Experiences with a Capstone Database

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A key aim of Capstones is to improve the job-readiness of students which ideally requires engagement with industry sponsors, a new and elusive stakeholder group that can become an integral part of delivering a successful program. The sourcing of student projects and the interaction between students, sponsors and the teaching team, make the coordination and delivery of Capstones more complex than conventional teaching programs. Managing a Capstone program demands significantly more administrative support that is distinct from the teaching effort and often goes unrecognized.

This paper describes the motivation for developing, and the experiences using a database tool as a Capstone Administration System (CAS) to support the necessary logistics for each Capstone class. The CAS tool simplified many of the routine, time-consuming tasks enabling the teaching team to better support a doubling of the student cohort while improving the student experience. Continuous improvement of the tool is ongoing with the goal to identify and streamline the unique aspects of industry-focused Capstones to create a better student experience that improves learning outcomes.

Introduction

Our world is increasingly reliant on software and Information Technologies that provide immediate access to the latest information, and the efficiency of automated workflows. There are software solutions that support every activity imaginable, and modern educational institutions could not operate without the support of administrative databases or Learning Management Systems (LMS). The question that this paper aims to explore is how a simple database tool can automate some of the drudgery associated with administering Capstone units and improve the student experience.

This paper describes the development and utilization of CAS, a simple database tool to support the administration of a Capstone program. The tool was developed by the author at the beginning of COVID and has been in use for 4 years, supporting 8 cohorts of a one semester (15-week long) Capstone. This core unit within the Master of Project Management program in the School of Project Management at the University of Sydney, caters for a pre-experience student cohort that has doubled in size with over 200 students in the last semester of 2023.

Based on the survey conducted by Howe and Goldberg[1] our cohort fits in the top 12% of the (ranging from 101 to 200 students) and follows the trend of increasing class size. The unique aspects of running a large-scale Project Management Capstone and the program's "social good" philosophy have been described previously[2,3]. The critical challenge that our program shares with all Capstones is the need to engage with industry sponsors to source the student projects. Being one semester in duration, our Capstone has the added challenge of finding suitable projects at volume. We engage with industry and community organizations to source over 30 new project topics per semester as Capstone students are required to work in teams of 5 to 6 in recognition of the fact that teamwork is central to real-world industry projects,

Working with a pre-experience cohort that can exceed 200 students per semester, has been the prime motivation for the development of the CAS tool. The alternative of moving towards a more simulated project environment was considered however unique, real-world projects offer students the opportunity to develop professional (soft) skills in dealing with a "live" sponsor and project uncertainty that provides a more authentic project experience.

Capstone's Unique Requirement

The University of Sydney offers a rich set of educational support tools including the Canvas Learning Management System[4]. In such an environment, common

to many educational establishments, the development of new tools specifically for Capstones requires some justification. The question as to what additional support Capstones need beyond that provided for traditional teaching units is addressed in the Appendix, providing a comparison of CAS and the capabilities offered by traditional LMS's such as Canvas. The initial motivation for the development of CAS was that industry sponsors, a critical element or our Capstones that also required significant administrative effort, were not formally part of teaching team and being external to the University, did not have access to the LMS.

Sourcing Industry Projects

The sourcing of projects from industry is an essential activity that begins well before semester starts. This is recognized as an ongoing and time-consuming activity in the Capstone community[5]. We maintain a contact list of all previous industry partners who have offered to sponsor projects. However, the administrative exercise of contacting these sponsors each semester and obtaining Project Proposals from them can be a logistics challenge. Knowing the stage at which each proposal is at and being assured that the sponsor is willing to "show up on the day" can pose a problem. If Capstones operated like a commercial enterprise, the business would have full-time administrators to manage the process. However, our Capstone Program has not made the case for additional administrative support. Hence the need for the CAS database that allowed industry project sponsors to create, upload and edit their project proposals, which could more easily be readied for the review and selection by students at the start of semester.

Team Formation

While many LMS's like Canvas support groupwork, team formation however falls outside of their scope. This is a recognized challenge of Capstones which is met in our unit via a Matchmaking Survey undertaken by all students. Previously the team formation was undertaken using a separate tool[6], however, when the survey was conducted via the CAS database, the resulting (manual) allocation of teams could be recorded and communicated to the students more easily. The efficiencies that resulted were indicative of a pattern – while individual tools may exist to support a specific activity, the effort of switching between tools and transferring data between them created inefficiencies and gave rise to administrative stress.

Project Allocations

To find a motivated student team for an industry sponsor, we allow teams to vote for their preferred project from the list of available proposals. The projects are then allocated to teams based on their votes (as far as possible) but with due consideration of their existing skills and capabilities. When conducted with the aid of a survey tool, there was a significant amount of data transfer and reconciliation required. Communicating the results to students entailed identifying the students in each team, emailing them their allocated project and attaching the appropriate project proposal. Undertaking these tasks for around 30 teams and ensuring that the information is accurate soon becomes untenable. Such administrative activities are an essential aspect of most Capstone programs and could benefit from tool support.

Capstone Administration System

The CAS tool was first developed to reduce the amount of routine administration that is a part of our industry-focused Capstone program and address the essential logistics that was not well understood or acknowledged by those outside the Capstone community. The Knack platform[7] was selected because of it was an online relational database that required no-code and had a per-app (as opposed to per-user) pricing model that also supported simple user administration.

