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Food Science EDUCATION WILEY

RESEARCH IN FOOD SCIENCE EDUCATION

Career management for UK food degree students at multiple institutes using an industry-developed professional competencies framework

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Abstract

Recruitment of food science and technology graduates remains a priority for the UK food industry in the wake of skills shortages. As a result of the contemporary pressures faced by the food industry, it is essential that students applying for such roles are aware of and ready for management, leadership, and relevant professional competencies. This collaborative study uses the industry-informed established framework, namely, competencies for food graduate careers (CFGC) and assesses the integration of this resource into careers education for food-related programs of four higher education institutions: Cardiff Metropolitan University, Sheffield Hallam University, University of Nottingham and University of Reading. Mixed method analysis was conducted with students prior to and on conclusion of the teaching sessions, including surveys and focus groups. Students confirmed that CFGC was informative and useful for preparing them for a graduate career in food science and technology. No single method of integration of CFGC was proposed; instead, intervention can be undertaken by a variety of approaches, suitable for the level of study and Institutional operation as outlined in the study.

KEYWORDS
education, employability, food industry careers, food science, professional competencies

1 | INTRODUCTION

Ensuring students of vocationally based programs have an understanding of the requirements of graduate employers is well understood (Bohlscheid & Clark, 2012). This is increasingly the case in food sciences education where the graduate job market is strong, to meet demands for food science and technology "thought leaders" managing the more sophisticated conversion of raw materials, while satisfying consumer and global health demands (Institute of Food Science & Technology, n.d.-a; Lillford &

Hermansson, 2019). A recent UK government report outlines the need for training a workforce with strong management and leadership skills to meet future technological consumer and workforce demands for food businesses (Food & Drink Sector Council, 2019). In relation to the recent pandemic, a recent Universities UK (2020) report stated enhanced skills in "digital, entrepreneurship, business/public sector management, and sustainable economy" would benefit business recovery.

Discipline-specific competency frameworks can be utilized to improve a student's awareness of the desirable

skills and behaviors for specific vocational pathways and, while not prevalent in food-related careers, are widely used in healthcare and professional degrees governed by appropriate accredited bodies (Artess et al., 2017). These frameworks can inform choice and plans for personal development and enable success in future graduates' job application and selection processes.

In partnership with the United Kingdom and the Republic of Ireland industry employers, a project conducted from 2015 to 2017 established a language tool of desirable *elements* or competencies, namely, competencies for food graduate careers (CFGC; Weston et al., 2017). Following a survey, role profiles of desirable *elements* were developed for 14 initial bachelors' graduate roles typically undertaken by food scientists in the region (Weston, Foster, et al., 2020). This competency framework has been subsequently utilized for curriculum mapping and program development activities at the University of Nottingham (UoN; Weston, Benlloch-Tinoco, et al., 2020) and the University of Reading (UoR; Fagan et al., 2020) and is now recommended for use in applications for Institute of Food Science and Technology (IFST) degree accreditation (Institute of Food Science & Technology, n.d.-b). Food science degrees in the United Kingdom demonstrate reference to the content of the pertinent Quality Assurance Agency (QAA) benchmark statement (The Quality Assurance Agency for Higher Education, 2019) for specific technical skill requirements. However, as the "generic skills" list outlined for graduates to possess is shared across many other program types and careers, CFGC provides specific information on broader competencies requirements and is designed to complement the QAA standard.

An additional aim of the competency framework project was to provide credible and current careers education to students and recent graduates. While attempts are made to educate UK high school students about food industry careers via websites (Institute of Food Science & Technology, n.d.-a; National Skills Academy of Food and Drink, n.d.) and ad hoc outreach activities, students often start their higher education not realizing the full extent of the roles available to them. An integration of this framework into teaching at UoN has provided students (since 2017) with a coherent source of rich information to use in their career planning, with encouraging feedback from students and industry.

There is a growing interest in co-operation across higher education institutions (HEIs) domestically and worldwide to best prepare food science graduates for the global workplace (Bohlscheid & Clark, 2012; Roberts et al., 2010; Stevenson, 2016), and CFGC can provide a platform for further discourse and action (Emond et al., 2020). To encourage wider engagement by educators, students, and employers, the role profiles as infographic posters, and support

information is situated on the IFST website directly accessible by the reference provided (Weston, 2018). A simple interactive open access online tool has also been created, again directly accessible in the reference (University of Nottingham, n.d.) aiming to provide careers guidance for students and new graduates and support personal development and job application preparation. By accessing open access CFGC resources, other UK HEIs have started to introduce the framework to support careers education and research. As broader use of CFGC for careers education commenced, it was considered worthwhile to discover how and when the framework was integrated into other teaching programs and, by gathering student perceptions, reflect on the relative success of such interventions.

