

How does a vocational qualification (BTEC) prepare students for a degree in Biosciences at a research intensive university?

Elizabeth Hurrell¹, Emma Shawcross² & Edward Keeling²

¹Environmental Science, University of Central Lancashire, Preston, PR1 2HE

²Biomedical and Life Sciences, Lancaster University, Lancaster, LA1 4YW

Corresponding author: e.shawcross@lancs.ac.uk

Keywords: *Widening Participation; BTEC; Transition; Progression; Retention; Higher Education; Bioscience*

Abstract

Over the last decade the number of students coming to university with a BTEC qualification has risen. As BTEC students are more likely to come from widening participation backgrounds, accepting students with a BTEC qualification has been instrumental in helping universities to broaden access to Higher Education. However, the poorer progression and retention of students attending university with a BTEC qualification is a key area of concern. The aim of this study was to explore the transition experience of Biosciences students entering university with a BTEC qualification in order to better target support for these students. Focus groups with current students who entered university with a BTEC qualification, and semi-structured interviews with teaching staff at feeder colleges, highlighted that the BTEC equipped students with many transferable skills relevant to university study. In particular it prepared students for time management, report writing, practical laboratory work and working independently. However, our findings suggest that further support is required in mathematics, chemistry, examination and revision techniques. We propose that instilling confidence, encouraging friendship groups, more transparent advertising and developing inclusive curricula may help to improve BTEC student retention and progression.

Introduction

UK universities have made great progress to widen participation (WP) over the last decade (Social Mobility Commission, 2016) but WP and social mobility is still high on the Government and Higher Education Institutions' agenda (Social Mobility Commission, 2016; Department for Business, Innovation and Skill, 2014; HM Government, 2017). The acceptance of students with a vocational qualification (Level 3 Business and Technology Education Council qualification; BTEC) onto UK university courses has been central to broadening access to Higher Education (HE) (Gicheva & Petrie, 2018) and increasing numbers from lower participation neighbourhoods (Kelly, 2017). Whilst this participation itself is largely seen as a success, the poor retention of these students and progression of students during and after their course has been highlighted as a key concern (Gicheva & Petrie, 2018; Gill & Vidal Rodeiro, 2014; Shields & Masardo, 2015; Al Meselmani et al., 2018). The aim of this paper is to examine the transition experience of BTEC students onto a Biosciences undergraduate course in order to assess and improve departmental provision for this particular cohort.

The level 3 BTEC is an applied qualification that is available to 16-19 year olds and mature

students. It can be taken on its own or in combination with traditional A-levels. Nationally, the number of students taking BTEC rose from 45,000 in 2005 to 150,000 in 2015 (Mian et al., 2016). This rise has been attributed to BTECs being seen as a 'middle option' for students (Kelly, 2017) as it provides a route into both employment and HE (Pearson, n.d.). As a result of increasing numbers of post-16 students taking a BTEC qualification, the number of BTEC students attending university has increased from 50,000 (in 2008) to 100,000 (in 2016) (Mian et al., 2016). As this number is likely to continue increasing it is imperative that universities understand the student transition from undertaking a BTEC to a university degree.

Whilst holding a BTEC qualification is not itself an indicator of WP, it is well established that BTEC students are more likely to come from social backgrounds established as having low participation in HE (Al Meselmani et al., 2018; Mian et al., 2016; Shields & Masardo, 2015). For example, university students from low participation areas and with parents working in manual and routine jobs are more likely to hold a BTEC qualification (Gicheva & Petrie, 2018). Additionally, students studying vocational courses are more likely to be one or more of the following: first generation HE students; male; older than traditional students; have a disability; to come from non-white backgrounds and from low socio-economic groups (Banerjee et al., 2017; Rouncefield-Swales, 2014; Shields and Masardo, 2015). Therefore, admitting students to university with a BTEC qualification is an important mechanism for WP (Rouncefield-Swales, 2014).

Whilst admitting BTEC students to university and simultaneously addressing WP is positive, there are still many issues. Firstly, BTEC students are more likely to attend low entry tariff universities than high entry tariff universities (Gicheva & Petrie, 2018) and to achieve lower comparative wages after graduation (Social Mobility Commission, 2016). Secondly, BTEC students are more likely to drop out of university (32%) and attain a lower degree classification (46% attain a lower second class or below) than students entering with A-levels (8% and 28% respectively), particularly at research-intensive universities (Al Meselmani et al., 2018;

Banerjee et al., 2017; Holland, 2017; Rouncefield-Swales, 2014). Therefore, for WP to be truly successful it is important to address issues of progression and retention.

This study centres on a research-focused university with a typically high entry tariff to its programmes. Like many universities it has increasingly accepted applicants with BTEC qualifications but, like national trends, has seen poorer progression and retention of these students. The current university strategy focuses on improving retention and progression of students and so an aim of this research was to provide an evidence-base for intervention and support of students with BTEC qualifications. As progression and retention are likely to differ for different degree courses (Banerjee et al., 2017) and for students entering from different BTEC schemes, it is important that support is tailored by subject area as well as putting wider university strategies in place. This research therefore focuses on an exploration of the transition of BTEC students onto a Biosciences degree programme.

