

Life Sciences/Business School Case Study 3 – Level 0/4	
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eMail:	
Setting	Level 4 and Foundation Year students across the Bioscience suite of Programmes in the Life Sciences and Level 4 students on the Business Studies suite of Programmes in the Business School
Cohort Size	Approx. 500 students (across Life Sciences and Business School)
Rationale for using the Toolkit	<p>Students entering higher education for their first year of study often experience anxiety due to the fundamental differences in learning between secondary and higher education. They are experiencing a new environment and are asked to engage with challenging new knowledge and skills. In their first months of study, they have to develop new learning (and life) skills that will sustain them through their study. Not all succeed, which is why attrition rates are typically highest for students in their first year of studies. Chief among these are transferrable skills that reflect autonomy and ownership in learning. From a tutor's perspective, newly arriving students represent a 'black box' of attitudes, skills, knowledge and prior experiences that are likely to affect their willingness and ability to learn. This presents a challenge when designing and delivering teaching for these students. Students in the Life Sciences involved in this case study were embarking on a suite of newly validated programmes. In addition, the timetables for both the life science and business programmes had been moved to semesterized timetables for the first time. This presented additional challenges for delivery and structuring of teaching and the Traffic Lights Toolkit could provide insight into the student's mind-set and confidence levels, therefore informing the design of teaching in this and future years.</p> <p>In this context, the Traffic Lights Toolkit was offered to beginning students in two different disciplines and programmes of study (life sciences and business) to introduce them to the idea of reflection and autonomy in learning and also to gain an insight into the confidence levels and attitudes of students beginning their studies.</p>
Learning activity	<p>The Toolkit was not tied to or integrated with any single learning experience or activity. Instead, it was introduced to students in induction sessions (Life Sciences and Business School) and was also used as guide for conversations with students in timetabled tutorials (Life Sciences only). In these induction sessions, students were introduced into the ideas and principles of learning and teaching in higher education, in particular the notion of independence and autonomy in learning. As part of their studies, students were also supported in on-on-one tutorials with personal academic tutors, where the Traffic Lights Toolkit formed part of the discussion.</p>
Traffic Lights Toolkit elements used	Perception of Challenge Tool (POC), Quadrant Tool
Mode of delivery	Digital (Excel Spreadsheet available through module and programme virtual learning environment [Blackboard])

Number of engagements with the Toolkit	2
Aims	<p>There were two distinct aims in using the Traffic Lights Toolkit with these cohorts of students. The primary aim was to signpost for students some of the fundamental skills they would need or be asked to develop during their first year of studies. The POC Tool therefore included ten statements relating to fundamental skills and qualities required for study in higher education. By assessing their confidence against these statements, students could identify areas of existing confidence but also highlight areas of concern that they should prioritize in conversations with their personal academic tutors and during their early engagement with their programme of study. This also related to the general aims of the induction process, by introducing students to the concept of autonomy and reflection in skills development and the idea of taking ownership of their learning. The second aim was to gather information about students' attitudes and prior learning, information which is not readily available to lecturers or personal academic tutors. Because the Toolkit was not integrated or associated with any summative or formative assessment, it also could be used as a measure of engagement by students early on that might be helpful in signposting issues in this regard and help develop strategies for increasing engagement and encouraging student autonomy and reflection in future cohorts.</p>
Methods	<p>First use of the Toolkit: Students were briefed on the concept of being an independent learner and the utility of the Traffic Lights Toolkit in developing their ability to reflect and develop autonomy in their learning either during an IT briefing session during induction week (Life Sciences cohort) or in the first IT session of the compulsory module 'Marketing Principle and Practice' (Level 4) (Business School cohort). These briefings lasted approximately 45 minutes, with 20 minutes available to students to complete the Toolkit sheet. Students in both cohorts were asked to download a pre-formatted Excel spreadsheet template with a POC and Quadrant Tool and complete these in-session with the support and guidance from tutors present (Table 1). The POC Tool had ten statements, grouped by the themes 'Expectations' and 'Higher Education Skills' (Table 1). These statements had been developed and chosen in collaboration between tutors from the life sciences and business to reflect skills expected from students in both programmes. For each statement, the POC Tool included a space to indicate the traffic light colour, a space for adding a numerical confidence rating (1-10) and a space for notes, thoughts and comments. There was also a space for general comments and thoughts that students could use to reflect on their overall confidence levels and any issues or problems. Students were encouraged to reflect on their confidence levels at the time and were encouraged to add any notes, thoughts and comments in the provided spaces so they could articulate for themselves and for their personal academic tutor why they felt a certain way. Students were directed to submit completed sheets to an online submission point (Turnitin) where they could upload the completed file. In addition, students were directed to a blank Toolkit sheet that they could complete at their own</p>

