

ORIGINAL ARTICLE

Development and evaluation of Entrustable Professional Activities embedded in an e-portfolio for work-based assessment in community and public health dietetics

Andrea Bramley PhD, Mast Nutr Diet. Grad Cert. Health Service Management. Adv APD^{1,2} |
Adrienne Forsyth PhD MSc Nutr Diet & Ex Rehab MEd Higher Ed Adv APD Adv SD AEP³ |
Lisa McKenna PhD MEDST RN RM FACN FANZAHPE⁴

¹Department of Dietetics and Human Nutrition, La Trobe University, Bundoora, Victoria, Australia

²Monash Health, Clayton Road, Clayton, Victoria, Australia

³Dietetics and Nutrition at Australian Catholic University, School of Allied Health, Human Services and Sport, La Trobe University, Bundoora, Victoria, Australia

⁴School of Nursing and Midwifery, College of Science, Health and Engineering, La Trobe University, Bundoora, Victoria, Australia

Correspondence

Andrea Bramley. Allied Health Education Lead Monash Health. Adjunct Senior Lecturer, Department of Dietetics, Human Nutrition and Sport, School of Allied Health, Human Service and Sport, La Trobe University. Kingsbury Drive Bundoora, Vic. 3086, Australia.
Email: a.bramley@latrobe.edu.au

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Abstract

Entrustable professional activities (EPAs) is a recent concept that helps operationalise competency-based education. In this paper, we report on the development of EPAs and incorporation into an e-portfolio for work-based assessment of final year dietetics students in a community and public health professional placement. We aimed to determine the utility of the EPAs for work-based assessment in this context. We used action research methodology to conduct broad consultation with students and supervisors using anonymous surveys and focus groups to understand their beliefs and attitudes towards work-based assessment. Consequently, 40 EPAs with an accompanying four-point entrustment scale were developed and mapped to the National Competency Standards for Dietitians in Australia. The EPAs and assessment tool were piloted and evaluated via an anonymous online user survey across three cohorts of students ($n = 133$) and supervisors ($n = 67$). Following mediocre pilot year evaluation results, EPAs were revised and reduced in number. While students positively evaluated the e-portfolio, their appraisal of the EPAs and entrustment scale was less positive compared to supervisors. Supervisor evaluation of the EPA-based e-portfolio supported the validity, feasibility and acceptability of this novel assessment method in a community and public health setting. Assessment using EPAs, and the resulting educational data collected by the tool, offers potential for individual learners to identify areas needing development during placement, as well as potential to inform curriculum improvements and increase understanding of learning opportunities and outcomes for dietetic students in community and public health settings.

KEYWORDS

competency-based education, dietetic education, Entrustable professional activities, e-portfolio, work-based assessment

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1 | INTRODUCTION

Work-based placements are a fundamental feature of health professional entry-level degrees allowing students to demonstrate that they can translate knowledge, skills and attitudes into professional practice contexts (Carraccio et al., 2008). Entrustable professional activities (EPAs) are becoming an increasingly popular and accepted assessment strategy, helping operationalise competency-based education in work-based settings (Shorey et al., 2019). EPAs are units of observable work that a competent professional does as part of their healthcare role (Hauer et al., 2014; ten Cate, 2013). They have been extensively used in postgraduate medicine (Aimer et al., 2016; Rose et al., 2014), are emerging in international entry-level medicine (Meyer et al., 2019) and gaining increasing acceptance in entry-level nursing (Lau et al., 2020; Shorey et al., 2019), pharmacy (Haines et al., 2017) and allied health professions, such as dietetics (Begley et al., 2019; Wright & Capra, 2017), with entry-level defined as being immediately prior to registration. To date, adoption of EPAs has predominantly occurred in professions that provide direct clinical care to individual patients in inpatient healthcare settings, but there are early examples of use in community-based medicine and pharmacy (Bramley & McKenna, 2021; Chang et al., 2013; Russo et al., 2016; Valentine et al., 2019; Westein et al., 2019).

Dietetics courses in Australia include three main different practice areas, each with supervised work-based placements (Dietitians Association of Australia, 2017). Clinical dietetics involves the provision of medical nutrition therapy for an individual and is typically based in a hospital setting. Food service dietetics involves the provision of dietetic interventions for populations dependent on a food supply for their nutrition intake such as hospitals, prisons or residential aged care. Community/public health dietetics involves provision of project-based health promotion or population/ program-based nutrition interventions delivered using the program management cycle in a community or public health organisation (Grier & Bryant, 2005). These placements allow the development of cultural competencies, preventative and public health experiences that may be difficult to obtain in other settings. Community and public health dietetic placements are used for assessment of students against the national competency standards for dietitians in Australia (Dietitians Australia, 2015); however, lack of a widely accepted work-based assessment tool for use in clinical dietetics has been noted (Jamieson et al., 2019) and there is little published literature regarding assessment of students in food service or community domains of dietetics (Palermo et al., 2018).

