



Graduate perspectives of workplace preparation and skill development in undergraduate human nutrition programs

Anjana J. Reddy^{1,2}, Donna Reid², Ashley H. Ng^{1,2}, Deanna Horvath² and Adrienne Forsyth³

Corresponding author: Adrienne Forsyth (adrienne.forsyth@acu.edu.au)

¹ Monash Centre for Health Research and Implementation, Faculty of Medicine, Nursing and Health Sciences, Monash University, Australia.

² School of Allied Health, Human Services and Sport, La Trobe University, Australia.

³ School of Behavioural and Health Sciences, Faculty of Health Sciences, Australian Catholic University, Australia.

Abstract

Earlier work has explored perspectives of undergraduate nutrition students, academics and employers regarding career-development initiatives. This study aimed to identify nutrition graduates' degree expectations and understanding of career outcomes, explore perspectives of skills and attributes important in developing career readiness, and assess the emphasis placed on development of these skills during the degree. Graduates (2015–2020) from one on-campus and one online undergraduate human nutrition degree at an Australian university were invited to participate in an anonymous online survey and optional follow up interview in July 2021. The survey collected quantitative and qualitative (short form) responses that were analysed descriptively, with open-ended responses subject to inductive content analysis. Semi-structured interviews were transcribed and analysed thematically. Fifty participants completed the online survey and seven participated in interviews. The university-defined graduate attributes considered the most important in developing career readiness were oral communication, creative problem solving, application of skills and adaptability, autonomy and initiative, and planning and organisation. Forty-four per cent of graduates felt career-readiness was developed during their undergraduate nutrition studies, with critical inquiry and research skills developed the most. Industry experience, food skills, education resource development, clinical skills, knowledge of software, and dietary data collection and analysis were considered essential for a nutrition professional. Placements, work experience, authentic case studies, simulation and problem-solving activities were strategies seen as fostering career-readiness. These views echo those of students, academics and employers. Universities should incorporate authentic, industry-based learning activities within explicit career development curricula to support the development of work-ready nutrition graduates.

Keywords

undergraduate, nutrition, profession, career, work, graduates, principal employability, graduate attributes

Introduction

University-educated workers are considered essential to a country's economic health and development, international standing and social wellbeing (Bennett, 2020). In Australia, government funding is provided to universities using a performance-based model guided by graduate employment

outcomes (Tehan, 2019). This model intends to ensure that universities focus sufficient attention on the quality of teaching and student support to achieve the best possible graduate outcomes (Wellings et al., 2019). Alongside employment outcomes, another key consideration for universities is the workplace preparedness or ‘career-readiness’ training they provide to students. The term career-readiness encompasses an individuals’ confidence and capability to gain employment, and to efficiently execute tasks pertaining to their role based on the skillset developed in their training programme (Bennett, 2019; Steurer et al., 2022). Career-readiness is an evolving, multi-dimensional concept to be developed by students and graduates that requires communication with and between curriculum designers, educators and future employers (Darling-Hammond et al., 2014).

Career opportunities in human nutrition have diversified in recent years, parallel to increasingly complex diet, health and environmental issues (Barber et al., 2023; Croxford et al., 2022). Undergraduate nutrition degrees in Australia and other developed countries have increased in response to market opportunities of nutrition-related professional roles (Australian Government, n.d.; Murray et al., 2020). Traditionally, nutrition programmes have served as a pathway into the dietetics profession, which includes the management of disease using medical nutrition therapy (Morgan et al., 2019). While dietetics remains a desirable option for many aspiring nutrition professionals, opportunities exist in areas such as product development, marketing, food labelling and law, policy and consumer engagement, education and research (Lawlis et al., 2019). Thought leaders have also proposed future roles for nutrition and dietetics professionals including food aficionados, diet optimisers, knowledge translators, equity champions, systems navigators and food systems activists, change makers, activists and disruptors (Boak et al., 2022). Universities are challenged to revise their curricula to ensure students are equipped with skills that prepare them for existing and emerging roles (Croxford et al., 2022).

To assure the development of disciplinary-specific skills, as well as more diverse attributes, the Nutrition Society of Australia (NSA) established recommended national nutrition science competency standards to guide university education, ensuring graduates are prepared for diverse workforce roles (Lawlis et al., 2019). The competency standards have been incorporated as assessable components of higher education curricula by universities, to better prepare graduates for the range of work settings and potential employers. Employers seek graduates with academic expertise, disciplinary-specific skills and transferable skills (Monteiro et al., 2021), which are commonly recognised in university, policy and employer graduate attribute lists as essential graduate capabilities (Bridgstock, 2009). These include oral and written communication, planning and organisation, teamwork, problem solving, autonomy and initiative, critical thinking and digital capabilities. Additionally, it is important for graduates to develop self-management and career-building skills to navigate their careers (Bridgstock, 2009). Taken together, the development and finesse of capabilities, ability to secure and retain employment, and capacity to improve productivity, income and job opportunities is considered ‘employability’ (Bridgstock, 2009).

To assess the link between skill development and employability, researchers often survey or directly question employers to identify the most and least developed skills, and skills most valued by the employer (Bridgstock, 2009). The literature highlights a ‘skills gap’ emerging between industry expectations and graduate training in health services, including nutrition and dietetics (Gibson et al., 2015; Volders et al., 2010). In Australia, nutrition professionals have highlighted communication, business and professional skills as critical for new graduates, in addition to disciplinary-specific skills and knowledge (Croxford et al., 2022). They also offered potential student-driven strategies to improve graduate employability including strategic career planning, networking, work and volunteer experience, and university-led initiatives such as explicit teaching of business and professional skills and creating more opportunities for work-integrated learning (Croxford et al., 2022). While students may be lacking the skillsets desired by employers at the time of graduation, research has also documented a so-called ‘awareness gap’, which occurs when students lack awareness of skills developed during university study or are unable to articulate and translate these skills in the workplace

(Julien et al., 2023; Markovitz, 2017). These paradigms, alongside the ideological shift in the expectation of skills and capabilities of graduates, has produced a new challenge for universities and academics responsible for the development and delivery of vocational degrees. Experts argue that universities are responsible for teaching, assessing and evidencing student self-awareness, communication and their attainment of graduate attributes prior to graduation (Jorre de St Jorre & Oliver, 2018).