BTEC students entering the Biosciences degree programme are required to have undertaken the BTEC Level 3 National Extended Diploma in Applied Sciences. The BTEC consists of both mandatory and optional unit (or module) covering a broad range of scientific subjects e.g. Biology, Chemistry, Physics and Material and Forensic sciences. Pre-2017 the assessment method was entirely coursework based but now an examination component has been added to the course (Pearson, 2015). The Biosciences degree consists of mandatory core modules taken in years 1 and 2 and a combination of core and optional modules in year 3. Students are assessed in a variety of formats. In first year, coursework contributes 30% of their mark and can include practical reports, essays and presentations. To encourage engagement with the course material, 10% of the mark is given for completing weekly online tests which can be taken as many times as a student likes within a given time frame and the highest mark is recorded on their transcript. End of module tests and an end of year summer examination account for 60% of the student's final grade. Years 2 and 3 are assessed through a combination of coursework and written

examinations.

Methodology

There were three dimensions to this project. The first dimension involved running focus groups with current Biosciences undergraduates who entered the university with a BTEC qualification. Focus groups were advertised to all Biosciences students via whole cohort e-mails and a lecture slide with only those students with a BTEC qualification selected for participation. Focus group topics centred upon exploring: the student experience of undertaking a BTEC qualification prior to coming to university; how well the BTEC qualification prepared students for university study and how the students found transition to university. The topics focused on the transition from college to university and the first year of study due to the higher drop-out rates between years 1 and 2 of the university degree scheme which suggests that problems occur soon after starting university. An Amazon voucher was used as an incentive to participate in the study. As a result we managed to explore the experience of 7 students. Although more focus groups would have been ideal, this approach allowed us to focus on a single subject area, across all year groups and in depth. Five males and two females were involved in the focus groups which reflects the predominately male make-up of BTEC courses. Students involved in this research completed their BTEC pre-2017 and as such did not undertake any exams.

The second dimension of the project was to meet with teaching staff at four feeder sixth form colleges. The aim of these meetings was to gain a better understanding of the Level 3 Applied Sciences BTEC qualification. Feeder colleges of BTEC students to the university were specifically selected as the majority of students entering the University with an Applied Sciences BTEC attended local sixth form colleges. We used semi-structured interviews to ask teaching staff about: how the BTEC prepared students for university, aspects of the BTEC which did not prepare students for university and whether any support is provided to assist students in going to university. The final dimension, which is not fully reported here, is our response to the outcomes of the data i.e. implementation and

development of support mechanisms. However, some emerging ideas to support BTEC students are presented in the discussion section of this paper.

Following the focus groups and interviews with local sixth form colleges (subsequently referred to as 'colleges'), transcripts from focus group recordings and detailed researcher notes from college meetings were compiled. Collaborative data analysis, in which all researchers explored and discussed the themes emerging from the data, (Cornish et al., 2014) was undertaken to incorporate all researchers' perspectives on the data. This was important as the researchers' interests lay in both the academic study skills perspective (EH) and departmental perspective (ES). Joining together these different perspectives enabled a more integrated and joined-up response to the data. Data analysis of the transcripts and meetings notes involved the identification of common themes that emerged from the datasets. This was achieved initially through immersion in the transcripts and meeting notes followed by coding and labelling (Vaismoradi et al., 2016). Comparisons between transcripts and meeting notes also formed an important part of thematic development (Vaismoradi et al., 2016). Care was taken to avoid generalising the data to the extent that differences of opinion were lost.

Results

Four key themes emerged from the meetings with colleges and students. These themes are explored below.

Skills development and subject knowledge

Overall, students felt that the BTEC qualification adequately prepared them for their Biosciences degree. The strong focus on research, coursework deadlines, lab work, report and essay writing, referencing and paraphrasing and independent study during the BTEC course equipped students with key skills that are required at university. In fact, many students perceived that they were more prepared for study at university than traditional A-level students. This is because A-level students have fewer laboratory practicals and less of an emphasis on coursework.

How does a vocational qualification prepare students for a degree in Biosciences at a research intensive university?

"I know people that have come here, doing A-levels, and they they're like 'I'm in a lab all the time and I dunno what I'm doing' and, coming from a very lab background, which is all BTEC was you do a protocol and you write a report about it and you hand the coursework in, you get like, a lot more experience in the lab which I preferred... and you can also deal with the coursework when you come here [university], like it's just second nature to you whereas people in A-level I know they struggle with the coursework..." (P7)*

Sixth form college staff confirmed this view stating that BTEC students are required to work much more independently than A-level students. Three out of the four colleges said that BTEC students were exposed to more practical laboratory work and were challenged to develop their own experiments. College staff reported that BTEC students had a greater understanding of why key steps of practical tasks were undertaken whereas A-levels students 'followed the instructions'. As coursework dominates the BTEC curriculum, college staff stated that BTEC students are good at working to deadlines, managing their time, thinking for themselves and have experience of referencing and paraphrasing. These are all essential skills that are required for university study and highlight that the BTEC does prepare students for university study.