The dominant reported assessment strategy appears to be portfolio-based approaches where students collate evidence of learning and demonstration of competencies (Porter et al., 2015). An assessment challenge in community and public health dietetics is that students may have diverse placement experiences and typically incorporate project work that addresses a public health or population nutrition issue as opposed to individual nutrition management that occurs in clinical dietetics (Bacon et al., 2018). Placement supervisor feedback tends to be formative with summative competency

What is Known

- Entrustable professional activities (EPAs) represent an enhancement to competency-based education by operationalising competency frameworks into observable activities
- EPAs are gaining popularity in health professional education for work-based assessment
- There are currently limited examples of EPA use in the community and public health setting of any profession

What this paper adds

- Community and Public Health dietetic EPAs demonstrate utility for work-based assessment of entry-level dietetic students
- EPA-based assessment offers potential to increase understanding of how students develop competency and learning opportunities during supervised professional placements
- Student assessment using EPAs in community and public health settings can be valid, acceptable and feasible

assessment performed by university academics incorporating additional evidence linked to oral presentations, written project reports or student reflection on placement experiences (Palermo et al., 2015). It has been the authors' experience that students, who associate assessment with feedback, can become frustrated with perceived lack of assessment (Palermo et al., 2018). As EPAs describe work that is done by practising professionals, the use of EPAs offers potential to satisfy the need of students for feedback, promote reflection and link placements explicitly to competency development while the e-portfolio allows some flexibility for the collation of additional evidence of learning that meet the needs of academics charged with overall assessment of competency against the standards.

Although EPAs had been used previously in the clinical context at La Trobe University, the release of revised entry-level competencies for graduate dietitians by Dietitians Australia (DA) provided opportunity to explore the use of EPAs as a work-based assessment strategy in community and public health (Dietitians Association of Australia, 2017). At project commencement, there was no known use of EPAs to assess dietetics students in community or public health settings. However, there has been recent work in the dietetic community to develop a national set of EPAs (Begley et al., 2019). This work represents a considerable advance to create a shared mental model of a work-ready dietetic graduate; however, these EPAs are phrased to be applicable to all areas of practice and may lack specificity to facilitate assessment in specific settings such as community and public health (Chen et al., 2015).

Use of EPAs for work-based assessment is appealing as they link the work that is done by practising professionals to competencies

and are readily understood by students and educators (Bramley & McKenna, 2020). EPAs offer potential means to measure both dietetic student performance and community and public health educational experiences addressing the gap in published literature regarding the attainment of dietetic competence in this setting.

This study aimed to develop, implement and evaluate EPAs embedded in an e-portfolio for work-based assessment of dietetic students in the community and public health setting. We evaluated the utility of this assessment approach using the framework proposed by van der Vleuten (1996) and van der Vleuten and Schuwirth (2005) that describes utility as a product of validity, feasibility, reliability, cost and educational impact. The focus of this report is to describe the development, validity (content and context validity) and feasibility of the community and public health dietetic EPAs and associated assessment tools. As a proxy for cost, we investigated the acceptability and user experience of the tool. Evaluation of construct validity and educational impact are planned for future investigation as a greater sample size is required.

2 | METHODS

This study was conducted between November 2016 and November 2019 with four cohorts of final-year dietetics students from La Trobe University and their supervisors, practising dietitians from affiliated community and public health organisations in metropolitan and rural Australian locations (Figure 1). The development of community and public health dietetic EPAs was performed concurrently with development of clinical EPAs which has been reported separately (Bramley, Forsyth, et al., 2021; Bramley, Thomas, et al., 2021) The study was approved by the HREC of La Trobe University (#S16-198).

2.1 | Placement program

The community and public health placement at La Trobe University is a five-week/ 25-day full-time placement alternating with a five-week/ 25-day final clinical placement in the last semester of study. Students are expected to complete a project, or part of a project, that addresses a nutritional problem in the community where they are placed, in addition to observing and contributing to usual business of the placement site. Students have previously completed clinical and food service placements, but this is their first experience of community and public health dietetics.

2.2 | Project team

The project team consisted of the lead author, an experienced clinical dietitian and academic, and other faculty members with expertise in community and public health dietetics and dietetic education. The project team was supported by a university statistician and educational designers.

2.3 | Methodology

van der Vleuten (1996) suggest that there are several aspects that underpin utility including feasibility, acceptability and multiple types of validity. As different methods are required to measure each component of utility, an action research methodology, informed by mobile health development was chosen to allow different research methods and facilitate the input of users, essential to achieve feasibility and acceptability of an electronic tool (Whittaker et al., 2012). A recent systematic review examining EPAs found that most EPA development and implementation studies employed methodology that allowed for iterative revision (O'Dowd et al., 2019). Figure one depicts each action research cycle including inputs and outputs and participant numbers at each study stage. A time series design was used to seek feedback as part of three action research cycles performed with four cohorts of dietetic students and their supervisors, as follows:

Formative cycle (2016) to determine learners' and teachers' perspectives and needs regarding work-based assessment to develop EPAs and the electronic assessment tool.

Action research cycle 1 Pilot cycle (2017) to field-test the EPAs for validity, acceptability and feasibility.

Action research cycle 2-3. Implementation/ evaluation cycles (2018, 2019) to determine validity, acceptability and feasibility following revision of EPAs and tool post-pilot.