leisure to track their own progress. Students who weren't able to complete the tool in session were asked to complete them at home and were reminded to submit them the following weeks via group eMails. Students in the Life sciences cohort were also instructed to discuss their sheet with their personal academic tutor during a timetabled tutorial in the fifth week of their studies. Personal academic tutors in the Life Sciences received instructions on the use of the Toolkit and how to interpret completed sheets and were asked to discuss the Toolkit sheet with students in their tutorial, though the students were also instructed to take the initiative to discuss their sheets with tutors as a sign of their engagement.

Table 1: Skills statements included in the Perception of Challenge Tool. Statement 11 (marked with an asterisk) was only included in the second of the two sheets for life science students.

Expectations	1. I know who to speak to if I have a question about my studies.
	2. I know who to speak to if I have a question or a problem outside my studies.
	3. I am able to organize my time effectively to study independently.
	4. I know how to review my coursework critically before I submit it.
Higher Education skills	5. I know how to find information relevant to my coursework.
	6. I know how to extract and summarize information form a text effectively.
	7. I know how to express myself formally in writing.
	8. I know how to convert 75% into a fraction.
	9. I know how to use excel to calculate a sum.
	10. I am comfortable delivering a presentation to an audience.
	11. I know how to effectively prepare for my exams in January.*

Subsequent completion of the Toolkit:
 Students were asked to complete a second Toolkit sheet at the end of the first semester of their studies. The statements on this sheet were identical to those on the first, though for life science students only an

	<p>eleventh statement was added to encourage students to reflect on their level of preparation for upcoming examinations (Table 1).</p> <p>For the Life Sciences cohort, students were asked to download a second sheet and upload it to an online submission point in the eighth week of their studies and they were reminded several times thereafter. This sheet was intended to support their second meeting with their personal academic supervisor that they were asked to schedule before Christmas, when they were preparing for summative assessments and exams and could reflect on the first semester and their learning experience by using the Toolkit sheet.</p> <p>For the Business School cohort, the second copy of the Toolkit sheet was completed, as the first one had been, as part of the final session of the module 'Marketing Principle and Practice' (Level 4).</p>
Sharing and evaluating outcomes	<p>Students had access to their own sheets at all times during the project, so were able to assess their progress and growth in confidence by comparing newly completed sheets to those completed previously. General outcomes will be used to inform induction activities and teaching for future cohorts and will also be communicated to those cohorts in induction sessions to emphasize the shared experience they have with previous students in higher education.</p> <p>To evaluate their experience with the Toolkit, an evaluation questionnaire was integrated into the second Toolkit sheet students were asked to complete.</p>
Outcomes	<p>Overall, engagement with the Traffic Lights Toolkit was low across both programmes involved in this case study. In the Life Sciences, across the first year and foundation year students enrolled, only 29% of students completed the first of the two Toolkit sheets (N=264). Only thirteen students completed the second Toolkit sheet (5%) and only seven completed both. Engagement was similarly low among the business students: 34% completed at least one Toolkit sheet (N=230), twelve completed the second (5%) and only five completed both. This meant that student growth in confidence and other analyses requiring students having completed both sheets were not possible. Likewise, not enough students consistently completed the Quadrant Tool to allow extensive analysis. This may indicate that the Quadrant Tool is more difficult to understand and use effectively for students.</p> <p>Student confidence levels at the beginning of their studies was mixed, as anticipated, and confidence levels were similar for students in the life sciences and business (Fig 1). Even basic study skills were rated as 'red', indicating low confidence and possibly anxiety by students (Fig 1). Especially skills that require reflection and higher-level thinking an preparation were a source of concern and/or anxiety for students (e.g. statements 4, 10). For the small number of students who completed both Toolkit sheets, at the beginning and end of the first semester of their studies, growth in confidence was not as evident as it was in the other case studies carried out with students at levels 5 and 6 in the Life Sciences (see www.canterbury.ac.uk/TLT for results of these case studies) (Fig 2). This may indicate that students early on in their studies grow in confidence more gradually. Alternatively, perhaps the fact that the</p>

Toolkit was not linked to one particular learning activity/module/assessment and required students to self-assess against general and transferrable skills meant that it was more difficult for students to evaluate and identify progress in these skills.