Whilst some key skills were developed during the BTEC course examination, revision and mathematics skills were highlighted by both college staff and students as areas that needed further development. One advantage cited by students of the BTEC programme was the lack of examinations. Some students took BTEC because they disliked examinations or felt they were not good at examinations. College staff also stated that they moved students who were initially registered on the A-level programme onto the BTEC programme when they felt the students knew the science but did not respond to the A-level style of teaching and assessment. The absence of examinations during BTEC has implications on students studying a Biosciences degree where assessment focuses on examinations and tests as the students have not had the opportunity to develop revision or examination

strategies. Interestingly, almost all the students found the Biosciences examinations frustrating as they felt their memories were being tested as opposed to their understanding. This ties in well with their prior experiences of applying their knowledge for coursework assignments:-

P4: *"That's, that's why I think the exams are directed more at people who did A-levels because it is that test of memory, it's how much you can remember rather than what you know. It's uhh, it's all wrong to be honest [laughter]."*

M: *"How would you say structure an exam then if you were [interrupted]..."*

P4: *"I think, I think yeah it's more applied knowledge so when you, when you ask someone questions it needs to be 'how can I genuinely test this person's knowledge', what they actually know, not ah, remember this or regurgitate this it's, it's actually applying the knowledge to the situation..."*

The need to develop more effective revision and examination skills was a common theme for all students. However, the students perceived their development of mathematics skills during the BTEC programme as quite variable. Some students felt that they developed good statistical knowledge during their BTEC course but lacked other mathematics skills such as utilising equations. Other students reported the opposite. Although there was a difference in the type of mathematics skills developed, there was overall consensus that there were gaps in their science-based mathematics knowledge. This was noted strongly in discussion with college staff who stated that whilst mathematics is addressed in the BTEC assignments, it is not constantly tested and reinforced like at A-level. In particular, one college reported that BTEC students can use their notes as a bit of a 'crutch' for mathematical calculations and are less able to apply mathematical concepts to new scenarios. In contrast A-level students need to learn the mathematics to be able to apply it to a range of problems in the examination.

The variability of BTEC programmes came out strongly during discussions with both parties.

Teaching methods, content and depth of knowledge varied substantially between colleges. During this research the BTEC programme required students to undertake 19 units (or modules) of assessment, over a two year period, consisting of some mandatory and optional modules. According to college staff the decision of which optional modules to include in the curriculum is dictated by the availability and specialism of teaching staff. Some colleges chose modules based on university admissions criteria where those were available. One college attributed the differences in content and depth to the lack of clarity provided by the exam boards in terms of learning outcomes. These were described as a 'shopping list' with no guidance on breadth and depth of knowledge required. Some colleges felt that the BTEC offered students the option to study a wide range of scientific topics without acquiring detailed knowledge. Other colleges felt that the BTEC curriculum allowed students to explore concepts in more depth but at the expense of content. This variability makes it a real challenge for universities to gauge the baseline knowledge gained from the BTEC programme.

Contrasting student experiences were also evident during the focus group discussions. For example, two students highlighted the variable content taught at BTEC:

P1: *"Some of it is just complete[ly] brand new. I don't think I ever learnt mols [standardised unit of measurement in chemistry] at all..."*

P2: *"No, I did, I had a whole unit on mols [a molecular unit of measurement used in chemistry]..."*

P1: *"I think that's the biggest difference between BTEC and A-levels. They're [A-levels] basically on the same syllabus, our colleges can choose different modules, so he [referring to P2] might have done completely different modules to me so I've learnt completely different things to him."*

Similarly, differences in experience occurred where some students undertook an A-level alongside their BTEC studies and therefore gained some examination experience. Whilst

there was this contrast, many cited lack of chemistry subject knowledge as an issue once starting their Biosciences degree.

The modular nature of the BTEC curriculum prepared students well for study at university. It enabled students to get used to juggling several modules at once developing organisational skills. However, colleges highlighted that there is little room for students to recap subject content during BTEC. One college reported that BTEC students are 'drip-fed' content throughout the two years whilst A-level students do more self-assessment and testing for examination preparation. As a result, they felt that the BTEC does not require students to learn the materials in the same way as for the high stake examinations of A-levels. This becomes particularly problematic when university modules cover content that BTEC students have not recapped since the start of their BTEC programme.

"...whereas when you're doing A-levels it's drilled into you, you have to remember it for the exam. Whereas you hand in a coursework [for BTEC], that's it, you don't need to think about it again, any of that information. So I think that's where I struggled at some points." (P7)

Teaching styles

Both students and college staff reported that the teaching style for BTEC was more relaxed and interactive than would be expected at university. Many students reported their teachers were not as strict on deadlines compared to the University. The students also felt they had a strong bond with their teachers and found taught sessions fun:

"... was the loveliest guy ever [referring to a teacher at the college]. You can have a laugh and joke with him". (P5)

This close interaction with staff means BTEC students felt able to ask questions and gain clarification on subject content. One college stated that BTEC students often ask 'why?' and the flexibility of the BTEC course allows greater discussion on one point if required. Overall, college staff felt that BTEC students required different teaching styles compared to A-level students due to differing personalities. This was backed up by P4 who stated:

“...you can see BTEC, you can see a clear difference between even the personalities like we’re talkative, we’ve got stuff to say [laughter]. When you speak to someone from A-level they just, they’re just so intellectual... and that’s where they’re good and this is where we’re good. So to mix the groups is obviously a good idea, you want, you wanna try and bounce off different people...” (P4)

This led to one college concluding that adopting the same teaching strategy for A-levels and BTECs would risk alienating one of the groups thus making this a challenge for universities.