In order to investigate these research questions, a study was undertaken during the 2019–2020 academic year with selected undergraduate (UG) and postgraduate (MSc)-taught cohorts studying food science-based degrees in four UK institutes, namely, Cardiff Metropolitan University (CMU), Sheffield Hallam University (SHU), UoN, and UoR. The specific aim was to explore the impact of the integration of CFGC into curricula activity to support careers education. Each HEI included this intervention at a level of study and semester initially deemed most appropriate for their programs of study. While recent events in relation to the Coronavirus pandemic impacted some aspects of the study in the spring semester, sufficiently useful data was obtained to review and reflect on the interventions.

2 | METHODS

The four UK institutions outlined above that undertake the teaching of food science at UG and MSc level took part in this study. The purpose was to explore the impact of the integration of CFGC into curricula activity, by a variety of means to support careers education. The study was conducted from September 2019 to May 2020.

This study was organized into two parts, first students' knowledge of careers in the food industry was evaluated by a "pre-survey," and then students were introduced to CFGC materials. Their knowledge was tested again by the same means using a "post-survey." Both surveys included multiple-choice and open-ended questions. The format of delivery of CFGC into sessions varied at each university due to year of study, teaching methods, and module (UK term equivalent for "course") subjects.

Questions asked in the pre-survey comprised questions on demographics and characteristics that might influence career ambitions (age, gender, program studied, year of study, placement, home country). Additionally, questions were asked about intended careers and potential roles that the student was interested in as well as a measure of how

confident they were of the skills and qualities required in such roles.

The post-survey repeated some of the demographics questions where a purely longitudinal study could not be undertaken–UoR was able to collect and match data for their cohort. The students were again asked about their proposed entry into the food industry and career ambitions before asking about the CFGC, how useful and easy it had been to navigate through including some institutional-specific questions.

Research data was collected from pre- and post-surveys and analyzed in a qualitative and quantitative format. STATA Version 15.1 (StataCorp, 2017) was used to analyze the quantitative data–this was achieved through simple tabulations of data and comparison of the survey responses of the different groups of students (e.g., MSc/UG and CMU/SHU/UoN/UoR) or simple demographics (e.g., age and gender), and using Chi-square, testing was conducted to measure any significant difference between groups. This was conducted in order to assess the impact of characteristics on the research questions. Basic thematic analysis (Braun & Clark, 2006) was applied to analyze open-ended questions with supporting triangulation (Golafshani, 2003) and external auditing (Creswell, 2014) of draft results conducted for validation purposes. A semi-structured group interview, conducted before the impact of the Coronavirus pandemic[1] was conducted at UoN to explore outcomes of their post-survey data, which informed overall findings.

This study was approved by the four collaborating institutes' ethics committees: CMU (Sta-1628), SHU (ER21512350), UoN (BIO-1920-003 & SBREC190106A), and UoR (08/2020). Informed consent was obtained from students prior to the data collection, either on paper (in-class) or via an online survey.

2.1 | Delivery of CFGC at each institute

2.1.1 | UoN

The online pre-survey at UoN was performed with third-year UG food sciences cohorts and also MSc food production management students. Specific teaching intervention of CFGC as outlined below and subsequent capture

of student feedback was centered on the UG cohort studying food science or food science and nutrition programs. This cohort was a mixture of students returning from an additional year-long industry placement or directly from the second year. They attended a core personal and professional development for food scientists module conducted in semester one, where CGFC has been increasingly integrated into learning outcomes, content, delivery, and assessment for 2 years prior to this study. The module includes several activities, some adapted to include CFGC (such as developing a tailored CV and mock interview against a CFGC role). In other cases, new activities have been developed such as mapping CFGC roles against real job specifications for students to explore their personal interests and possible ideal roles. Reference to the online resources and tool (University of Nottingham, n.d.; Weston, 2018) were made during activities alongside the inclusion of CFGC documentation in the module virtual learning environment (VLE) and presence of the 14 role posters on the walls of the teaching room each week.

Toward the end of the semester, a paper-based version of the post-survey was completed by the UG cohort (December 2019). Initial inspection of survey results, informed the areas to explore in a 1.5-h semi-structured group interview, held in February 2020. The session was facilitated by a researcher from another institute (SHU) and comprised six student volunteers aiming to represent the gender, nationality, program of study, and placement options of the cohort.

MSc students were given a specific timetabled classroom session in semester one to introduce CFGC to the cohort, explore the career options available, and associated development of elements of the CFGC framework to their core areas of study.

