATIVE
RATING

Response	Percentage
Positive	93%
Negative	7%

B. Jira Service Management Metrics

Jira Service Management has reporting and rating capabilities that can be used to monitor customer satisfaction, time-to-close tickets (i.e., issue resolution) and other metrics. While we did not extensively explore these features, there are some features that are used by default that we can examine in retrospect.

After each closed ticket the system sends an email to the student indicating the matter has been resolved. In that email, there is the possibility for students to rate the interaction. While only 15 of 200 students chose to rate their interaction, the ratings were high at 4.9 stars out of 5 (one student rated 4 stars the rest were 5 stars).

Jira also tracked various time-based metrics including, time to first response, where the team averaged 12.22 hours, and time to resolution, where the team averaged 15.83 hours. These averages were increased slightly due to a handful of complex cases which were open for a week or more but serve as a good general indicator of productivity. The team's goal has always been to respond to student enquiries within 24-48 hours.

C. Staff Perception

The coordinator who set up Jira Service Management, despite having an IT background, found that it is a complex tool having been designed to do a lot of things for a lot of different teams, and designed for software engineers to use. At times the settings and setup were confusing with numerous menus to set up a simple new query form. That being said, once the tool was fully set up it was very easy to use both from the query submission side (students) as well as the staff side answering queries.

Coordination staff reflected that resolution of queries was noticeably less work due to the clear response allocations, response visibility, and forms that require all information be submitted in the first instance. Visibility of who is working on what was also identified as having improved primarily due to query allocations and what still needs to be addressed showing as unallocated. This meant less communication was needed between team members to determine what needs responding to. Coordination staff also felt that their efficiency had improved through 'batchable' queries such as missing students and improved visibility of the current state of queries which take significant time e.g., academic misconduct.

Tutors expressed generally positive feelings about the system, indicating that they felt coordination staff were fast to respond to both students and tutors, and that getting help was frictionless for them. One area of improvement identified by tutors was related to Jira not providing enough information for

the tutor on the action that has been taken for their students. That is, Jira currently does not have a ‘middle customer’ between the service provider and the customer, as we do in teaching teams where we have coordinators, tutors and students. This also relates to Jira’s per-user licensing scheme, where it was not possible to pay for a license for each tutor so they were reliant on coordination staff to manually update them rather than being able to login to Jira themselves to check the status of a student query.

V. DISCUSSION

As discussed in the findings, despite the relatively simple needs for the subject, the setup of Jira was quite complex, with many settings menus, multiple layers deep to complete the setup of simple forms. This was a pain point for us despite having a very technically savvy team (IT and engineering backgrounds). It should be noted there has been some updates to Jira since our initial implementation which have improved this slightly, but there is still more that could be done to simplify the setup of these service management tools.

Once set up staff found the tool easy to use and it has demonstrably improved the efficiency of the team. Certainly, it improved the visibility of communications and student query management, as all queries were in the one place and all coordinators could see these queries. It was particularly useful to be able to assign queries to coordinators responsible for certain tasks, which would then notify them there was a query and student response waiting for them. Overall Jira, was a clear success for our team from student and coordinator perspectives for student query management. Students overwhelmingly felt that we efficiently managed their queries and appear to have not experienced any friction in sending queries to the team. And with all queries in the one system that all coordination staff had access to, we were able to respond to queries on average in a quarter of our target time of 48 hours.

One area of improvement for the team is communication with tutors. Some staff identified that they knew their students had submitted queries but had no way of knowing what stage the query was at nor the resolution. Whilst the Jira licensing remains as per-head, we can communicate updates to tutors more effectively in future.

Since the drafting of this paper, we have continued to use Jira and are now in our second semester using the tool. This semester we have 700 students and early indications are that it has scaled seamlessly from last year to support us in supporting more than double the students this paper reports on.

VI. CONCLUSION

With an ever-increasing cohort of students taking up engineering studies at university in Australia, we have found that our class sizes, particularly for core (compulsory) subjects such as our first year subject *Introduction to Engineering Projects*, are also increasing. With the tutor teaching team also

increasing in size, the volume of student queries and consistency in response amongst the teaching team are becoming more difficult to administer

Atlassian’s Jira Service Management was a response to the hurdles of managing both a large teaching team and managing the significant volume of student queries. We found that Jira was an exceptional tool for this purpose, improving our efficiency significantly and by extension the student experience as queries are responded to in a timely manner. As an IT service management tool, to adapt for student query management, Jira could improve, in particular, in the initial set up of the tool being quite difficult to complete.

We have continued to use Jira in our subject for our current semester, thus far with great success. We intend to continue using Jira, and would recommend coordinators with similar-sized subjects, particularly subjects with multiple teaching staff responsible for queries, to experiment with Jira or a similar IT service management tools.

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