BTEC students are often in smaller classes and are with the same group of people for the duration of their course, unlike A-level students who will study different subjects with different people. This enables the students to form a close-knit community with the support of college staff:

“...We learnt more off each other than we did off the teachers. We were all very, very close. It was a good community to be in, but BTEC in general, we’d all help each other out but I don’t think A-level [students] had that, because they didn’t have a reason to. We had work projects, like group projects, we had to do coursework which was based off that. We had debates and stuff and we had to work together to do the debates, we could then write about the debate. So that was our little community we had which was fun.” (P7)

Evidently, the student participants perceive that staff-student and student-student interactions are more limited at university compared to their prior experiences at college. Many of the students felt isolated coming to university and felt that some (not all) of the lecturing staff were unapproachable.

“It sort of feels isolated when you get here because you feel like there’s not many of you and there’s a lot of A-level people just [around you]” (P1)

However, whilst the teaching style at university was different compared to college, the students felt strongly that both BTEC and A-level students were having to adapt to new styles of learning e.g. taking notes from lectures.

Entrance criteria

A surprising, yet significant, theme that emerged from both discussions with college staff and students was clarity in advertising materials. All students we spoke to were uncertain whether the university would accept them onto the course and many were surprised when they had been accepted:

“To be honest I did not expect to get into XXXX University. I only applied because my friend applied so I was like ‘go on,’ I’ll apply as well, I won’t get in but I’ll apply’. I was quite shocked when I heard back from them, I was like ‘oh God’...” (P3)

One student felt that there was some secrecy in whether the university admitted BTEC students:

“I think [if] you’re going to accept it [the BTEC] offer it [as] an option. There it’s almost like oh we’ll do it half in secret so we don’t get many of them in”. (P4)

Therefore, students felt that universities needed to be more transparent in their admissions criteria, particularly with clarity around specific BTEC module requirements. The colleges also felt that this transparency would enable them to choose modules that would help students access HE. For example, in response to another local university requirements one college had adopted the new BTEC exam curriculum.

Confidence and stigma

Finally, an underlying theme that emerged in the focus groups centred around confidence and stigma at being BTEC students at university. Many students perceived that the A-level students were smarter than them and ‘looked down’ on them for having taken a BTEC. Many said they avoided telling people they had a BTEC qualification due to fear of being labelled.

How does a vocational qualification prepare students for a degree in Biosciences at a research intensive university?

"I feel there is a stigma of, umm, BTEC students [that] they're not as good as A-level [students] and they don't belong here... that's just how I've felt sometimes" (P5)

"...when I first started everyone I did remember yeah... like they did take the mic out of BTEC students, so I didn't really want to tell them where I was from. There was a joke that they were saying in one of the workshops about BTEC students. I can't remember exactly what it was, but apparently I think they thought we were below them so that was very awkward" (P3)

This lack of confidence translated into aspects of the course that BTEC students should feel more confident about, for example lab practicals:

"I feel the confidence also translates to the practicals where we should know everything to do with the practicals because we've pretty much done them. But you feel like you were already behind when you get there [lab practicals at university] so you sort of second guess yourself about everything." (P1)

Although students felt there was negativity surrounding the BTEC course from some lecturing staff and peers, several reported a shift in attitudes over time whereby the A-level students ended up coming to them for help:

"...it's just I've kinda stopped worrying about that much [people putting down BTEC students] 'cos I know it's a lot of these people that were putting down BTECs, so these A-level people ended up coming to me for help with coursework so I thought it was quite funny!" (P3)

Discussion

It is clear from discussions with college staff teaching BTEC and students entering university with this qualification, that the BTEC equips students with many essential skills required for university study. In terms of transferable skills, college staff implied that the

BTEC qualification better prepares students for a Biosciences degree compared with A-level. For example, students develop more skills in: independent study; report writing; group work and practical laboratory work when compared to A-level students. Because the BTEC and first year of university is modular, the BTEC course structure prepares students for managing and organising their time. All these skills are highly valuable for any science undergraduate student. However, given that the dropout rate is higher amongst BTEC students compared with A-level students, there are clearly issues that are not accounted for by these positive aspects of BTEC-university transition.

It is important to note at this stage that the purpose of the BTEC is not necessarily to prepare students for HE (Banerjee et al., 2017; Gill & Vidal Rodeiro, 2014), but to offer a "professional qualification for anyone taking their first steps into the world of work, progressing through their career or planning to enter university" (Pearson, n.d.). Whilst the BTEC qualification offers a route into HE, it is primarily a work-based qualification with a focus on applied learning (Banerjee et al., 2017; Gill & Vidal Rodeiro, 2014). In fact, many BTEC students do not initially plan to go into HE due to negative experiences of education at school, lack of social reference, or some other deficiency of social capital (Gartland & Smith, 2018). For some, the BTEC is a second chance at education (Gartland & Smith, 2018). For those who do enter HE, it is the applied nature of the BTEC course that helps to equip students well for a Biosciences degree which has a strong practical element to the course.