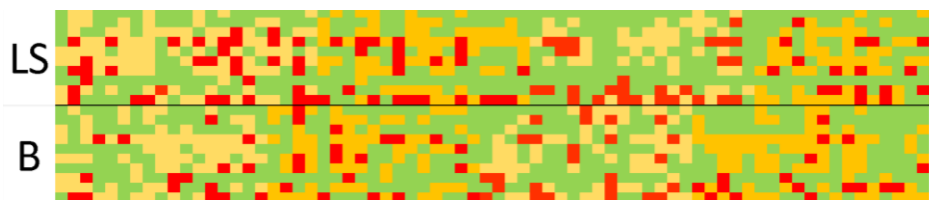


Fig 1: Colour map indicating self-reported confidence levels of students in relation to ten skill statements at the beginning of their studies the Perception of Challenge Tool. Green = Confidence, Amber = Challenge, Red = Stress/Anxiety. Each column represents one student, each row one statement. Responses from life science students (top) and business students (bottom) are separated by the bold horizontal line (N = 71 and 70, respectively).

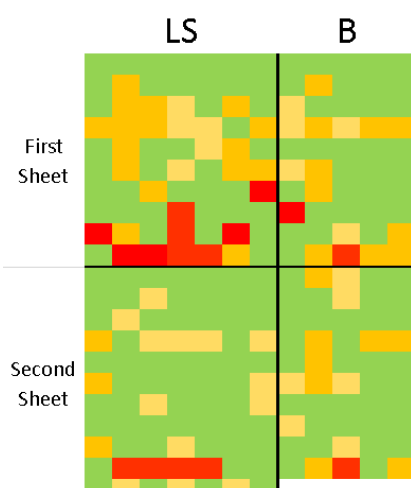


Fig 2: Colour map indicating self-reported confidence levels of students in relation to ten/eleven skill statements as reported on the two Perception of Challenge Tools completed. Green = Confidence, Amber = Challenge, Red = Stress/Anxiety. Each column represents one student, each row one statement. Responses from life science students (left) and business students (right) are separated by the bold vertical line (N = 7 and 5, respectively).

There was no significant relationship between the overall confidence rating reported by students and the marks achieved in their first semester of studies in all assessments of semester 1 for life science students (linear regression; Coef.=1.34, $F_{1,51}=0.01$, $P= 0.924$; Fig 3) or in marks achieved in the assessment in the module in which they were introduced to the Toolkit sheet for business students (linear regression; Coef.=1.88, $F_{1,43}=0.51$, $P= 0.480$; Fig 4). This means that confidence levels at the outset of their studies had no impact on how well students did in the summative assessment completed in their first semester of study. This outcome may seem unexpected, but since high-achieving

students can be highly-self-critical and dismissive of their skills and abilities and low-achieving students may overestimate their abilities, this lack of a direct relationship between confidence levels and achievement is not surprising. It is an interesting observation to feed back to beginning students however – lack of confidence does not preclude high achievement.

