Finding the right fit: Enhancing the academic-industry link in the sector for Nutrition undergraduates – a student partnership study

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Abstract

Academic learning prepares students for professional life by enriching their scientific knowledge, whilst laboratory practicals upskill their experiences applying theory into "real world" scenarios. As not all undergraduate programmes offer a placement year, students rely heavily on their initiatives and networking to maximise their continuous professional development (CPD) and career prospects. Through a staff-student partnership, this study evaluated the collaborative arrangements between academia and industry/sector. It examined staff and students' perceptions of existing academia-industry collaborations in terms of usefulness for future studies and employment. An online survey was designed to explore the awareness of industry opportunities and the future career plans of BSc (Hons) Human Nutrition students at the University of Westminster. This was followed by focus groups to further understand students' perceptions of the relevant professional organisations and their related experiences outside academia. Additionally, individual semi-structured interviews were conducted with nutrition teaching academics on the benefits and barriers of integrating industry collaborations into their curriculum. Students' perceptions reflected their learning through course progression and awareness of external opportunities. It underpinned that graduate readiness improved progressively with years spent studying. The Academics' interviews recognised the limited academic-industry collaborations and underpinned many barriers faced; the need for more "top-down" support was identified as a strategy to enhance external links. The study provides a clear lens into the present academic-industry links within the nutrition programmes and ascertained the perceived challenges experienced by students and academics. Collaborations and centralised university communications should promote a better university experience. Equally, enhanced staff-student partnerships will facilitate a new approach to understand both staff and students' perspectives and enhance learning experiences within the sector.

Keywords

Nutrition students, graduate attributes, employability, student experience, graduate readiness

Introduction

Students graduating today are faced with many challenges – competitiveness in the graduate job market, having the right skills and qualifications, managing financial burdens and being satisfied with the learning experience. Yet standing out, being

employable and developing ways to equip themselves with graduate attributes remain a challenge for all.

Nutrition opens many career opportunities in various environments (i.e., food industry, dietitians, charity, freelance, academia) (Association for Nutrition, 2019). The UK food and drink manufacturing sector, for example, accounts for almost 20% of the UK manufacturing and employs over 430,000 people, with the industry being the biggest manufacturing sector in the UK (Food and Drink Federation, 2020). Weston *et al.* (2017) highlighted the key competencies needed for food science graduates, providing relevant frameworks to ascertain graduate roles supporting their professional development and the sector. Stakeholders were identified as key contacts to provide support and encourage students to develop their attributes. The study draws on the importance of embedding a "consistent language for student development and graduate recruitment" in academia, of which key concepts of competencies should be developed whilst in training (i.e., during university). This highlights the need for skilled nutrition graduates to help sustain the growing market although the sector remains in need from STEM (science, technology, engineering and maths) graduates.

There is an overall indication in the literature that demonstrates the challenges graduates face in transition into working professionals (Dhakal *et al.,* 2018; Tuononen *et al.,* 2019). However, there is limited evidence in specifically understanding the students' learning development, the university provision with links to external organisations to become skilled professionals and the support mechanisms between academia-industry in the undergraduate nutrition course.

This 'staff-student partnership' project, "Students as Co-Creators", funded by the University's student partnership programme in the Centre for Education and Teaching Innovation, provides opportunities and resources for staff and students to collaborate on learning and teaching research projects (Sum, 2018). It was generated through conversations with current students and graduates, considering the increasing number of students enrolling on the degree course with no clear understanding and successes of working and or staying within the field post-graduation. A reflection by Sum *et al*. (2021) discussed the students' involvement, motivation, and lessons learned during this student engagement and partnership project. Thus, there is a research scope in exploring the current collaborative arrangements between academia and industry for nutrition undergraduates, supporting their learning experience and career progressions, developing their graduate attributes and making them readier to be employed.

Aims:

- To understand the awareness of nutrition undergraduates of the relevant professional organisations in the sector,
- To identify the university provision (including the support between academia and industry) for students to engage with organisations in the sector,
- To establish the benefits of embedding academic-industrial collaborations into curriculum activities,

- To qualify the challenges and barriers to enable academic-industry collaborations in learning and teaching.

Methods

Design Study

A mixed-method design (Figure 1) was selected to scope out the existing feedback of the current student cohort. The rationale of this design was to deepen the understanding of undergraduates' perception of their employability readiness post-graduation. An online survey was conducted to gauge students' experience with respect to external organisations and disciplinary-related activities. A qualitative study was followed to further understand students' perspectives on the developed themes, identifying what needs to be done to improve learning and teaching through academic-industry collaborations.

All BSc (Hons) Human Nutrition students (Levels 4 – 6 and both course pathways: Human Nutrition and or Exercise Science) at the University of Westminster were invited via a convenience-based sampling (e.g., Blackboard announcements – a virtual learning environment, word of mouth and informing other nutrition staff members to encourage their students) to complete an online survey (Appendix 1). This was to establish students' current knowledge of any nutrition opportunities, their current involvement, and the challenges they face for career development during their study. Students were further invited to attend focus groups following survey completion to establish current perceptions of their learning development and "graduate readiness". Each student who participated in both the survey (n=22) and the focus group (n=11) received an Amazon voucher (£10) as an incentive.

All nutrition teaching academics on the BSc (Hons) were directly invited via generic announcements for individual semi-structured interviews.

