A Framework for Managing the Transition from Second Level to Higher Education in Response to the COVID19 Emergency Restrictions

Frances Sheridan
School of Computing
National College of Ireland
Dublin, Ireland
frances.sheridan@ncirl.ie

Emer Thornbury
School of Computing
National College of Ireland
Dublin, Ireland
emer.thornbury@ncirl.ie

Lisa Murphy
School of Computing
National College of Ireland
Dublin, Ireland
lisa.murphy@ncirl.ie

Cristina Hava-Muntean
School of Computing
National College of Ireland
Dublin, Ireland
cristina.muntean@ncirl.ie

Pramod Pathak
Faculty of Computing, Digital & Data
Technical University Dublin
Dublin, Ireland
pramod.pathak@tudublin.ie

Paul Stynes
School of Computing
National College of Ireland
Dublin, Ireland
paul.stynes@ncirl.ie

***Abstract*—This Research-to-Practice Full Paper looks at the transition from second level education to higher education and the challenges this presents in terms of students getting to know a new learning environment, identifying supports to assist with their learning and even getting to know new friends. This challenge is even more complicated with the move to an online learning environment in response to the COVID19 emergency restrictions. This research introduces a higher education transition framework (called S³F) that provides support and intervention activities to manage students transition from second level education to higher education, to reduce the impact of the online environment on students learning experience and to help to improve student mental health. The S³F framework uses ongoing student Feedback to inform activities across three pillars: Learning Environment Support, Academic Subject Support and Social Support. The research presented in this paper was conducted over the 2020/2021 academic year when 1st year undergraduate Computing students from National College of Ireland, School of Computing participated in an innovative induction programme that consisted of a number of activities and support actions for the entire duration of the academic year that were part of the S³F framework. Students were surveyed during each induction session for live feedback to adapt the activities for the following sessions and to inform staff of other interventions required. Students initially have expressed feelings of nervousness at the start of the first semester however this changed to feelings of excitement midway through the induction programme. Results of the case study demonstrates that the activities and innovative actions introduced as part of S³F framework had a positive impact on student's transition to higher education, especially around mental health, seen in the retention figures for those students. This paper discusses the results only in terms of students mental health This research is of benefit to higher education management and course directors involved in first year orientation that would like to reduce the impact of the online environment on student's transition from second level to higher education.**

Keywords—undergraduate research, higher education, student induction, first year experience, attrition.

I. INTRODUCTION

Traditionally students that transition from second level or high school to 3rd level education receive support such as orientation at the beginning of the academic year and interventions (e.g. academic support). At National College of Ireland (NCI), orientation is typically a once-off event at the beginning of the academic year. It is organised face to face with students attending various events in the college and it covers an introduction to the campus, support services and key staff members. Students can also experience the learning environment in a physical classroom that they could walk to as part of the introduction to the campus. Students enrolled into the School of Computing programmes are also introduced to the Computing Support tutor who presents the computing related service and it's supports to assist students with their learning. Incoming students get to meet each other through ice breakers such as name games. Through this process they form friendships. Following the COVID19 outbreak in early 2020 and the new national health guidelines, Irish higher education institutions such as NCI decided that there would be no further face to face learning sessions and all educational and learning activities moved into online delivery mode. With the move to an exclusively online learning environment, identifying supports to assist students with their learning and even getting to know new friends was a challenge for both students and staff within the educational institutions.

The aim of the research presented in this paper is to investigate support actions required to manage the transition of students from second level education to higher education in an online environment. The major contribution is a novel higher education transition framework (S³F) that combines three types of adaptive support activities in terms of Learning Environments used by the institution, Academic Subject Support, Social Support and ongoing Student Feedback. These activities are adapted based on ongoing student feedback provided during the entire induction programme. Learning environment support refers to the diverse physical locations, contexts, and cultures in which students learn [1]. Academic subject support refers to a wide variety of instructional methods, educational services, or school

resources provided to students in the effort to help them accelerate their learning progress, catch up with their peers, meet learning standards, or generally succeed [2]. Social support is defined as the provision of assistance or comfort to others, typically to help them cope with biological, psychological, and social stressors [3]. Student feedback is used to tailor the induction sessions to meet the students' needs in a timely fashion.