Whilst the practical and independent nature of the BTEC course is valuable, the lack of examinations during the BTEC seems to be an issue for students coming onto the programme, with 60% weighting on tests and examinations in the first year. This appears to be partly due to the lack of opportunities to develop examination and revision techniques prior to coming to university but also the lack of self-assessment and reinforcement of scientific materials. During BTEC, students submit coursework for each module meaning there is little chance for students to recap or retain the information beyond the end of the module. This means there are likely to be substantial gaps

between the student's study of material at BTEC and then at university (Brunel University, 2017). In contrast, the high stake exams of A-levels encourage constant testing and reinforcement of information which aids deeper processing of information and better conceptual understanding (Jensen et al., 2014). Therefore, although BTEC students may have studied materials relevant to their degrees it is likely that the lack of reinforcement means they have not remembered the information or fully processed it. This may become less of an issue with the development of mandatory examination component of assessment in BTEC (Braun, 2019) which may encourage students to build up their scientific mental vocabulary (Dear, 2017).

The students in this study noted frustration with the exam-based assessment of their degree. It was not the examinations themselves that frustrated the students but the focus on memorisation of facts particularly in the first year examinations and end of module tests. Coming from an applied background it makes sense that students focus more on the application of knowledge rather than the memorisation of facts. This came out strongly in discussion with college staff who stated that BTEC students want to know 'why' with less interest on detail whilst A-level students are more like 'sponges' absorbing knowledge to pass the examinations. In the US there has been criticism of undergraduate biology courses for focusing too heavily on memorisation and rote learning (Wood, 2009). This prompted Momsen et al (2010) to conduct a national (US) analysis of learning outcomes and assessment and concluded that introductory biology courses frequently focus on recall of facts as opposed to high cognitive levels such as critical thinking and problem solving. It has been shown that shifting towards high cognitive examination questions encourages deeper conceptual understanding as well as memory of course materials (Jensen et al., 2014). It also encourages the development of critical thinking and creativity (Dehaan, 2011) which are key skills for scientific development. Therefore, shifting examination questions away from memorisation to application would improve learning outcomes for all students in the cohort and not just BTEC students.

Consideration of student's prior learning experience is important at university programme level for a wide range of students, not just those studying for a BTEC. For example, placing a strong emphasis on examinations may not just affect BTEC students but also mature students, who may not have studied for a long period of time, and international students, where the styles of teaching and assessment may be different. Therefore, as universities now strive to design inclusive curricula (Morgan & Houghton, 2011) and adopt more active learning techniques (Beetham & Sharpe, 2013) a shift towards a more varied assessment strategy may help improve the retention and progression of BTEC as well as many other students within cohorts. For example, assessing practical work itself, rather than assessing the outcome (i.e. report) would give BTEC students the opportunity to showcase their laboratory skills. Similarly, providing opportunities in the curriculum for collaborative work, a key scientific skill, would draw on the experience of undertaking group work developed during BTEC. Whilst we are not proposing re-designing the curriculum wholly in favour of BTEC students at the expense of A-level students, or removing the examination component completely, incorporating a wider range of assessments methods and designing more inclusive curriculum should be of benefit to all students (Morgan & Houghton, 2011) and not just those who follow a particular pathway of study.

A strength of the BTEC in Applied Sciences is that it offers a broad spectrum of learning and gives students more choice post study. It also allows colleges to choose modules that play to the strength and expertise of their teaching staff. However, this is also a limitation of the BTEC as a route to HE as it means universities will struggle to know exactly what was taught and to what depth. What emerged strongly through this research, and is confirmed by Al Meselmani et al., (2018), was that no two BTEC courses are the same. This makes it a challenge for universities to provide continuity in the learning experience. In addition, Holey (2016) noted that the broad range of subject delivery during the BTEC has led to the fragmentation of knowledge with no encouragement for students to link ideas and concepts together. Therefore, whilst the

students may be taught the science, the lack of integration and scaffolding of these concepts is a limitation of the course in terms of preparation for HE. Supporting students early on in their degree programme to link ideas and concepts together may be important in helping them to develop as learners at university. It may also be beneficial to work closely with BTEC students during the early stages of their degree to ensure they have a strong foundation of knowledge to enable progression.

In addition to examination skills, mathematics and chemistry knowledge were cited by both students and college staff as areas requiring further development. This links back to the variability of BTEC courses with some students feeling that they had adequate depth of understanding in these areas and other less so. Similarly, some students felt confident in statistical mathematics and less confident in the use of mathematical equations whilst for others it was the other way around. Again, this makes it a challenge for university departments to adequately target mathematics support. It has been highlighted that Biosciences students who have studied A-levels but do not have A-level mathematics also require additional mathematics support (Koenig, 2011). Similarly, Burrell (2010) found that students with both chemistry and biology A-levels performed better in biomolecular science than those with just A-level biology. Burrell's study also highlighted that students with a BTEC performed worse than those with just A-level biology suggesting more substantial gaps in knowledge prior to the course. These studies highlight that although BTEC students require additional support in both mathematics and chemistry, any additional support provided will benefit other students in the cohort and it may be of benefit to introduce these within the programme curriculum.