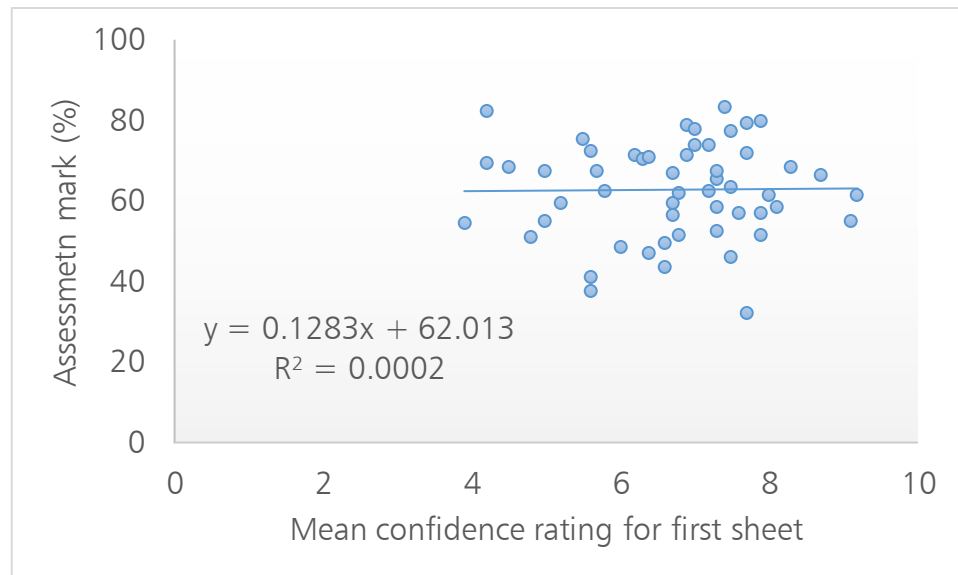


Fig 3: Linear regression of mean confidence rating per life science student (mean of responses to all statements on first sheet) against assessment mark. Line indicates linear fit.

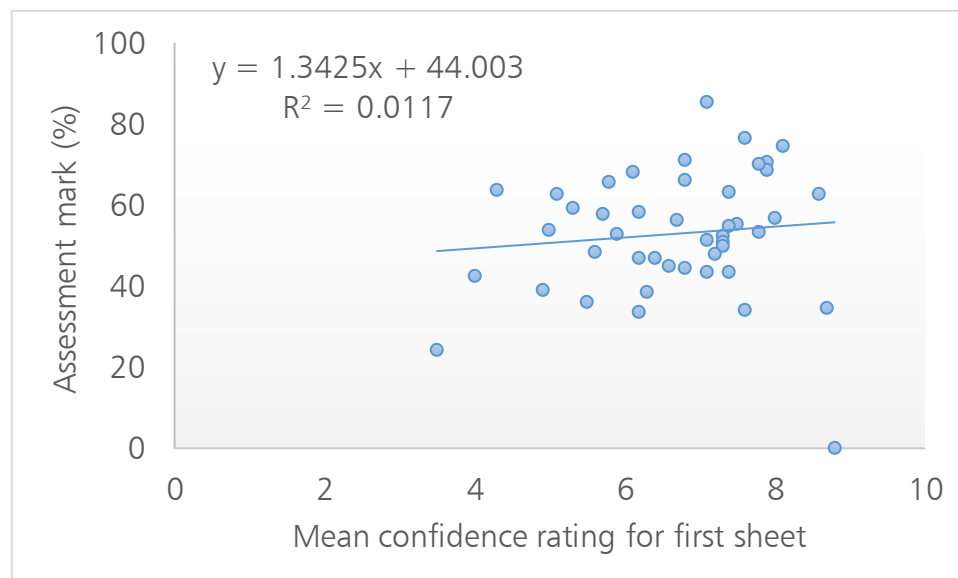


Fig 3: Linear regression of mean confidence rating per business student (mean of responses to all statements on first sheet) against assessment mark. Line indicates linear fit.

Since attrition rates in the first year of study are typically high and it is therefore important to identify students who require additional support, but also students who are less likely to engage with their studies at the levels required to succeed, it was investigated whether engagement with the Traffic Lights Toolkit was a good predictor for continued engagement throughout the first semester of studies. Session attendance data were only available for life science students at the time of writing. When these were grouped for 96 students according to whether they had engaged with the Toolkit and completed at least one of the Toolkit sheets or none at all, the median attendance for students who had engaged was significantly greater than that of those who had not engaged (Mann-Whitney U-Test; $W = 1803$, $P = 0.006$; Fig 5). Similarly, when the proportion of student who attended no timetabled teaching sessions was compared between the two groups, students who had not engaged with the Toolkit at least once were more than three times as likely to not have attended than students who completed at least one Toolkit sheet (Chi-squared test; $\chi^2=7.915$, $DF = 1$, $P = 0.005$; Fig 6). This suggests that beyond signposting higher education skills for students at the outset of their studies, the Toolkit may also be useful in predicting which students are least likely to engage in their studies and therefore support retention by targeting these students with additional motivators and learning support.

