Chapter 4

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A Whole Team Approach to Integration of Student Feedback into Continuous Assessment Activities for First-Year Students Transitioning to University Chemistry Education During the COVID-19 Pandemic

Frances Heaney[1]*, Denise Rooney[1], Orla Fenelon[1], Tobias Krämer[1], Eithne Dempsey[1], Stephen Barrett[1], Caytlin Boylan[1], Kyle Doherty[1], Luke Marchetti[1], Joseph Curran[2], Lisa O'Regan[2], and Trinidad Velasco-Torrijos[1]

[1]Department of Chemistry, Maynooth University, Maynooth, Co. Kildare, Ireland
[2]Centre for Teaching and Learning, Maynooth University, Maynooth, Co. Kildare, Ireland
** Corresponding author: frances.heaney@mu.ie*

Abstract

This paper reports on a team-led, discipline specific solution to the problem of gathering, analysing and responding to student feedback on teaching and learning in a timely manner and in a way that supports transition to university for the in-situ group. We demonstrate the pedagogical value of integrating student feedback into mainstream, on-going teaching and learning activities as a vehicle to increase engagement and improve representation. The cohort was a large and diverse first year chemistry class (350 students) transitioning from second to third level teaching and learning methods in an Irish University during the COVID-19 pandemic where the bulk of activities were delivered either remotely or in a blended fashion. We show that a continuous assessment framework can be piggy-backed to gather student feedback and enact informed improvements in a manner which is both immediate and noticeable. We believe our approach is an excellent fit for chemistry programmes that could readily and successfully be incorporated into other programmes in cognate subjects and could be easily adapted for second and higher year students.

Keywords: Integration of Feedback: Team Approach: Responsive Structures: Embedment of Culture: Continuous Cycle: Student Feedback: Academic Feedback.

Introduction

The transition from second to third level, a critical development phase for many students is accompanied by a myriad of social, financial, and academic challenges, consequently the first-year encounter has been extensively reviewed in the literature. Leong et al. identify secondary educators alongside students and tertiary educators as stakeholders in the perception of preparedness and the successful transition of chemistry students (Leong et al., 2021) whilst De Clercq et al., with a focus on biology majors, have teased out the dynamic and complex nature of the temporal adjustment process (De Clercq et al., 2018). The role of assessment practices in developing the first-year students' confidence and sophistication as learners has been studied by Hodgson et al. (Hodgson et al., 2011) whilst Miltiadous et al. go further in associating a multitude of engagement activities, including weekly assessment tasks, with an increased likelihood of success in this formative period (Miltiadous et al., 2020).

It is recognised that success, retention and development are closely linked to student satisfaction (Beltyukova & Fox, 2002) as is the probability of completing the undergraduate programme on time (Bussu et al., 2019) and the student perception of their higher education institute (de Lourdes Machado et al., 2011). In an extensive article on the use of formal instruments to measure students' satisfaction in North American, British and Australian

settings Richardson discusses key practical issues of the *why*, the *what*, and the *when* of student feedback, but recognises an apparent disconnect in the significance students and teachers attach to student feedback and the seriousness with which it is taken by teachers and institutions (Richardson, 2005).
Some educators recognised for excellence in teaching caution that student ratings of teaching should be used as only one component of the holistic reflection (Cain et al., 2019; Pienta, 2017). Despite this caveat across the higher education sector there is a great value placed on feedback processes with formative and summative implications for ensuring quality and continuous improvement in experience at programme, teacher and individual student level (Okogbaa, 2016). Staff-to-student academic feedback (**AF**), and student-to-staff course evaluation feedback (**SF**), formative or summative, are twin pillars of this dialogic process.
The pedagogy, methods and mechanisms for provision of formal and informal **AF** have been extensively studied (Dawson et al., 2019; Mulliner & Tucker, 2017). Reports have focussed generally on the challenges and conditions to enable effective feedback (Henderson et al., 2019), as well as specific approaches tailored e.g., to work-based settings (O'Malley et al., 2021). In one interesting article Hwang advocates for the soliciting of weekly low-stakes assignments to gauge student learning online (Hwang, 2020).
Whilst **SF** offers one key perspective for course evaluation as Richardson points to in his excellent review, there are significant challenges and time constraints to gathering representative feedback from large student cohorts with increasing diversity in the population; the student impetus for providing information in end-of-module surveys is weakened by the fact that their personal experience of the module/course is complete, and issues with sampling error and sample bias jeopardise the validity of data extrapolation (Richardson, 2005). One tactic to encourage the student voice and increase the response rate is to devote in-class time for survey completion (Lau, 2019), yet, where lecture attendance is not compulsory the merit of this face-to-face (**f2f**) approach is clearly limited by the proportion, and likely the diversity of students who turn up to class. Indeed, having identified clear differences in course assessment between *no-show* sub-groups and the overall class ratings, Treischl advocates for an online survey mode to capture the opinion of those not in attendance (Treischl & Wolbring, 2017). Prior to the widescale COVID-19 induced shift to online/blended teaching selected programmes had already adopted this pedagogical approach and shown that existing tools could be adapted to evaluate the effectiveness of online teaching (Ravenscroft et al., 2017), and significantly, that quality **SF** can be obtained (Watson et al., 2017) and is not undermined by online collection (Gakhal & Wilson, 2019). Focus group interviews, also reported to be effective in an online format, (Almendingen et al., 2021) can be a useful complement to other feedback approaches. They afford an opportunity to gain a deep insight from a few individual students, however the opinions they capture may not be statistically representative and may suffer from "groupthink".
There are challenges with student feedback literacy denoting the understandings, capacities and dispositions needed to make sense of information and use it to enhance work or learning strategies (Carless & Boud, 2018). There is also a need to empower students by showcasing the value of their opinions in the shaping of teaching and learning both for themselves and for future students (Isaeva et al., 2020). To ensure quality and enhance a sense of ownership of their learning it is important that the student information is gathered from a reasonable sample size (Holland, 2018), and that departments role model feedback. There is a need to build trust between students and staff; as partners students should be made aware that their input will be considered and acted upon as appropriate (Asghar, 2014; Bovill et al., 2015).