A scoping review of employability initiatives used in undergraduate nutrition degrees recommended that universities incorporate strategies that develop essential and project-based skills while exposing students to diverse workplace settings through work-integrated learning (Murray et al., 2020). In one of the few studies of nutrition graduates' experiences, Barber and colleagues (2023) found that curricula in research, food regulation and public health can support employment, perhaps due to the applied and authentic nature of learning activities related to these concepts. They also found that work-integrated learning and guest lectures were helpful in building employability skills and social networks and were thought to contribute positively to employment outcomes. While graduate outcome surveys have been used to determine arbitrary employment outcomes, limited data exists in understanding student and new graduates' confidence in their skills, and in seeking and sustaining employment in their field (Barber et al., 2023; Clark et al., 2024).

This study aimed to explore the perspectives of recent undergraduate nutrition graduates regarding the skills and attributes they consider to be important for employment in the modern Australian nutrition profession. It also examined graduates' awareness of how their university emphasised the development of these skills and attributes during their degree. Uniquely, this study sought to explore graduates' perspectives on their own career awareness and degree expectations both at the time of enrolment and as they progressed through the degree programme. It explored graduates' perspectives on their development of employability skills during the degree as well as the approaches implemented by university staff, including within curricula, to assist with this skills acquisition. The findings from this study may inform the development of employability initiatives within undergraduate nutrition curricula at any university.

Methodology

The research team comprised a recent nutrition graduate undertaking Honours study, two nutrition-qualified academics and two academic dietitians. All the academic researchers were course advisors or coordinators responsible for the development, delivery and management of the undergraduate nutrition courses. They had conducted prior research exploring the perspectives of nutrition students, academics and employers, which shaped the direction of this research and may have influenced their choices with respect to data analysis. Consistent with the earlier work, a pragmatic approach was used for this research, drawing on the research methods most appropriate to address the research aims within a given context. In this case, we used an explanatory sequential mixed methods design (Cresswell & Creswell, 2023), with an online survey for maximum reach and follow-up interviews to explore salient findings and discuss participants' perspectives and experiences in depth.

Ethical considerations

Ethics approval was obtained from La Trobe University (HEC21149). All participants provided implied informed consent by completion of the online survey and written informed consent before participating in a semi-structured interview.

Participant sampling and recruitment

Purposive sampling was used to recruit participants (>18 years old) who graduated from one on-campus or one online undergraduate human nutrition degree at one Australian University between 2015 – 2020. The on-campus degree, offered on a metropolitan Melbourne campus since 2012, with 30-60 students per cohort, had a predominantly blended approach utilising online learning and face-to-face tutorials, workshops and practical classes. There was a pivot to fully online learning during pandemic restrictions in 2020 and 2021. The online degree, available to students across Australia and Australians living overseas since 2015, had up to 560 full-time equivalent students per cohort and could be completed remotely, with block-mode on-campus practical classes. The sample included students who later enrolled in postgraduate dietetics degrees.

Participants were recruited through alumni lists provided by the University Alumni team, directly via research staff networks and using targeted social media campaigns across Facebook, LinkedIn and Twitter platforms. A total of 321 graduates were invited to participate in this study via email. The invitation email contained the survey link, which remained open for four weeks from July 02 to July 30, 2021. Reminder emails were sent to potential participants if no response was received on day 7 and day 21. Social media recruitment on Facebook, LinkedIn and Twitter platforms was also refreshed once, 2-weeks after the initial post, to encourage participation.

Methods of data collection

The online survey, administered via QuestionProTM, collected initial quantitative and qualitative (short form) responses about participant demographics, years since graduation, previous education and current employment, classification of important skills required for the profession, key skills and attributes developed and not adequately developed during their nutrition degree, understandings of career readiness and strategies experienced during their degree, which they believed improved their career readiness. As this study formed part of a wider undergraduate nutrition employability project, the format and structure of the online survey questions (Appendix 1) were adapted from prior research (Ng et al., 2023) to align with the current study's aims by incorporating the specific skills and attributes outlined in La Trobe University's Graduate Capabilities Framework and Essentials Guideline. The revised anonymous online survey took approximately 20 minutes to complete and contained 19 questions, including multiple choice, one 3-point Likert scale question and one confidence rating scale question. The last question asked participants whether they were willing to participate in a one-on-one interview via Zoom. If participants selected 'yes', they were directed to a separate QuestionProTM form to enter their personal contact details so a trained member of the research team could contact them to schedule an interview.

Qualitative data was collected by a trained student researcher via semi-structured interviews using Zoom video-conferencing software. An interview guide comprised of 16 questions was collaboratively developed by the research team using inquiry logic (Dewey, 2018) on the findings from the online survey. The questions aimed to explore participants lived experience regarding career awareness and aspirations, confidence, skills development, employability concerns and employability initiatives in curricula to inform future curriculum and initiative development. Appendix 2 provides the logic for the questions asked in interviews.

Interviews were held at a time convenient for each participant and ran for 45-60 minutes. No academic or teaching staff were present during the scheduling or data collection process to avoid observation bias, whereby a participant either consciously or unconsciously alters responses due to the presence of an authoritative figure (Burghardt et al., 2012). Interview transcripts were audio-recorded, deidentified and transcribed by the student researcher prior to sharing with academic members of the research team. Each participant reviewed the transcript of their interview and confirmed its accuracy.

Survey data analysis

Quantitative data and open-ended responses collected from the online surveys were analysed descriptively using Microsoft Excel software. Open-ended responses were categorised and quantified to identify the most frequently occurring responses for each category. The categories were derived from the data using an inductive content analysis process, involving the distillation of open-ended responses into fewer content-related categories (Elo & Kyngäs, 2008). This process enabled the researchers to assume that, when classified into the same categories, words and phrases shared the same meaning (Cavanagh, 1997; Elo & Kyngäs, 2008). Categories were proposed by the student researcher and finalised following rounds of discussion with the supervising academics. The results from this analytical process are presented as descriptive statistics (frequency counts (n) and percentages (%)).