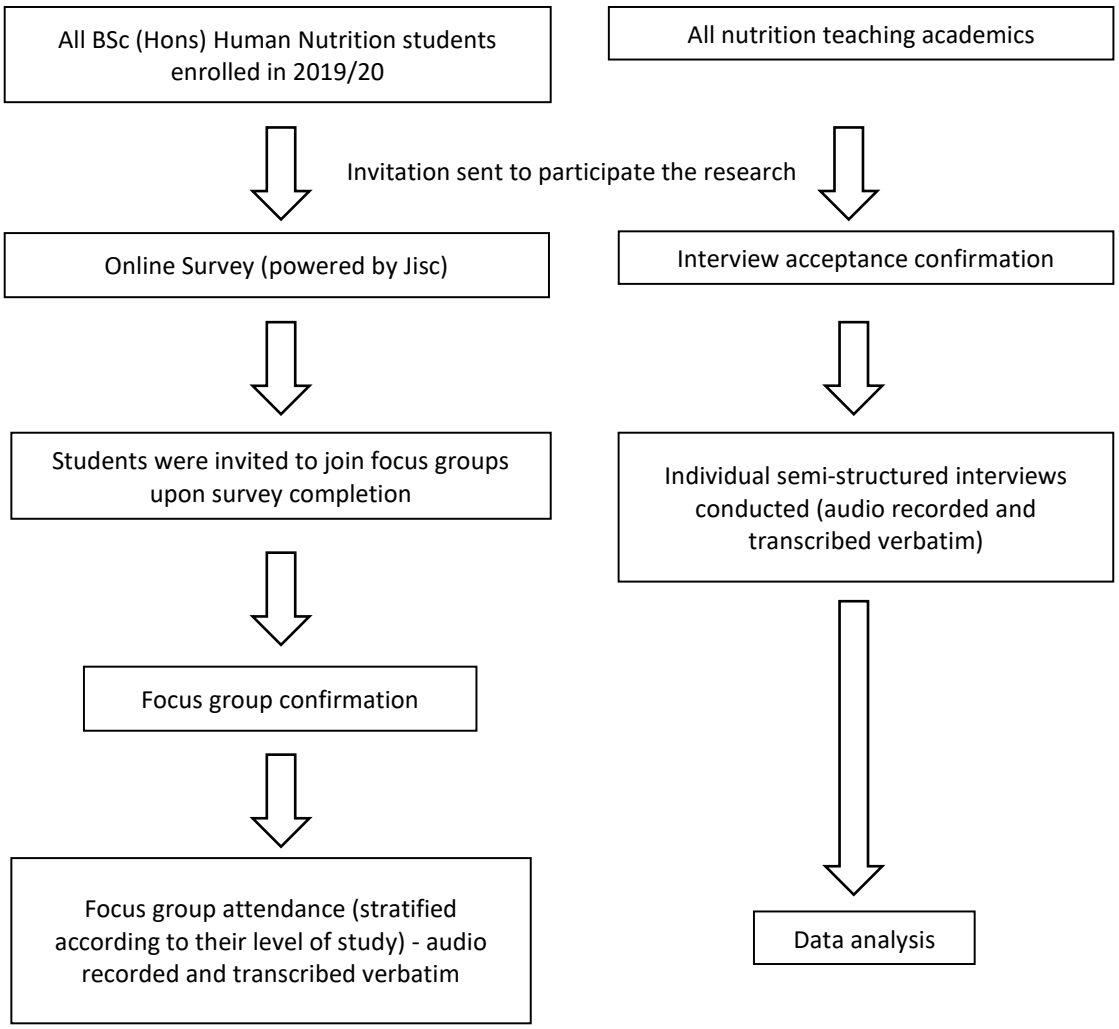

Figure 1: Design study for mixed method approach for nutrition undergraduates (survey and focus groups) and nutrition teaching academics (semi-structured individual interviews)

Data collection and analysis

Following the survey, three 1-hour long focus groups were held at the Cavendish Campus, University of Westminster, facilitated by the student researchers using a predetermined list of semi-structured questions (Appendix 2) to elicit students' current perceptions and experiences in nutrition opportunities. Each staff interviews lasted a maximum of 30 minutes due to time constraints (Appendix 3). Participant information sheets were provided, and focus groups and interviews were audio-recorded and transcribed by student researchers. An inter-reliability step was implemented (adapted from Krippendorff, 2011) before thematic analysis.

Ethics

Ethics approval was granted by the University of Westminster's Centre of Education, Teaching and Innovation's Ethics Committee (CETI-LTRC-1920-05).

Results

Student survey

14% (n=22) of the total nutrition undergraduate population participated in the online survey (Table 1) following an open invitation. Overall, there was a relatively equal distribution across the characteristics, except for course pathway and gender.

Table 1: Key characteristics of students who completed the online survey [N=22]

Characteristics	**n (%)**
Level of study	
Level 4 (First Year)	9 (40.9)
Level 5 (Second Year)	8 (36.4)
Level 6 (Third/ Final Year)	5 (22.7)
Course pathway	
Human Nutrition	15 (68.2)
Exercise Science	7 (31.8)
Age {years}	
18 – 21	5 (22.7)
22 – 25	3 (13.6)
26 – 30	7 (31.8)
30+	7 (31.8)
Gender	
Male	2 (9.1)
Female	19 (86.4)
Prefer not to say	1 (4.5)
Highest academic qualification level prior their current BSc	
6th form or school (e.g. GCSEs or A-Levels)	6 (27.3)
A Level or Advanced Apprenticeship or similar	7 (31.8)
Certificate of Higher Education or Higher Apprenticeship or equivalent	1 (4.5)
	1 (4.5)
Diploma of Higher Education or Foundation Degree or equivalent	2 (9.1)
Prior University studies on another degree	1 (4.5)
Employment prior to the current degree	4 (18.2)
Mature student	
Previously studied Level 3 (foundation year) at XX	
Yes	12 (54.5)
No	10 (45.5)

The survey explored students' experiences of any subject related opportunities to facilitate their learning development whilst studying (Tables 2 and 3), with joining professional organisations as a student member provides opportunities to extend their subject knowledge and work experiences – the Association for Nutrition (AfN), The Nutrition Society and British Nutrition Foundation, were organisations students are most aware of (100%, n=22; 15.8%, n=9; 12.3%, n=6 respectively). 81.8% (n=18) of students were aware of membership benefits, yet only 63.6% (n=14) pays the annual

membership for The Nutrition Society's student membership. Reasons for those not being members include the high membership cost and limited knowledge of membership benefits.