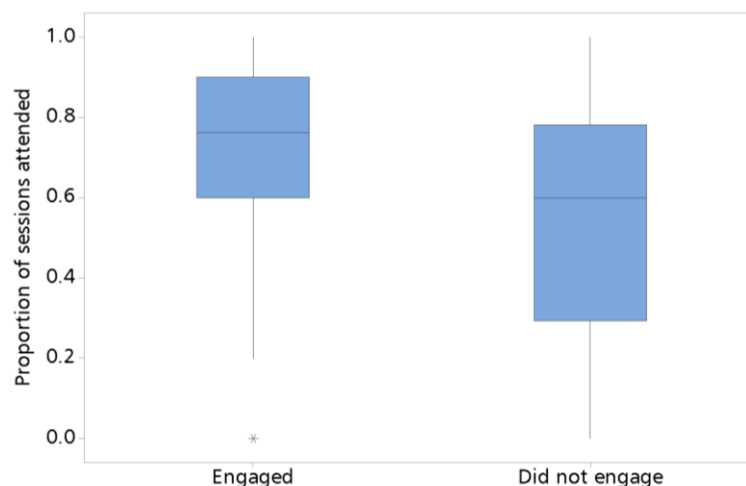


Fig 5: Median attendance at timetabled sessions for students who either completed at least one of the Toolkit sheets ('engaged') or completed neither of the two sheets ('did not engage'). $N = 30$ and $N = 66$, respectively.

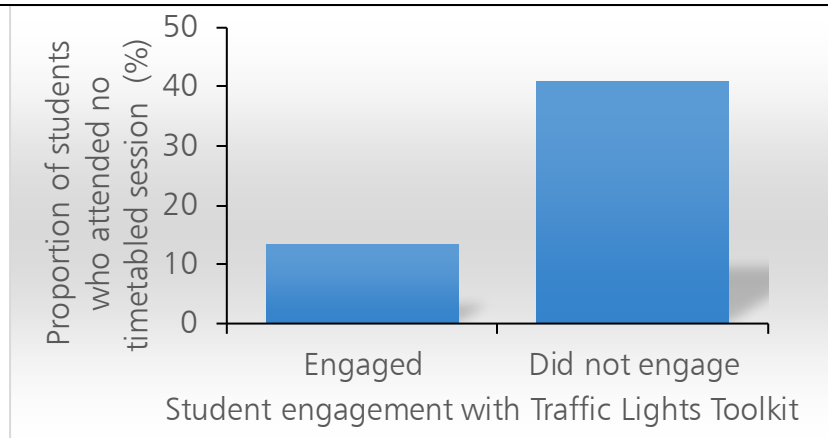


Fig 6: Proportion of students who attended no timetabled sessions compared between students who either completed at least one of the Toolkit sheets ('engaged') or completed neither of the two sheets ('did not engaged'). N = 30 and N = 66, respectively.

In addition to the colour indicators and numerical ratings for their confidence levels, many students also added qualitative comments for some or all of the statements, articulating barriers and enablers to learning. These are collected in Table 2. The barriers and enablers reported were common to all three of the case studies carried out with life sciences students and were also reported by business students.