2.1.2 | SHU

The cohort at SHU was formed from final year UG students studying food and nutrition or food marketing management programs and postgraduate students studying various MSc food-related curricula. Students at both levels attended a session at the beginning of semester two where they all took part in an online pre-survey. Cohorts then studied food innovation consultancy (UG) and work-related learning (MSc) modules, respectively, where they had the opportunity to explore existing professional skills and receive support to develop new ones. In these modules, specific reference was made to the CFGC and also the Chartered Institute of Marketing (CIM, 2019) competencies framework. Students were directed to the resources for self-directed study and possible use in the development of their personal portfolio. The post-survey was carried out

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[1] The Coronavirus pandemic meant that studies in semester two had to be completed online in all institutions. This did not affect the study for UoN and UoR as work was completed prior to "lockdown." SHU had completed the lectures containing the signposting of the resources but were not able to complete the survey in seminars as hoped, so response rates were affected. Students at CMU and MSc students at UoN were not able to be invited for participation in the second survey for the same reason.

online toward the end of semester two, and students were reminded to complete the survey before the end of the term.

2.1.3 | CMU

The cohort that took part in the study at CMU were first-year UGs enrolled in the food science and technology program. Students attended two sessions in semester one to obtain general information on how to prepare themselves for university and careers after graduation. One of those sessions took place during induction week in September 2019 where students received talks about different food sectors from food technologists based at Cardiff Met Food Industry Center. Students received information on how the food industry operates and what employers are looking for. The session continued by introducing a real job advertisement, discussing what skills an individual needs to secure that role. At the end of the session, students were introduced to different study subjects and given direction on how to develop their skills and competencies while at university.

Students attended the second session in a form of a plenary toward the end of semester one where they were asked if they had a general understanding of the type of graduate job they may apply for. Students were then encouraged to discuss and search for relevant skills for that particular role. They were advised to think of suggestions on how they could acquire those skills. At the end of the session, students shared their thoughts and findings with the class, and they were informed about the future use of CFGC in semester two, the aims of the study, and how it will work

At the beginning of semester two, students were reminded by email about the CFGC project and asked to complete the online pre-survey. CFGC resources were presented on the VLE, and staff encouraged the cohort to explore materials in routine communications during the newly enforced online teaching activities.[2]

2.1.4 | UoR

The CFGC was not currently integrated into UoR teaching but planned intervention with CFGC resources focused on first-year UGs and MSc students both studying food-related programs. Students had experienced prior careers education intervention. First-year UG students had access to online information on CV writing, covering letter, appli-

cations, and interviews. They also had the opportunity to attend a teaching session where students were introduced to careers service, placements, and methods of applying. At MSc level, students had an introduction to career services and also a meeting with an industry mentor and attended a food symposium where individuals from the industry came and talked about their roles and careers.

A specific session was timetabled in semester two to give students an overview of the CFGC resources to obtain their immediate feedback on this. The students were not required to formally use the resources beyond the one-off session. It was delivered in a computer lab to allow students to explore the online resources mid-session. The session started by introducing the project to students where they were asked to discuss the roles within the food industry that they were already aware of and competencies that they thought employers were looking for. Then students were asked to complete the paper-based version of the pre-survey. Next, students were introduced to the CFGC and given a tour of different elements that it contained. Students were given time to explore the CFGC materials and consider a role that they are interested in applying in the future and discovering relevant skills. At the end of this exercise, students were asked to complete the paper-based version of the post-survey in class.

3 | RESULTS

3.1 | Survey participants

For three institutions (SHU, UoN, UoR) the pre-survey was issued and completed in class, whilst CMU issued the online survey remotely–a total of 139 students took part in the first part of the study (CMU: 10, SHU: 55, UoN: 37, UoR: 37). Participants of the post-survey reduced to a total of 66 students (CMU: 0, SHU: 12, UoN: 18, UoR: 36) due to the remote nature of the survey completion by SHU students and also the inability to satisfactorily access students at CMU and for MSc students at UoN due to the Coronavirus pandemic.[2]

The characteristics of the sample for the pre-survey are set out in Table 1 indicating that 110 (79%) of the participants were female, while 39% of the total were from outside the United Kingdom. In total, 45% of participants were 18–21 years old and 43% were 22–25 years old. Of the total number of students, 47 (34%) were studying an MSc program with the remainder 92 (66%) studying a UG qualification. Of the UG students, 66 (72%) were in their final year of study with 50% having taken the opportunity to undertake a placement.

Participants' characteristics of the post-survey are presented in Table 1 indicating that 51 (77%) of the participants

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[2] The Coronavirus pandemic meant that some activities related to CMU studies (semester two) moved online and students were not able to be reliably invited to participate the second survey.