Research Problem

Our research question was on the potential in-person or synchronous participation in weekly laboratory/workshop activities to afford a discipline specific platform to integrate student feedback (**SF**) into mainstream first-year chemistry activities. Integration of learning is an active topic in higher education, it implies there is an enhancement or something better, something of a higher-order about learning when it is integrated (Leadbeatter, 2021). Our research set out to explore if the integration of both **SF** with laboratory related activities, pre-lab talks, and **AF** could simultaneously deliver academic related learning outcomes and provide a platform for a holistic engagement with students about their teaching and learning experiences.

Academic support, technology support, health and well-being, and a sense of community have been identified as "four pillars" supporting student success (Roddy et al., 2017). The first-year is the cornerstone of the University experience, the pedagogical transition from second level is significant however, it also provides an opportunity to embed a culture of engagement and to develop the concept of student feedback literacy. Most students perceive practical work as engaging, motivating (Smith & Alonso, 2020), and taking place in a low stakes environment. We questioned the compatibility of including ongoing and inclusive **SF** opportunities into main-stream academic activities associated with practical work. The (potential) benefits of structured **SF**, pre-, mid- and end-of-year (Holland, 2018; Sozer et al., 2019) for identifying just-in-time and specific muddy point issues, e.g. on remote learning of organic chemistry, have been reported (Ramachandran & Rodriguez, 2020). However, our question differed significantly from these published works in that it seeked to explore the value of a continuous (weekly) two-way feedback process exploiting multiple survey modes and probing holistic concerns as well as discipline related teaching and learning themes.

Diligent collection of student feedback is necessary, but not sufficient to affect an improvement in the student experience. First-year chemistry programmes, far from the single lecturer led models, involve input from a number of academic and technical staff, as well as laboratory and workshop demonstrating staff; for this reason, the requirements for a responsive feedback process distil down to the need for a whole team approach, the motivation to make improvements and a degree of agility within the course structure and organisation. The team assembled for this project included the Head of Department, four academic staff, including two first-year Chemistry Coordinators, one technical staff member and four postgraduate students.

Method

Implementation: As part of a university wide initiative "Enhancing Teaching and Learning through Programme and Module Evaluation" our primary consideration was to discover how to synergistically gather **SF** whilst enhancing teaching and learning in a way that first-year chemistry students would recognise as a valuable experience in real-time.

***Embedding Feedback in Course Structure*:** Our key approach was to offer all students an opportunity to participate in a scheduled *feedback meeting* where a structured **SF** discussion would be combined with the weekly pre-lab talk and class level **AF** on previously submitted reports, *Figure 4.1.* In parallel, we introduced a weekly Chemistry drop-in centre, which students could attend on an optional basis.

Figure 4.1. Approach to integration of student feedback (**SF**) with mainstream curricular activities: **SF** is normalised through embedment with pre-lab talks and class level academic feedback (**AF**) in a weekly scheduled class involving small groups of students.

To best meet the needs of all stakeholders each component of the feedback meeting was carefully considered: the optimal size of the feedback groups, the approach to scheduling and *meeting* students during the period of COVID-19 restrictions, the affordances of our Virtual Learning Environments (VLEs, Moodle and MS Teams in our case), the most suitable personnel to lead the activities, the environment and tools to best promote engagement, the structure of the feedback discussions, how to encourage students to initiate discussions, the mechanics of recording, reviewing and analysing the opinions offered by the students, and finally the most effective means to close the feedback loop and report back to students.
It is reported that initiating and maintaining instructor-student rapport is linked to motivation. Classroom engagement is facilitated by smaller class, ~20-40 students (Flanigan et al., 2021), and a sense of belonging supports student success (Roddy et al., 2017). For these reasons, feedback groups were designed to have up to 25 participants. In our department, first year lab/workshop classes are scheduled towards the end of the week, so we were constrained to scheduling feedback meetings incorporating pre-lab talks on Mondays or Tuesdays. Slots within the congested first-year timetable that were either vacant or not excessively overlapping with other first science subjects were identified. Students were invited to use a Moodle Choice activity to self-enrol in one of 12 slots that suited their individual schedule; it would have been logistically difficult, and so no effort was made to align the members of each feedback group with a particular lab group. Since COVID-19 restrictions seriously impacted on **f2f** gatherings during this period we relied on digital tools and the feedback groups were hosted by video conferencing on MS Teams.
Since we felt students would be more likely to give honest feedback on their teaching and learning experience to someone other than their current lecturers post graduate students from the department were recruited as *friendly faces* to lead these meetings. We subsequently referred to these leaders as Feedback Facilitators (**FF**). We did not see the choice of **FF** as the student facing personnel as by-passing an opportunity to build up trust between staff and students, rather we ensured **FF**s were well briefed and carefully articulated the cyclical nature of the process from Staff-**FF**-Students-**FF**-Staff to students from the outset.

***Alternative Feedback Channels*:** To investigate alternative mechanisms to gather feedback, we complemented the weekly structured feedback sessions which students were required to attend with a drop-in centre which students could attend on an optional basis. Academic support was integrated with feedback in the form of a short anonymous Moodle questionnaire. The drop-in centre, also *via* MS Teams, was staffed by one of the **FF**. It was hosted on a Wednesday at 3-4 pm and again at either 5-6 pm or 7-8 pm; the evening slot, not a traditional time for chemistry classes, was selected with a view to promoting inclusivity and providing flexibility for students with additional responsibilities. We considered a *suggestion box* to be left at the exit point of the teaching laboratory to facilitate students in posting immediate comments on any aspect of their learning in chemistry. However, this proposal did not gain any traction during this period of COVID restrictions and so our portfolio of feedback approaches was completed with the provision of two online focus group meetings to gain a deeper understanding of the student perspective.