Learning Environment Support, Academic Subject Support, Social Support and Student Feedback form the basis for a series of induction measures which were put in place for 1st year full-time undergraduate Computing students. These included a yearlong induction programme of targeted timetabled online induction sessions as well as a series of regular timetabled academic subject support sessions with the Computing Support Service. These sessions were guided by regular student feedback with a focus on student group-work and regular signposting of contacts and services within the college which students could avail of.

The paper is structured as follows. Current related work in the investigated area is discussed in Section 2. Section 3 introduces the novel S³F framework while Section 4 presents results of the case study. The last section concludes the paper.

II. Related Work

The difficulties associated with the transition into Higher Education are widely acknowledged [4]. Numerous studies have been conducted in this area. Much of this research focusses on three main perspectives: the mindset and concerns of students regarding entry to Higher Education [5] [6]; students educational experiences prior to entering Higher Education [7]; and the experiences of students in the first year in Higher Education [8]. This research focusses on the latter. Wilson et al [9] identify the first weeks of the semester as the period in which students are at the greatest risk of attrition. They highlight the importance of early interventions which aid students in navigating their online learning environment and resources and the availability of early support drop-in sessions as well as opportunities for peer interaction and early preparation for group-based assessment.

Research shows that attrition rates in Higher Education are due to multiple causes such as financial stress, family and work commitments. Time management and study loads are also cited as significant factors [10]. Higher Education institutions also play a significant part in contributing to the reasons why students stay in college as when students connect and share values with a group, they are less likely to leave. Research has also identified that a significant factor in the retention of students is the ability to integrate academically and socially into the educational institute [11]. Aljohani classified factors of student attrition into categories, these include the policies and rules of an institution, the fit of a student to a college, the integration of a student into the college academic and social systems, student academic ability and the students' own goals and commitment. They identified the college experience, supporting students to connect with peers, and academic integration as areas where Higher Education institutions can make changes.

The National Strategy for Higher Education in 2030 [12, pp. 55-56] recognizes that students may not have all the necessary skills and may need additional support in STEM subjects when making the transition to Higher Education. Academic integration can be supported with extra classes and individual tutorials. Higher Education institutions with a strong background in delivering computer science programmes generally have academic support specifically for computer science. These academic supports offer services that include classes, individual tutorials, class assistants, facilitating peer to peer study groups and more. The aim is to support the new programmer in critical thinking, planning and problem solving through practical exercises [13]. In Ireland academic Computing Support is a service offered by all the major universities and colleges and is often funded by the Higher Education Authority [14]. A challenge in this area is making students aware of the availability of the service [13]and encouraging them to avail of it before it becomes critical. Availability of academic support became one of the key areas to signpost and integrate students with during this series of induction interventions.

While the challenging transition for students to traditional Higher Education is well recognized, the pivot to online learning which took place has not only presented new obstacles but has also served to exaggerate already existing difficulties. Edu et al. [15] identify six factors that influence the student transition to online education: Instructors' and Administrative Support, Course Structure, Lack of Interaction, Student's lack of Self Confidence, and Technology availability. While Technology availability is a factor which can be clearly attributed to online learning, factors such as "Student's lack of self-confidence" can be considered common to both the transition to traditional higher education and online higher education, but which may be amplified by an online learning environment. They suggest that universities should acknowledge this by supporting students in becoming proficient with the tools and technologies necessary for online learning. Adedoyin & Soykan [16] echoed this, identifying significant challenges and hindrances to online learning during the pandemic. Competence was one such challenge considered critical for this study. The National Forum also identified general skills as an area that needed support [17]. Prior to the pandemic, students were able to walk onto campus and ask where their classroom was, in an online environment this was not possible and brought a host of other challenges. In the physical classroom, students were introduced to and supported in becoming familiar with virtual learning environments (VLE) such as Moodle. Institutions needed to look at reducing the cognitive load required for student to merely access their classes. Technical issues and difficulties with the virtual learning platforms were rated high in negative aspects of the online learning experience [4].

The three areas of Learning Environment Support, Academic Subject Support and Social Support which form the basis for interventions in this study are based on the research above and supported by the considerable experience that NCI has in online teaching. We recognized the ongoing need for support for first year students in computer science subjects; that accessing an online classroom and virtual learning environment could be a significant hurdle to overcome; and that the lack of a physical social space would make it difficult for students to form social groups.

