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PADDIES: Project Administration and Dissertation Delivery Innovations and Education Support

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Abstract

Purpose – Undergraduate Computer Science (CS) students participate in multiple project-based classes throughout their studies. In our context, the two most significant of these are the optional final year project dissertation, and the compulsory penultimate-year team-based software engineering project. These projects can require levels of independent work, teamwork, critical thinking, communications, and time management that are not required in other classes. They can also help inform students' future paths, with many doctoral students tracing their research back to their undergraduate projects. The importance of projects is increasingly recognized by professional, accreditation and education bodies. This paper explores the evolution of these two project classes over their short history at the first Sino-foreign higher education institution (SfHEI), University of Nottingham Ningbo China (UNNC). Growing from the paper & pen-based administration of a couple of dozen students in 2014-15 to the current highly automated administration of around one hundred students, stages in this evolution have included: automation of project catalogue preparation; introduction of rubric-based marking; industrial collaboration; COVID-related remote working and administration; and innovative quality assurance mechanisms.

Design/methodology/approach – This paper traces the background and evolution of the two explicit UNNC CS project classes. Cross pollination of ideas and innovations across both are explored, following a reflective practice grounded in *Kaizen* philosophy. Experiences scaling up the classes, and managing the related administrative and pedagogical challenges, are explored. A recent experience of obtaining Chinese provincial "1st class module" recognition is also critically examined, including a discussion of the importance of accreditation and external recognition for curriculum innovations.

Findings – Delivering undergraduate projects is challenging, requiring management not only of participating students, but also the coordination of the supervisors and other key stakeholders. Ensuring timely and consistent marking, suitable provision of feedback, punctual mark administration and quality assurance practices that meet accreditor standards are examples of the tensions and challenges to be contended with. This paper includes details and experiences of how these issues have been dealt with in an SfHEI, over the last decade of UNNC CS projects.

Originality/value/implications – This is, we believe, the first report of undergraduate CS project classes in an SfHEI context. The double recognition,

by both British professional body and Chinese provincial education authority, represent a unique aspect of this study. The lessons learned over the evolution of the two project classes, and the listing of best practices and advice for other undergraduate project administration will be of interest to both educators and administrators.

Keywords: Undergraduate projects, professional accreditation, class administration, Sino-foreign higher education, reflective practice.

1 Introduction

Undergraduate projects are opportunities for students to apply the skills and knowledge that they have developed during their studies to produce a substantial, independent piece of work. In completing project-based activities, they will need to draw on levels of independent work, teamwork, critical thinking, communications, and time management that are not required in other classes. Participation in these activities can also help inform their future career paths, with many doctoral students tracing their research back to their undergraduate projects (Beier et al., 2019). Equally, graduates may draw upon project work during interviews when entering industry. The importance of projects is increasingly recognized by professional, accreditation and education bodies for these reasons (Hart, 2019; Foster et al., 2018).

Although existing literature outlines support for students completing project-based classes (Hofstee, 2006), the practical considerations in the administration of projects are often left unaddressed. In this paper, we present a reflection of the authors experience administering project-based classes at a Sino-foreign higher education institution (SfHEI) over the past decade. Specifically, we examine past challenges in the administration of a software engineering team project (SETP) class and a final year individual project (FYIP) class. Based on these experiences, we present some identified best practices that we have developed to respond to these challenges. These practices are also critically examined in terms of the relevant literature. It is hoped that the guidance outlined in this paper may be of benefit to new and existing project administrators, especially in the subject-area of Computer Science.

2 Context

University of Nottingham Ningbo China (UNNC) was the first SfHEI, established in 2004 as a partnership between The University of Nottingham and the Wan Li Education Group. The University of Nottingham delivers the same degree content across all its campuses, including at UNNC, where the undergraduate degree programmes related to CS are fully accredited by relevant professional organisations.

2.1 Final Year Individual Project (FYIP)

The Final Year Individual Project (FYIP) is an optional class available to final year CS students. Projects are supervised, one-to-one, by a CS academic. The FYIP runs

across two semesters and contributes 30% towards students' final year grade. Projects may be based on theoretical or empirical research, or software development. The FYIP requires students to draw upon all the skills and experience they have developed throughout their studies up to that point, allowing them to engage deeply with the project.