TABLE 1 Responses to questions identifying participant's characteristics

Variable	*n*	Mean	Std Dev.	Min	Max	Definition
Pre-survey						
Country	139	1.74	0.95	1	3	1 UK, 2 EU, 3 Non-EU
Gender	139	0.21	0.41	0	1	0 female, 1 male
Age	139	1.65	0.79	0	4	0 prefer not to say, 1:18-21, 2:22-25, 3:26-30, 4:31+
Undergraduate (UG)/ postgraduate (PG)	139	0.34	0.47	0	1	0 UG, 1 PG
UG year of study	92	0.34	0.45	0	1	0 first year UG, 1 final year UG
Placement	92	0.72	0.50	0	1	1 placement (BSc final year only)
Post-survey						
Country	66	1.89	0.96	1	3	1 UK, 2 EU, 3 non-EU
Gender	66	0.23	0.42	0	1	0 female, 1 male
Age	66	1.56	0.68	1	4	0 prefer not to say, 1:18-21, 2:22-25, 3:26-30, 4:31+
UG/PG	66	0.35	0.48	0	1	0 UG, 1 PG
UG year of study	43	0.63	0.48	0	1	0 first year UG, 1 final year UG
Placement	27	0.63	0.49	0	1	1 placement (UG final year only)

TABLE 2 Responses to initial multiple choice careers related questions included in pre-survey—Compared between UG and MSc

Variable	*n*	UG	MSc	Chi-square (*p* value)
Do you know what types of skills/qualities are desirable for the career path that you want to take?				
I do not know	7	6 (6.52%)	1 (2.13%)	3.01
I have some idea	98	67 (72.83%)	31 (65.96%)	(0.222)
I am well aware	34	19 (20.65%)	15 (31.91%)	
How confident are you that you understand what skills you can offer the workplace?				
Not at all confident	2	2 (2.17%)	0 (0.0%)	11.39
Not confident	37	22 (23.91%)	15 (31.91%)	(0.010)*
Confident	85	63 (68.48%)	22 (46.81%)	
Very confident	15	5 (5.43%)	10 (21.28%)	

Note:

*Significant at *p* value < 0.05.

were female with 48% from outside the United Kingdom. In total, 53% of participants were 18–21 years old and 39% were 22–25 years old. Of the total number of students, 23 (35%) were studying an MSc program with the remainder 43 (65%) studying a UG qualification. Of the UG cohorts, 27 (63%) were in their final year of study.

3.2 | Analysis of quantitative data

3.2.1 | Pre-survey

Figures 1(a) and (b) illustrate the types of career paths the students are considering on graduation and any specific role types under consideration, respectively. Results indicate a prevalence for seeking employment alongside or instead of further study or a research degree in their responses (it is worthy of note for non-UK contexts that "a graduate scheme" is a form of employment, not academic study in any form). Aside from appreciably lower interest in academic research from the MSc students, there appears similarity of response or interest in fields by UG and MSc students. Types of roles of interest are briefly considered in the discussion section. Table 2 shows that the first question holds no significant association between understanding of desirable workplace skills and the level of their study; however, it appears UG students are relatively more confident in understanding the personal skills they possess for working life.

TABLE 3 Analysis of responses collected from the post-survey questionnaire (multiple choice single answer)

Variable	n	Strongly agree %	Agree %	Neutral %	Disagree %	Strongly disagree %
I am confident from the explanation given of the research undertaken that the competencies for food graduate careers (CFGC) reflects food industry requirements for graduate competencies.	65	35.38	46.15	16.92	1.54	0
The terms and the language used in the CFGC is understandable to me.	64	42.19	46.88	7.81	3.13	0
Having 14 different roles outlined for graduates entering the food industry has been useful for me.	63	41.27	46.03	11.11	1.59	0
I have found the information on what is desirable for each of the roles useful in considering what the most appropriate first graduate roles are for me.	64	29.69	48.44	17.19	4.69	0
Overall, the CFGC has been a useful reference with regard to supporting my future career planning and job applications. (Sheffield Hallam University and University of Nottingham only)	28	46.43	46.43	7.14	0	0

3.2.2 | Post-survey

Responses to key single response questions in the post-survey are illustrated in Table 3 indicating that the majority of students positively received the introduction and integration of CFGC into teaching activities with all questions responded affirmatively at 78% or greater. Responses also indicate that students understood the resources and found them relevant and useful for career planning and job applications.

3.2.3 | Analysis of qualitative responses (post-survey only)

Qualitative responses were analyzed, and the generated themes gathered for the two open-ended responses in the post-survey (Q10 and Q11) are presented in Figures 2 and 3.

When asked "what did you like about the CFGC?" (Q10) and "what would you improve about the CFGC?" (Q11), similar profiles were observed for both UG and MSc cohorts. Proportions of response provided are based on the total items collected, namely, Q10, 69 (UG), 25 (MSc) and Q11, 31 (UG), 16 (MSc). For the first question, *provision of role types and profiles as well as information on types of graduate skills or competencies required* (Figure 2) were the top two responses accounting for very similar percentages overall (32% and 20%, respectively, in UG and 40% and 16%, respectively, in MSc). Furthermore, UG students found it *very easy to use* (14.5% UG vs. 8% MSc), and both cohorts

similarly favored the tool *for personal use for job suitability and personal development* (17.4% and 16% for UG and MSc, respectively).