Interview data analysis

Using NVivo13 software, thematic analysis was carried out by two members of the research team. Thematic analysis provides a structured and rigorous approach to analysing qualitative data and erecting meaning, without generating theory (Nowell et al., 2017). The qualitative component of this research design followed an interpretive phenomenological approach to explore deeper meaning in discourse and understand multiple realities (as opposed to one objective reality) represented in a collection of participant narratives (Guest et al., 2011). This approach elucidates participants' views and experiences by analysing large sections of texts or dialogue to interpret meanings from lived experiences by searching for themes and engaging with the data interpretively (Edmonds & Kennedy, 2016).

Two researchers independently reviewed each transcript, grouped together common responses to generate initial codes, and formed themes by collating the initial codes. At each stage of the thematic analysis, codes, text and themes were cross-checked between the two researchers prior to broader discussion with the research team. In the results section, the final themes are presented in relation to each of the research questions.

Integration of the findings

While the interviews were informed by the survey results, to identify the most salient graduate perspectives, a further integration exercise was undertaken, involving one researcher scanning the survey and interview data separately to identify overlapping results. Each set of overlapping results was described using the interview data to, where possible, explain the survey responses or identify discrepancies between the data obtained from each method.

Results

Fifty participants completed the online survey and seven of these completed the follow-up semi-structured interview. Most were female (84%) and a higher percentage had completed the on-campus, as opposed to online, degree (58%) (Table 1). Seventy percent of participants had enrolled in their nutrition course directly following high school, while the remaining 30% had studied at a tertiary level or participated in professional work prior to enrolling. Fifty-four percent stated they intended to pursue a career as a nutrition professional or 'nutritionist', 8% as a research nutritionist, 30% onto further studies (dietetics or other) and 8% were unsure.

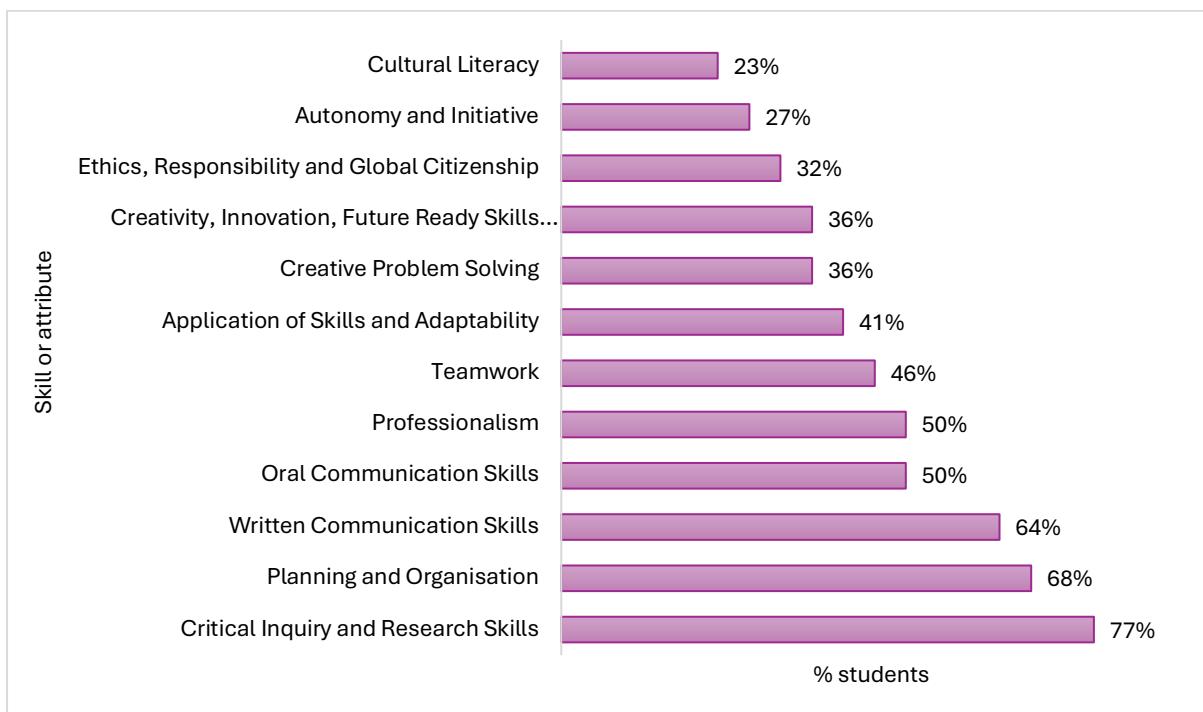
Table 1: Demographic characteristics of graduates who completed the online survey (n=50)

Demographic		n	%
Age	18-25	16	32%
	26-30	21	42%
	31-35	9	18%
	36+	4	8%
Gender	Female	42	84%
	Male	8	16%
Year graduated	2015-2016	13	26%
	2017	4	8%
	2018	5	10%
	2019	8	16%
	2020	20	40%
Course delivery mode	On-campus	29	58%
	Online	21	42%
Tertiary training or work experience prior to enrolment	Yes	15	30%
	No	35	70%
Found employment in nutrition-related field	Yes	14	28%
	No	34	68%
	Unsure	1	2%

In the online survey, participants were presented with a predefined list of 12 attributes considered essential graduate skills and capabilities by the university (Appendix 3). Of these, participants ranked oral communication, creative problem solving, application of skills and adaptability, autonomy and initiative, and planning and organisation as the top five skills and attributes important for developing ‘career readiness.’

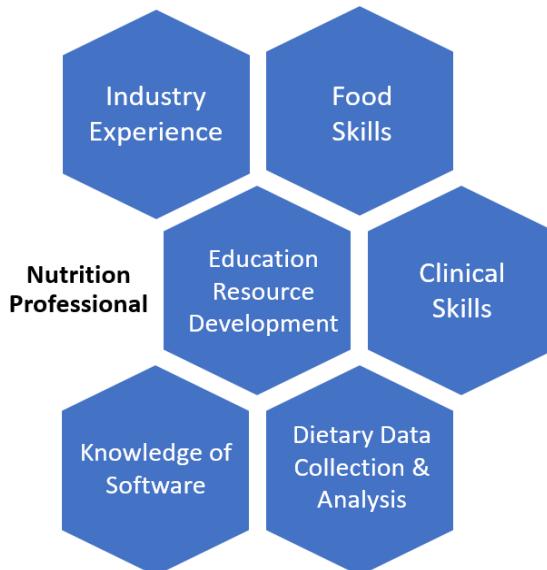
Forty-four per cent of participants felt that career-readiness was developed through the programme. When asked to select the skills and attributes they felt were most developed during their undergraduate degree, critical inquiry and research skills was ranked the highest, followed by planning and organisation, written communication, oral communication and professionalism (Figure 1). When prompted to list any other skills and attributes their undergraduate degree helped develop in terms of career readiness, predominant open-ended responses were: ‘self-guided learning’, ‘self-motivation and inspiration’ and ‘time-management skills.’