2.4 | Formative cycle

The intent of the formative phase of the project was to determine user views regarding the current e-portfolio and explore alternative assessment options, such as EPAs, for assessment of community and public health placements. All final-year dietetics students ($n = 38$) and their supervisors ($n = 19$) were invited to complete electronic surveys distributed by anonymous web-link to provide qualitative and quantitative feedback. Surveys consisted of 13 questions (Likert scale, 1 = highly dissatisfied/strongly disagree to 5 = highly satisfied/strongly agree), four questions regarding experiences of using the e-portfolio, two qualitative responses and three demographic questions (Supplementary Materials S1). Topics evaluated included frequency and timing of assessment, assessment methods and inclusion of student self-assessment. Surveys were designed by the lead author with face validity established through consultation with the project team and experienced dietetic academics outside the team. Prior to distribution, surveys were pilot tested for functionality within the project team and then distributed in the final week of placement. Surveys remained open for 3 weeks with a reminder sent 1 week prior to closing. Participants were incentivised to complete the survey through offer of a prize (\$50 gift-card) with anonymous results distributed to the project team to inform the development of discussion points for subsequent focus groups (Supplementary Materials S2). Focus groups aimed to obtain additional information regarding assessment methods, including the use of EPAs and practicalities of assessment in the

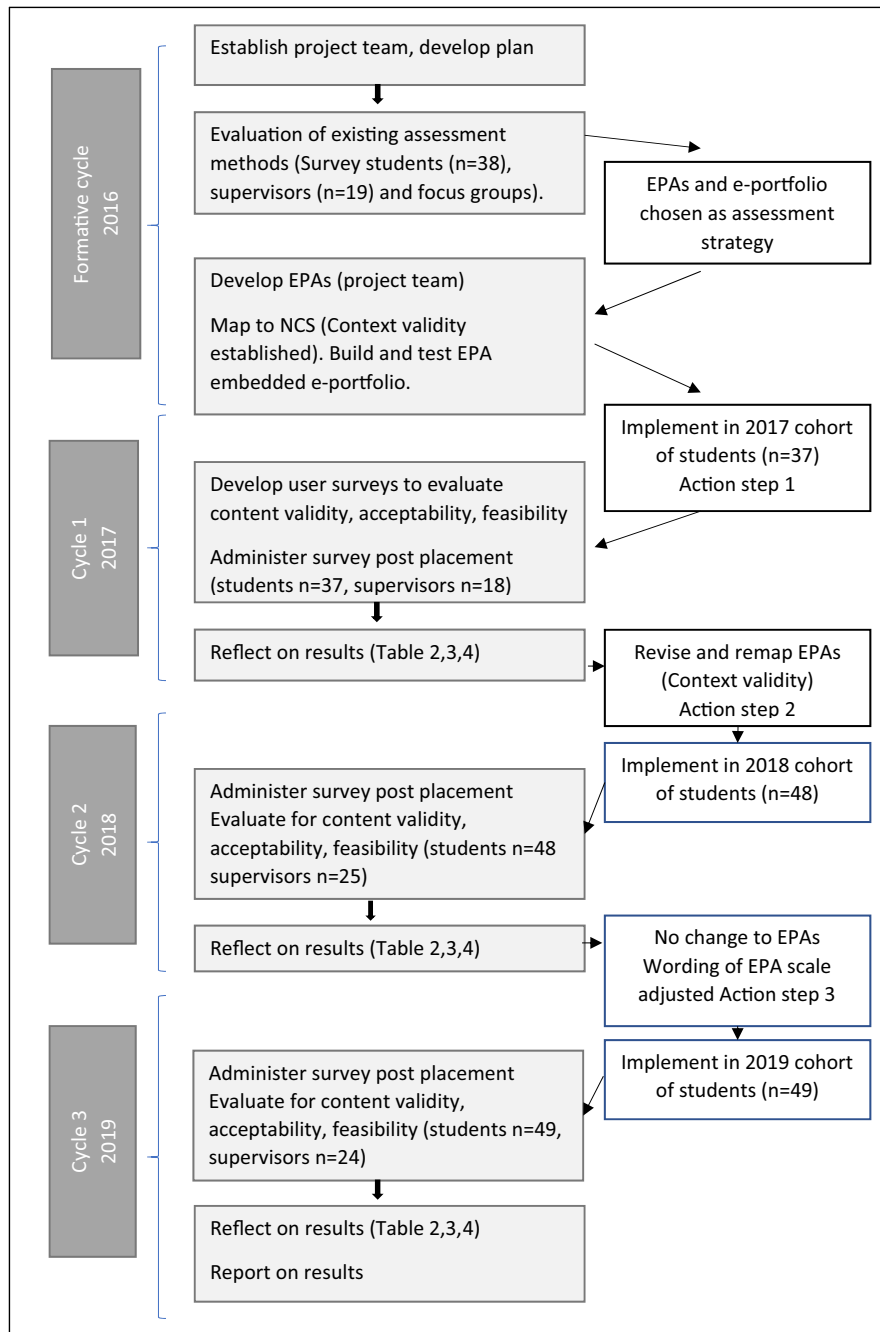


FIGURE 1 Action research cycles used to develop, implement and evaluate the EPAs and e-portfolio.

workplace. Evaluation of placement assessment methods for clinical and foodservice placements was performed concurrently and has been reported elsewhere (Bramley, Thomas, et al., 2021).