The availability of online database platforms and the author's rudimentary software skills allowed the creation of an online Project Proposal form that prospective industry sponsors were directed to complete. From this basic functionality the CAS has grown to address all the information transfer and communication challenges discussed earlier. Further functionality has been added that has greatly improved the student experience and offered a "one-stop-shop" for all things related to their Capstone project.

The following is a summary of the features that have been added as a result of continuously improving the CAS database tool over the four years since it was initiated:

- CAS organizes Capstone information as a project with activities and assessment structured according to the recommended progression over the semester. This is a crucial departure from a traditional LMS enabling CAS to provide consolidated, role-based database views that mimic the project lifecycle.
- As all students were required to have a CAS login, it was easy to record some project activities such as weekly reflections using the tool. While the LMS could have been used for this purpose they did not support the granularity and volume of these micro, reflective assessments. Further, the tutors (who support the Capstone instructor by guiding the student teams) did not have a consolidated view of these reflections that they could conveniently mark,

or importantly in a Capstone, respond to in a timely fashion. The CAS provides tutors with a view of each team and tutors can drill-down to individual students to fully understand the team's status. From the student's viewpoint we recently added a feature that enables sharing of an individual's reflections with their peers which helps reduce their sense of isolation and offers the opportunity to gain insights from other students in the cohort.

- Guidance is provided on the activities expected to be undertaken each week of the program. This began with weekly prompts to the teaching team to stimulate team discussions, but quickly moved to providing students and industry sponsors with their unique perspective of what should be happening in each week. Even though individual team activities may vary from this guidance, it reinforces the project structure and communicates common expectations to all project stakeholders.
- A Tips & Tricks section was added to the CAS to aid student revision of the material they are expected to know. While Capstones aim to have students apply the knowledge they acquired they often need to be reminded of key concepts. Given projects undergo a set of predefined stages, the CAS provided supported student learning with relevant techniques that might be considered at each project stage.
- The latest area marked for improvement is the creation of a simple project status report which each team completes in CAS that provides visibility of progress to both the team's tutors and industry sponsor. While sponsor reports have been encouraged in the past, there was no guarantee that tutors would have visibility of what was being sent to sponsors. By centralizing and contextualizing these reports in the CAS database a more consistent approach to reporting is encouraged that also reduces tutor effort while allowing each sponsor's unique request be met by attaching them to the generic status report.

The above provides a sample of the features that have been incrementally added to the CAS tool. We used the term portal to represent the consolidated stakeholder view that the CAS generated and today we have four such portals – one for each of the stakeholders who have to interact in any Capstone project: students, tutors, industry sponsor, and Capstone administrators.

Summary and Conclusion

The CAS database tool is now an integral part of the Capstone program at the School of Project Management, and we are looking at ways in which it can be utilized in other Capstone programs. Providing a centralized source of truth for the multiple stakeholders who work closely in a Capstone project has reduced the administrative load while improving coordination of the program. The program has nearly doubled in size without the need to increase the administrative effort.

Yet, the greatest testament to the success of CAS is the student experience and improvement of their learning environment, as evidenced by a consistently high and improving student feedback ratings. Each semester we identify new possibilities for CAS that are limited only by time and skills required to develop them.

This paper seeks to stimulate discussion on the importance of administration and logistics in Capstone programs. Are the challenges faced in our program unique or is it a common problem; and if so, are the requirements similar across different programs? While our contribution to this discussion is limited to the CAS tool, we aim to understand if there is a place for such tools within the Capstone community.

References

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Appendix: Comparison of Traditional LMS vs CAS Capabilities

Support for:	Traditional LMS (e.g. Canvas)	CAS Capabilities	Notes
Content	Pages provide web-like static content which can be released conditionally.	Weekly project guidance is provided with reminders and suggestions for Capstone activities.	Capstones follow a recommended five-stage project lifecycle that structures each semester.
Students	Students access is linked to institution's admissions systems and capture administrative information on individuals including assessments and grades.	Student logins for the independent database with records having extensible fields for Capstone information which can be made visible selectively to specific CAS roles.	Both systems are utilised for different purposes with Single Sign-On (SSO) to the CAS feasible but not implemented.
Groups	Student groups are supported for assessments and collaborative workspaces and tools are provided.	A Matchmaking Survey is used to form Capstone teams with a focus on team building and team-centric interactions captured in CAS.	Both systems provide the necessary capabilities although CAS focuses on team activities/ communications.
Assessments	Canvas provides a comprehensive set of features around the creation, release, and grading of assessments.	CAS does not support general assessments although specific Capstone activities (e.g. Matchmaking, regular reflections, and status updates) are captured. .	Both systems are utilised with Canvas used for submission/marking of project deliverables.
Instructors/ Tutors	Canvas provides different access levels based on content, assessment, marking, etc.	CAS provides Capstone instructors/tutors with specific views and dashboards that enable them to review the progress of Capstone teams and their projects.	CAS collects the information required by instructors/tutors making it quick and easy to determine project performance.
Projects Briefs	Descriptions of the Capstone Project are not naturally supported in Canvas.	CAS provides a means of capturing, refining, and sharing the Capstone Projects available to students.	Managing Project Briefs provided the stimulus for CAS as they require significant interaction with sponsors before finalization.
Prospects/ Sponsors	Industry partners who provide project suggestions have no access to Canvas.	Prospects who wish to "submit" a Project Brief are provided with a CAS login so they can edit/refine it. Where the project is selected the Prospects take on a Sponsor role with the ability to selectively view and communicate with their Capstone teams.	CAS provides a Sponsor Dashboard offering visibility of all Capstone activities and project/ team status.