

STUDENT-DRIVEN LEARNING OF PROFESSIONAL SKILLS IN THE SUPPORT OF INTERDISCIPLINARY TEAMWORK

C. Johnson¹

University of Twente
Enschede, The Netherlands
<https://orcid.org/0000-0001-7215-5464>

M. Macleod

University of Twente
Enschede, The Netherlands
<https://orcid.org/0000-0002-6346-545X>

K. Visscher

University of Twente
Enschede, The Netherlands
<https://orcid.org/0000-0002-3690-5229>

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ABSTRACT

Interdisciplinary project-based learning facilitates the development of a range of skills and knowledge through autonomous learning or an experiential educational structure. The ability to cooperate across disciplinary boundaries within a team environment is an inextricable component, and supporting the necessarily skills for doing so, via the deliberate development professional skills-training, is arguably crucial. As tutors may lack time or expertise to extensively scaffold interdisciplinary teamwork, the question is whether a minimally guided student-driven learning context in which students are left to decide on which professional skills to develop, can be effective, given the collaborative challenges students face. For this study, a trial was implemented to ascertain whether students would recognise the importance of and engage with, resources designed to foster professional skills in a collaborative interdisciplinary context. A variety of student-driven resources were implemented with varying degrees of success. Students were encouraged to use a team contract with the aim to delineate expectations and pre-empt strife. Professional skill resources on topics such as communication and conflict management were offered in order to enhance self-reflection and self-development. There was some indication that team contracts offer a safe condition to set expectations, but there was low interest in the student-driven courses aimed at professional skills. The results suggest autonomous modes of

¹ *Corresponding Author*

C. Johnson

C.johnson@utwente.nl

learning may not be appropriate for the development of such skills. The ability to motivate students to adopt the student-driven approach as well as prioritise time in their busy schedules, remains elusive. Details on the rationale of resources as well as recommendations for use are offered.

1 INTRODUCTION

Interdisciplinary (ID) project-based learning (PjBL) requires students from contrasting disciplinary backgrounds to collaborate on an interdisciplinary problem-solving task. In these contexts, interdisciplinary teamwork and professional skills are not always trained explicitly in university programmes. Rather, in line with the self-driven learning philosophy governing PjBL [1], it is often assumed that these skills will be developed through the process and experience of the group project. This is as groups confront tensions between conflicting ideas and epistemologies [2]. Some research has pointed out however, that interdisciplinary interactions can be more challenging than disciplinary ones, and that the development of collaborative and team skills i.e., should not be taken for granted [3]. Therefore, the need for professional skills training is becoming recognised as an important facet of tertiary education [4].

However, often due to time and staff constraints, many programmes are unable to support ID training beyond a few workshops. Even then, not all workshop-based initiatives are necessarily appreciated by students [5]. In this study, the aim was to ascertain whether autonomous learning of these skills can be effective. The experiment was undertaken at the University of Twente, where we trialled the effect of certain low-intensity initiatives, in two ID project-based courses, for bachelor students of different science and engineering backgrounds. These initiatives involved 1) the inclusion of a team contract, and 2) student-driven learning (SDL) resources supporting professional skill development. The details and objectives of the SDL resources are explained in *Table 1*.

Table 1.: Student-driven Courses, Topics and Intended Learning Outcomes offered to Case study 1 & 2

Provided Resource	Intended Skills	Intended Attitudes	ILO – Students are able to...
Team Agreement (<i>Slides & example doc.</i>)	Defining & expectations Negotiation	Self & mutual respect Responsibility Accountability	... set team goals & desired behaviours into writing.
Non-Verbal Communication Guidance (<i>Slides</i>)	Self-evaluation Self-correction	Respect Confidence	... analyse own NVC habits, improve own comm. deficiencies.
Conflict Management (<i>Slides, role play prompts</i>)	Identify harmful behaviours Manage uncomfortable situations	Empathy Perceptiveness Resoluteness	... assess difficult situations, use considered response.
Teamwork Traps (<i>Slides</i>)	Assessment of status quo Challenging	Active Critical Reflective	... classify team behaviour, take necessary steps to avoid traps.

The trialled resources are consistent with the philosophy that students within PjBL should be responsible for making their own decisions regarding the development and management of their team relationships.

2 METHODOLOGY

2.1 Case study setting

To examine the effects of the uptake of SDL resources and their perceived usefulness to students, a two-case, mixed-method, descriptive study was undertaken. Student surveys, staff interviews and peer feedback were analysed. Design of materials was based upon IPT Metrics, a research based team assessment platform [6].

2.2 Case study details, instruments and sources

Participants: Two ID modules joined the study. Both cases had access to the teamwork resources, but only Case study 1 had access to project-related resources due to the co-ordinators preference, see *Table 4*.