III. S³F: A Novel Higher Education Transition Framework

Under the areas of Learning Environments, Academic and Social supports, the key aspects that 1st year undergraduate students required support were identified and

prioritized. The research team has investigated what would need to be addressed explicitly in an induction session and what could be integrated with other existing activities such as classwork and assessment. The design of the proposed S^{3}F framework consisted of a series of 4 induction sessions per semester over a 2-semester period that would allow the team to connect with and assess the students transition at regular intervals. In the weeks where an induction session wasn't scheduled, Academic Subject supports were delivered in its place. All these activities were timetabled in the same one hour-long slot each week to give consistency.

In semester 1, induction sessions were held in weeks 1, 4, 8 and 11. Week 1 focused on orienting students with NCI's Learning Environments and introducing Academic and Social Support facilities, weeks 4 and 8 focused mainly on Social Support including mental health awareness and signposting of available supports offered by the College. Week 11 focused on exam preparation and what to do if a student failed an exam. In semester 2, induction sessions were held in weeks 1, 5, 9 and 13. The first session included a reminder of the Learning Environments, Academic Subject and Social Supports and any updates or changes students needed to be aware of. The following weeks focused on Social Support with a quiz evening. In the final session exams and the repeat examination process was addressed alongside information on the Academic Supports available over the summer.

TABLE I. S^{3}F framework structure

Semester	Week	Overview of supports covered
1	1	**Learning Environment Support:** Online class access, MS Teams, Moodle VLE, Timetable App, online applications, Turnitin, IT Support Hub. **Social Support:** introduction to key contacts, email etiquette. **Academic support:** plagiarism, submission checklist. Q&A. Live feedback poll.
	4	**Social Support:** tools for groupwork, cyber bullying, netiquette, meditation. Q&A. Live feedback poll.
	8	**Social Support:** online team Quiz Q&A. Live feedback poll.
	11	**Academic Support:** preparing for examinations, **Social Support:** what if you fail an exam. Q&A. Live feedback poll.
2	1	**Learning Environments, Social and Academic Supports:** update information and reminders to all. Q&A. Live feedback poll.
	5	**Academic Support:** discussion on academic challenges. **Social Support:** Competition launch. Q&A. Live feedback poll.
	9	**Social Support:** online team Quiz with prizegiving. Q&A. Live feedback poll.
	13	**Academic Support:** exam preparation and tips. **Social Support:** processes for exam reviews, feedback, rechecks and repeats. Q&A. Live feedback poll.

A. Learning Environments Supports

The aim of Learning Environments Support was to ensure that students could access and use their online classroom and VLE as well as other essential online resources and technology. It was essential that students were supported in becoming familiar with and competent with these resources as these were fundamental for a successful transition. Support in this area comprised two main interventions. Firstly, students were allocated an Online Learning Support Contact. This was a staff member in a support role in the college that students could contact if they experienced any difficulties relating to their online learning environment or resources. The second intervention was a series of targeted, timetabled online induction sessions which ran throughout the entire academic year.

During the 1st session the essential applications were highlighted, students were shown where to find them and given an introduction in how to use them. The applications considered essential were MS Teams for access to class, Moodle for course content and submissions, OneDrive for saving work, and the college Virtual Desktop in case they did not have the required software. To support the above, other items were also on the agenda such as accessing timetables, class attendance and the IT Support Hub. During the subsequent sessions, there were reminders of the essential applications and further opportunities to practice using online applications such as Turnitin plagiarism software for assignment submission. Each session also provided an opportunity to answer student questions and to address any issues that were observed by staff or experienced by students between induction sessions.

B. Academic Subject Support

The aim of Academic Subject Support is to provide additional tuition in the form of classes and individual sessions for students in subjects they may find difficult. When the inductions sessions were added to the student timetables, the alternate weeks were used for Academic support run by the Computing Support Service at NCI. In Semester 1: weeks 2, 3, 5, 6, 9, 10, 12 and Semester 2: weeks 2, 3, 4, 6, 7, 10, 11, 14 were dedicated to Computing Support classes. These classes consisted of a revision of difficult concepts from lectures in the form of practical exercises delivered by tutors. For example, a session on programming would focus on problem solving in terms of understanding a given programming problem, identifying the inputs, outputs, processes and then the syntax needed to write the code for that problem.

The purpose of these classes was twofold: firstly, to offer students ongoing weekly additional practical activities in areas such as programming and web development with the support of a dedicated tutor; and secondly, to increase the visibility and accessibility of the Computing Support Service among incoming students. The service is available to all Computing students who may wish to seek additional support on an individual basis to address specific learning needs. However, publicizing the service to students has often been a challenge. The team hoped that all students attending these classes for revision each week would reduce any stigma associated with accessing support services and encourage familiarity with the service so that students might seek help individually before they were in significant difficulty.

