Can an online scenario-based learning intervention influence preservice teachers' self-efficacy, career intentions, and perceived fit with the profession?

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A R T I C L E   I N F O

A B S T R A C T

The purpose of this article is to explore how a brief, scalable, online scenario-based learning (SBL) intervention influences preservice teachers' self-efficacy, career intentions, and perceived fit with the profession. A sample of 1,513 preservice teachers from a large undergraduate teacher education programme in Australia was recruited over two years to complete three SBL sessions (with four measurement points) over the course of three weeks. We conducted a series of latent change analyses to explore the patterns of change over time, with covariates including year in ITE programme, prospective teaching level, and sex. Results showed that self-efficacy, teaching commitment, and perceived fit with the profession increased after the initial SBL session, and the effect was maintained for self-efficacy and perceived fit, but not for teaching commitment. Implications for practice and further research are discussed.

1. Introduction

Preservice teacher education is a period of personal and professional discovery and growth. This initial stage of professional identity development sees changes in teaching confidence (i.e., self-efficacy) and in perceptions of professional commitment and 'fit' with the profession. Not all preservice teachers emerge from initial teacher education with a strong commitment to the profession. The proportion of preservice teachers dropping out of initial teacher education (ITE) programmes before completion, or not entering the profession after ITE completion, is increasing (e.g., Gov. UK, 2022; Vagi et al., 2019), contributing to the already-chronic teacher shortages found in many jurisdictions around the world (Garcia & Weiss, 2019).[1] Wang et al. (2015) found that 30%–40% of preservice teachers either do not complete their ITE programme or choose not to pursue a teaching job, and that 30%–50% of those who do begin teaching leave their job within the first five years of service.

Within-programme factors, such as the perceived quality of instruction and the perceived value of the experiences provided, are associated with desired outcomes, including persistence and continuation during ITE (Kim & Corcoran, 2018), teacher effectiveness and retention in teaching practice (Goldhaber et al., 2017), and overall commitment to the teaching profession (Christophersen et al.,

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[1] In Australia, the rate of preservice and early career teacher dropout is unclear. Weldon (2018) noted that early career attrition rates between 8% and 50% are reported by various organisations, but that definitions of 'attrition' vary across sources, and that little reliable evidence is available.

2016). The nature and quality of preparation during ITE shape preservice teachers' perceptions about their fit with the profession (*person-vocation fit*), and ultimately, decisions about pursuing teaching as a career.

One critical developmental activity in all ITE programmes influencing preservice teachers' career intentions is the teaching placement (Krieg et al., 2021). Preparing preservice teachers to make the transition from *student* to *teacher* during teaching placements is a high-stakes endeavour, with positive experiences during placements boosting the likelihood that a preservice teacher will believe that they have the potential to succeed in professional practice, whereas less positive experiences can result in preservice teachers opting out of the profession (Zhang & Zeller, 2016). Leaders of ITE programmes design pre-placement instructional activities to prepare preservice teachers to recognise and cope with the inevitable challenges and complexities that will be faced during placements.

New technologies that present preservice teachers with simulated classroom experiences have been shown to boost preparation for teaching placements: recent research using a UK sample shows that an online, *scenario-based learning* (SBL) intervention delivered before teaching placements increases preservice teachers' teaching self-efficacy and classroom readiness (Klassen et al., 2021). In the current study, we extend previous research by (a) replicating recent results pertaining to the effects of an SBL intervention on teaching self-efficacy using a sample of preservice teachers from a new context (i.e., Australia), with a range of intended teaching levels (i.e., early years, primary, and secondary), and (b) exploring how an SBL intervention influences changes in preservice teachers' career intentions and perceived fit with the profession. The novel contribution of this study is that we test an SBL intervention in a new context, and with teaching career-related outcomes.

1.1. Preservice teacher education and identity formation

It is important to build an understanding of preservice teachers' professional commitment during ITE because many countries are experiencing significant drop-out rates of teacher candidates during training (e.g., Gov. UK, 2022; OECD, 2014). One factor associated with teacher commitment is the development of professional identity formation during professional practice and the formative ITE period (Schaefer et al., 2012). Building a sense of professional identity, or 'fit' with the teaching profession is one way to increase the chances that a preservice teacher will be more likely to continue on the pathway to successful professional practice. Past research shows that building a sense of professional fit and commitment is at least partly dependent on a preservice teacher's sense of teaching-related confidence, or self-efficacy.