Typically, around 20 supervisors and 80-100 students participate in the FYIP, with one member of staff convening the class, coordinating the logistical and administrative aspects of the class (an author of this paper, Pike). FYIP consists of three distinct deliverables: Interim Report (10%); Dissertation (75%) and Practical Demonstration (15%). The Interim Report outlines progress at the midway point in FYIP, with details of key objectives, related works and selected methodology presented. The Dissertation is a standalone, 15,000-word document which reports on all aspects of the project. Although there is no set structure that the document must follow, most include an overview, background work, methodology, implementation, results, and discussion of the results and findings. Practical demonstrations consist of a 10-minute video introducing the project, followed by an in-person Question and Answer session facilitated by a panel of three to four CS staff.

2.2 Software Engineering Team Project (SETP)

The software engineering team project (SETP) is a compulsory class for penultimate year undergraduate CS students (Towey, 2016; Towey & Pike, 2021). The SETPs are completed by teams of five to seven students, who work on software engineering problems over the course of a year, under the supervision of a CS staff member. As part of the support for the SETPs, the convenor (an author of this paper, Towey) provides weekly workshops, lectures, and other activates (Towey, 2015). Students receive marks for completing SETPs in two ways: as part of their team (80%); and for their Individual Reflective Report (20%). Each team is awarded a Collective Team Mark on the standard university scale, with individual grades being calculated from the collective team mark and the results of each team's peer assessment.

3 Administering Project Modules

Between the authors of this paper, there is over a decade of experience in convening project-based classes. Through critical reflection (Schön, 1987), and discussion, we have identified the following factors that other project-based conveners may like to consider when delivering their classes.

3.1 Marking

The marking of student-submitted work is possibly the biggest source of tension and workload that an administrator will face (Jerrim & Sims, 2021). Marking, alone, will require significant management, requiring the coordination of multiple supervisors marking each project; verification that supervisors are marking correctly; and resolution of disagreements between markers.

Administrators must consider a variety of human factors that may impact the supervisor's ability to apply the marking rubric in an impartial manner. Supervisors and students will form a working relationship (Derounian, 2011), which may cloud the supervisor's judgement during marking. Similarly, it is likely that the supervisor feels a close attachment to the project itself, having dedicated considerable time in advising the direction and approach taken in the project work. Supervisors may also bring different experience to bear, with factors such as professional practice, education background, working experience and prior institutional practices which may inform the supervisors evaluation of student work in a manner that differs from the expected standard.

The specification and distribution of detailed high-quality Marking Rubrics is strongly recommended. Marking rubrics help alleviate supervisor biases towards the work, and aid the standardization of marking across multiple markers (Reddy & Andrade, 2010; Jonsson & Svingby, 2007). Similarly, rubrics can clearly communicate the requirements of a deliverable. In both the FYIP and SETP, marking rubrics are distributed to students at the beginning of the academic year. In the FYIP class, follow-up exercises in "applying" the marking rubric during workshop sessions can also be conducted to ensure that the rubric is clearly understood by students (Jones et al., 2017). Campbell's recommendation of administering marking rubrics using ICT assessment tools (Campbell, 2015), such as Turnitin Feedback Studio[1], is a practice we have followed in SETP and FYIP. ICT assessment tools also have the benefit of significantly reduced marking time and improved student satisfaction with their feedback (Atkinson & Lim, 2013).

The moderation of project marking varies depending on the number of students in the class. Our experience is that moderation remains a necessary practice, in spite of the marking rubric. It is important to verify that supervisors have applied the rubric appropriately. It is common for supervisors to draw upon knowledge and experience acquired from their involvement in the supervision of the project, rather than evaluating the submitted work (only). In some instances, multiple markers may be required by the accrediting body of the degree programme. For a large cohort of students, it is not always practical to have all members mark using the original marking rubric, as this may introduce unnecessary burden and workload (Bloxham, 2009). In these situations, we recommend that the project supervisor completes the full marking rubric, but peer markers complete a shorter, high-level, category-based rubric (derived from the full rubric). When processing the marks themselves, the peer-markers grades are used to check the correctness of the supervisor's marks: They have no impact on the project's score if there is agreement among the markers. When there is significant disagreement, the supervisor is asked to deliberate with the peer markers: one party is expected to compromise, accordingly. If a compromise cannot be reached, the dissertation is fully remarked by an unrelated third marker.