C. Social Support

The aim of Social Supports is to provide students with ample opportunity for social interaction with their peers which can often be difficult to do in an online setting as they can't physically turn to ask their neighbor a question. The focus of this intervention was to facilitate students getting to

know one another whilst working toward a common goal. Social supports were a part of the induction sessions and on-going throughout the semester. This was done several ways through increased group project work, in-class peer learning activities, an online social event, a team competition. In addition, each induction session was in itself a supported social interaction allowing time for questions and interactions with key staff.

Throughout the two semesters opportunities were provided for group work during class time where appropriate. Assessments in semester 1 were structured so that students were always working on at least one group project throughout the semester. The group projects were supported by dedicated class time where students would move in their groups to online breakout rooms enabling them to chat using microphones and to turn on their webcams. These were opportunities for students to get to know one another whilst working toward a common goal. The induction sessions in semester 1, held in weeks 4 and 8, focused on Social Support addressing topics such as how to manage Group Work, Escalation Procedures for any issues or concerns, what to do if an assignment is missed, Cyber Bullying awareness and how to look After your Mental Health. Also in week 8, there was an online virtual table quiz with fun activities for student teams to participate in. The students were given the choice to form a group or be assigned a team.

In semester 2, in-class peer learning activities were used, which included pair programming in the Introduction to Programming module. To encourage further engagement and awareness of both the induction sessions and the Computing Support Service, the School of Computing held a competition where students were asked to work in teams to create a new design for the Computing Support Service which was then rolled out on the service Moodle page. A prize was awarded to the winning team. This competition formed the basis of the week 5 induction session. Again, in semester 2, an online quiz took place. In this instance, year 2 students were also invited to facilitate connections across the years.

Social supports were considered from both a student-student and staff-student perspective. To enhance and build staff-student connections, the key staff contacts attended the induction sessions. Also, regular contact times were set aside for contacting fulltime lecturers and Programme Directors. The quiz was another way for staff to connect with students in a more informal way. Induction sessions, groupwork, peer learning activities and the online quizzes all supported student-student connections while promoting positive online etiquette.

D. Student Feedback

The aim of Student Feedback is two-fold. Firstly, to take a snapshot of how students were transitioning at points in time and also to tailor upcoming induction sessions to meet their needs. During each of the targeted induction sessions, students were polled about how they were feeling about attending classes online. The results of this poll were presented live on screen as a word cloud. This gave faculty the opportunity to allay many of their concerns during the session and provided students with the reassurance that they were not alone in their concerns. One approach taken for this was that the content of the first cloud was used as the inspiration for a blog post to raise awareness among students of the supports available to them across the college. Students were also polled throughout the semester to ascertain their academic support needs going forward. Much of the response to these polls aligned with other supports being offered elsewhere in the college so these supports were sign posted for students as well as being picked up in subsequent induction sessions. Where a specific need was identified from the feedback, it was addressed in subsequent a Computing Support or induction session.

IV. Results

This research aimed to investigate support activities and interventions deployed over the entire duration of first year of study of undergraduate students in order to help and support the students with the transition from second level education/ high school to higher education/ 3rd level education in an online learning environment. A novel S³F framework comprising of triple support in terms of Learning Environments, Academic Subjects and Social interaction was implemented and applied as a case study for the entire duration of the academic year on 90 first year undergraduate Computing students at National College of Ireland. This paper presents and discusses case study results that analysed the S³F framework effectiveness in terms of students' mental health and students progression rate. Qualitative data garnered through students' feedback and faculty observations.

All induction sessions organised during the two semesters were run online, live and recorded using the MS Teams platform. Video recordings of all sessions were made available to all students via a Moodle page along with the slides from the sessions for students. Therefore, students that were not able to attend a particular session had the opportunity to watch the recordings. The video recordings were also very useful for students to review them anytime and from anywhere when they needed to remember details related to a specific type of support provided by the College.