1.2. Self-efficacy, career intentions, and perceived fit

Teachers' self-efficacy—teachers' beliefs in their capabilities to influence student outcomes—is situated in Bandura's social cognitive theory which posits that self-efficacy is a key factor influencing how people manage life's challenges (Bandura, 1997; Schunk & DiBenedetto, 2021). Four sources of self-efficacy are proposed: enactive or past experience, vicarious experience (i.e., observing successful others), verbal persuasion, and cognitive processing of physiological state. Each of these sources contributes, depending on contextual factors, to an individual's beliefs in their capabilities to succeed in pursuing a desired goal. For preservice teachers, self-efficacy about teaching capabilities is crucially important for success when facing new teaching-related milestones, such as entering the classroom for the first time as a teacher. A robust body of research shows that (a) teachers' self-efficacy is associated with desired teaching-related outcomes (Klassen & Tze, 2014), and (b) self-efficacy changes over time for preservice teachers during ITE (Klassen & Durksen, 2014). In addition, teachers' self-efficacy has been shown to offset negative emotions experienced during teaching placements (Hascher & Hagenauer, 2016), and is linked with novice teachers' retention in, and commitment to, the profession (Chesnut & Burley, 2015; Pfitzner-Eden, 2016). For preservice teachers, beliefs in their capabilities to succeed influence their career intentions and their sense of fit with the teaching profession.

Teaching career intentions refer to the degree of commitment to teaching expressed by preservice teachers. Teaching commitment, like teaching self-efficacy, serves as a motivator: a goal-oriented belief that influences effort, persistence, and engagement (Chesnut, 2017). For preservice teachers, career intentions vary in intensity depending on the psychological attachment to the idea of teaching, and furthermore, depending on the source of the commitment, i.e., economic, subject interest, or values and personality (Wang et al., 2021). Career intentions are influenced by self-efficacy for teaching, although the relations between the two constructs have been shown to vary according to teaching level and teaching subject area (Chesnut, 2017). Career intentions are associated with other motivation-related variables, including the perceived fit between personal characteristics and the demands of the target job (Chuang et al., 2016).

Person-vocation fit (PV fit) is based on one of the fundamental theories in psychological and organisational behaviour research: *person-environment fit* (Barrick & Parks-Leduc, 2019; Darrow & Behrend, 2017). The perceived fit between worker and job is relevant to recruitment, commitment, job satisfaction, and retention (De Cooman et al., 2019). A recent longitudinal study in the education sector (e.g., Wang & Klassen, 2023) with more than 1000 teachers in Canada found that teachers' perceived value congruence with their organisation (i.e., their 'fit') was significantly associated with commitment to the profession. Hayes and Stazyk (2019) found that teachers were more likely to remain in their jobs if they perceived congruence between their beliefs and values with those of their organisation, and Player et al. (2017) found that teachers with high levels of PV fit were up to 65% less likely to leave the profession.

PV fit is not static: it fluctuates over time and can be strengthened using 'socialisation tactics' that highlight areas of congruence (De Cooman et al., 2019). For novice teachers, perceptions of PV fit may be unstable and uneven, and these perceptions vary with main teaching subject. For example, Kaub et al. (2016) showed that beginning science teachers felt a stronger fit with subject-related aspects of teaching in comparison to social and pedagogical aspects of teaching. However, these uneven perceptions of fit evolved as teachers

gain experience and confidence in the diverse aspects of their teaching roles (Kaub et al., 2016).

Interventions can be built to promote preservice teachers' self-efficacy, career intentions, and PV fit (Klassen et al., 2021; Bosman et al., 2021; Chesnut & Cullen, 2014). For example, building a preservice teacher intervention that includes elements of enactive experience, modelling or vicarious experience, and verbal persuasion captures three of the four sources hypothesized to boost self-efficacy beliefs, and by extension, commitment to a teaching career. Providing messages that include fit messages in an intervention can influence how preservice teachers view their perception of how well they fit with the demands of the teaching profession. Brief interventions with modest effect sizes have the potential to play a role in influencing important educational issues (such as teacher retention) if they are scalable and relevant for large numbers of target participants (Kraft, 2020). Over the last several years, one such brief, economical, and scalable online intervention using a scenario-based learning (SBL) approach has been tested with preservice teachers in a range of settings.