Figure 1: Graduate rankings of skills and attributes developed during their undergraduate nutrition programme (n=50)



In addition to these transferable skills and attributes, participants described (via open-ended responses) seven main categories of disciplinary-specific skills, knowledge and experience that they considered essential for nutrition professionals (see Figure 2).

Figure 2: Graduate perspective of disciplinary-specific skills, knowledge and experience required for nutrition professionals



Of the 50 participants, 54% stated that their career aspirations had not changed following graduation, while 34% considered their aspirations had changed and 12% were unsure. Fifty six percent of participants felt the programme did not develop their career-readiness or were uncertain as to whether it did. Sixty-eight percent were not employed in nutrition-related roles, 18% identified their current employment as nutrition-industry based and a further 10% gained relevant employment after completing post-graduate studies. Participants reported a lack of real-world experience (29%) and

limited job availability (26%) as the main concerns or barriers to employment, followed by the competitive nature of the application process (14%), a lack of career-readiness (8%) and not knowing where to find jobs (7%). Most (64%) participants reported they were 'not confident' in sourcing their own work experience during their programme.

Fifty-eight percent of participants reported that the career-readiness sessions they had attended at university – hosted by university academic staff, external advisory panels and/or health employers – were 'not helpful' for developing their career-readiness, with a further 26% unsure whether they were helpful or not. An open-ended question prompted participants to suggest strategies that could best foster career-readiness and the most common responses, ordered from highest to lowest ranked, were: (1) placement in clinical and public health settings; (2) work experience programs; (3) real-life case studies or examples; (4) simulations of professional roles; and (5) additional problem-solving activities. Other suggestions included requests of work placements and experience, assistance with job searches, and job application and career-ready training throughout the degree. The themes generated through analysis of the interview data are presented in Table 1 and described in detail below.

Table 2: Summary of research questions, pre-defined categories and themes identified from semi-structured interviews

Research question	Category	Theme
What was the level of career awareness and degree expectations of nutrition undergraduate students at the time of enrolment, and did this change as they progressed through the degree programme?	1. Degree expectations 2. Career aspirations	1.1 The roles and responsibilities of a nutritionist were unclear to many students commencing the degree. 2.1 Students with predefined career goal(s) or previous study at a university level had more confidence in gaining employment and career outcomes. 2.2 Students developed increasing knowledge and awareness of career pathways available in the field of nutrition and dietetics.
Which of the transferable and targeted employability skills were developed during the degree programme?	3. Skill acquisition	3.1 Graduates felt that they had limited opportunities to apply skills into practice during their studies. 3.2 Ownership of skill development was present in some, but not all graduates 3.3 Useful transferable skills were developed.
Did university staff and curricula assist the acquisition of transferable and targeted employability skills?	4. Career-readiness at university	4.1 Transferable skills were perceived as well developed, whereas career building and self-management skills were perceived as underdeveloped. 4.2 Career sessions required more active support.
Is it necessary to revise and rebuild employability initiatives into the undergraduate degree curriculum?	5. Reflective approach to employability in curricula	5.1 Graduates felt that there was a lack of business training provided within their degree. 5.2 Graduates highlighted the need to incorporate employability skills training into the course, suggested in the form of a subject. 5.3 Work experience could provide links with industry professionals and industry-based training. 5.4 Shadowing professionals could support career readiness.

Category 1: Degree expectations

Theme 1.1. The roles and responsibilities of a nutritionist were unclear to many students commencing the degree

Participants regularly stated they were unclear of the scope of practice of a nutritionist, both prior to enrolling and whilst undertaking their degree. The main confusion seemed to be between the role of a nutritionist versus dietitian, whether both could work in a clinical setting and provide medical nutrition therapy, and what exact alternate (non-clinical) roles existed.

Like many students or potential students, I was kind of unclear on what a nutritionist could and couldn't do. Before enrolling it was very much, I'll work in a clinical scope [...] But, obviously learnt that the role between a nutritionist and a dietitian is very varied. (P05)

Category 2: Career aspirations

Theme 2.1. Students with predefined career goal(s) or previous study at a university level displayed more confidence in gaining employment and successfully achieving career outcomes

Participants who had a clear goal or career outcome to achieve at the time of enrolment tended to be more focussed, confident, and direct in their approach to gaining employment. Participants who had previously studied at a tertiary level were more confident in the pathway taken in nutrition, perhaps through the process of eliminating avenues during previous studies.

I knew the pathway I wanted to pursue. I thought about the skills I would obtain through completing the degree, I knew they would help me in my career even if I didn't pursue dietetics. (P02)

Theme 2.2. Students gained increasing knowledge and awareness of career pathways available in the field of nutrition & dietetics, and career goals change as the degree progressed

A common perception shared by many nutrition graduates in the interviews was the realisation that alternate nutrition pathways exist instead of, or beyond, dietetics. The diversity of career options in nutrition became apparent as students progressed through their degree and with this so too did the students' career goals. Many participants moved away from the idea of pursuing dietetics. Many participants in this cohort pursued teaching and education, with a focus on health and nutrition.

[...] you don't necessarily need to work in a clinical practice to have an impact [...] This is so exciting to me. It has opened my mindset. (P02)

Category 3: Skill acquisition

Theme 3.1. Graduates felt that they had limited opportunities to apply skills into practice during their studies

Participants conveyed feelings of inexperience that were associated with the inability to practice discipline-specific or employability skills in practice-based scenarios or as a trainee. Participants explained that without being placed in a professional setting, they felt that they did not fully understand or experience what their role as a nutrition professional would entail.