2.4.1 | EPA development

The method described by Mulder et al. (2010) was used to develop the EPAs for community and public health dietetics and for subsequent revisions. The Mulder method involves the use of experts in the field to select and describe the EPA with attention paid to how the learner will have opportunities to perform the EPA, receive feedback and be assessed. Other more common methods reported

in the literature for developing EPAs include establishing broad working parties (Chang et al., 2013) or Delphi approaches (Hauer et al., 2014) were not possible due to the short implementation timelines owing to placement timing in the academic year. To address this potential shortcoming, action research enabled practising community and public health dietitians to have input into the EPAs. A four-point entrustment scale was chosen for consistency with the clinical EPAs; however, due to the breadth of potential experiences, an additional item of 'Not Assessed' was included should students not have an opportunity to execute that EPA. The EPAs were mapped to the National Competency Standards for dietitians in Australia in a matrix (Supplementary Materials S3) to establish context validity.

2.4.2 | E-portfolio design

The e-portfolio was designed and created using Pebblepad® portfolio software. The new e-portfolio incorporated features identified as important by all stakeholders (students, supervisors and academics) in the formative study (Bramley, Thomas, et al., 2021):

1. EPAs and entrustment scale for work-based assessment
2. Fields for student self-assessment
3. Two assessment points (assessment for learning and of learning)
4. The ability to generate educational data to inform teaching
5. User-friendly navigation
6. The structure reinforces provision of dietetic care in community and public health
7. Opportunity to describe student learning preferences, interests and previous experience in advance of placement

2.5 | Action research cycle 1 pilot of EPAs and e-portfolio

Prior to pilot field testing, the e-portfolio with embedded EPAs was tested for functionality and educational data reporting capability by the lead author. The new EPA-based e-portfolio was piloted with the 2017 student cohort ($n = 37$) and their community and public health placement supervisors ($n = 18$). Students were orientated to the e-portfolio in class and supervisors through a remote group training session via videoconference. Additional written instructions regarding e-portfolio and EPAs used to assess performance and expectations were included within the e-portfolio, as were instructions for placement assessment. Individual training for new supervisors was provided as part of general orientation to the placement in 2018 and 2019.

2.5.1 | EPA and e-portfolio evaluation

Content validity, feasibility and acceptability of the EPAs and work-based assessment tool were evaluated using surveys distributed to users (students and supervisors) via anonymous web-link. Surveys were distributed to students and supervisors in the week following placement with a reminder 7 days later, with timing chosen to maximise response rate and ensure recency of experience following low response rate in action research cycle 1. No incentives were provided for participating.

The surveys consisted of two demographic questions and 25 Likert scale response questions designed to evaluate the content validity, acceptability and feasibility of the EPAs and structure and function of the e-portfolio, including inclusion of student self-assessment and design (Supplementary Materials S4). Seven free-text response questions offered an opportunity for participants to provide more detailed feedback regarding their experience with the work-based assessment tool. As participants were non-academics,

the term “skill descriptors” was used in place of EPAs to overcome lack of familiarity with this recent academic term.

2.6 | Action research cycle 2 and 3: Implementation, content validity, acceptability and feasibility evaluation

2.6.1 | Modification of EPAs and e-portfolio work-based assessment tool

Following the 2017 evaluation cycle, the community and public health dietetic EPAs were modified and re-mapped to the competencies in a matrix (Supplementary Materials S5). The modifications were made by the lead author in conjunction with the academic domain lead for community and public health dietetics. The new EPAs were mapped to the National Competency Standards for Dietitians in Australia to determine context validity. No changes were made to e-portfolio design and inclusion of student self-assessment remained. A change to the entrustment scale was made in 2018 with the wording of level 4 “independent and competent” changed to “work ready” to reflect the highly collaborative nature of dietetic work in this setting.

2.6.2 | EPA and e-portfolio work-based assessment tool evaluation

Student and supervisor evaluation of EPAs and the work-based assessment tool was repeated with surveys distributed to all students (2018 $n = 48$, 2019 $n = 49$) and their supervisors (2018 $n = 25$, 2019 $n = 24$) using the methods described in action research cycle 1.

2.7 | Data analysis

Data were analysed using statistical software (SPSS, IBM version 25). Likert responses were converted to numerical scales using means and standard deviations to describe results. Group means were compared using ANOVA with Bonferroni correction for normally distributed data or Mann–Whitney U tests for non-parametric data. Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement was adhered to when preparing the manuscript (von Elm et al., 2008).

3 | RESULTS

The results of each action research cycle are reported below. As the evaluation methods for cycle 2 and 3 are identical, results have been presented in table format to allow for comparisons between each cohort. Demographics of each cohort of respondents are reported in Table 1. Table 2 reports on key survey items regarding content

validity, Table 3 reports on key survey items regarding acceptability and Table 4 reports on key items regarding the feasibility of the EPA-based e-portfolio over the evaluation period. Results from 2018 and 2019 cohorts have been pooled to simplify reporting. Results are reported as means and standard deviations.