[1] Turnitin Feedback Studio - https://www.turnitin.com/products/feedback-studio

3.2 Automation

Project administration can require multiple administrative, many of which will vary, based on the demands of the institution, accreditor, and nature of the project.

For SETP and FYIP, a project catalogue is generated, which students can review during the project allocation phase. Generation of this catalogue has been automated, using a Python script. The script processes the multiple Microsoft Word documents containing supervisor specifications of project ideas. The script performs a series of checks to identifies project descriptions that do not comply with the expected format, allowing quick remediation.

The project allocation procedures are also, largely, automated. FYIP allocation can require significant interaction between the student, supervisor, and class administrator. On reaching agreement to form a supervision pairing, the supervisor uses an online form to input the supervision arrangements with the student, triggering an automated email formalizing the arrangements. The SETP structure differs slightly, including incorporation of a bidding procedure.

Marking procedures associated with both classes are also automated, with staff submitting marks through a web interface.

3.3 Developing Student Skill

Many students find writing frustrating and extremely difficulty (Santangelo et al., 2007). This is especially true for students in Science and Engineering, where assessments focus more on technical ability rather than written word. As such, when faced with the requirement of having to produce a 15,000 report, as is the case in FYIP, it can be a daunting prospect for students. In SETP and FYIP, a specialist academic English instructor, from the "Centre for English Language Education" at UNNC, is brought to support student's writing ability. Over the course of the project, students will receive support on various aspects of writing, including developing a literature review; cohesive writing; grammatical accuracy; and Coherence and Cohesion.

Additional topics that administrators may want to support will vary according to the deliverables associated with the project. In addition to the above, the SETP and FYIP provide support for time management and project planning; dealing with procrastination; managing communication and the relationship with supervisors; and developing public presentation skills.

3.4 Ethical Considerations

Undergraduate projects involving human subjects or data are being utilized more and more, highlighting the need for ethical review processes in project-based classes. Administrators must ensure that students have sufficient ability to evaluate and identify potential ethical issues. The SETP and FYIP ethical reviews include both a preliminary and (if needed) detailed review: projects with identified risks in the preliminary review receive further scrutiny through the detailed review. Depending on the design of a given curriculum, there may be dedicated ethics classes which students undertake during their studies (Colby & Sullivan, 2008). Administrators, however, cannot rely on this provision of ethics training alone, as the timing and specificity of

this content may not align with the requirements of the project. Dedicated training sessions should be provided to students, with specific ethical training related to the context of the projects. Again, we recommend that the processing and documentation of ethical reviews be digitized/automated.

3.5 Reflective Practice

In 2021, FYIP obtained provincial "1st class module" recognition in Zhejiang, People's Republic of China. The application procedure involved facilitated reflection by the convenor, who was provided an opportunity to argue the relative merits, innovations and pedagogical approaches that underpin the module. This reflective process was performed in tandem with the SETP administrator, providing further opportunities to compare the approach taken in delivering respective modules.

4 Conclusion

Delivering undergraduate projects is challenging, requiring management not only of participating students, but also the coordination of the supervisors and other key stakeholders. Ensuring timely and consistent marking, suitable provision of feedback, punctual mark administration and quality assurance practices that meet accreditor standards are examples of the tensions and challenges to be contended with. In this paper, we have reflected on the experiences of two project-based class administrators working in SfHEI over the last decade of UNNC CS projects. Through reflection and critical discussion, key considerations have been identified and communicated best practices related to: Marking, Automation, Developing Student Skillsets, Ethical considerations, and Reflective practices being discussed. Through this work we hope to initiate broader discussion on the administrative aspects of coordinating project-based classes in the hope of identifying approaches to improving the student learning experience.

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