Instrumentation: A digital survey was sent to all students of both modules, 123 responded. The survey consisted 5 agreement statements (Likert scales), and 3 open questions. Open answers from the student surveys and peer feedback underwent thematic analysis. *Materials used:* SDL resources were made available for self-study on the learning management site - Canvas.

3 RESULTS

Case Study 1: Interdisciplinary Engineering Module. (N=77)

Case Study 2: Interdisciplinary Computer Science Module. (N=46)

When surveyed on team function, around 70% of students in both groups were positive mid-way through their modules. At the end, most students in the CS1 group (79%) were positive. However, CS2 students were evenly split, although with a low response rate (N=10).

Team Contracts: Their use was encouraged by the module coordinators. 90% of students applied them. *Table 3* shows that at least a quarter of the users found them directly helpful. Positive written responses revolved around the advantages of starting the teamwork well by setting expectations, negative comments centred around them being time consuming or futile.

Table 3. Team Contract Usage Categories

Categories of answers	CS1 Number (%)	CS2 Number (%)
Positive response	18 (23%)	13 (28%)
Did not refer back to it	16 (21%)	3 (6%)
No need: good team functioning	13 (17%)	5 (11%)
Neutral/Negative	23 (30%)	20 (44%)

Examples of the comments on the team contract:

“Yes, it was a great icebreaker and good way to lay down rules without being bossy about it.”

“Yes but the contracts themselves are kind of pointless most if not all students don't really care about creating an extensive contract...”

SDL Resources: These were not well utilised. Less than one third of students engaged with them. The positivity expressed on the team functioning question, may mean well-functioning teams saw no need to engage with the resources.

Table 4. Student-Driven Professional Skills Resources

Categories of Resources	CS1 Number (%)	CS2 Number (%)
No	50 (65%)	33 (75%)
Yes	27 (35%)	11 (25%)
<i>Project-Related Resources *</i>		
Presenting and Pitching	4 (10%)	n/a
Deliverables	16 (38%)	n/a
Brainstorming	9 (21%)	n/a
Remote collaborative working	1 (2%)	n/a
<i>Teamwork/ Process-Related Resources*</i>		
Communication	5 (12%)	9 (82%)
Conflict Management	5 (12%)	-
Teamwork Traps	-	1 (9%)
"yes"	2 (5%)	1 (9%)

*May have followed more than one course therefore total courses done is 42, not 27.

Examples of the comments on the SDL courses:

"Not really, we looked quickly into them but timewise wasn't really efficient to follow them all."

"Communication. The content was sound and logical but I didn't have a specific use case for them in the current project, however I may use them later along the line."

4 CONCLUSIONS & DISCUSSION

In this paper we set out to explore whether some minimally guided student-driven tools provide effective responses to ID collaborative challenges and professional skill development. We conclude while the team contract has some benefits, the self-driven courses were not perceived as useful or relevant by most students and thus not engaged with. In both cases, some student teams faced challenges related to different disciplinary backgrounds. Also, teamwork function took time to develop in many cases. In principle both the team contract and SDL resources were provided to students in order to manage such situations.

Team Contract: The mixed response with regard to the team contract, indicates utility for a certain type of student who can apply it as a means to pre-empt teamwork issues. When referring to the high levels of team functioning satisfaction it is possible that the team contract, even if not evoked again, played a role in establishing firm expectations and penalties for unacceptable behaviour.

Student-Driven Courses: These case study results provide evidence that student-driven interventions, geared towards enabling team or professional skill development, were not perceived as useful by most of the students. This suggests students did not recognise a payoff for developing these skills in order to improve team performance and ultimately their overall result, despite the challenges still faced by some.

The failure of this SDL trial may be partly explained by a few considerations. Firstly, although students from different backgrounds evaluated the courses differently in terms of task opportunities and role, students may not have recognized that their different levels of engagement were not only a function of course or problem design,

but also a matter of collaborative or professional skill deficiency; something within their power to potentially improve. This points to the importance of articulating the relevance of such skills to students. [7] states that fostering SDL competence in formal educational settings may be necessary. Here, students were not offered support on their SDL journey. Rather, they were provided with a list of options from which they could choose according to their own identified need. Secondly, the lack of constructive alignment with regard to explicitly measuring team functioning meant that students had to rely on intrinsic motivation to follow these courses. There were no credits at stake, so were more prone to invest time on tangible endeavours. Finally, [8] cites lack of learner support as a demotivation for SDL; when there is no feedback or obvious reward for the effort expended, it becomes less motivating to learners.

As a result, there are various interventions instructors can make to encourage better recognition, by students, of the need to develop team-work or professional skills. For example, in order to enhance prominence, incorporating credits and the recognition of the teamwork process via constructive alignment of courses, may underline its importance for all.

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