3.1 | Formative cycle

Formative evaluation of existing assessment methods was inconclusive due to low response rates in the evaluation surveys (Students $n = 4$, response rate 7% and Supervisors $n = 7$, response rate 36%) and focus groups ($n = 2$). Students and supervisors reported mean levels of overall satisfaction with the existing assessment e-portfolio with competency-based assessment method as 3.50 ± 1.30 and 3.54 ± 0.53 respectively. As survey response rates were low, focus group questions developed for the evaluation of the clinical e-portfolio (Bramley, Thomas, et al., 2021) were adapted for the community and public health setting. Results of the mixed methods clinical dietetics evaluation indicated the preferred work-based assessment approach was EPAs embedded in an e-portfolio (Bramley, Thomas, et al., 2021). Owing to the low participation in this phase of the study, the team elected to use an e-portfolio with embedded EPAs for work-based assessment in community and public health placements so that the assessment method would be consistent across placement types and decrease the cognitive load for students with regard to navigating software. It also presented an opportunity to test the potential of EPAs for assessment in a non-clinical setting.

3.2 | Creation of EPAs for community and public health dietetics and design of the e-portfolio work-based assessment tool

A total of 40 EPAs were developed and linked to the National Competency Standards for dietitians (Supplementary Material S3). The community and public health dietetic EPAs were nested into

subheadings reflecting the program management cycle derived from social marketing (needs assessment, planning, implementation, evaluation and dissemination) and professional skills (cultural competency and professional behaviour) (Grier & Bryant, 2005).

A four-point entrustment scale ranging from level 1 (observing) to level 4 (independent and competent) was developed to assess student performance based on level of supervisor input needed to execute the activity to a satisfactory level (Chen et al., 2015). Given the breadth of experiences possible in the community and public health dietetic placement, and that these placements focused typically on only one aspect of the performance management cycle, an additional grade of 'Not Assessed' was incorporated into the assessment scale to allow students and supervisors to indicate an activity was not performed during the placement.

Performance feedback using the work-based assessment tool was provided to students at mid-placement (formative feedback) and end of placement (summative feedback). Students were required to self-assess their performance against each EPA at each time point which triggered unlocking of a corresponding supervisor field. Academics were able to track students' feedback remotely in real time and assessment data could be exported into a CSV file for input into programmatic assessment and for future analysis of trends within and between student cohorts. Additional areas to upload informal feedback via a weekly paper goal sheet were included to ensure students and supervisors discussed project progress. Fields to upload learning artefacts as evidence of achieving EPAs were incorporated into the e-portfolio design. A free-text field for qualitative feedback at mid-point and endpoint of each placement was included as qualitative feedback has been identified in the literature to be important for learning (van der Schaaf et al., 2017). Although EPA content differed, design and navigation of the clinical and community and public health dietetics e-portfolios were very similar. The intent of this was to increase familiarity with the technology, addressing criticism in the literature and from our previous study that e-portfolios are difficult to use (Andrews & Cole, 2015; Bramley, Thomas, et al., 2021; Garrett et al., 2013).

TABLE 1 Participant demographics

Year	Students			Supervisors		
	2017 ($n = 12$)	2018 ($n = 15$)	2019 ($n = 15$)	2017 ($n = 9$)	2018 ($n = 17$)	2019 ($n = 16$)
Response rate (%)	32	31	31	50	68	67
Gender	12 female 0 male	14 female 1 male	13 female 2 male	8 female 1 male	16 female 1 male	16 female 0 male
Age (years) Mean (SD)	27.75 (5.43)	24.85 (7.70)	24 (3.59)	Not collected	Not collected	Not collected
Supervisor experience						
First time				1 (11.1)	2 (11.8)	0 (0)
1–2 years				0	4 (23.5)	3 (18.8)
3–4 years				1 (11.1)	2 (11.8)	4 (25.0)
5–10 years				5 (55.6)	5 (29.4)	4 (25.0)
10+ years				2 (22.2)	4 (23.5)	5 (31.3)

TABLE 2 Face validity of an e-portfolio with embedded EPAs and self-assessment during community and public health dietetic professional placement

Survey item	2017 mean (SD)			2018/2019 mean (SD)		
	Students	Supervisors	<i>p</i> value	Students	Supervisors	<i>p</i> value
The portfolio was effective to assess my development on placement	3.25 (1.14)	3.67 (0.71)	0.382	2.90 (1.12)	3.79 (0.93)	0.001
The skill descriptors accurately assessed my performance of placement	2.92 (1.08)	3.67 (0.87)	0.129	2.57 (1.04)	3.67 (0.85)	0.000
The current 4-point scale adequately describes the range of performance on placement	2.92 (0.90)	3.44 (1.13)	0.193	2.77 (1.38)	3.79 (0.82)	0.002
I would prefer a 5-point scale	3.67 (0.89)	3.33 (1.23)	0.508	3.53 (1.20)	2.88 (0.82)	0.009
I was comfortable with interpreting the skill descriptors and rating my/my student's performance	3.00 (1.04)	3.44 (1.24)	0.345	2.83 (1.23)	3.67 (1.02)	0.007
The skill descriptors helped me link day-to-day activities on placement with the graduate entry dietetics competencies	2.58 (0.79)	3.56 (0.73)	0.015	3.20 (1.16)	3.45 (0.94)	0.345
I would prefer to be assessed directly against the competencies rather than skill descriptors	2.75 (1.22)	2.56 (0.53)	1.00	2.97 (1.10)	2.48 (1.80)	0.04