***Facilitator Training, Digital Tools and Documentation*:** Given logistical components of online delivery, timetable constraints, and staff scheduling, we considered how to deliver a common and consistent feedback meeting approach across all 12 student groups. We were aware of the importance of the appropriate choice of digital tool(s) to achieve engagement, active learning and team teaching (Tan et al., 2020). We create a dedicated MS Team with academic and technical staff, laboratory demonstrators and **FF** as members to form the backbone of our information flow and this was supported by regular email communication and occasional online meetings.

To empower the staff involved in the project, meetings were held to clarify the role of all members, to explain the project goals and the mechanics of the operation. From the outset it was clear that arriving at a shared understanding of key terms: academic and student feedback (**AF** and **SF**), and "closing the feedback loop" would be imperative to the success of the project. In line with their student-facing role, the facilitators worked to develop feedback literacy within their groups. Thus, we imparted an understanding of **AF** as information from lecturers/facilitators/demonstrators to students, and of formative class level feedback as a tool with potential to improve quality and support learning. We contrasted this with an understanding of **SF** as information from students to lecturers/facilitators/demonstrators, valuable in providing staff with information on what works well and what does not, and which also gives students an opportunity to reflect on their learning experience whilst promoting a relationship between the students and the department. Finally, we shared that "closing the feedback loop" meant returning to the students with a review on how their information was meaningfully considered/acted upon by departmental staff (Curran, 2021).

As all facilitators were familiar with the learning outcomes of each lab and competent to deliver the pre-practical talk, the pre-lab component of the meeting did not require a shared resource. However, only one of the facilitators was also a first-year laboratory demonstrator. To provide quality **AF** on submitted reports, all laboratory demonstrators were asked to contribute to a summary document commenting on how lab assignments were presented, what went well and what was problematic highlighting the main knowledge gaps. These documents were accessible to all members in the above-mentioned dedicated Team folder.

To focus on key elements rather than generate a diffuse collection of information the weekly **SF** discussions were structured by topic and by response platform. Each week, in addition to encouraging students to proactively raise topics of concern, all groups concentrated on specific themes. Thematic areas were chosen to allow an insight into both academic and non-academic student concerns. Facilitators could find the topics, identified by initiative staff, in a Teams folder laid out in the form of a templated word document: groups of questions were designed to gather information from a range of areas including technology/online learning environment,

subject content, study and home environment, approach to time management, time spent on self-study platforms, study routine, external work/caring commitments, peer support, preparedness for practical sessions, understanding of content, perception of links between lab and lecture content, usefulness of online videos, clarity of online course platforms, preferences for synchronous vs asynchronous delivery and finally an evaluation of student confidence in the subject as the year progressed.
On alternate weeks facilitators invited their groups to engage, during the feedback session time, either *anonymously* by responding online to a Moodle questionnaire, by contributing, by *voice* or in *chat* to a discussion on MS Teams, or an anonymously to a Padlet wall. Padlet is an online noticeboard tool which allows immediate collection and real-time display of inputted information. We planned to draw qualitative information from the Padlet facilitated *conversations* and both qualitative and quantitative information through the Moodle survey mode. Our reliance on online over traditional, paper based questionnaires is supported by Treischl (Treischl & Wolbring, 2017) and Gakhal's (Gakhal & Wilson, 2019) observations on the impact of survey mode on the quality of **SF**. Student responses to questionnaires arising from both the feedback sessions and the drop-in centre meetings were hosted on an "All First-Year" Moodle web page and were immediately accessible to all initiative staff. Facilitators populated templated word documents to summarise the *live* discussions and returned the completed files to the appropriate MS Team folder.

***Closing the Feedback Loop*:** To help students see the value of providing feedback it is incumbent on staff to role model good feedback practice, close the loop, and inform students of the impact their feedback has on course development. Such practices empower students to own their experience through conversations where they can know their voices are listened to. The weekly cycle of feedback meetings provides for timely opportunities to close the feedback loop; at regular intervals members of the initiative team reviewed the documents in the Teams repository summarising student information from the weekly meetings. Student opinion was categorised according to the concern or the learning experience it related to *viz* workshop or laboratory content, lecture, tutorial or assessment concerns, or the overall holistic student experience *viz* technical matters, issues with VLEs and learning support issues, workload or communication with the department. As necessary the initiative team consulted the wider staff involved in first-year teaching and items were subsequently flagged as *for clarification*, *actionable* or *not feasible.* The outcome of these considerations was shared with the **FF** who in-turn kept students abreast on how their information was being responded to. The interaction between the project partners and the feedback cycle are summarised in *Figure 4.2.*