Table 2: Students' awareness of subject-related opportunities whilst studying

Awareness of opportunities	**n (%)**
Awareness of any professional organisation (i.e. learned societies, professional, membership bodies) related to nutrition or related area	
Yes	20 (90.9)
No	2 (9.1)
Sources of awareness for the professional organisation	
Friends/ and or family	2 (9.1)
University academics	17 (77.3)
University – careers services	2 (9.1)
University – events organised by the university	8 (36.4)
Directly from the organisation (i.e., mailing list)	3 (13.6)
Coincidently saw or heard it	4 (18.2)
Other	4 (18.2)
Awareness of membership benefits	
Yes	18 (81.8)
No	4 (18.2)
Member (i.e., pay annual membership) of any professional organisations	
Yes	8 (36.4)
No	14 (63.6)

Table 3: Students' learning development in the subject whilst studying

Professional Development	**n (%)**
Carry out any continuous professional development activities	
Yes	16 (72.2)
No	6 (27.3)
Ways for nutrition professional development external to study	
Scientific articles	9 (56.3)
Attend events and or conferences	13 (81.3)
Internships, placements or work shadows	0 (0)
Part-time work with professionals	1 (6.3)
Others (via social media)	1 (6.3)
Ways to look for nutrition opportunities	
Social media	5.5 (25.0)
Professional organisations	4 (18.2)
Job search engines	3 (13.6)
Work experiences/ placements	4 (15.9)
Networking/ conferences	4 (15.9)
No specifics	2 (11.4)

Students were asked about their current and or previous nutrition experience relevant to the degree in paid work, volunteer work and others were asked (Table 4). Many experiences received were from part-time jobs and or volunteer work in local organisations.

Further to graduate expectations following their undergraduate course (Table 4), students shared their perceived challenges and barriers during their study and after graduation in their learning development. Overall, limited time (27.5%, n=6) with financial burden and lack of experience in the field (22.5% each, n=10 total) were highlighted as the top three barriers for career development. Other variables include high competitiveness in opportunities (7.5%, n=2), travel (5%, n=1), family responsibility (2.5%, n=1), visa restrictions (2.5%, n=1), with an interesting 5.23% responded no direct development needed at the moment of their degree course. Obstacles after graduation also resonated with challenges during their study: limited relevant work experience related to nutrition (31.6%, n=7), high competitiveness and or lack of relevant job opportunities (with 23.7% respectively, n=10 total), a desirable starting salary (7.9%, n=2), unsure what to do after degree (7.9%, n=2) and inaccessible locations (5.3%, n=1). These highlight the niche nutrition sector and students unable to identify other possible careers with their skills.

Table 4: Overall summary of students' current and or previous experiences in Human Nutrition in either paid work, volunteering work and or others

Experiences in Paid Work	Experiences in Volunteer Work	Other Experiences
● Nutrition-related awareness campaigns	● Health ambassador	● Extracurricular research
● Internships within the industry	● Local community - delivering health cooking sessions	● Shadows consultations in nutrition with private clients
● Part-time job in the food industry	● Schools	
● Part-time job in the marketing industry	● Physical activity courses	
	● Volunteer with non-profit organisations	

Students were asked to share their thoughts on their career aspirations and job expectations after graduation (Table 5). Most participants (68.2%) indicated the continuity of further education in the subject related area or working in the industry (54.5%), with an expected graduate salary between £20,000-£30,000 and further opportunities to gain nutrition-related experiences for career progression.

Table 5: Students' career aspirations and expectations after graduation

After BSc course	n (%)

Career aspirations following graduation from BSc	
Further studies in a nutrition-related subject	15 (68.2)
Further studies in a non-nutrition related subject	3 (13.6)
Working as a freelance associated (or related) Nutritionist	1 (54.5)
Working in other non-nutrition related roles	0 (0)
Working in sports nutrition-related field	8 (36.4)
Teaching career as a health educator	5 (22.7)
Working in the industry (e.g. food science or product development)	10 (45.5)
Health promotion within the NHS	12 (54.5)
Other	1 (4.5)
Expected starting salary after graduation	
£9,000 - £15,000	2 (9.1)
£15,000 - £20,000	7 (31.8)
£20,000 - £30,000	12 (54.5)
£30,000 +	1 (4.5)
Expectations for career progression after BSc	
Gaining further nutrition experience	8 (36.4)
Work in nutrition sector	7 (31.8)
Setting up consultancy	6 (27.3)
Further study in nutrition	5 (22.7)
Further study in dietetics	2 (9.1)
Undecided	2 (9.1)

Student focus groups

Participants who completed the survey were invited to join the focus groups. Figure 2 summarises the themes identified across Levels 4 – 6 on awareness of nutrition opportunities inside and outside of the university, responsibilities of their career success, and being "graduate-ready".