Note: Survey responses were Likert scale with 1 = highly dissatisfied and 5 = highly satisfied. Survey responses of students and supervisors were pooled in 2018/2019. Means were compared to identify inter-group differences. *p* values were calculated using Mann Whitney-*U* tests and considered significant if *p* < 0.05.

3.3 | Action research cycle 1

When compared to the 2016 formative evaluation, mean overall satisfaction in 2017 remained relatively unchanged for students (3.50 ± 1.30 vs 3.42 ± 0.52) and supervisors (3.54 ± 0.53 vs 3.78 ± 0.44) following implementation of the community and public health dietetic EPAs and e-portfolio. This, in combination with low or ambivalent student responses to evaluation survey items regarding the ability of EPAs to link work activities to competency standards (2.58 ± 0.79) and the ability of EPAs to help students take charge of their learning needs (2.92 ± 0.67) prompted revision of the EPAs for 2018. The EPAs were revised, decreased to 23 in number and remapped to the competency standards (Supplementary Material S5). Structure of the e-portfolio with areas for student self-assessment, formative and summative assessment were unchanged as results for feasibility and acceptability were mostly >3 for items evaluating these aspects (Tables 3 and 4).

3.4 | Action research cycle 2 and 3: Implementation and evaluation

No changes were made to EPAs or portfolio design in 2018 following maintained or improved results for most evaluation survey items, particularly among supervisors. No significant differences were found with intragroup comparisons between 2017 and 2018/2019 evaluations but there were many significant differences found when comparing student to supervisor evaluation.

Overall, supervisors evaluated both the e-portfolio and EPAs more positively than students with survey items evaluating content validity trending higher after the 2018 revision (Table 2). Supervisors reported that the EPAs were effective to assess student performance (3.67 ± 0.87 in 2017 and 3.79 ± 0.93 in 2018/19) and expressed preference for the four-point entrustment scale (3.44 ± 1.33 in 2017 and 3.79 ± 0.82 in 2018/19). Furthermore, they indicated they would not prefer a five-point entrustment scale (3.33 ± 1.23 in 2017 and 2.88 ± 0.82 in 2018/19), nor direct assessment against the national competency standards (2.56 ± 0.53 in 2017 and 2.48 ± 1.80 in 2018/19) (Table 2). Overall satisfaction increased over time for supervisors with the median overall satisfaction increasing from 3.78 ± 0.44 in 2017 to 4.00 ± 0.83 in 2018/2019. Satisfaction with the length of time taken to complete the portfolio improved following the 2018 EPA revision with 97% of supervisors in 2018/19 finding the length of time to complete the portfolio reasonable compared to 77.8% in 2017 (Table 3). Students' evaluation was ambivalent regarding EPAs accurately assessing placement performance (2.92 ± 1.08 in 2017 and 2.57 ± 1.04 in 2018/2019) and this was significantly different from supervisors who evaluated this survey item positively (3.67 ± 0.81 2017 and 3.67 ± 0.85 2018/19; *p* < 0.000).

All users were in favour of opportunities to provide formative and summative feedback with the most frequent preference being expressed for two assessment points, mid- and end of placement in both groups ($\geq 89\%$). Similarly, both groups agreed that student self-assessment against the EPAs was useful but supervisors valued this more highly (students 3.42 ± 0.79 in 2017 and 3.93 ± 0.78

TABLE 3 Feasibility of an e-portfolio with embedded EPAs and self-assessment during community and public health dietetic professional placements

Survey item	2017 mean (SD)			2018/2019 mean (SD)		
	Students	Supervisors	<i>p</i> value	Students	Supervisors	<i>p</i> value
The skill descriptors helped me identify my strengths and weaknesses in community and public health nutrition	3.33 (0.89)	3.67 (0.71)	0.310	2.93 (1.11)	3.55 (0.91)	0.017
The skill descriptors helped me understand what I needed to achieve on placement community and public health placement	3.25 (1.22)	3.44 (1.01)	0.745	3.17 (1.18)	3.70 (0.98)	0.045
The skill descriptors helped me take charge of my own learning needs	2.92 (0.67)	3.67 (0.87)	0.049	2.87 (1.11)	3.79 (0.96)	0.001
I would like to be assessed on placement (n(%))						
Once (endpoint)	0 (0%)	0 (0%)		0 (0%)	0 (0%)	
Twice (midpoint & endpoint)	11 (92%)	8 (89%)		29 (97%)	32 (97%)	
Three times	0 (0%)	0 (0%)		1 (3%)	0 (0%)	
Weekly	1 (8%)	1 (11%)		0 (0%)	1 (3%)	
It is useful for me/my student to self-assess their performance against skill descriptors prior to supervisor assessment	3.42 (0.79)	4.33 (0.50)	0.018	3.93 (0.78)	4.27 (0.45)	0.057
Self-assessment helped me track my/ their progress and develop a plan for improvement	3.33 (0.78)	4.11 (0.60)	0.049	3.73 (0.83)	4.18 (0.39)	0.009

Note: Survey responses were Likert scale with 1 = highly dissatisfied and 5 = highly satisfied. Survey responses of students and supervisors were pooled in 18/19. Means were compared to identify inter-group differences. *p* values were calculated using Mann Whitney-*U* tests and considered significant if *p* < 0.05.