	<p>Table 2: Barriers to learning and enablers to learning as expressed by students in the space provided for qualitative comments on the Perception of Challenge Tool and Rating Scales Tool.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; width: 50%;">Barriers</th> <th style="text-align: left; width: 50%;">Enablers</th> </tr> </thead> <tbody> <tr> <td>Lack of experience</td> <td>Confidence</td> </tr> <tr> <td>Lack of confidence/skill/ability</td> <td>Receiving Guidance/Support from lecturer/technician/instructor</td> </tr> <tr> <td>Learning disability</td> <td>Guidance/review from peers</td> </tr> <tr> <td>General anxiety</td> <td>Planning ahead</td> </tr> <tr> <td>Fear of the unknown</td> <td>Practice/ experience</td> </tr> <tr> <td>Self-criticism</td> <td>Individual research/study</td> </tr> <tr> <td>Time management</td> <td>Time</td> </tr> <tr> <td>Past negative experiences</td> <td></td> </tr> <tr> <td>Lack of motivation</td> <td></td> </tr> <tr> <td>Social circumstances</td> <td></td> </tr> <tr> <td>Lack of infrastructure/resources</td> <td></td> </tr> <tr> <td>Social anxiety</td> <td></td> </tr> </tbody> </table>	Barriers	Enablers	Lack of experience	Confidence	Lack of confidence/skill/ability	Receiving Guidance/Support from lecturer/technician/instructor	Learning disability	Guidance/review from peers	General anxiety	Planning ahead	Fear of the unknown	Practice/ experience	Self-criticism	Individual research/study	Time management	Time	Past negative experiences		Lack of motivation		Social circumstances		Lack of infrastructure/resources		Social anxiety	
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<p>Student perceptions and feedback</p>	<p>Student feedback and opinions of the Traffic Lights Toolkit was a lot more mixed for this group of students than it was for students in the two other case studies carried out for this project with life science students, who had a largely positive experience and reported benefits from using the Toolkit. For example, while almost 70% of students agreed that the Toolkit had helped them to identify areas where they needed additional support, only a minority of about 25% agreed that it had helped reduce their anxiety and almost half of students were unsure whether they wanted to keep using the Toolkit for other modules/learning activities during their degree (Fig 7). Students also were split in reporting whether or not tutors had discussed the Toolkit with the during tutorial sessions. While it was also a responsibility of the students to raise the Traffic Lights Toolkit with their tutors, this may indicate that tutors were not consistent in their emphasis and discussion of the Toolkit. It is also possible, however, that students who responded negatively to this statement did not attend tutorials with their tutors.</p>																										