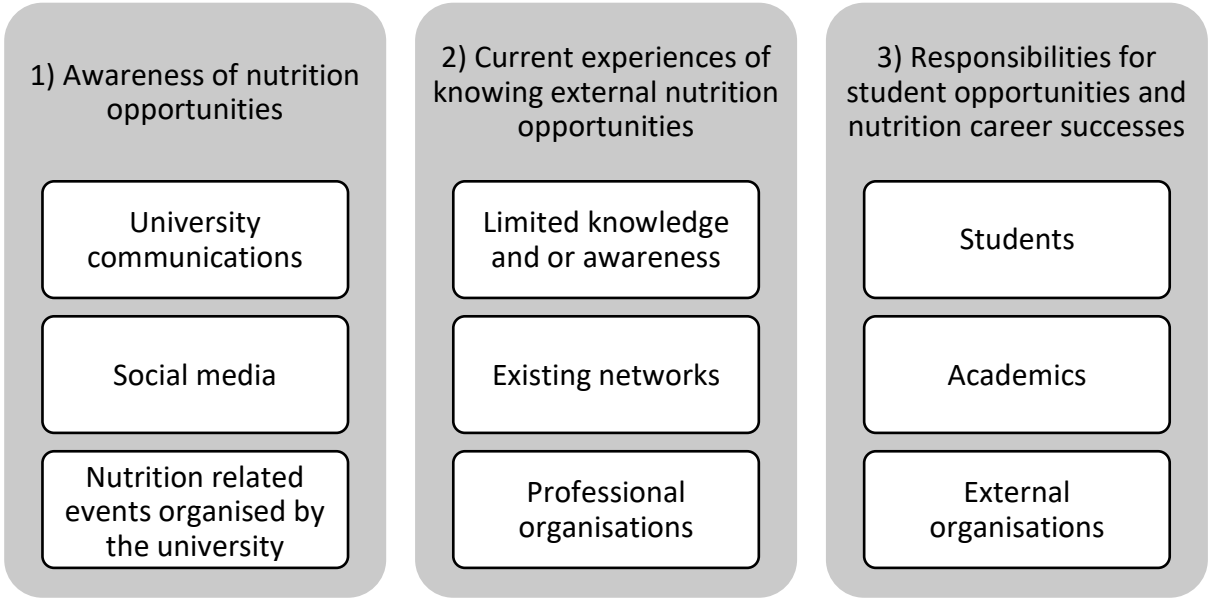

Figure 2: Themes identified from focus groups with nutrition undergraduates on their current perceptions to learning development

Students were predominantly aware of nutrition opportunities across all levels of study (Table 6). There was a mix of student feedback on university communications, with First Year students feeling overwhelmed with email messages often containing irrelevant opportunities to their level. Conversely, Level 6 students felt university communications were more relevant to them with employability and career workshops appropriately targeted at their level. Nevertheless, students preferred more personalised content relevance at their level to feel more inclusive. Social media also plays an important role for students' reach as a source of information and opportunities – though caution is required when considering the lack of guarantee for evidence-based information. Nutrition events organised by the university provides opportunities for students to gain insights. Yet, students felt there were no consistent, engaging events and some external speakers are not specific enough to describe their career journey offering a range of career prospects.

Table 6: Nutrition students' awareness of nutrition opportunities

Themes	Example quotes
University communications	"When you get the university emails, it's usually just Blackboard updates and there's just loads of them" (First Year)
	"Sometimes the opportunities are not suitable in terms of either location, or maybe they require a particular experience or schooling and are more for graduates rather than undergraduates" (Second Year)
	"The emails are mostly relevant because they're from the Nutrition department" (Final Year)
Social media	"You have to be careful of who it is that you're taking the information from" (First Year)
Nutrition-related events organised by the university	"...someone who does a specific thing, and they speak to you about that specific job that they do, and you think, how did they get there?" (First Year)

Encouraged to develop their learning through experiences outside their study, students were asked to share their current experiences of knowing nutrition opportunities outside their university (Table 7). Findings illustrate that first year students showed limited knowledge of the information channels outside of the university compared to those in senior years – students were aware of the possible positions yet unclear how to get those jobs. Through existing networks, students across all levels highlight this as a possible strategy to connect and be aware of possible career opportunities - yet knowing how to get relevant opportunities matched against their skills remains a challenge. Professional organisations such as learned societies regularly communicate with students on scientific information, career opportunities, upcoming events, and activities. Final Year students perceive this information as beneficial as networking opportunities, yet first- and second-year students do not regard it as relevant for them when still studying.

Table 7: Nutrition students' current experiences of knowing external nutrition opportunities

Themes	Example quotes
Limited knowledge and or awareness	"I haven't seen much of anything. I haven't looked that much just yet" (First Year) "Our awareness is depending on how they're advertising, or even if they are advertising or whether they're going through word of mouth" (Second Year) "Demand for job opportunities is so high and they are easy to miss" (Second Year)
Existing networks	"I worked in a gym and I know that professional fighters there get meals from a nutritionist working there [...] as far as I'm aware, they're not hiring" (First Year) "I'm trying to go to different universities that are related to Nutrition and check for any vacancies they have" (Final Year)
Professional organisations	"It's not that useful in terms of opportunities for someone who is still studying' found one of the level five subjects" (Second Year) "I'm a member of a few societies outside of University. I'm aware of opportunities being presented by those places all over the internet, emails, and conferences, as well" (Second Year) The talks are very interesting, and usually, they are free for the members, or you have to pay very little" (Level 6)

Students shared their opinions of who should have the greatest responsibility for their successful nutrition-related career and learning development – Table 8 summarises the identified themes. Students highlighted themselves as predominantly responsible for their learning development and success with support from university staff (academics and or services) and external organisations. Yet findings suggest a shift to relying on university staff and external organisations more as they progress through the course for more structured guidance and relevant opportunities to highlight skills and learning development.

Table 8: Nutrition students' feedback on responsibilities for student opportunities and nutrition career successes

Themes	Example quotes
Students	"I am mainly responsible because the university can give me general information and can guide me until I decide what I want to do" (First Year)

	"I have a responsibility as a student because I could decide to do something not related to Nutrition" (First Year) "We are lacking motivation and inspiration; we do not know what is going to happen after we graduate" (Second Year)
University staff (academics and or university services)	"...having updated academics is the key to being able to be successful yourself outside of the university" (First Year) "The knowledge we get from the university is a base for what we will do after graduation..." (First Year)
External organisations	"The external organisations can be very useful because one can get constant up to date information from there, and the newsletters will sometimes have jobs advertised" (First Year) "I don't think the responsibility should fall on the academics, they've got enough to do in teaching us and marking" (Second Year) "No one is the most responsible, everyone is responsible!" (Final Year) "Another thing which needs to be established is the connection between the industry and the university" (Final Year) "It would be nice if the university could get some partnerships with other organisations that could help the students to get an internship over summer" (Final Year)

To understand and be aware of the imperative of self-development, students reflected on their current status and experience with the term 'graduate readiness' and applications to future career plans (Table 9). As expected, those in First Year were not graduate ready as they just started settling into university. However, those in the senior year – especially in third/ final year – reflected they had become graduate ready by taking advantage of any available opportunities during their studies – e.g., building on their knowledge and skills gap.