TABLE 4 Acceptability of an e-portfolio with embedded EPAs and self-assessment community and public health dietetic professional placement

Survey item	2017 mean (SD) <i>n</i> (%)			2018/2019 mean (SD) <i>n</i> (%)		
	Students	Supervisors	<i>p</i> value	Students	Supervisors	<i>p</i> value
I was comfortable using the e-portfolio	4.08 (0.52)	3.78 (0.44)	0.310	3.87 (0.94)	4.12 (0.82)	0.254
I found the e-portfolio interface easy to use and navigate	3.92 (0.79)	3.67 (0.71)	0.58	3.90 (1.06)	3.79 (0.74)	0.299
Overall, I would describe my experience using the Pebblepad™ e-portfolio as positive	3.42 (0.52)	3.78 (0.44)	0.169	3.37 (0.93)	4.00 (0.83)	0.006
The amount of time taken for me to complete the student/supervisor section of the e portfolio was reasonable						
Too much	2 (16.7%)	2 (22.2)		2 (6.7)	1 (3%)	

Note: Survey responses were Likert scale with 1 = highly dissatisfied and 5 = highly satisfied. Survey responses of students and supervisors were pooled in 2018/2019. Means were compared to identify inter-group differences. *p* values were calculated using Mann Whitney-*U* tests and considered significant if *p* < 0.05.

in 2018/19 compared to supervisors 4.33 ± 0.50 4.27 ± 0.45; [Table 4](#)).

4 | DISCUSSION

The community and public health dietetic EPAs and e-portfolio work-based assessment tool demonstrated content and context validity,

acceptability and feasibility with dietetic supervisors. Dietetics students reported an ambivalent response with regard to effectiveness of the EPAs in assessing placement performance and the response to this survey item decreased following the 2018 EPAs revision. In contrast, dietetic supervisors reported EPAs effectively and accurately assessed student performance in community and public health settings. Both groups, however, indicated that they would not prefer competency assessment in this context, with this preference being

more strongly expressed by supervisors, suggesting that EPAs are the preferred method for work-based assessment. Supervisors expressed preference for a four-point entrustment scale; however, students reported preference for a five-point scale. Other studies using EPAs have found a similar preference for more granular feedback in their student populations (Croft et al., 2019; Cutrer et al., 2019).

There may be several reasons for the disparity between student and supervisor evaluations. Given the short placement duration (25 days), poor student evaluation may stem from lack of familiarity with dietetic work in this setting, rather than lack of EPA validity. This interpretation is supported by the significant intergroup differences with supervisors evaluating both the EPAs and e-portfolio more positively than students on multiple survey items, supporting EPAs' viability for work-based assessment in this context. Alternatively, the diverse nature of dietetic work in this sector, combined with the requirement for students to focus on a single project during their placement, suggests that EPAs may not lend themselves well to assessment in this context. While other health professions have successfully used EPAs for student assessment in community settings, the difference with dietetic placements in our study is that the placement is project-based, so it is possible the style of placement is less conducive to use of EPAs for assessment (Valentine et al., 2019; Westein et al., 2019). There are no examples of EPAs to assess project work in any discipline that are known to the authors. There are reports exploring feasibility of interprofessional education EPAs; however, it has been questioned whether such an EPA would meet the definition of an EPA, as it may not be sufficiently focussed (ten Cate & Pool, 2020). While EPA use in professions outside medicine such as nursing, pharmacy and dentistry is emerging, very few examples exist of EPAs in areas not involving direct patient care such as research and teaching (Dewey et al., 2017; Haines et al., 2017; Lau et al., 2020; ten Cate & Taylor, 2020; Tonni et al., 2020).

The inclusion of both formative and summative assessments against the EPAs was positively evaluated by both our groups of users. Similarly, use of EPAs for student self-assessment was valued highly by both groups. This finding is consistent with other reports in the literature that support the use of self-assessment to promote reflective practice and track progress (Palermo et al., 2018). Our study supports sustainability of the EPAs and e-portfolio, as minimal training was provided to supervisors with regard to use of the portfolio. Additionally, the majority of supervisors felt the length of time taken to assess students using the tool was reasonable supporting acceptability.