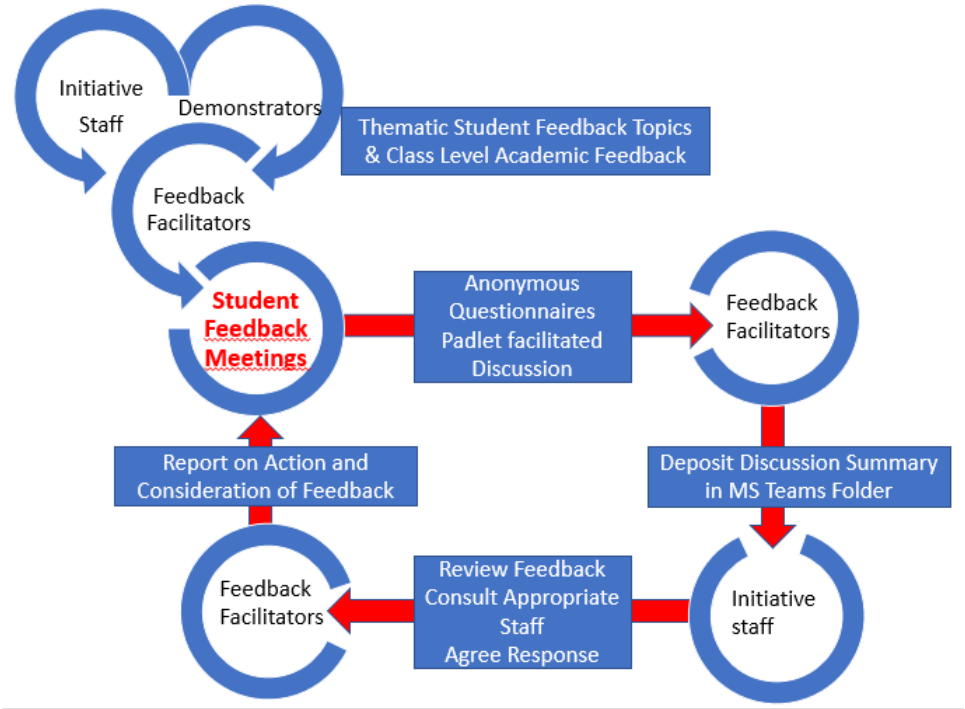

Figure 4.2. Graphical representation of project partners, academic and technical staff (initiative team), demonstrators, feedback facilitators (**FF**) and first-year students, and the communication flow/decision making mechanisms. It indicates the importance of the whole team working together to provide a systematic approach across the weekly **Student Feedback Meetings** with academic feedback **AF** and thematic topics for student feedback **SF** provided to the **FF** by demonstrators and initiative staff respectively. It shows the circular flow of information between student partners, **FF** and initiative staff that allowed an efficient **closing of the feedback loop** through continuous analysis of, and response to student information.

Results and Discussion

A number of key points will help in understanding how we analysed the quantitative information from our student responses:

(i) The numbers of students in first-year chemistry is approximately 350, however, the numbers responding to particular questions/discussion points are significantly smaller and can vary considerably for two main reasons. First, on alternate weeks half the groups engaged with the topics via in-class discussions and the other half via in-class online questionnaires. Second, while student attendance at the scheduled meeting was expected, participation in the questionnaires or discussions was voluntary.

(ii) Some questions posed to understand the perception of a particular strand of the teaching and learning experience invited students to indicate their level of agreement with a series of statements *scoring from 1 to 5* where 5 is the highest agreement and 1 the lowest agreement with the statement. Using this rubric, the maximum average score for a statement is 5/5 and the lowest is 1/5; the number and percentage of students giving each score, or a computed class average score are available. We discuss the data in terms of the *average score* (as X/5) and/or the percentage of students who indicated agreement over a number of categories e.g. neutral or negative (scoring 1, 2 or 3/5), or agreeing or strongly agreeing (scoring 4 or 5/5) about a statement.

(iii) Some questions invited students to *tick all options that apply*, in such cases we report the acceptance of the option in simple percentage terms.

Impact of the initiative on development of student feedback literacy

We gained two key insights into the students' pre-university experience. Firstly, many students had had limited chances to feedback on their experience; 76% were neutral, disagreed or strongly disagreed with the statement that they "often had opportunities to give feedback to their tutors/teachers/lecturers" [2.7/5] (n=81). Secondly, the second level experience of the students also indicated varied awareness of the concepts of academic and student feedback (n=81). Against this backdrop, the students' agreement or strong agreement with the statements that they have a clear understanding of the difference between **AF** and **SF** (79%) [4.3/5] and see the value of feedback opportunities built into the course (92%) [4.5/5] is suggestive of enhanced student feedback literacy over the course of the first-year in college (n=81), *Figure 4.3*. It can also be interpreted as a vote of confidence for the integrated approach. Indeed, probing students to see how they felt about having feedback opportunities built into the course elicited a response from one student that "*they would be struggling a lot more without it"*.

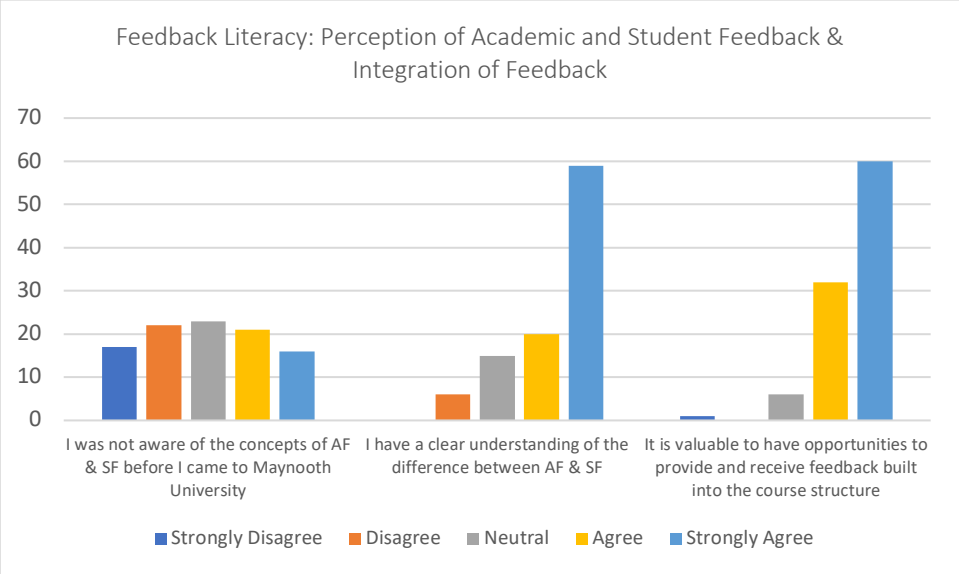

Figure 4.3. Percentage of Students indicating each level of agreement with statements relating to their prior experience, current understanding of **AF** and **SF** and their views on an integrated approach to **SF** (n=81).