Table 9: Nutrition students' feedback on 'graduate readiness' and application to future career plans

Level of study	**Example quotes**
First Year	"I am not graduate ready at all…have been out of education for a little while, so I am trying to focus on getting used to being in education again"
Second Year	"...I do not feel ready at all. I think that I have practical skills and things like that but they have not been very supervised so I would not trust me with anyone on my own" "I would say you probably know more than you realise. That is partly a confidence thing but also a lack of practice thing"

Third / Final Year	“I could say "yes" for myself because I have done whatever I could do. I applied wherever I could, I took as many opportunities as I could because I know that it is important to enhance your CV from day one” “I'm ready to continue applying for jobs” “I do feel secure because of what skills and knowledge I have acquired at the university. However, I feel that I have not got enough practical work experience to feel entirely safe”

Staff interviews

Six nutrition teaching academics (60%) participated in the individual semi-structured interviews conducted by the student partners from the project team, following an open invitation to all teaching staff. The aim was to understand their experiences teaching undergraduate modules and how they relate their teaching materials and resources to the nutrition sector, further, how the staff’s perspective would differ to students.

Four overarching themes were developed following the interviews: taught modules, external contract or visiting lecturer, barriers for a sustainable link, and barriers to enhance employability and learning development (Figure 3).

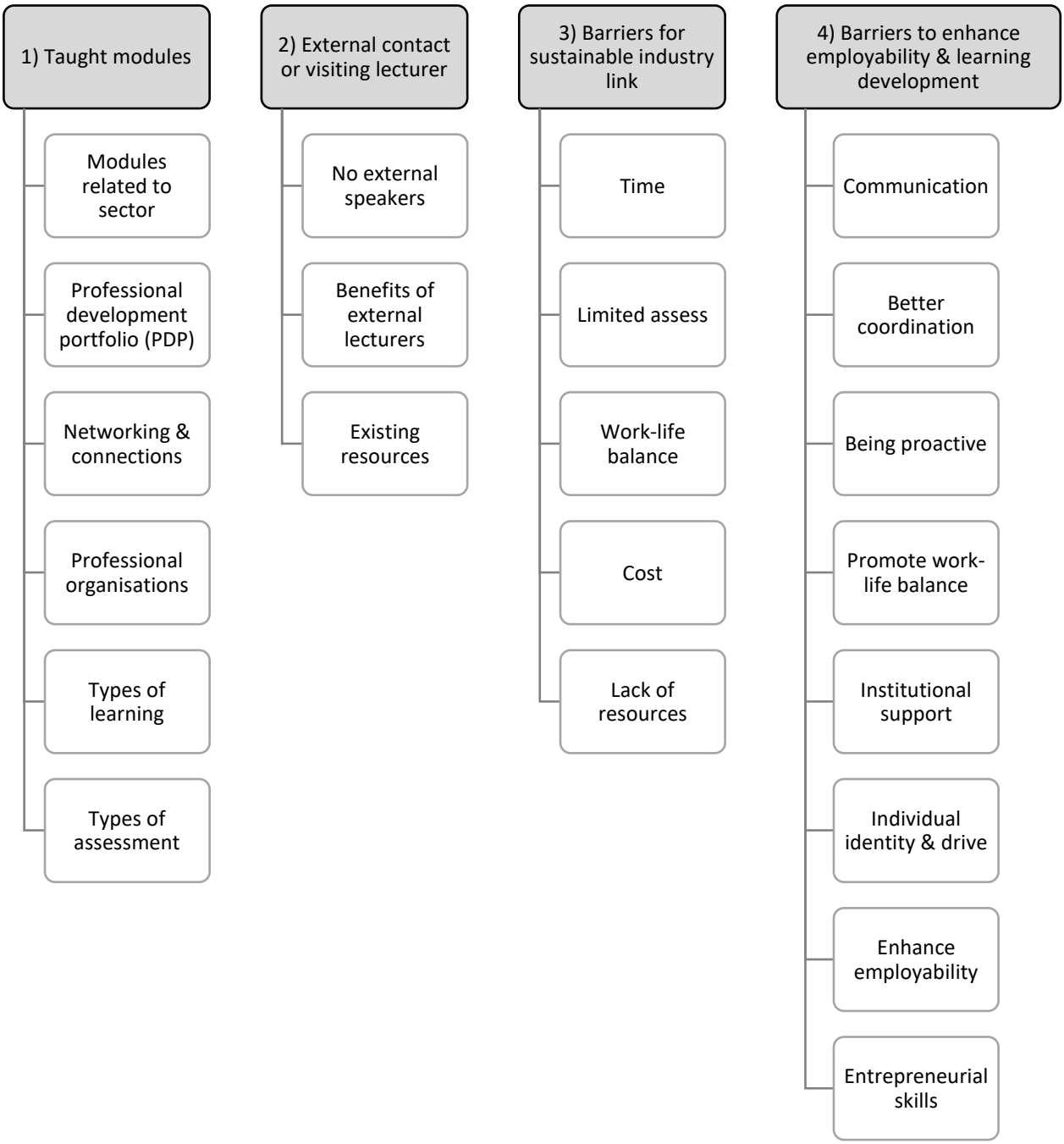

Figure 3: Themes identified following individual semi-structured interviews with nutrition teaching academics on their experiences in teaching nutrition undergraduate modules and relevance to the sector

Teaching staff reflected on their taught module(s) and shared how it relates to the industry sector, theory, or practice, and how assessments exemplify this. As a requirement for the course, students produce a Professional Development Portfolio (PDP), which enhances students' learning development. All academics identified that the PDP acts as an assessment to encourage students to reflect on their skills from the start of their degree (E.g., making connections and networking by attending conferences and getting involved with social media). As such, this complements the competencies required by the course's professional accreditation (Association for Nutrition (AfN)), benefiting students to engage with their course internally and

externally to understand the applications to real-life scenarios improving awareness in the wider nutrition field.