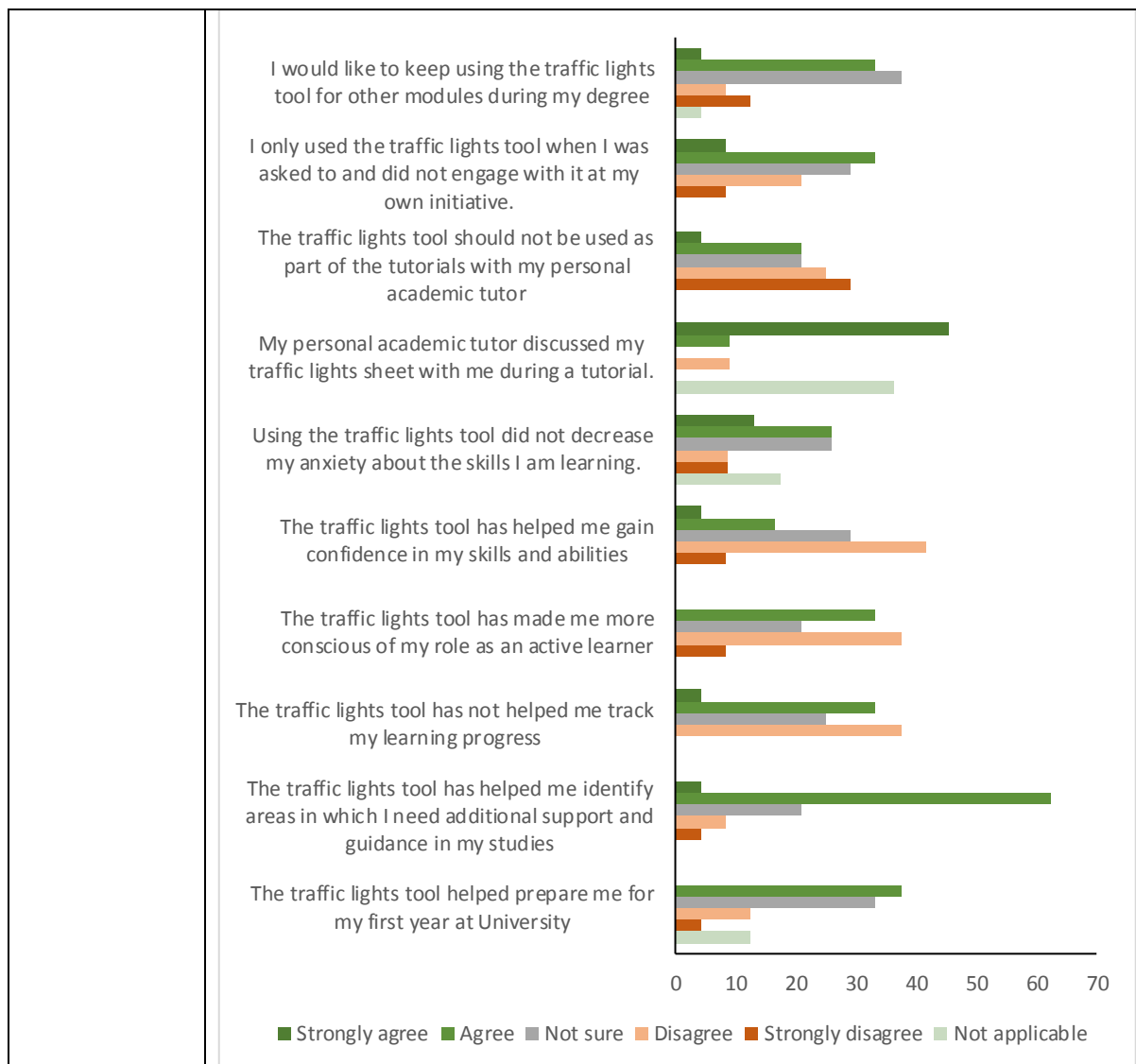


Fig 7: Life science and business student responses to a questionnaire evaluating their experience with the Traffic Lights Toolkit. (N = 24, except statement four from the top, which was only asked of life science students, N = 13)

In the questionnaire, students were also asked to further comment on any positive or negative responses they had given and suggest changes and/or improvements to the Toolkit. There were some comments that clearly indicated a positive impact on students, similar to those reported by students in other case studies for this project. These comments fit the model extracted from responses in other case studies, whereby the Toolkit facilitated a process of externalization and perspective shift, encouraged sorting and mapping and finally led to intrapersonal change. For example, students commented:

“[The Toolkit] identifies if I have improved in any of the areas listed when comparing it to the first tool.”

“All of my positive responses were because the traffic light system backed up my understanding of what I already knew, this allowed me to feel more confident in my decisions and provided proof for many of my decisions e.g- using my own initiative to find range of sources to include in my assignments.”

“It helped in the discussion with the personal tutor so I could gain advice.”

However, several students also commented that there was not much impetus or motivation to use the Toolkit or that the benefits were not clear:

“While extremely useful there was no need to engage with it much unless I was meeting my tutor.”

“It was more experiencing the modules and learning what the uni wants rather than the traffic lights tool that helped gain skills and get confidence.”

“The questions asked are not relevant to me improving.”

Some of the suggestions for improvements revolved around the need for making the Toolkit more specific to module learning outcomes and more directly linking it to support sessions to increase its impact on learning:

“The answers from everyone could be reviewed and if a lot of people said they needed help with revision, a session could be organised to offer guidance.”

“The perception of challenge tool could be more module specific with questions on certain topics?”

“Change the questions which are being asked to questions which are more relevant to the course subject.”

“There could be a section where people fill in what they think they struggle with most rather than focussing only on the provided areas of study.”

Overall, the student responses and the level of engagement with the Toolkit in this case study indicate that there are significant challenges and limited benefits associated with using the Toolkit with such large cohorts of students, especially where there is no direct integration of the Traffic Lights Toolkit with a specific learning activity or assessment and there is potentially significant diversity in how tutors and students perceive and engage with the Toolkit. Particularly for students only just transitioning into the mind-set of higher education, a Toolkit that relies on a willingness and basic ability of students to reflect and develop some autonomy in their learning may be challenging to use in a way that provides a significant positive impact. This is probably especially true for students entering an area of study not typically associated with

	<p>reflective practice, such as science and business studies. The data also show, however, that lack of engagement with a Toolkit that encourages reflection and self-assessment and measures levels of anxiety and challenge at the outset of a student's journey in higher education may act as an effective 'canary in the coalmine' and may be useful in identifying students likely not to engage fully in their studies at an early stage.</p>
Outlook	<p>Large amounts of data and student responses originated from this case study and provide opportunities for extensive further analysis and interpretation. This analysis will continue into the future and will inform future iterations of the Toolkits and its use, especially in challenging contexts such as the one presented in this case study. When considering very large cohorts of students, where regular one-to-one or even small-group contact is unfeasible, it could be that the Toolkit is most effective when used with individual students who are most motivated to use it to reflect and assess their progress. The Toolkit could then be offered as a learning support tool for students and tutors who most wish to engage with it.</p>