One option to overcome issues of variability in the BTEC course is for universities admissions criteria to specify particular module requirements for entry onto the degree programme. Through identifying specific BTEC modules that the department feel are essential will ensure parity between what has been studied at BTEC and the degree scheme. However, given that colleges appear to teach materials at different depths this strategy may be limited and may actually become a barrier

to BTEC entry. It is essential to have clear admissions criteria for BTEC students entering universities to ensure transparency and clarity to students and college staff (Banerjee, 2018; Gicheva & Petrie, 2018; Gorard et al., 2017). It enables college staff to make more informed decisions about the BTEC curriculum they deliver and enables students to not only have more confidence in applying to university but also to make more informed choices about their post-16 education (Kelly, 2017). It is important that if universities are to make specific BTEC modules a requirement they allow adequate time for colleges to adapt their programmes and allow students to make informed decisions about the BTEC they undertake.

Clearer advertising material may also instil confidence in students applying to university, and may enable them to feel more confident once they arrive. Many students reported feeling behind at the start of their course and this, in part, may be because there was some uncertainty about whether the university accepted BTEC students in the first place. Even when e-mailing admissions tutors students report receiving mixed messages. Feeling like they are accepted and wanted may go some way to ensuring confidence prior to starting their degree. Having clear advertising materials may also raise aspirations of BTEC students (who are often WP students) to apply to high tariff, research intensive universities. It may also be advantageous to have profiles of successful graduates who came to university with a BTEC prominent on the university webpages and encourage them to participate on open days.

The relationships between confidence, motivation and academic progress are interrelated, complex (Archer et al., 1999; Christie et al., 2008) and beyond the scope of this research to explore in depth. However, lack of confidence due to stigmatisation and assessment methods was highlighted in all focus groups and it could be that the higher university drop-out rate of BTEC students between years 1 and 2 may be explained by the students feeling on the back-foot and not having the confidence to continue their studies. A challenge for universities is that lack of confidence and feeling behind is likely to develop at college where BTEC is given a

lower status compared to A-levels (Gartland & Smith, 2018) and with the term 'BTEC' being used to substitute inferior on twitter (Kelly, 2017). Therefore, early initiatives to change perception and boost confidence may be successful at improving BTEC student retention and progress. One idea is to provide pre-arrival materials to support all students (but particularly encouraging BTEC students) early on in the degree scheme enabling students with the chance to recap course materials as well as develop confidence in their subject knowledge.

Integration and recreating the community-feel may be another way to support BTEC students early on in their degree schemes. During their BTEC studies, the students reported having a strong support network with their peers and tutors. This finding is supported by Gartland and Smith (2018) who highlight the importance of friendship groups and closeness of course tutors in motivating and supporting BTEC students to gain confidence. More widely, it has also been established that the development of strong friendship groups helps to reduce the feeling of isolation, enable students to feel more confident and secure thereby leading to better progression of students in their studies (Mallman & Lee, 2016; Mallman & Lee, 2017; Stuart, 2006). Whilst supporting the development of friendship groups will be a challenge with large cohorts it may be possible to encourage small group project work early on in the programme to allow students to interact with one another and also showcase their strengths. Many of the students in this study felt pride in being able to support A-level students and encouraging this early on may help increase confidence and improve progression. Encouraging early peer-to-peer support will allow sharing of best practice amongst all students (Boud et al., 2014) and may help to reduce department staff workload. Therefore, encouraging early friendships is vital to help progression and also integration of BTEC students at university.

Although university teaching styles are different to college teaching (Al Meselmani et al., 2018) students felt that adapting to university teaching was new to all students and not exclusively BTEC students. Students did report feeling like some (not all) lecturers were inapproachable and were not willing to answer

their questions. This is a key difference to the BTEC environment whereby students have a close relationship with teaching staff with whom they spend a considerable amount of time (Gartland and Smith, 2018) and welcome the opportunity to ask questions. Al Meselmani et al., (2018) support this view saying that students who came to university with a BTEC showed a preference for small group teaching, valued more student-teacher interactions and opportunity to ask questions. Their study also implied students had higher expectations of teaching staff although this was not explicitly highlighted in our focus groups. Although university cohort size is unlikely to get smaller in the near future, providing opportunities for students to interact and ask questions within lectures or seminars may appeal to students who prefer this type of learning and it may help allay fears and build confidence.

Understanding the BTEC programme and keeping abreast of changes in post-16 education is vital (Brunel University, 2017; Al Meselmani et al., 2018; Gicheva & Petrie, 2018). As Al Meselmani et al., (2018) highlight, the best way for universities to achieve this is through developing and maintaining strong links with colleges. The colleges we spoke to were keen to work more closely with universities and highlighted the low aspiration of many BTEC students and the lack of understanding of the transformational nature of a degree. Working closely with colleges may help to raise aspiration of students who come from WP backgrounds. Equally developing strong relationships with colleges will enable universities to identify strong BTEC candidates and become more aware of changes to A-level and BTEC curricula.