> "...not have anything really to show in terms of what they've done [...] nothing concrete that they could take away. [...] the whole idea behind the PDP was to really not wait until […the…] final year but to start from day one"

> "...professional bodies have got a framework, and the framework is interpreted differently by every academic and every qualified professional, [...] so we're educating students on the breadth of the field and [...] students should be well advised to expect alterations in the specific field that they wish to follow as they move forward."

Utilising external networks/ contacts or selected visiting lecturers were identified as an approach to initiate links with industries to bring outside knowledge into the academic setting. Connections were identified as likely to be from the closed personal network due to the existing established interpersonal connections as challenges vary when establishing connections between person to organisation or organisation to organisation. Providing new perspectives and useful insights for students regarding expectations and subject opportunities demonstrated the benefits of using external speakers or visiting lecturers. However, it reported barriers to have external speakers, such as budget constraints and the need to prove benefits beyond teaching through the academic staff. Despite barriers to providing consistent opportunities for external speakers for the course modules, it nevertheless could suggest that the benefit of engaging students outweighs the challenges.

> "...there is a world beyond these walls, and how those skills might apply there, and different kinds of opportunities and avenues for work."

> "We've had quite a big push to avoid it this year financially and if we want an external to come in, we have to come up with our rationale for why we cannot teach it ourselves."

Participants identified time, limited access, cost, and lack of resources as barriers to establishing strong and sustainable links within the sector. For instance, finding enough spare time to invest whilst dealing with increasing workload, commuting, and personal responsibilities (e.g., work-life balance) presented barriers. Further, having limited access to experienced 'big players' within the sector from a closed network was a challenge, with the possibility of missing significant opportunities to organise something that could contribute to students' engagement and development. Cost of personal financial remuneration, lack of resources and support were also suggested as barriers to building connections. For example, the financial cost to event organisation and lack of institutional and management support were likely to hinder any such efforts. Nevertheless, participants emphasised the need to facilitate an environment enabling academics to pursue engagement and meaningful connections actively and consistently in the most efficient way, beyond the boundaries set by the university to support students' learning.

> "I think linking to the industry is fantastic but [...] to create those links, to build something takes time and effort. If you are not getting support from your

> management, nothing is going to make you want to do that [...] the staff can't do much, the students can't do much, and there are kind of certain bounds."
>
> "How do we make it easier and useful for the outside to come in? What is the incentive for people on the outside to come into the university and work with students? The barrier is trying to make it smooth so that the outside can come in and the inside can go out."

Considering the efforts by academics to provide for their students, participants reflected on how best to enhance students' employability through mutual cooperation between academia and the sector. Eight themes were identified (Figure 3), with findings suggesting that better communication and coordination should be implemented and supported across the institution. This ensures that consistent messages and support for students' development are provided, engaging, and encouraging them to see beyond their subject area. Understandably, academics are experiencing an increased workload. Yet maintaining good health and wellbeing promoting work-life balance is paramount, ensuring a healthy and retainable staff to help motivate, nurture creativity, and provide the stimulus necessary for students' continuous development and growth. Acknowledging individual identity and drive to enhance students' learning facilitates the importance of 'getting students involved, getting us involved' – inspiring students' to self-reflect on their learning experience and upskill their employability opportunities. Nevertheless, any emphasis on developing skills would be directly applicable and helpful in adopting a wider lens of potential opportunities – moulding students to be graduate-ready.

> "I think that the connection and time needs to be spent with respect to what is the thing that drives the student cohort, what is the thing that drives the staff cohort. If there is some alignment there, you could potentially connect the two, and then connect that with your industry as well."

Discussion

A mixed-method study on the current supportive mechanisms between academia and industry for nutrition undergraduates at the University of Westminster was conducted, combining staff and students' feedback to provide insights into their existing academic-industry experiences. Through a staff-student partnership, this project involved students, as co-creators, across different levels of study within the same programme, which benefited the collaboration and mentorship between team members. The experience of these co-creators working in this collaborative student engagement project was discussed in Sum *et al.* (2021), highlighting the involvement, motivation, and lessons learned working in a partnership initiative.

This study's findings add evidence to the limited knowledge in nutrition graduates through students' lenses within the sector and or their university experience. Though there are currently limited literature in this area, there is the opportunity for students to explore the many career opportunities there are upon graduating with a nutrition degree. As noted, the UK food and drink manufacturing sector accounts for almost 20% of the UK industry sector, highlighting the prospect to engage and encourage students during their degree to think about possible career aspirations and professional developments directly and indirectly.

This project identified students' experiences on university provisions, current employability knowledge within the sector, career aspirations and the perceived barriers for their professional developments. Using semi-structured interviews, nutrition teaching academics reflected on their perceived experiences and challenges to enhance academia-industry collaborations.

14% (n=22) of the nutrition undergraduates who responded to the survey provided insights into their current perceived nutrition experiences – opportunities for professional development such as work experience outside their academic study, being competitively employable-ready, and achieving their career. The survey highlights student knowledge from the available resources, demonstrating their learning initiatives outside their degree course. Yet, challenges and barriers – financial burden, limited time, the niche nutrition sector, and accessibilities – remain first and foremost to any decisions in partaking in activities. Student focus groups further explored their university experience. However, due to the small sample size, no definite conclusion could be reached, with results ungeneralisable for the whole nutrition undergraduate population. Nevertheless, as expected, results reflected students' perceptions of the sector's relevant (professional) organisations and highlighted the benefits of embedding academic-industrial collaborations into curriculum activities to support their learning development. Students reported their career success dependent on university opportunities, transparent collaboration from external organisations and self-motivation – with similar results reported by Mulrooney (2017). Unexpectedly, neither the university emails nor university-organised events (e.g., nutrition-related) seemed beneficial for students. Awareness of external opportunities and graduate readiness improved with years spent studying nutrition, yet most students lacked practical experiences. Therefore, embedding academic-industrial collaborations into curriculum activities is significant to engage and improve students' learning, confidence and employability.