Overall, constructive and positive comments were obtained when the students were asked what to improve. It is noteworthy that some students indicated the tool as good and there was nothing that needed improvement (13% and 25% of UG and MSc students, respectively). However, 13% of both UG and MSc responses indicated that they would like to see more than three themes to choose from when using the online tool (University of Nottingham, n.d.), and the same proportion would like to view roles outside of the CFGC remit. Furthermore, 29% of UG and 31% of MSc would like to see examples of real job advertisement. Within the UG cohort responses, some suggested improved visual impact and others requested features that were actually already available (13%).

3.2.4 | Semi-structured group interview

Conducted at the start of semester two, the group comprised one male and five female UG students, where half that had undertaken a placement year and within the overall group of six had representation of home (the United Kingdom) and overseas students. Taking the findings of the UoN post-survey as a basis for discussion, the findings clearly confirmed the value of the tool to the students. However, areas for further improvement centered on provision of "real-life" examples of graduates in each role
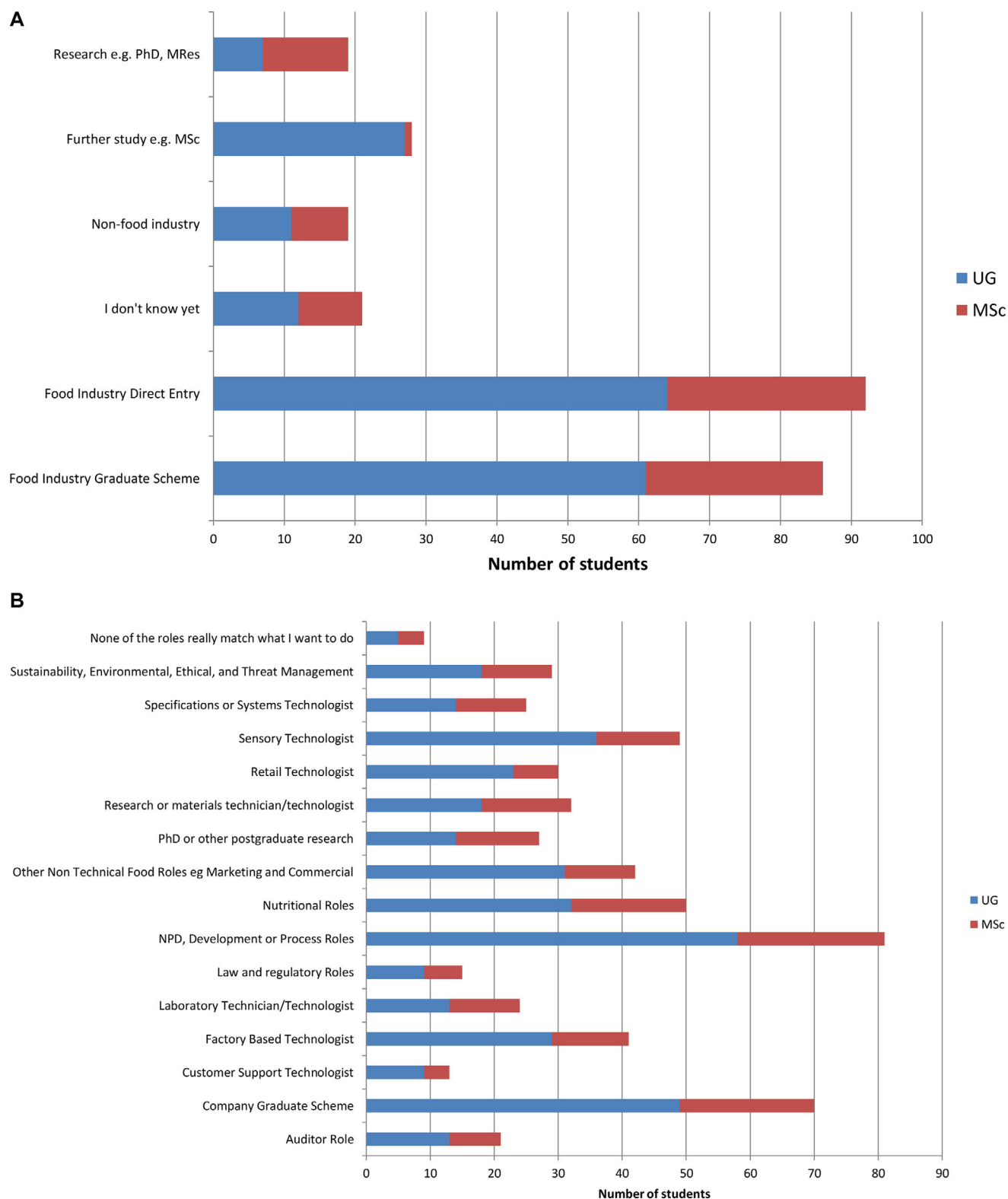
A