Student perception of the structure of the weekly feedback meeting

There was a definite preference for the weekly meeting (64%), over a virtual suggestion box (14%), a Moodle forum (11%), a drop-in centre (9%), or a focus group (2%) as a channel for giving feedback (*Figure 4.4(a),* n=81), and since only a small percentage of students disagreed, or strongly disagreed (13%) with the statement that they would attend such meetings even if attendance was not compulsory [3.6/5] (n=82) it can be surmised that the students put a high value on this activity. Most students felt the one-hour session was the appropriate length (83%), significantly a strong preference emerged for online over **f2f** meetings had both options been available 63 *vs* 37% (n=59). Attendance was good with 83% of students indicating they had attended 80% or more of the weekly feedback sessions (n=69).

Students were very strongly in favour of "in-class anonymous questionnaires/Padlets" (76%) over in-class discussion (even with the use of Padlet) (16%), or "after-class anonymous questionnaires" (8%) as inclusive methods/technologies for providing feedback (*Figure 4.4(b)* n=81).

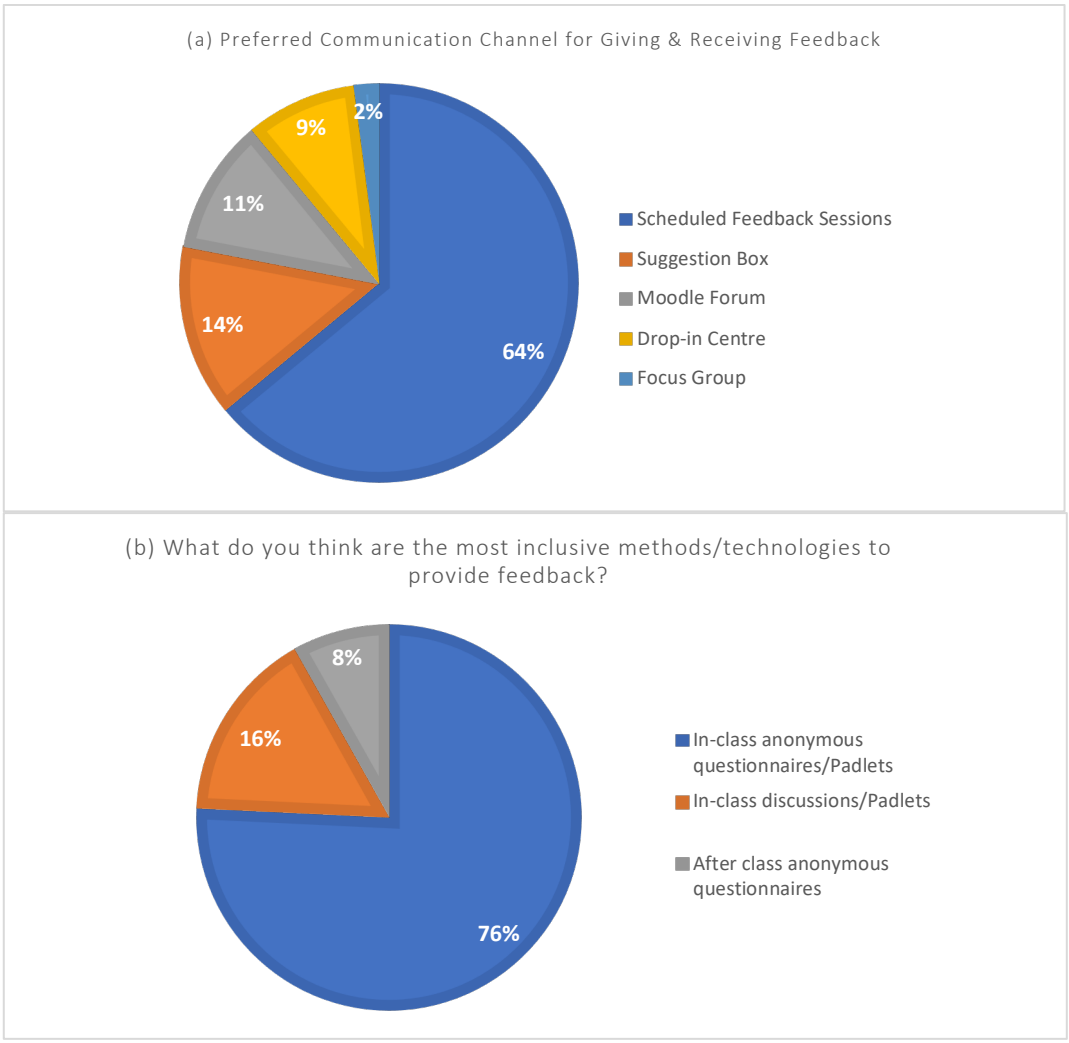

Figure 4.4. Student opinion as to **(a)** the preferred channel and **(b)** preferred survey mode for giving and receiving feedback (n=81)

The key attraction of Padlet was the anonymity, with one student remarking "*Padlet is good as it is anonymous*". If such live polling response systems were to be rolled out more widely in future it is reassuring to note that students registered with the Maynooth Access Programme (MAP) as having a disability recorded a similar level of comfort in using Padlet [4.2/5 n=12] as those students not registered with a disability [4.8/5 n=59], *Figure 4.5.*