Career readiness equate(s) to experience, feeling competent performing daily tasks associated with the role. I still lacked much understanding of exactly what those daily tasks would be. (P07)

Theme 3.2. Ownership of skill development was present in some, but not all graduates

Differences in motivations and ownership of their path from a nutrition student to professional were evident in this sample. Graduates who felt that the degree adequately prepared them for the workforce were able to identify that whilst the education, resources and skills were provided by the university, it was the graduates task to apply the skills and transfer those skills to additional aspects of their career.

I made the most of every topic, I exploited my teachers, I wanted to learn, and the course allowed me to do that [...] the university is there you can use the resources, it's there. (P01)

Theme 3.3. Useful transferable skills were developed

In agreement with the open-ended survey results, graduates acknowledged that their undergraduate nutrition program aided the development of diverse transferable skills.

[T]he [online nutrition] degree provides a really diverse and wide range of skills, soft skills, hard skills [...] in our field we have a broadness of needing to have so many different skill sets. (P02)

The skills I gained – writing for diverse audiences, statistics, organisation, project management, understanding of policy and legislation, report writing, SPSS – all can be attributed to the [online nutrition degree]. (P02)

Category 4: Career-readiness at university

Theme 4.1. Transferable skills were perceived as well developed, whereas career building and self-management skills were perceived as underdeveloped

Overwhelmingly, graduates expressed that their undergraduate nutrition course did not provide adequate preparation for the job searching or application process – specifically, CV writing and interview skills. Participants felt that this was a major limitation in successfully gaining employment and that key aspects of this preparation process were under or not presented at all in programme content.

An interview in health science is very different to an interview in teaching or fast food. (P03)

Teach us how to write a grant proposal or how to write a CV [...] type of stuff that is necessary in the job market. I think universities really need to grab that by the horns. (P04)

Theme 4.2. Career sessions required more active support

Graduates recalled that career sessions were offered at the course level and resources to enhance employability were embedded into subjects, though felt that sessions were lacking directness and employability curriculum should be organised into a standalone subject. Graduates expressed that they would have liked a direct avenue to job opportunities and hands-on job training, or networking events to mingle with professionals in the industry.

We probably needed a lot more of that in terms of having industry leaders connecting with students to offer an array of different job opportunities that come out of studying that degree. (P03)

I think what that session lacked was, I guess, that education on the steps to get there. (P05)

I did attend and didn't feel I was provided with any more direction on how to get my foot in the door. (P05)

Category 5: Reflective approach to employability in curricula

Theme 5.1. Graduates felt there was a lack of business training provided within their degree

Graduates emphasised the necessity for business and entrepreneurial knowledge and skill development to be embedded within the undergraduate nutrition programme. Graduates expressed that they themselves had intended to develop their own nutrition business but did not receive adequate training to do so in their course.

There wasn't enough emphasis or information or resources for people who actually wanted to have their own business [...] I still have a business coach (2 years later). (P01)

Business training. If it could be more specifically business for a nutritionist. (P01)

Theme 5.2. Graduates highlighted the need to incorporate employability skills training into the course, suggested in the form of a subject

Many graduates who participated in the survey and interviews proposed that employability training be placed in the undergraduate degree as a standalone subject which focuses specifically on the career-readiness of a nutrition professional.

Even just doing like one subject dedicated [...] to talk all about the workforce, careers, how to write a resume, how to make yourself stand out in a cover letter and interview skills. (P06)

Having an integrated career-readiness subject on career CVs/resume writing, interviewing skills etc. [...] I don't know if it would involve guest speakers, nutrition graduates that are in the workforce and having a large variety of them so that students in this degree can actually see that they are not just limited to working at a gym or food industry. Demonstrating different types of areas presented by people who actually do that for their work. (P06)

Theme 5.3. Work experience could provide links with industry professionals and industry-based training

All graduates expressed that the feelings of inexperience upon graduation (presented in theme 3.1) were strongly linked to the lack of industry-based experience they had received during the undergraduate programme, and the shortage of professional connections with practicing nutritionists or industry-based role models/mentors.

It would be beneficial to incorporate industry-based learning into the undergraduate degree. (P06)

Pick your own placement, engaging the different types of areas that a graduate nutritionist may find themselves working in. (P06)

Theme 5.4. Shadowing professionals could support career readiness

Graduates in both the online survey and in-depth interviews suggested shadowing a professional from a chosen sector in nutrition would be helpful in workplace training and career readiness. Graduates advised that this may assist future graduates to feel ready for the diverse range of sectors in which nutrition graduates may find employment.

For a couple of days a week could you shadow someone in the workplace – maybe not necessarily nutrition related. (P02)

Research-based work integrated learning. Perhaps do some practice at a lab in exercise physiology, nutrition science and so on. Maybe they can learn some basic lab skills if interested. Perhaps even shadowing a dietitian or shadowing a nutritionist. (P04)

Integration of survey and interview data identified five common topics: early career awareness; authentic employment experience; identification of transferrable skills, career preparation activities, and mode of delivery of employability initiatives. Seven per cent of survey participants reported not knowing where to find jobs as a barrier to employment. In support of this, some interview participants confirmed they were unsure about the difference in the scope of practice between a nutritionist and a dietitian while, in contrast, those who felt they understood the profession and had a clear career goal at the beginning of their degree felt more confident in gaining employment.

Authentic employment experience was raised as a concern in both the surveys and the interviews. Twenty-nine per cent of survey participants reported a lack of real-world experience as a barrier to employment. The most reported strategies to foster career-readiness were placement, work experience, authentic case studies and simulation. In interviews, participants unpacked these concepts further, conveying feelings of inexperience and uncertainty about what was expected in their future work, linking these feelings with a perceived lack of industry-based experience and interaction with professionals working in nutrition-related roles.

Forty-four per cent of survey participants reported that their degree program had developed career-readiness. They identified critical inquiry and research skills, planning and organisation, written communication, oral communication and professionalism as the transferrable skills they had developed. In interviews, specific examples of transferable skills were listed, including writing for diverse audiences, statistics, organisation, project management, understanding of policy and legislation, and report writing. Survey participants suggested assistance with job searches and job applications would foster career readiness. Interview participants overwhelmingly agreed, reporting that disciplinary-specific CV writing and interview skills were essential in the curriculum.