Academic staff involved in the organisation and running of the induction sessions have noticed that students attendance at the sessions was high and student engagement throughout was excellent. This is evident in the volume of interaction in the online chat logs both during and after the sessions. This is a channel that was not previously available to students for asking questions or seeking support. After the first session scheduled in week 1, students engagement continued online throughout the week and into week 2 via the MS Teams Chat window associated with the first induction. Students started to use the Chat feature to ask follow-up questions, which were then answered either by faculty or by other students. In excess of 100 messages were exchanged via this chat during the first month of the semester, the main topics of concern and discussion are captured in the word-cloud illustrated in Fig. 1.

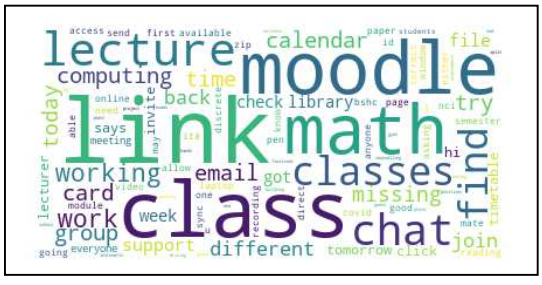

Fig. 1. Word cloud of Online Chat Themes

Rather unexpectedly, this dialogue proved to be a valuable asset to both faculty and students in the early days of their programme highlighting student concerns to faculty as well as encouraging peer to peer interaction. As can be seen in the word cloud, the most dominant words are "link" and "class". This brought to the research team attention, unanticipated difficulties that students were experiencing in accessing online classes which could then be addressed in a timely manner to ensure all students had the access they required. It also provided evidence to support changes in the IT process for making classes available to students from semester 2.

Students were polled at regular intervals to ask how they were feeling about taking classes online and to better understand how they were coping with the transition to higher education. For the most part, the results of these polls were very much as we expected them to be. Students met the start of the first semester with a mix of excitement and trepidation where the feeling expressed the most was "Nervous" (Fig. 2).

However, by the end of week 3, the strongest feeling expressed was "Alright" and those feelings of uncertainty and nervousness for some had been replaced with stress, and for others with boredom and distraction (Fig. 3).

These feelings of stress could likely be attributed to the onset of assessments which would be typical for this stage in the semester. Conversely, the feelings of boredom and distraction could more likely be attributed to the online delivery of the programme. This gave the team valuable insight into students' mindsets at that point in the semester, refocusing the subsequent induction session toward providing students with a social outlet and an opportunity to mingle outside of coursework.

In semester 2, students were polled in weeks 1, 5 and 13 to ask how they felt about the semester and later to ask how they felt about their first year of study (Fig. 4, 5, and 6). A similar pattern can be seen in the word clouds for semester 2 as with semester 1 where feelings of stress started to creep in mid semester with the onset of assignments. Most notably though, the feelings of nervousness expressed at the start of the first semester had for some students been replaced by feelings of excitement and optimism at the start of semester two.

Overall, when looking back at their first year in higher education, the most dominant feeling expressed by students was "good", closely followed by "alright" whilst others expressed feelings of relief, tiredness and loss of motivation. Again, this mix of feelings is to be anticipated as while classes were nearing completion, students were still in the process of completing terminal assignments at this point.

Fig. 2. Word cloud of poll responses, Semester 1, Week 1

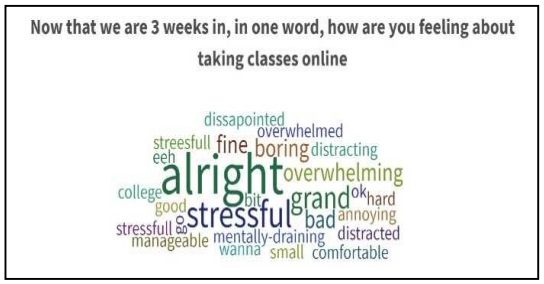

Fig. 3. Word cloud of poll responses, Semester 1, Week 4

Fig. 4. Word cloud of poll responses, Semester 2, Week 1

Fig. 5. Word cloud of poll responses, Semester 2, week 5

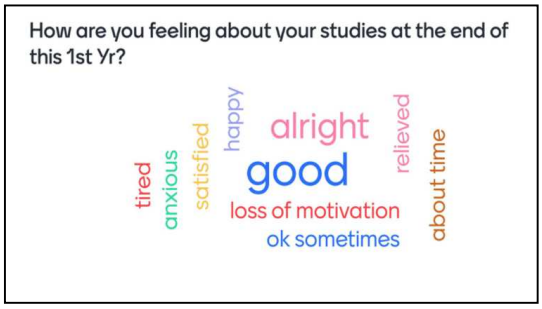

Fig. 6. Word cloud of poll responses, Semester 2, Week 13

In both semesters 1 and 2, students were asked for feedback relating to their academic subject support needs (Fig. 7 and 8). These enabled the team to respond by running Academic Subject Support activities that targeted the struggles indicated and discussing with academic staff to see how best to support the students in the class.