A strength of this study was inclusion of user co-design in creation of the portfolio, resulting in an electronic tool that was well accepted by users. This method has been demonstrated in other contexts to improve functionality and its use in health professions assessment is supported by our study (Whittaker et al., 2012). Following a low response rate in the 2016 formative study, timing of the anonymous survey was adjusted. The response rate among supervisors was high, increasing confidence in our results. Response rates were lower in students, but still reasonable given that they were preparing for final examinations and coursework submission. Despite high participant

engagement, our study is limited to a single discipline at one institution. As surveys were anonymous it is possible that supervisors completed the surveys on more than one occasion and that may be a potential source of bias. The inclusion of qualitative methods to more deeply explore themes may have resulted in richer results; however, recruitment to focus groups during the exploratory stage was difficult due to the fractional nature of the community and dietetic workforce and thus, was not considered feasible.

The method of EPA development could be further critiqued, as although our working party consisted of community and public health dietetic academics and education experts, wide consultation with the sector was not possible due to timing of the academic year. Furthermore, the recent rapid increase in adoption of EPAs in health professions education has seen further methodological publications in this area including frameworks for evaluating EPA quality and structure (Taylor et al., 2017; Taylor et al., 2021). Revision of the EPAs to further align their description to more recent definitions of an EPA combined with wider consultation involving practising experts and using robust consensus-building methodology would result in improvement of the current EPAs. A limitation of this current study is that only content and context validity of EPAs was evaluated. Further analysis of construct validity is planned once a large sample size is available with future cohorts of students to help determine the effectiveness of EPAs for assessment in this context.

Another consideration is that the work of dietitians employed in the community sector where the placements were based has become more orientated towards delivery of individual dietetic care in primary healthcare settings (Hughes, 2004). While a professional activity of community dietitians is program management, to which the EPAs are aligned, their public health activities may be secondary to delivery of direct patient care. This may explain why supervisors felt the EPAs accurately assessed student performance and linked day-to-day placement activities with the national competencies for dietitians, but students less so, as the provision of direct patient care is more visible during the 5-week placement compared to longer term project work.

Two aspects of van der Vleuten's utility framework that were not addressed in this study are reliability and educational impact. Reliability analysis and the development of milestones is planned for future studies when additional data from graduating cohorts can increase the sample size. Similarly, educational impact and analysis of the frequency of specific EPAs attained by dietetic student will be conducted when more data is available. This will inform future revisions of the EPAs as dietetic work in this sector evolves and has the potential to drive evidence-based curriculum revision (Tekian et al., 2020). From a faculty perspective, ability to track progress remotely and generate educational data regarding what experiences and EPAs dietetic students achieve on placement is highly useful and has potential to drive evidence-based curriculum revisions, measure impact of curriculum revision and identify gaps (Murray et al., 2019; Tekian et al., 2020; Wijnen-Meijer et al., 2015).

This study adds to existing knowledge with regard to work-based assessment of dietetic students in contexts outside of

clinical dietetics. It confirms other studies that report on effective use of e-portfolios to support student learning in food service or community contexts but is the first to our knowledge that incorporates use of EPAs as an additional assessment strategy (Porter et al., 2015). Other professions have begun to expand EPA use from inpatient hospital settings into primary and community care settings, but this is the first example in the dietetic profession. A key difference in our study is creation of a set of EPAs for a specific workplace context, namely community and public health dietetics, and it could be argued that this is incongruent with recent definitions of EPAs (Taylor et al., 2021). Recent work by Begley et al. (2019) to develop a set of national EPAs defining dietetic work in all contexts occurred after commencement of this project. Other authors report that there is a need for EPAs to be more specific to allow greater feedback for students (Chen et al., 2015). One approach may be to have a series of smaller activities known as observable practice activities (OPAs) or EPAs that nest into larger ones to provide more guidance (Holzhausen et al., 2019; Warm et al., 2014). A further challenge in the community and public health setting is that work is interprofessional and highly collaborative, and independence and autonomy is not usual work practice. In our study, we altered our entrustment scale to have the highest assessment level described as “work ready” to reflect this with positive support from supervisors shown in our evaluation. Other reports of EPAs in the pre-graduate domain report similar expectations with students being allowed to practise with post hoc supervision and have their findings checked (Tekian et al., 2020).

5 | CONCLUSION

The community and public health dietetic EPAs demonstrated validity, feasibility and acceptability for work-based assessment following a three-year evaluation from supervising community and public health dietitians. Students were less positive in their evaluation of the EPA-based work-based assessment tool but did not express preference for an alternative assessment method. Both groups valued student self-assessment and found the e-portfolio structure easy to use, supporting sustainability of the model. This work provides an example of the use of EPAs for work-based assessment in an allied health profession in a non-hospital setting, demonstrating the potential for EPAs to be used in placements not focused on direct individual patient care. The EPA-based tool offers opportunity to increase knowledge of how students learn on placement and educational opportunities they have in the evolving area of community and public health dietetics. Additional potential to measure educational outcomes and identify potential curricula gaps represents an area for future research.

AUTHOR CONTRIBUTION

AB designed and led the study and prepared the manuscript with support from AF and LM. All authors critically reviewed and edited

the manuscript and approved the final copy and declare that the content has not been published elsewhere.

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CONFLICT OF INTEREST

No conflict of interest is declared by the authors.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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SUPPORTING INFORMATION

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

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