Participants in surveys and interviews recalled career sessions offered throughout their degrees, but only 16% of survey participants found these to be helpful. This was unpacked further in interviews, with participants expressing a desire for more intensive support in the form of a standalone disciplinary-specific work-readiness subject, as well as direct contact with industry professionals through networking events and work-integrated learning.

One idea expressed in the interviews, but not seen in the survey data, included the importance of business and entrepreneurial skills for nutrition professionals. These participants expressed a desire to launch a nutrition business, but they felt they lacked the knowledge and skills to do so.

Discussion

This study aimed to identify nutrition graduates' degree expectations and understandings of career outcomes, the skills and attributes considered important in developing 'career readiness', and their emphasis on the development of these skills during university studies, to assess the need for revision of the employability curriculum. Graduates who participated in this study tended to be career-goal oriented and understood degree expectations and outcomes. Their understanding of potential areas of practice evolved over the course of their studies, influenced by the diverse subjects taken and advice from academic staff. Participants noted that whilst their undergraduate degree assisted in developing transferable skills and disciplinary-specific knowledge, they perceived a lack of practice through real-world or scenario-based learning as a disadvantage to their career-readiness. This is consistent with views expressed by students and graduates of other undergraduate nutrition programs in Australia (Barber et al., 2023; Clark et al., 2024; Ferguson et al., 2024).

Participants ranked the five most important transferable skills for career-readiness as oral communication, creative problem solving, application of skills and adaptability, autonomy and initiative, and planning and organisation. Graduates felt that career-building and self-management skills required to attain employment were not adequately or explicitly taught in nutrition programs, and further refinement of these skills was desired. These findings are similar to those of Clark and

colleagues (2024) who surveyed graduates of undergraduate nutrition programs nationally and found that career development was one of the key aspects they wanted in the curriculum to support their future careers.

Graduates believed they would benefit from employability initiatives, such as a subject focused solely on career-goal specific training, industry-based training or placement, and the opportunity to shadow a nutrition professional from a chosen sector. These views reflect those of undergraduate nutrition students, academics and employers cited in previous research in which work placements, authentic learning tasks and networking were identified as important (Barber et al., 2023; Clark et al., 2024; Croxford et al., 2022; Ferguson et al., 2024; Murray et al., 2023). However, our participants also felt that understanding pathways for different career options, including labour market expectations and what roles they could play in the sector assisted with their development of intentional skills and capacity to make career-related decisions. This may require less intensive and more focused employability initiatives such as tasks that support students to identify and explore a selected career (Julien et al., 2023), develop reasonable, implementable career goals (Brown et al., 2003), and critically analyse external factors such as labour market conditions and demand of the discipline area (Rothwell et al., 2008). This learning can be reinforced with guest speakers, online modules or tours to expand on this information in practice (Julien et al., 2023).

However, while an improved awareness of career options is desirable, many graduates who participated in this study continued to have a potentially inaccurate understanding of scope of practice. The skills that they perceived they needed may not all be appropriate for practice as a nutritionist. Clinical nutrition skills were frequently cited as important to develop during their undergraduate degree. However, clinical nutrition, as defined in the European Society for Clinical Nutrition and Metabolism Guideline, pertains to nutrition measures used in disease prevention and treatment for individuals (Cederholm et al., 2017). In Australia, this is beyond the scope of practice for nutritionists and requires further training and qualifications as a dietitian (Allen & Palermo, 2022; Lawlis et al., 2019).

Many graduates in the present study felt a disconnect between the attainment of knowledge and transferable skills and their ability to refine and apply these skills in practice. Skills such as critical inquiry, research, planning and organisation, written and oral communication and professionalism that graduates felt they had adequately developed are directly linked with learning outcomes and assessment tasks throughout the undergraduate programmes. In contrast, less than half of graduates surveyed felt they had developed problem solving skills, could apply and adapt their skills or felt they had autonomy and initiative. These skills and attributes may be developed through practice-based and case-based learning, effective approaches to support unguided higher-order and critical thinking, enabling students to solve problems in a professional context (Blackburn, 2017; Croxford et al., 2022; Harman et al., 2015; Murray et al., 2020). Practice-based learning allows students to integrate their knowledge into real-world scenarios and learn how their skills and knowledge guide the decision-making process. Case-based learning helps students to connect theory to practice by thinking critically and solving authentic problems (Blackburn, 2017).

Graduates in the present study felt industry-based projects or placements that allow students to gain work experience to be the most important employability initiatives lacking in their nutrition degree. Nutrition graduates viewed ownership and coordination of practical work experience as a university responsibility and felt they were inadequately equipped to source placement or work experience alone. Industry experience provides an opportunity to build confidence and networks, and experience real-world learning and application of skills (Habets et al., 2020). However, the capacity to offer conventional work placements to the large number of nutrition undergraduate students remains limited (Barber et al., 2023; Croxford et al., 2022). The evolving nutrition landscape and diverse career outcomes outpaces the ability of university staff to initiate and maintain placement relationships and the workload involved for industry partners limits their capacity to take on students (Croxford et al., 2022). Moreover, university departments may be ill-equipped to manage additional overhead

demands associated with maintaining university-industry alliances (Murray et al., 2020). An alternative approach may be to empower students to source their own volunteer roles to gain experience and build networks throughout their degree which could enhance employment opportunities (Barton et al., 2019; Hackl et al., 2007). The lack of current confidence, autonomy and initiative may need to be addressed with increased pastoral care, perhaps a factor to be considered within an employability-specific subject or unit content.

In 2021, after all participants in this study had graduated, a new employability-focused elective subject for nutrition students was introduced based on earlier research with other key stakeholder groups (Croxford et al., 2022; Ng et al., 2023). The elective subject aimed to help students understand the purpose of their qualification and scope of practice, explore various career pathways in nutrition, and link their individual subject and degree learning outcomes to the NSA competencies. An individual module within the subject was designed to facilitate development of employability skills pertaining to impactful job searching strategies, creating CVs, addressing key selection criteria and effective interview skills. Finally, the subject aimed to equip students with an understanding of how to conduct themselves as a graduate in a professional environment, forming and maintaining meaningful relationships and networks, and how to be proactive in career planning and ongoing professional development. The ability to provide a concise, professional description of oneself on paper and in person, articulate the transferability of their skills to the job at hand, and the ability to decipher between suitable and unsuitable roles is pivotal to navigating one's own career. The ability to search and apply for jobs, formulate a CV and interview at a professional standard are classified as career-building and self-management skills and require separate and specific training. Outcomes of employment for students who enrolled in this subject are not yet available, but these learning experiences are expected to support the acquisition and development of skills pertinent to multiple nutrition-related careers.