There are inherently limitations in our study. In particular the small number of focus groups makes conclusions somewhat limiting. Although we did consider recruiting outside the Biosciences department we felt strongly that a strength of our research was in addressing departmental specific issues in order to tailor appropriate support (Banerjee et al., 2017). Although our sample size is small, many of our key conclusions align with Al Meselmani et al., (2018) who performed university-wide focus groups. This provides validity to our results and suggest that our conclusions are valuable to departments outside Bioscience. The

How does a vocational qualification prepare students for a degree in Biosciences at a research intensive university?

variability of the BTEC course makes it difficult to identify specific gaps in subject knowledge which makes designing and implementing support at university more challenging. However, it is hoped that the adoption of small group work, mathematics and chemistry support and a wider range of assessments methods would be of benefit to all students and not just those with a BTEC qualification. As previous work around friendship groups and confidence has focused on mature student populations, future studies could explore how friendship groups and confidence affect BTEC students in particular.

Conclusions

As increasing numbers of BTEC students enter Higher Education it is important to address issues of progression and retention of this cohort. In this study we have explored the transition experience of Bioscience students who have entered a research-intensive university with a BTEC qualification. It is clear that BTEC students are equipped with many transferable skills relevant to university study, such as experience of practical work and working independently. However, further support in mathematics, chemistry, examination and revision techniques are required. Developing and instilling confidence, through more transparent advertising, friendship groups and boosting confidence, may also be key to improving retention rates of BTEC students. Inclusive curriculum design and assessment methods may also enable BTEC, as well as other, students to showcase their strengths outside of more traditional examination assessment methods. Many of the support mechanisms proposed in this study would be of benefit to the entire cohort preventing the singling out of BTEC students.

Acknowledgements

Funded by Friends of Lancaster University Alumni Fund

References

Al Meselmani, M., Baker, Z., Basi, A., Broglia, E., Sutherland-Jarvest, A. & Towers, L. (2018). *Finding Potential: How a selective University can attract and retain high quality students with equivalent qualifications to A-levels*. [Online]. The University of Sheffield Available:

https://www.sheffield.ac.uk/polopoly_fs/1.7799931/file/Finding_Potential-Final_Report_Equivalent_Qualifications_Project.pdf [Accessed 09/10/2018].

Archer, J., Cantwell, R. & Bourke, S. (1999). *Coping at University: an examination of achievement, motivation, self-regulation, confidence, and method of entry*. Higher Education Research & Development, 18, 31-54. DOI: 10.1080/0729436990180104.

Banerjee, P.A. (2018). *Widening participation in higher education with a view to implementing institutional change*. Perspectives: Policy and Practice in Higher Education, 22, 75-81. DOI: 10.1080/13603108.2018.1441198.

Banerjee, P.A., Myhill, D. & Robinson, C. (2017). *Does prior qualification affect degree outcomes?* [Online]. Working paper. Available: <https://ore.exeter.ac.uk/repository/handle/10871/30283> [Accessed 26/06/2018].

Beetham, H. & Sharpe, R. (2013). *Rethinking pedagogy for a digital age: Designing for 21st century learning*, New York, Routledge.

Boud, D., Cohen, R. & Sampson, J. (2014). *Peer learning in higher education: Learning from and with each other*, New York, Routledge.

Braun, M. (2019). *A pilot study investigating further education engineering lecturers' readiness for the shift in Business and Technology Education Council (BTEC) assessment*. Research in Education, 105, 42-59. DOI: 10.1177/0034523718771091.

Brunel University. (2017). *Improving Transition from School and College to University*. Available from https://www.heacademy.ac.uk/system/files/brunel_university_london_heacademic_summary.pdf [Accessed 16/06/2018]

Burrell, H. (2010). *Do A-level results in biology and chemistry inform 1st year pass rate for biomolecular science students?* Innovations in Practice, 2, 52-61.

Christie, H., Tett, L., Cree, V. E., Hounsell, J. & Mccune, V. (2008). *A real rollercoaster of confidence and emotions': learning to be a*

How does a vocational qualification prepare students for a degree in Biosciences at a research intensive university?

university student. *Studies in Higher Education*, 33, 567-581. DOI: 10.1080/03075070802373040.

Cornish, F., Gillespie, A. & Zittoun, T. (2014). *Collaborative Analysis of Qualitative Data*. In: FLICK, U. (ed.) *The SAGE Handbook of Qualitative Data Analysis*. Los Angeles: Sage.

Dear, D.V. (2017). *Do student-centred learning activities improve learning outcomes on a BTEC Applied Science course in FE?* *Journal of Further and Higher Education*, 41, 717-726. DOI: 10.1080/0309877X.2016.1177170.

Dehaan, R.L. (2011). *Teaching creative science thinking*. *Science*, 334, 1499-1500.

Department for Business, Innovation and Skills. (2014). *National Strategy for access and student success in Higher Education*. Available from <https://www.gov.uk/government/publications/national-strategy-for-access-and-student-success> [Accessed 06/01/2018]

Gartland, C.E. & Smith, C. (2018). *Supporting progression to HE: the role of colleges and vocational courses*. *Education+ Training*, 60, 637-650. DOI: 10.1108/ET-02-2018-0053.

Gicheva, N. & Petrie, K. (2018). *Vocation, Vocation, Vocation*. [Online]. Social Market Foundation. Available: <http://www.smf.co.uk/wp-content/uploads/2018/01/SMF-Vocation-Vocation-Vocation.pdf> [Accessed 10/07/2018].