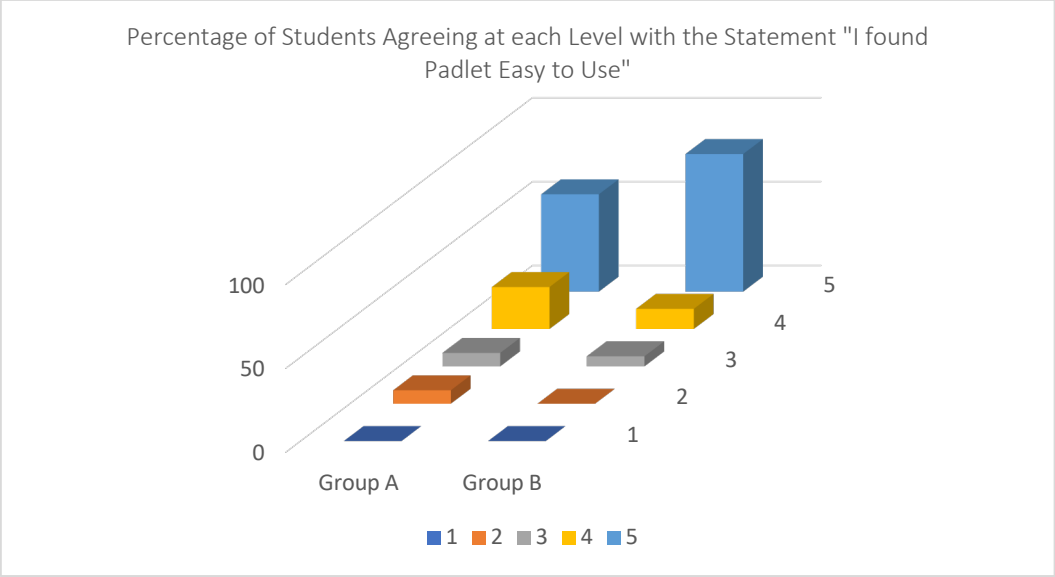

Figure 4.5. Perception of students on the ease of use of the online polling tool Padlet: 1 = lowest and 5 = highest agreement with the statement. Group A, n=12, students registered with a disability; Group B, n=59, students not registered with a disability.

Students strongly agreed the structure of the weekly feedback meeting allowed for a free and independent expression of opinion [4.2/5] with a smaller portion (26%) agreeing they were sometimes influenced by the opinions expressed by others during the session [2.8/5]. Most students felt the smaller size of the feedback sessions made them more comfortable in giving feedback [4.3/5] but it didn't quite go far enough to give a strong sense of a community of students [3.0/5] or a connectedness to the class [2.9/5]: more students gave a neutral (~38%) than either an affirmative (~30%) or a disagreeing (~32%) responses to both these statements (n=82), *Figure 4.6*. Indeed, one discussion group summarised that in the coming year "*lots of people looking forward to doing labs in person as well as meeting friends".*

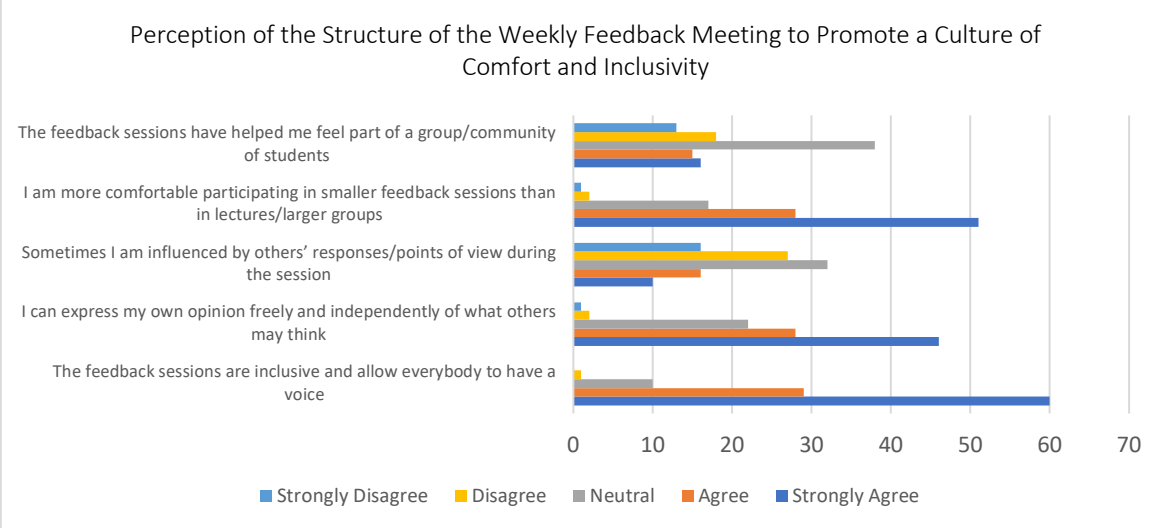

Figure 4.6. Percentage of students indicating each level of agreement with a range of statements relating to how the structure of the weekly feedback meeting facilitated inclusivity and comfort in contribution (n=82).

When asked how the structure could be made more effective some students expressed a preference for scheduling the meetings earlier rather than later in the day suggesting "*not running them so late in the evenings as I feel our timetables are so full by the time it comes to extra classes in the evenings all the motivation to listen and learn and concentrate is gone*". This view was reinforced in a review of attendance numbers at the drop-in centre which showed the late afternoon, 5 pm, slot attracted only about half the number of students as the 3 pm slot. Whilst the 5 pm slot suited the timetable of ~38% of students it was *the* preferred slot for only 5%. For this same group the most attractive time slots were Wednesday 2-3 or 3-4 pm (17% and 16% respectively) (n=69).

Student perception of the weekly meeting for receiving class level academic feedback

The weekly online meeting, with an average score of [4.1/5] ranked higher as a platform for class level **AF** than alternative modes: **f2f** in the lab [3.2/5], in the form of a word document [3.1/5] or as a screencast made available on Moodle [2.5/5] (n=59). Most students [3.8/5] were neutral, agreed or strongly agreed that class level **AF** was usually helpful; students agreed it helped them understand the grading scheme [3.6/5], appreciate what a good report should look like [3.4/5] and to ultimately improve their grade [3.3/5] (n=59), *Figure 4.7*. One student reported "*It is useful for getting the overall idea of how people are doing in the labs and going through issues that people had*".