Strengths and limitations

A strength of this study was the mixed methods design which enabled rich data collection by capturing complex and diverse graduate experiences (Schoonenboom & Johnson, 2017). This design also allowed for the moderation of over-dependence on statistical data to explain subjective graduate perceptions of career-readiness (Schoonenboom & Johnson, 2017); nonetheless, as our interview questions did not directly replicate the survey questions, direct triangulation was not possible and could have strengthened the findings. As this study relied on a relatively small sample of data collected from graduates of one discipline (nutrition) at one university, these results may not be generalisable to other disciplines and other universities (Quintão et al., 2020). Selection bias or respondent bias may be present within this study as graduates who volunteered to participate are most likely to be those with strong views related to employability (Tripepi et al., 2010).

Despite these limitations, the graduates who participated in this study reported similar preferences and experiences to those from other institutions, particularly in relation to the importance of work integrated learning, explicit teaching of employability skills, and support to develop social networks (Barber et al., 2023). They also reported common perspectives regarding the importance of communication and professional skills (Clark et al., 2024). These perspectives and preferences echo those of current students, academics, and employers (Croxford et al., 2022; Ng et al., 2023).

While our findings align with those of contemporary peers, increasingly there has been a focus on student development not only for the purpose of securing employment upon graduation, but on student development for the contributions graduates can make to society both through and outside of their employment (Cook, 2022). Only one third of our survey participants reported that ethics, responsibility and global citizenship were developed through their course, a finding that deserves further consideration and attention, particularly given identified future roles of nutrition professionals as 'equity champions, systems navigators and food systems activists, change makers, activists and disruptors' (Boak et al., 2022). Boak et al. (2022) describe a further 16 critical capabilities that, in

employability speak, may be considered transferable soft skills and should be considered alongside university graduate capabilities and professional body competency frameworks.

Future research related to employability should consider not only how degree programs prepare graduates to gain employment, but how they can prepare graduates to shape the employment landscape and contribute to society. The relational employability framework (Cook, 2023), incorporating elements of 'foundational career development and identities', 'contribution to local and global challenges', and 'interactions with other people', has been used to support nutrition students' awareness of their position and impact on others (Cook & Sambell, 2025), and may be a useful framework to consider in future development of nutrition employability initiatives.

This study concludes a larger body of research conducted by our group that involved a scoping review of employability initiatives (Murray et al., 2020), interviews with academics and employers (Croxford et al., 2022), surveys and focus groups with students (Ng et al., 2023), and surveys and interviews with graduates. This body of work was initiated in response to our observations that nutrition students struggled to identify relevant work opportunities on graduation, despite a plethora of diverse roles available. The consistent views of students, graduates, academics, and employers highlight the need for a greater focus on career readiness during undergraduate nutrition study, supported by authentic learning activities and assessment, work integrated learning, and opportunities to develop industry networks. While these course initiatives align with universities' emphasis on producing work-ready graduates, advocacy from industry and professional bodies may be needed to support the increased administrative burden associated with course-wide implementation of these initiatives.

Conclusion

Fewer than half of the nutrition graduates surveyed felt that career-readiness was developed during their undergraduate nutrition studies. They perceived critical inquiry and research skills to be most developed, while placements, work experience, authentic case studies, simulation and problem-solving activities were viewed as strategies to foster career-readiness. These views echo those of students, academics and employers found in previous research. Universities should strive to incorporate authentic, industry-based learning activities and explicit career development curricula to support the development of a nutrition workforce ready to fill existing and emerging nutrition-related professional roles.

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Conflict of interest

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Declaration on the use of AI

No use of Artificial Intelligence was made at any point in this submission.

CReDIT authorship contribution statement

AR, AN, DH and AF conceptualised the study. All authors had input into the design of data collection tools. DR and AR collected and analysed data. AR and DR drafted the manuscript. All authors critically reviewed the manuscript and approved the final version.

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Appendix 1: Questionnaire

Q1. Which gender do you identify with? (Select one)

- Male
- Female
- Prefer not to answer

- Prefer to self-describe [If selected – free text response provided]

Q2. Which age range do you fall into? (Select one)

- 18-25 years
- 26-30 years
- 31-35 years
- 36+

Q3. Did you complete Bachelor of Human Nutrition or the Bachelor of Food and Nutrition? (Select One)

- Bachelor of Human Nutrition (HBHN)
- Bachelor of Food and Nutrition (HBFN)

Q4. What year did you graduate from the Bachelor of Human Nutrition or Bachelor of Food and Nutrition? (Select one)

- 2015/2016
- 2017
- 2018
- 2019
- 2020

Q5. Before entering the Bachelor of Human Nutrition or Bachelor of Food and Nutrition, did you complete any other training or have prior work experience? (Select one)

- No
- Yes [If selected – please describe (free text response)]

Q6. Upon graduating from the Bachelor of Human Nutrition or Bachelor of Food and Nutrition course, what career or job were you hoping to get? Please describe.