In addition to polling students, staff observations also played a part in targeting content throughout the induction programme. One interesting outcome noted by staff from semester 1 student feedback and student messages in the chat room was related to the first group project due in semester 1, where students opted to be placed in groups by the lecturer. However, by the time the second project commenced some weeks later, students opted to choose their own groups. This

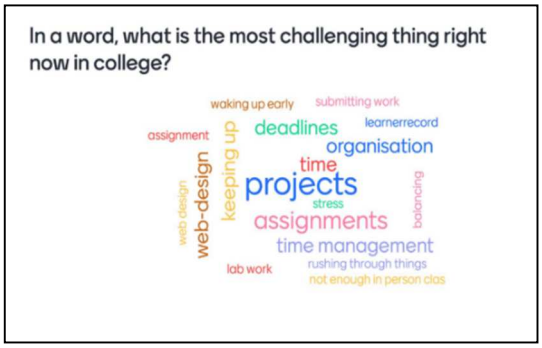

Fig.7. Word cloud of academic challenges, Semester 1

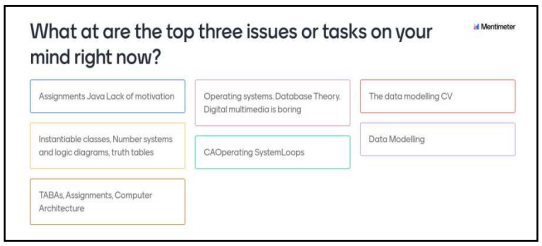

Fig. 8. Semester 2, academic challenges in ranked order

was a positive sign that the support activities put in place were proving successful in helping students to socialize and form friendships early on.

The ongoing students feedback provided during the 2 semesters both helped to inform the induction activities and demonstrated a positive impact on students transition to higher education.

Most encouragingly however is the analysis on the retention rate for the 1st year full-time undergraduate Computing students. The retention rate in the 2020/2021 academic year was 84%, compared with 78.9% observed in the 2019/2020 academic year. This represented an increase on the previous year of over 6% and the highest increase in retention since 2016. Worth noting is the fact that the 2020/2021 student cohort had a difficult year due to the tough COVID19 restrictions imposed on Irish society and the direct impact on student day-to-day life. The increase in the retention rate shows that the induction activities designed as part of the S³F framework supports students transition into 3rd level education and helps them to progress through their programme.

V. CONCLUSIONS

The aim of the research was to investigate support activities required to manage the transition of students from second level education to higher education in an online environment. A novel higher education transition framework (S³F) that combines three types of student feedback based adaptive support activities in terms of Learning Environments, Academic Subject and Social interaction was introduced. In the three support areas above, academic staff identified the key aspects to support and consider during the academic year. The framework was deployed as a case study through a yearlong induction programme of targeted timetabled online induction sessions, a series of regular timetabled academic subject support sessions with the Computing Support Service and an increase in groupwork in semester 1 and peer supported learning opportunities in semester 2.

The S³F framework was beneficial to both staff and students. For staff, it provided an opportunity to meet with students regularly in an online environment and generate connections. From the first meeting, the online chat highlighted unforeseen difficulties in accessing online classes which staff responded to promptly. Over the subsequent weeks, valuable feedback was gained from students via polls and interaction during the induction sessions. In terms of academic difficulties, this prompted more Academic supports to be put in place. In terms of social difficulties, it highlighted the need for continued support during groupwork. It alerted the team to the potential of cyber bullying which was addressed to ensure it did not become a problem.

For students, it provided the opportunity to connect with staff as incidental meetings on campus were not available to them. They had another chance to connect with each other and build on those connections. It provided a place for them to voice concerns, raise issues, make requests and very importantly to see quick responses from staff. Each induction session was built on the previous one, always responding to the student voice/feedback. Results indicate that early interventions have a positive impact on students transition into higher education in an online setting and serve to negate some of the difficulties presented by the online learning environment. However, the real value will be seen in the long-term retention and success of these students.

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