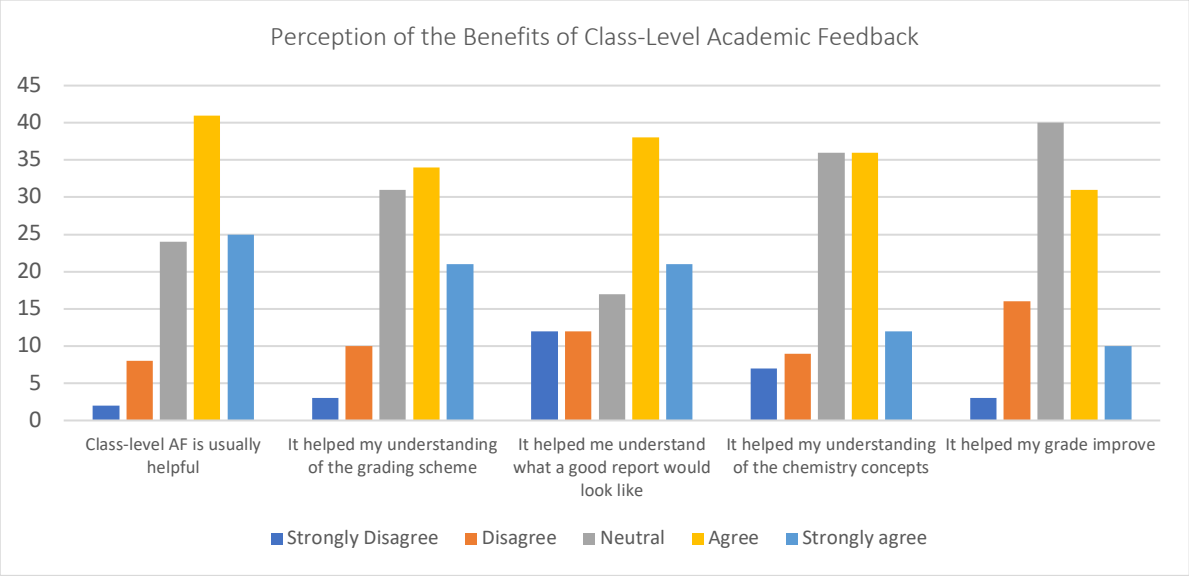

Figure 4.7. Percentage of students indicating their agreement at each level with statements relating to how they benefitted from class level academic feedback **AF** (n=59).

Whilst a modest sized group of students (32%) approached the learning by making notes directly on their own returned reports, significantly more used the information gleaned from the **AF** to help with understanding of the concepts (64%) and to help with improving the structure of future reports (80%) (*Figure 4.8*, n=69). One student indicated that they hoped to use this **AF** to "*be made aware of errors or improvements that can be made to do better in the next lab*".

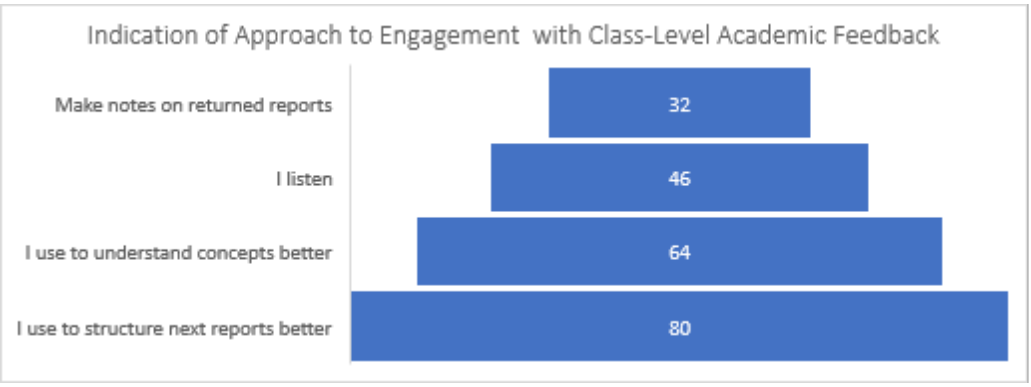

Figure 4.8. Percentage of students adopting each approach to class-level academic feedback **AF** (n=69).

When asked what changes they would make to the **AF** part of the meeting one student suggested "*Maybe try mentioning specific questions in the report that a lot of people lost marks on though, instead of general feedback such as structure or including units, etc*", another would like "*Just if the person correcting my lab could explain how I can improve*". One student suggested "*Maybe adding specific anonymous locations to ask questions that will be answered in your specific feedback group*" another commented "*the feedback is always helpful and I feel that its comfortable for us to ask questions*". A specific call for a review of "*exam paper questions*" and "*organic calculations on specific rotation and optical purity*" was noted in response to the question of "what would you like covered at feedback meetings".

Student perception of the reception of how their information was received and acted on: closing the feedback loop

The cohort of students not agreeing/strongly disagreeing with the statement that their feedback had been heard and impacted positively on their learning experience was very small (8%). Similarly, only 15% were negative about the clarity of the communication of actions taken in response to their feedback (*Figure 4.9*, n=81). One student pointed to a specific change made in response to their information "*yes. the workshops changed*" another remarked "*Yes feedback has been taken into account both the staff and me as a student*". One student specifically told us that one of the things that worked well about the way we gathered student feedback was "*letting us know what you plan on doing after the response*". A facilitator remarked that one group offered that they "*liked that they could raise concerns about problems/issues they were having with the course and were happy to see their concerns being heard*".