Semi-structured interviews with the teaching team suggest a fundamental role of the academic institution, encouraging a diverse group of undergraduates with transferable skills set – clear awareness of regulations, expectations, and challenges within the nutrition sector – applicable to "real-life settings" post-graduation. Personal and professional development (i.e., networking) signifies the importance of creating skilled nutrition graduates, effectively communicating evidenced-based science, and applying their competencies into their professional roles. Thus, it can be argued that these two aspects can be viewed as mutually inclusive to encourage development and success (De Janasz and Forret 2008).

The Higher Education context is ideal for engaging and developing the necessary skills (i.e., networking), offering a wide range of opportunities to attend and engage in conferences, seminars, and workshops to establish meaningful relationships relevant to the nutrition sector (Streeter, 2014). The concept of 'nudging' was identified from the staff interviews, an approach to encourage students to get involved with networking and "connecting" (i.e., via social media) with the sector through active learning and participation as outlined from course assessments and module outcomes. Networking, highlighted as a critical component, enables career advancement, door to new opportunities, personal growth and developing a reputation

as a knowledgeable and competent health professional (Öberg, 2019) – and thus complements the underlying aim of all undergraduate module outcomes.

The role of external contacts is beneficial to enhance learning outcomes when establishing the academic foundation. Participants acknowledged the importance of establishing and maintaining meaningful interpersonal connections with external speakers. For example, increasing efficient awareness of job specifications and employability opportunities (Streeter, 2014), providing valuable insights, new knowledge exchange, and sharing experiences (i.e., and challenges) expands the interconnected academia-industry relationship benefiting students' professional learning and training. Regardless of perceived barriers such as financial constraints and internal human resources, incorporating external speakers within the undergraduate course consolidate both the students' development and the academia-industry relationship.

Despite the small interview sample size (n = 6), this study indicates the complexity and overlapping factors influencing the academia-industry partnerships (Table 11). Data collected may not be generalisable and could be influenced by strong personal perceptions and beliefs and other social factors. Thus, this suggests that factors can also affect perceived success and management of the knowledge and experience exchanges (Perkmann *et al*., 2011).

Table 11: Factors impacting the establishment or prevention of academic-industry links

Categories	Factors
Organisation Resources and Capacity	● Adequacy/availability of resources (human, tangible or monetary) ● Incentive structure for academic staff or external speakers ● Time
Institutional Mechanisms and Policies	● Flexibility of university policies (time/budget) ● Willingness to change (big picture) ● Organisation culture and structure (differences between academia and industry/closed networks)
Organisation Management Issues	● Communication and collaboration ● Coordination and integration ● Top management commitment and support ● Interpersonal relationships of mutual trust ● Work-life balance

Having cultural or structural differences yet communities within academic and industry organisations remain at the forefront in institutional mechanisms. Nevertheless, the participants expressed concern about the limited access to expert knowledge and resources within "closed networks" and maintained by experienced "big players" within the sector. A plausible suggestion is the need to maintain standards of accountability and efficiency when seeking to establish inter-organisational links (Nahapiet and Ghoshal, 1998). However, the increased economic pressure and missed opportunities

could contribute to students' academic developments; academics are encouraged to actively expand their portfolio with external collaborations and engagements to enhance the university teaching quality and university experience. Consequently, institutions are constantly challenged to display transparency, flexibility, adaptability, willingness to change and finding solutions towards the barriers they face (Koka and Prescott, 2002). As a result, a closer exploration enables the development of strategies to improve the HE sectors.

Enhancing pedagogy quality, participants identified managing factors affecting academia-industry links and imperative cumulative outcomes (Barnes et al., 2002). Effectively managing communication, coordination and integration of students and staff across the course avoids a fragmented management approach, acknowledging individual identity and promoting congruence of ideas and solutions. A 'top-down' management and support from the university are fundamental to promoting work-life balance, creative thinking, and a proactive attitude towards seeking new opportunities outside the "academic bubble" to establish new academia-industry links within the sector.

Identified by both students and staff, applying core scientific practical skills in "real-world" scenarios during their course remains a priority – facilitating future employment within the sector with broader nutrition and entrepreneurial skills appears useful when searching for career opportunities (Mann and Blum, 2004). Thus, encouraging students to develop wider graduate attributes ensures their employability, understanding how their transferable skills can be applied in other related roles.

This study achieved the aims set out at the start. Data from both the undergraduate nutrition population and the teaching team provides a better understanding of both perspectives and how best to address and better consolidate the academia-industry link for the future. Due to limited evidence in this area, the data somewhat corroborated our expectations; however, both the interviews and focus groups provide rich insights into the participants' experiences and possible future developments when engaging with students on the course.

Future research such as developing a series of events or workshops relevant and directly applicable for nutrition undergraduates, rather than generalised under "Life Sciences" with students feedback one year later. Furthermore, identifying and assessing the role of government to enhance nutrition graduate employability through efficient academic-industry cooperation provides a better understanding of employers and professional organisations perceptions and compare to the results (of students' and academics' views) found from this study.

Conclusion

This study reported useful insights into the current mechanisms between academia and industry supporting course experience, skills and learning development, and future career prospects in nutrition post-graduation. But also, how a staff-student partnership project with a diverse team with different research experiences has also improved the skills developed through the role of mentorship between team members (Sum *et al.,* 2021).

The higher education settings represent an ideal environment to offer a wide range of opportunities for undergraduates, developing a diverse set of transferable skills, business acumen and capacity to apply evidence-based science to “real-life settings effectively”. Findings reflect an increased awareness, from students, of the important role the university plays, enhancing future career prospects through current and relevant opportunities, embedding transparent academic-industry collaborations into curriculum activities improving confidence and self-motivation. The role of external contact was identified as highly beneficial, providing fresh insights, new knowledge exchange and novel experiences, likely to enhance the core learning outcomes established within the academic environment - consolidating both the students’ development and the academia-industry connection.