B

FIGURE 1 Presentation of responses to pre-survey questions relating to future career possibilities (both allowing multiple responses; *please refer to Supporting Information "pre-survey questionnaire, section A, Q1 & Q2)*
(A) Which of the following career paths would you like to take after graduation?
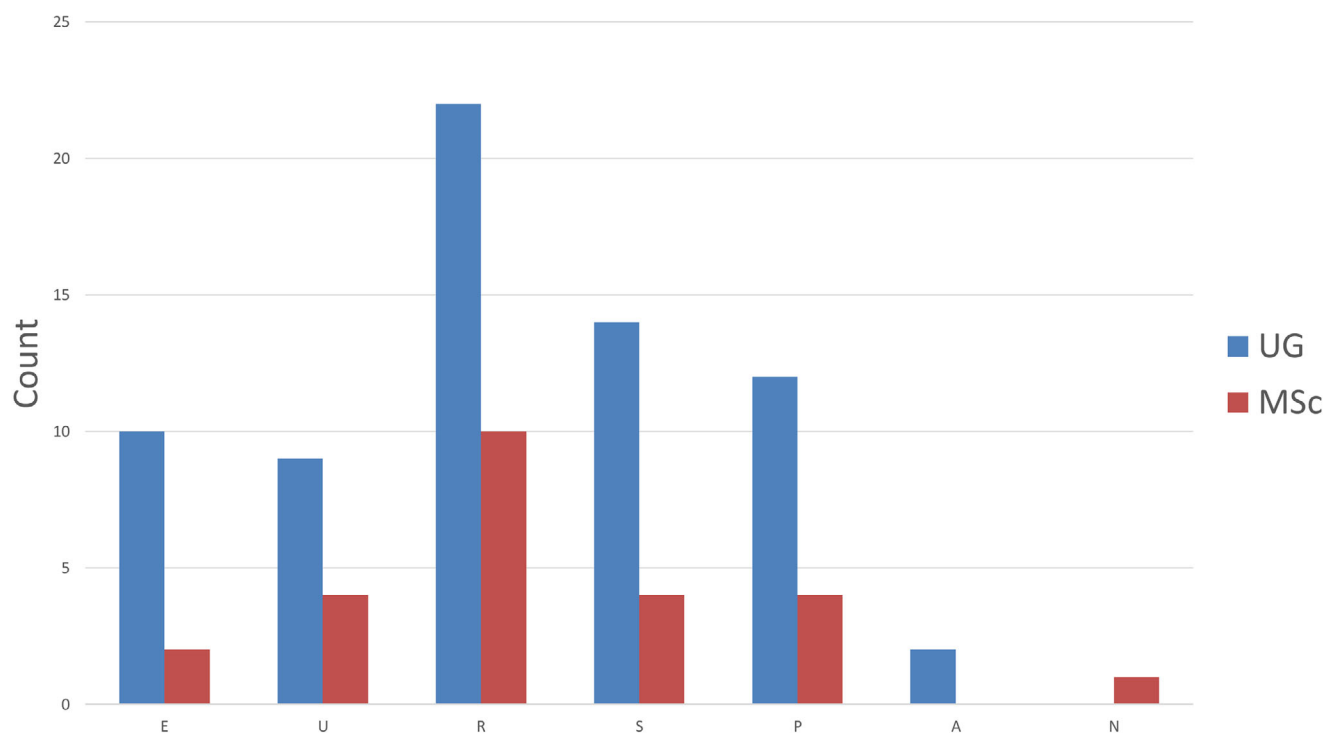(B) Have you considered any of the roles listed below?

FIGURE 2 Presentation of Q10 responses grouped into themes
E: Easy to use; U: Useful or like–general; R: Provision of role types and profiles; S: Information on types of graduate skills or competencies required; P: Personal use for job suitability and personal development; A: Supports job application; N: Did not like anything

and also improved visual impact of the material beyond the current "blue" tones. With respect to the teaching interventions, they found regular application of CFGC in activities such as interrogating job specifications, CV writing ,and mock interviews very useful. The provision of posters on the wall in the teaching room supported in-class activities while self-directed work drew on the online resources, including use of the additional maps of CFGC *elements* against their core program of study at UoN (Weston, Benlloch-Tinoco, et al., 2020).

3.3 | Discussion

Some of the interventions planned and the conclusion of the post-survey with some cohorts have clearly been hampered by the global pandemic.[1] Despite this, the study continued and all collected data synthesized to establish some findings that could be of worth for degree educators. Reflections of these initial findings could then enable the development of future careers support using CFGC while considering additional strands of research. Although the study has been conducted in the United Kingdom, it is envisaged that the findings will have some application for

educators and students in other countries, as the food sector is truly international and similarities can be drawn by others.

In reviewing data, researchers were mindful that while the CFGC tool is aimed at food science students, some programs have other disciplines embedded in curricula, for example, business, marketing, and consumer sciences. Thus, students may wish to explore roles outside of those highlighted in CFGC. The researchers appreciate they would not have the expertise to build extra vocations into CFGC; however, suggestions for inclusions of other frameworks or careers resources to support students moving into other fields will be facilitated in those institutes with some of these broader programs. It was also suggested that a generic "role" be developed for those planning to undertake postgraduate-taught (MSc) programs to support their career planning and immediate application processes.