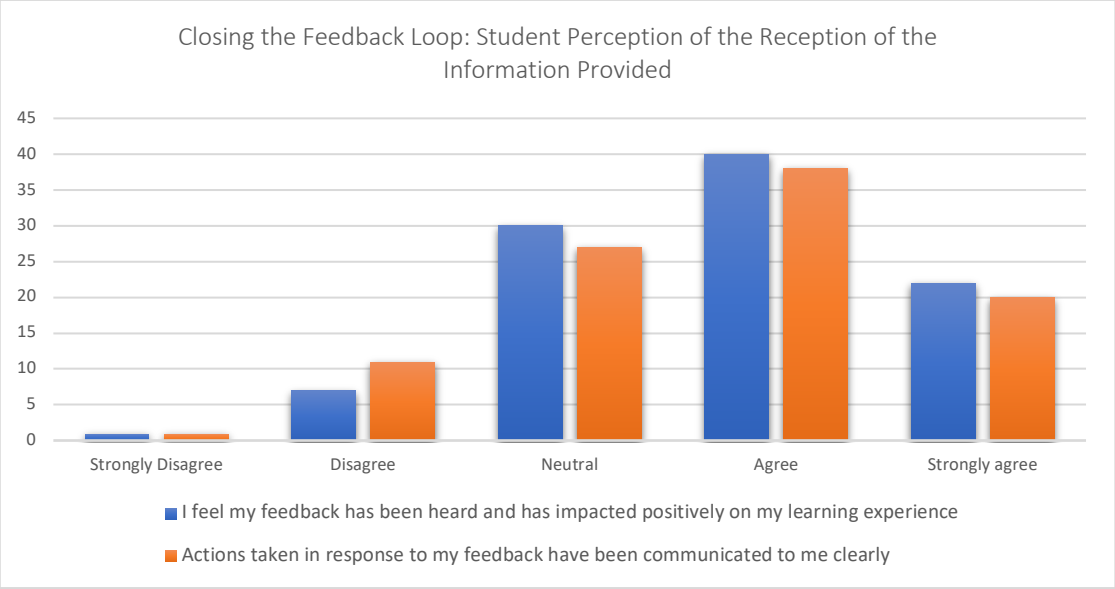

Figure 4.9. Percentage of students indicating each level of agreement with the statements relating to their perception of how their information was received and the impact on their learning (n=81).

Selected concerns, reflections, and real-time responses/actions

The students voiced a range of generally valid issues concerning their holistic, academic and structural experience. The ongoing and embedded nature of **SF** supported timely escalation and allowed us to reflect and respond in *real time*. Notwithstanding our empathy with the students not all responses were appropriate for action. For example, some concerns were dealt with through better articulation of goals and management of expectation whilst others did elicit changes in delivery/scheduling that were meaningful for the students. Selected issues are summarised in *Table 4.1.* Through participation in the closing the loop sessions students gained a greater understanding of our approaches/why we do things in a certain way. As an example, subsequent to addressing an early concern about structuring lab reports in a later survey 93% of students agreed/strongly agreed that they were confident in writing up a laboratory report (n=57).

Table 4.1. Selected Concerns Raised by Students during Thematic Student Feedback Discussions Reflected on by Staff and Information Relayed to Students in Closing the Feedback Loop.

Theme	**Student Concern**	**Reflection/Action/Response: Closing the Feedback Loop**
Clarity and Communication:	More clarity needed about commitments and assignments.	Selected Moodle messenger in parallel with Lecturer Announcements as a mode of communication
	Find it hard to establish a study routine unclear as to what is expected	Improved sign posting of activities: introduced a weekly planner

Table 4.1. continued

Assignment Scheduling and Workload:	Overwhelmed with workload, assignments, deadlines coming together	Reviewed assignment calendar and extended deadlines. Recommend study approach: work with lecture content and associate assignment in parallel Discussed management of expectations and what is required in higher education.
Pandemic Support	More support needed to for online lab classes	Additional resources provided: videos on lab skills/techniques, extra drop-in sessions for remote practical classes
	Miss the interaction with peers and learning from each other	Introduced break out rooms to workshops to foster communication in small groups. Undertook to prioritise workshops as a **f2f** activity
Report Structure & Marking Schemes	Difficulty understanding the marking scheme	Marking schemes revised, explained to students, included in student manual.
Labs/workshop	Struggling with how to write up a lab report	Revisited in lab and the weekly meeting
Academic Feedback **AF**	Class level academic feedback is good but more individual feedback would also be good.	Explained how to get the most from academic feedback -this is where independent study comes in. Reminded students about taking responsibility for their learning and the expectation for independent study.
Provision of solutions to workshop problems	Solutions to workshops to be made available	Explained pedagogic value of the guided-learning approach adopted.
Technology	Exposure to too many platforms was confusing but interactive software e.g. UniDoodle, facilitates engagement	Looking at capabilities of different packages for chemistry teaching - a wider use of UniDoodle and how this might help with individual/group feedback. UniDoodle is a sketch-based classroom response app (http://www.unidoodle.com/).
Knowledge Gaps	Certain concepts were not clear	Revisited content in lab and in drop-in centre worked through calculations in subsequent sessions.
Content Delivery	A mix of synchronous and asynchronous delivery is too stressful/too time consuming.	Reviewed study styles and the range of learning resources emphasising the importance of managing workload and ring-fencing time for independent study

Conclusions and Implications for Future Practice

We conclude that student feedback (**SF**) processes can be successfully integrated with mainstream continuous assessment activities in chemistry – pre-lab talks and class-level academic feedback (**AF**) on previously submitted lab reports. Our unique approach is effective for understanding and responding to the student experience in real-time and we believe it adaptable for any department with regular practical based activities. Key factors contributing to the success of the initiative, especially in context of the COVID-19 restrictions, included the "whole-team approach" with involvement of members from across all areas of the teaching

team, the appropriate choice of digital tools and a clear line of communication between the team members. Also critical is the choice of environment: a *friendly face* postgraduate student, anonymous response platforms and small group meetings allowed the collection of formal feedback in an informal setting. This study demonstrates that it is possible to integrate **SF** into core activities in the first-year university chemistry experience, and that the concerns raised in this transitory period can be dealt with meaningfully in real-time culminating in improvements to course organization, to aspects of teaching and learning and to better management of student expectations. We believe this experience has helped *normalise* feedback conversations and laid the foundation for embedment of a student feedback culture within the cohort.

Limitations

Considering staff time and pay for facilitators, this project was resource intensive as its scale was necessarily large. The group in focus (350 first year chemistry students) were making a particularly difficult transition to university during the COVID-19 restrictions when most teaching was remote. Readers wishing to adopt this approach in their own settings might consider working with a smaller pilot group in the first instance.

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Ethical considerations

The Maynooth University Social Research Committee Ethics research committee approved the study, and all participants gave their informed consent.

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