Q7. Did your career aspirations change as you entered the job market? (Select one)

- Yes
- No
- Unsure [If selected – please describe (free text response)]

Q8. Did you find employment (in the field of nutrition and health) once you graduated? (Select one)

- Yes [If selected – please describe (free text response)]
- No [If selected - please rank your concerns around finding employment in the field of nutrition and health from most concerning (1) to least concerning (6):
 - Competitive nature of application process
 - Job availability
 - Lack of real-world experience
 - Lack of career readiness
 - Not knowing where to find jobs
 - Other]

- Unsure [If selected - please rank your concerns around finding employment in the field of nutrition and health from most concerning (1) to least concerning (6):
 - Competitive nature of application process
 - Job availability
 - Lack of real-world experience
 - Lack of career readiness
 - Not knowing where to find jobs
 - Other]

Q9. What skills and attributes (qualities, characteristics, traits) do you think are the most important in defining your own career readiness? (Select all applicable)

- Oral Communication Skills
- Written Communication Skills
- Critical Inquiry and Research Skills
- Creative Problem Solving
- Autonomy and Initiative
- Creativity, Innovation and future ready skills (use of technology and innovative tools)
- Professionalism
- Planning and Organisation
- Teamwork
- Ethics, Responsibility and Global Citizenship
- Cultural Literacy
- Application of Skills and Adaptability

Q10. List any other skills and attributes (qualities, characteristics, traits) that you think are important in defining your own career readiness? [free text response]

Q11. From your perspective did the Bachelor of Human Nutrition or Bachelor of Food and Nutrition help develop your career readiness skills? (Select one)

- Yes [If selected – please select all applicable skills and attributes (qualities, characteristics, traits) that the Bachelor of Human Nutrition or Bachelor of Food and Nutrition helped to develop in terms of your own career readiness;
 - Oral Communication Skills
 - Written Communication Skills
 - Critical Inquiry and Research Skills
 - Creative Problem Solving
 - Autonomy and Initiative
 - Creativity, Innovation and future ready skills (use of technology and innovative tools)
 - Professionalism
 - Planning and Organisation
 - Teamwork
 - Ethics, Responsibility and Global Citizenship

- Cultural Literacy
- Application of Skills and Adaptability]
- No [If selected - What do you feel was missing from the Bachelor of Human Nutrition or Bachelor of Food and Nutrition in terms of helping develop your career readiness skills? [free text response]
- Unsure

Q12. Please list any other skills and attributes (qualities, characteristics, traits) not previously listed that the Bachelor of Human Nutrition or Bachelor of Food and Nutrition helped to develop in terms of your own career readiness? [free text response]

Q13. What skills, and attributes (qualities, characteristics, traits) do you classify as most important for you to learn or have developed during the Bachelor of Human Nutrition or Bachelor of Food and Nutrition course to achieve employment aspirations? [free text response]

Q14. During your course were there any career development sessions or any career development resources helpful in developing your career readiness or employability? (Select one)

- Yes
- No
- Unsure

Q15. How confident would you feel sourcing your own work experience or employment experience during your degree? (Select one)

- Very Confident
- Confident [If selected – what did this session entail? Please elaborate on what you remember]
- Not confident [If selected – please describe what support would you need to do this task? (Free text response)]

Q16. How confident did you feel in finding employment in the nutrition or health field after graduation? (Select a number on the confidence scale from 1-10; 1 being the least confident and 10 being the most confident)

Q17. Why did you select this confidence score? [free text response]

Q18. Could you identify any strategies or supports that might have benefited your consolidation of the skills and attributes required to be career ready? (Select one)

- Yes [If selected - what suggestions do you have of how La Trobe could best incorporate the skills and attributes you have mentioned within the Bachelor of Human Nutrition or Bachelor of Food and Nutrition course? Describe how these strategies would foster your career readiness upon graduation (free text response)]
- No
- Unsure

Q19. Do you have any other comments or suggestions in relation to career readiness development in the Nutrition degrees at La Trobe University? [free text response]

Appendix 2: Semi-structured interview questions and inquiry logic

Category Explored	Question	Logic
Degree Expectations	<ul style="list-style-type: none"> Prior to starting the degree, what did you expect your career path to be? What was your career goal? What made you choose La Trobe University's Bachelor of Human Nutrition or Bachelor of Food and Nutrition? 	Establish the expected career outcomes perceived by graduates upon entry into the degree to identify if these were actual outcomes of the course. Provides insight into the factors which contributed to the choice of degree.
Career Aspirations	<ul style="list-style-type: none"> What was your understanding of the career pathways available in Nutrition as you progressed through the degree? Now that you have graduated, has your career path or career goal changed? 	Explore perceived nutrition program career expectations and understanding of nutrition industry pathways. Understand factors that may have influenced changes in intended career goal or employment outcome/s.
Transferable and Targeted Employability Skills Developed and Assessed	<ul style="list-style-type: none"> What employability skills or attributes do you believe you have? <ul style="list-style-type: none"> Where did you obtain these skills/attributes? What career readiness or employability skills do you consider most important vs non-important to function well in the workplace? 	Allows participant reflection upon their own skillset and how/where skills were gained. Establishes importance placed on various skills from the perspective of the participants.
Career-Readiness and Approaches to Promote Employability at University	<ul style="list-style-type: none"> Could you define the term 'career ready' in simple language? What involvement do you think universities have in developing student career readiness or employability? What do you think about the quality of career readiness or employability skill development received in your Nutrition course? Were there any career development sessions or resources helpful in developing your career readiness/employability skills? <ul style="list-style-type: none"> If so, why do you think this/these session(s) were particularly helpful to you? 	Explores the meaning of career-readiness in participants. Measures the perceived ownership of career-readiness as the university's responsibility versus the students' responsibility. Evaluates the usefulness and accessibility of career insight sessions and current initiatives as seen by a previous student.
Reflective Approach to Integrating Employability into Curricula	<ul style="list-style-type: none"> (If employed) How do you feel your skills or attributes have facilitated your employment? Have your skills or attributes ever limited employment? (i.e., lack of skills) How do you think your degree could better prepare you for the workforce? What types of experience or learning would enhance student career readiness or employability skills in the undergraduate nutrition degree which you completed? 	Identifying strengths and limitations of current employability intuitive embedded into curriculum, as well as strengths and limitations in the perceived skills and attributes of recent graduates. Identifying the necessity to revise and rebuild employability initiatives into the undergraduate degree curriculum.

Appendix 3: La Trobe University Graduate Capabilities and Essentials Skills (2021)

1	Oral Communication Skills
2	Creative Problem Solving
3	Application of Skills and Adaptability
4	Autonomy and Initiative
5	Planning and Organisation
6	Written Communication Skills
7	Professionalism
8	Teamwork
9	Creativity, Innovation and future ready skills (use of technology and innovative tools)
10	Critical Inquiry and Research Skills
11	Cultural Literacy
12	Ethics, Responsibility and Global Citizenship