Responses from students in the pre-survey indicate a readiness to explore career options and varying levels of prior understanding of typical pathways and requirements, with MSc students perhaps having more confidence overall. Conversely, the UG students seem to have more clarity on the roles that they are interested in undertaking upon graduation. Roles such as *new product development*
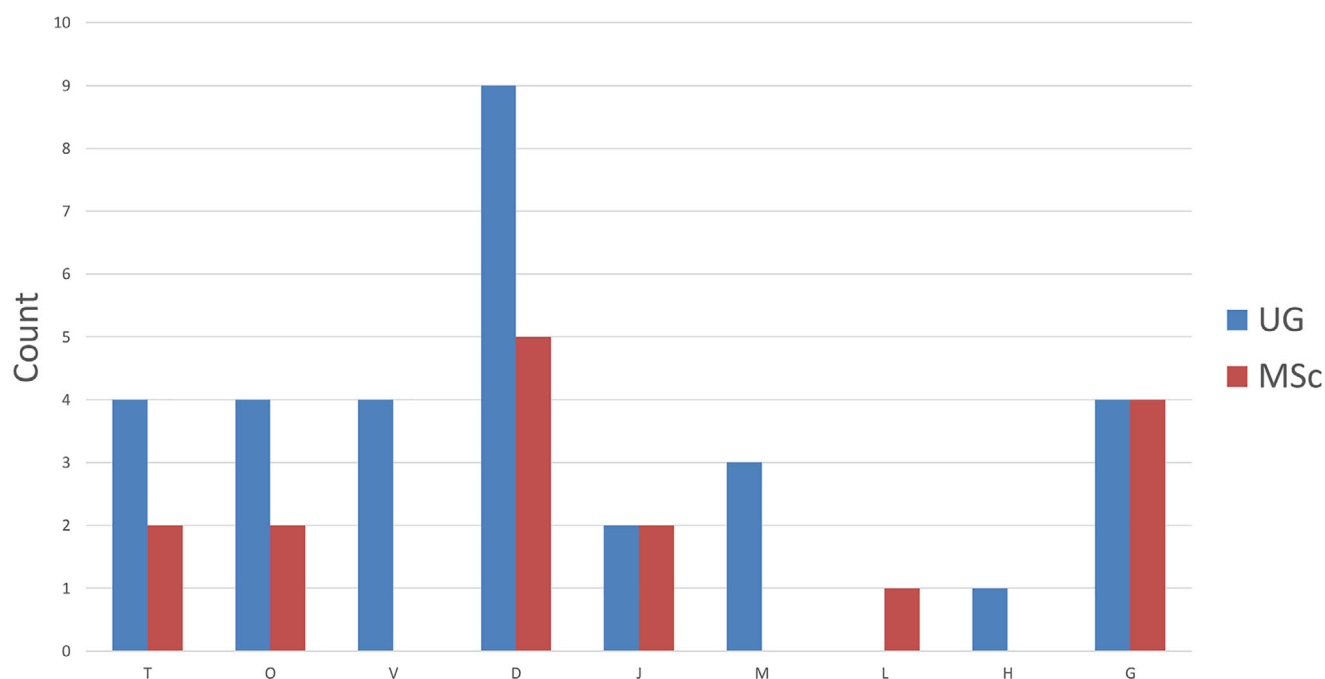
FIGURE 3 Presentation of Q11 responses grouped into themes

T: Want to choose more than three themes in the online tool; O: Would like other roles (some ask non-food science roles); V: Improved visual impact or interest of posters/profiles; D: More information on roles/job descriptions/real advertisement examples; J: More support in how to in reality search for a role/job; M: Misunderstanding–wanting features that are already available (cannot find?); L: Too many elements; H: Not happy with the tools results when entered info; G: All good nothing to improve

(NPD), doctoral study, company graduate schemes, and *sensory technologists* are commonly undertaken by new graduates in the United Kingdom, and to a certain extent, in an international context (Hartel & Klawitter, 2008; Oreopoulou et al., 2015). Relative numbers of responses in the pre-survey reflect this reality quite clearly. While no known research has been undertaken to confirm the prevalence of roles in the United Kingdom, there is prior knowledge of industry employment patterns, in particular, relating to destinations of graduates from the four UK institutions in the study. In addition, a review of graduate role advertisements over the past 5 years has been undertaken, where, for example, the NPD role types are one of the most common initial graduate positions to undertake. Participants selecting *nutritional roles* and *other non-technical food roles, for example, marketing and commercial*, perhaps reflect the nature of their program of study and thus interest in this field.