Gill, T. & Vidal Rodeiro, C. (2014). *Predictive validity of level 3 qualifications* [Online]. Cambridge Assessment. Available: <http://www.cambridgeassessment.org.uk/Images/178062-predictive-validity-of-level-3-qualifications.pdf> [Accessed 01/10/2017].

Gorard, S., Boliver, V., Siddiqui, N. & Banerjee, P. (2017). *Which are the most suitable contextual indicators for use in widening participation to HE?* *Research Papers in Education*, 1-31. DOI: 10.1080/02671522.2017.140208.

HM Government. (2017). *Building our Industrial Strategy*. Available from <https://www.gov.uk/government/consultations/>

[building-our-industrial-strategy](#) [Accessed 06/06/2018]

Hobley, J. (2016). *'Here's the iPad'. The BTEC philosophy: how not to teach science to vocational students*. *Research in Post-compulsory Education*, 21, 434-446. DOI: 10.1080/13596748.2016.1226586.

Holland, D. (2017). *Progression and achievement of first-year students in the School of Social Sciences at Nottingham Trent University, 2015-16*. Trent Institute for Learning and Teaching Conference, 'Success for All: Advancing Inclusive Curricula and Pedagogies'. Nottingham Trent University, Nottingham.

Jensen, J.L., Mcdaniel, M.A., Woodard, S.M. & Kummer, T. A. (2014). *Teaching to the test... or testing to teach: Exams requiring higher order thinking skills encourage greater conceptual understanding*. *Educational Psychology Review*, 26, 307-329.

Kelly, S. (2017). *Reforming BTECs: Applied General qualifications as a route to higher education* [Online]. HEPI Report 94. HEPI. Available: http://www.hepi.ac.uk/wp-content/uploads/2017/02/Hepi-Reforming-BTECs-Report-94-09_02_17-Web.pdf [Accessed 10/01/2018].

Koenig, J. (2011). *A survey of the mathematics landscape within bioscience undergraduate and postgraduate UK higher education*, Leeds: UK Centre for Bioscience, Higher Education.

Mallman, M. & Lee, H. (2016). *Stigmatised learners: mature-age students negotiating university culture*. *British Journal of Sociology of Education*, 37, 684-701. DOI: 10.1080/01425692.2014.973017.

Mallman, M. & Lee, H. (2017). *Isolated learners: young mature-age students, university culture, and desire for academic sociality*. *International Journal of Lifelong Education*, 36, 512-525. DOI: 10.1080/02601370.2017.1302012.

Mian, E., Richards, B. & Broughton, N. (2016). *Passports to Progress: How do vocational qualifications help young people in building their careers? Part 2*. [Online]. Social Market

How does a vocational qualification prepare students for a degree in Biosciences at a research intensive university?

- Foundation. Available: <http://www.smf.co.uk/publications/passports-to-progress-vocational-qualifications/> [Accessed 26/06/2018].
- Momsen, J.L., Long, T.M., Wyse, S.A. & Ebert-May, D. (2010). *Just the facts? Introductory undergraduate biology courses focus on low-level cognitive skills*. CBE—Life Sciences Education, 9, 435-440. DOI: 10.1187/cbe.10-01-0001.
- Morgan, H. & Houghton, A.-M. (2011). *Inclusive curriculum design in higher education: Considerations for effective practice across and within subject areas*. The Higher Education Academy.
- Pearson. (2015). *Pearson BTEC Level 3 National Certificate in Applied Science specification*. [Online]. Available: https://qualifications.pearson.com/content/dam/pdf/BTEC-Nationals/Applied-Science/2016/specification-and-sample-assessments/9781446938157_BTECNat_App_Sci_Cert_Spec.pdf [Accessed 06/09/2019].
- Pearson. (n.d.). *What is a BTEC?* [Online]. Pearson Education Limited. Available: https://qualifications.pearson.com/content/dam/pdf/btec-brand/BTECbrand/W984_a%20BTEC%20ICB%20what%20is%20btec%20ipdf.pdf [Accessed 24/06/2018].
- Rouncefield-Swales, A. (2014). *Vocational progression to selecting universities: comparisons and trends 2010-13*. Western Vocational Progression Consortium.
- Shields, R. & Masardo, A. (2015). *Changing patterns in vocational entry qualifications, student support and outcomes in undergraduate degree programmes* [Online]. The Higher Education Academy. Available: <https://www.heacademy.ac.uk/knowledge-hub/changing-patterns-vocational-entry-qualifications-student-support-and-outcomes> [Accessed 01/10/2017].
- Social Mobility Commission. (2016). *State of the nation 2016: Social mobility in Great Britain*. Available from <https://www.gov.uk/government/publications/state-of-the-nation-2016> [Accessed 26/06/2018]
- Stuart, M. (2006). 'My friends made all the difference': getting into and succeeding at university for first-time entrants. *Journal of Access Policy and Practice*, 3, 27-40.
- Vaismoradi, M., Jones, J., Turunen, H. & Snelgrove, S. (2016). *Theme development in qualitative content analysis and thematic analysis*. *Journal of Nursing Education and Practice*, 6, 100-110. DOI: 10.5430/jnep.v6n5p100.
- Wood, W. B. (2009). *Innovations in teaching undergraduate biology and why we need them*. *Annual Review of Cell and Developmental*, 25, 93-112.