Despite the keen interest and individual willingness from all participants to enhance knowledge and “network outside of the academic bubble", factors such as lack of sufficient time, work-life balance, financial constraints appear as ‘barriers’ to penetrate closed networks formed by experienced “big players” within the niche nutrition sector. As a result, recommendations such as encouraging 1) students to ‘nudge’ their peers in extracurricular activities related to their subject for professional learning developments, 2) academics to extend and take time to liaise and build a network and broadening the scope of employability through facilitating and 3) the creative application of academic learning objectives enhancing external learning within the sector. However, continuous support from the academic institution and efficient “top-down” management affects academia-industry links and their cumulative outcomes; identified to effectively circumvent barriers for graduates’ employability prospects through strong and cooperation between academia and the nutrition sector.

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Appendices

Appendix 1: Student Online Survey

Demographics

1) What is your current level of study?
   - Level 4 (first year)
   - Level 5 (second year)
   - Level 6 (third year)

2) What is your current Human Nutrition BSc (Hons) pathway?
   - Nutrition and Public Health
   - Sports Nutrition and Exercise Science

3) What is your age group?
   - 18-21
   - 22-25
   - 26-30
   - 31+

4) What is your gender?
   - Male
   - Female
   - Non-binary
   - Prefer not to say
   - Other (please specify)

5) What is the highest academic qualification level prior to your current BSc (Hons) Human Nutrition?
   - 6th Form or School (e.g. GCSEs or A-Levels)
   - A Level of Advanced Apprenticeship or similar (Level 3/ First Year)
   - Certificate of Higher education or Higher Apprenticeship or equivalent (Second Year)
   - Diploma of Higher Education or Foundation Degree or equivalent (Second Year)
   - Prior University studies on another degree
   - Employment prior to the current degree

- Mature student
- Other (please specify)

6) Have your previously studied Level 3 (foundation year) at Westminster?
   - Yes
   - No

Current knowledge of professional organisations (i.e., learned societies, professional and or membership bodies) in the field of nutrition

7) Are you currently aware of any professional organisations (i.e., learned societies, professional and or membership bodies) relating to nutrition and or related area?
   - Yes
   - No

8) List out the professional organisations relating to nutrition and or related area you are currently aware of:

9) How did you hear about any of the professional organisations you are currently aware of? (please tick all that apply)
   - From friends and/ or family
   - From the University - Academics
   - From the University - Careers Services
   - From the University - Events organised by the University
   - Directly from the organisations (i.e., mailing list)
   - Coincidently saw or heard it
   - Other (please specify)

10) Are you aware of how you may benefit from being a member with professional organisations?
   - Yes
   - No

11) Are you a member (i.e., pay annual membership) of any professional organisations?
   - Yes
   - No

12) If you answered 'yes', please list those you are affiliated with:

13) If you answered ‘no’, why is that?

Current and/ or Previous Experience

14) Briefly describe any current and/or previous experience relevant to the degree of Human Nutrition that you possess in 1) Paid, 2) Volunteer, 3) Other

New Developments in Nutrition

15) Do you keep up to date with new developments in the Nutrition sector other than your academic study?
- Yes
- No

16) If you answered 'yes' to the previous question, then how do you do that? [Please tick all that apply]
- I regularly read the latest scientific articles
- I attend events and or conferences
- I regularly do internships, placements or shadow professionals
- I work close to the professionals (as my part time job)
- Other (please specify)

Opportunities

17) In your opinion, what is the best way/ place to look for opportunities within the field of nutrition? (work experiences, placements, jobs, social media) and why? [List top 3]

Career Aspirations

18) What are your career aspirations following graduation with a BSc (Hons) in Human Nutrition from the University of Westminster?
- Further studies on the Nutrition-related subject
- Further studies on the subject that is not related to Nutrition
- Working as a freelance associate Nutritionist (or related roles)
- Working in other non-nutrition related role
- Working in sports nutrition-related field
- Explore teaching career as a health educator
- Working in industry (e.g., food science or product development)
- Health promotion within the NHS
- Other (please specify)

Influencers in Nutrition

19) Reflecting on your degree course experience so far, who have been the biggest internal or external influencers to your interest in nutrition and related topics? (List your top 3)

Salary

20) What are your expectations for your starting salary? [Please write to nearest £1000]

Career Progression

21) What are your expectations for your career progression? [List your top 3]

Current Barriers

22) What are your current barriers to career development whilst in full-time education? (list your top 3 if applicable)

Obstacles after Graduation

23) What do you consider to be the perceived obstacles after graduating from the University of Westminster? (list your top 3 if applicable)

Taking part in focus group

24) Would you like to take part in the project's focus group? (Students who take part in the focus group will receive £10 for their time). If so, please leave your contact details below.

Appendix 2: Student Focus Group Questions

1. How do you normally become aware of opportunities related to Nutrition or similar topics?
2. Describe how such opportunities can be relevant or even helpful in the context of your interests within the field of Nutrition?
3. What are your current experiences of knowing opportunities related to Nutrition that are outside the University of Westminster (i.e., not organised by your academics or the University)?
4. Describe the nature of possible opportunities as provided by any external organisations you can identify?
5. In the context of providing students with opportunities for a successful career in the field of Nutrition, who do you feel should have the greatest responsibility to do more - the academics on the course, the University via different services, external professional organisations within the industry or even the students (yourselves)?
6. How do think such opportunities can be provided in the best way possible? [Provide chronological order]
7. Reflecting on your current status and experience from your course on Human Nutrition at the University of Westminster, how do you think the term “graduate ready” applies to you in relation to your future career plans?
8. What, if anything, needs to change in order to provide Nutrition students with the best possible skills and chances for a successful career in the field of Nutrition?

Appendix 3: Staff Interview Questions

1. Define the industry sector your taught module can effectively relate its theory/practical to and [or] provide an assessment to exemplify this?
2. Do you have any existing external contact or visiting lecturer on your module? and how can they assist in initiating link with industries in the best way possible?
3. What are the current barriers in establishing strong and sustainable links with industries in the Nutrition sector?

4. How can such barriers be effectively circumvent in order to enhance the employability prospects of Nutrition students through a strong and mutually beneficial cooperation between academia and Nutrition industry organisations?