The interrogation of the survey responses of the different groups of students or when comparing simple demographics, through Chi-square testing, did not yield any significance, for example, institution, age, or placement. This was possibly in part due to the sample size of the post-survey. Additionally, the longitudinal movement of individual role

choices between pre- and post-survey questions could not be sufficiently tested due to the pandemic. This needs further research to establish if there are any changes to career interest following the introduction of the tool.

Responses gathered from the post-survey and group interview indicate students value CFGC and its use in teaching in four UK institutes, which is most encouraging.

Now confident in the success of the use of CFGC resources beyond UoN, there were some areas identified from the study that could be considered to develop CFGC in the future. The transition from higher education into employment is challenging and students should be supported so they are ready to perform in a real work environment and able to respond positively to the demands of employment (Pollard et al., 2015). Understanding the roles available more fully should enable students to identify the right positions to apply for, and if successful, in securing a role, start work to better prepare for what may be expected of them. Supporting this aim, a significant learning was that students from both UG and MSc cohorts would welcome examples of "real-life" job advertisement and case study examples of graduates associated with each of the CFGC roles. These additional features would inform them of (i) the type of role and how it fits within the company,

(ii) what type of person may suit the role, and (iii) more insights into how an individual may tailor job applications. This can aid reflection on whether they have the right competencies and thus personal decision-making. Work to gather such material to add to CFGC resources will be undertaken by the researchers, including updating the visual aspect of the components to maximize their impact as appropriate.

With respect to how CFGC can support teaching activities, this study has gathered viewpoints of different teaching interventions across four UK institutes. The system of integration at UoN is now well established into a core, third-year UG semester, and it was agreed that the students gain from this focused "rich" approach, but there is an argument that it may be at a relatively late stage of the program to provide the best use for some students. Respective cohorts have also valued targeting students before they embark on placement applications (UoR), before more detailed reflective modules (SHU), or use in plenary sessions to excite new UGs (CMU). The researchers are also mindful that the level of support from internal careers services at each institute varies and should be efficiently integrated into any plans for the future. For instance, mock interviews are already provided in some institutes by generic careers advisors but perhaps could be better supported by the use of CFGC resources in the future. As a result of this study, CGFC is now integrated into the educational processes at all four institutes; for example, at CMU it is embedded in their professional skills module where in the 2020–2021 year, students have engaged in an in-depth session about competency in the food industry.

The learnings from this study have provided ideas and confidence in processes for a number of forms of interventions that all the researchers intend to flexibly and appropriately in the future with their UG and MSc student cohorts. Although there are no plans to change the main timing of intervention in programs at each institute, the inclusion of additional earlier points of intervention in the second year of UG study at UoN exemplifies response to findings that students are receptive to explore personal development at earlier stages of study. Equally, it has been collectively agreed that in the future, all activities should be explicitly aligned so that the students can see how their career journey has been facilitated during their whole program of study. Specific curriculum mapping against CFGC (as outlined earlier) may be employed in other institutes to facilitate this, and prior work aligned to this study at UoN (Weston, Benlloch-Tinoco, et al., 2020) informed by studies including the limited work by other food science educators (Joyner, 2016), in addition to further publications (Joyner & Stevenson, 2017), may help to support this endeavor for others. It is also appreciated that some of the terminologies may be different for other countries; however, the content and applicability of the approach to aid employability is perceived to be universal for the wider food industry and higher education outside of the United Kingdom.

The perceived relevance of CFGC to students to help them choose the right career pathway in the food industry has been established from this study. The researchers are mindful that while core food sciences graduate roles are likely to remain as opportunities for students, businesses respond to future needs, and types of roles and the nature of requirements to succeed in them may evolve through time. For example, the CFGC element *digital capability* may increase in desirability for some roles, and new roles may also emerge for our graduates and postgraduates. As such it is aimed for the CFGC survey originally conducted in 2017 (Weston, Foster, et al., 2020) to be reprised in the future, to enable any revisions to be made to reflect the contemporary needs of employers.

4 | CONCLUSION

CFGC has been disseminated as open access resources and used at UoN for a number of years in teaching activities. This study has sought to understand the receptiveness of students at a range of UK institutes to CFGC resources and also explored the value of a variety of careers support interventions within food science-based programs. In a climate of rapid change in teaching "classrooms," striving to improve teaching quality for our students, including careers education, is never more important. The results of this study are aimed to support educators reflecting on this facet of their degree provision and how they can best prepare their graduates for success in the food industry.

AUTHOR CONTRIBUTIONS

Design, implementation (at the University of Reading), data analysis, draft and revision activity, report writing: Emma J E Weston. Design, implementation (at Sheffield Hallam University), data analysis, draft and revision activity, report writing: Caroline Millman. Design, implementation (at Cardiff Metropolitan University), data analysis, draft and revision activity, report writing: Anita Setarehnejad. Design, implementation (at the University of Reading), data analysis, draft and revision activity, report writing: Emma J Bennett. Design, implementation (at the

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.