1.3. Scenario-based learning interventions

Scenario-based learning (SBL) is based on a 'developmental situational judgment test' (dSJT) methodology (Cox et al., 2017) where participants engage with brief, authentic, interactive, text- and video-based scenarios that are followed by a series of questions requiring context-based reasoning. SBL is grounded in situated learning theory (Lave & Wenger, 1991) which posits that learning is optimised when it is embedded in situations that closely resemble 'real-life' practice. In an ITE context, SBL can present preservice teachers with a wide range of authentic and complex learning experiences in a low-risk setting, where participants can consider different ways of managing commonly experienced teaching challenges. SBL represents an instructional technology that is easy to implement and can be accessed online at the convenience of the participant, with automated assessment data on response patterns delivered to participants and to programme leaders for possible follow-up.

Three elements of SBL interventions enhance the learning provided by exposure to classroom scenarios alone (e.g., through role-play or reading vignettes of classroom experiences). First, the provision of real-time tailored feedback from experts coupled with post-intervention summary feedback increases motivation by building competence and confidence through individualised support and guidance (Karaoglan Yilmaz & Yilmaz, 2021). Second, explicit prompts for participant self-reflection lead to the development of deeper situational understanding by providing scaffolded support that links recent experiences (i.e., the SBL scenario) with critical reflection of said experiences (Coulson & Harvey, 2013). Third, SBL interventions delivered online are scalable, and can be delivered to large numbers of participants simultaneously. Interventions that present authentic experiences coupled with feedback and reflection encourage a 'reflection-feedback-cycle', thus providing a high-quality learning experience that can enhance preservice teachers' readiness to begin 'real' teaching (Prilop et al., 2019).

Bardach et al. (2021) used an experimental design to show that participants assigned to an SBL intervention with the combination of scenarios, feedback, and reflection showed increased teaching self-efficacy and classroom readiness compared to participants assigned to a control condition that included scenarios only. A longitudinal study of SBL interventions for secondary-level preservice teachers in the UK (Klassen et al., 2022) showed significant growth in teaching self-efficacy over four sessions, with similar upward growth trajectories for male and female participants, but a slower rate of change (but higher starting points) for participants from minority ethnic groups. The pattern of change differed by self-efficacy domain, with confidence to manage student behaviour developing in a non-linear pattern, although with an upward trajectory overall. Perceived self-efficacy plays an important role in career choice and development, with research showing a strong, direct influence between vocation-related self-efficacy and career decision-making (Frazier et al., 2019).

1.4. Current study

SBL interventions that boost preservice teachers' self-efficacy could also influence career intentions and perceived 'fit' with the profession. In this study, we examine the patterns of change in preservice teachers' self-efficacy, career intentions, and PV fit during the completion of an online SBL intervention designed to boost teaching competence and confidence.

2. Material and methods

2.1. Participants

Participants were 1,513 preservice teachers from a large undergraduate teacher education programme in eastern Australia ($M =$ 20.27 years, $SD = 4.54$), with data collected in 2020 and 2021 (Year 1 $n = 762$; Year 2 $n = 751$) from students enrolled in a compulsory introduction to teaching course in a 4-year ITE programme. In Australia, entry into tertiary education courses is determined by student choice and 'selection rank', based on ATAR (Australian Tertiary Admission Rank) score calculated from Year 12 results. The course in which data were collected is designed to be taken in the first term of Year 1, prior to a 10-day teaching placement offered in the second term of Year 1. Data were collected during covid-related school closures during which first-year students could not make initial school visits in the first term prior to their placement in second term. Our research team was contacted by programme staff to deliver the SBL intervention to provide students with a sample of authentic (simulated) classroom experiences in lieu of school visits. The SBL intervention was a compulsory part of the programme; that is, it was labelled as a 'hurdle requirement' for first-year students that was mandatory but was not graded for course purposes. We deleted data from 62 participants who did not provide consent for their data to be used for research purposes, and from 42 participants in Year 2 who were repeating the course (and who would have completed the

intervention in Year 1), leaving 1,409 participants.

Most participants were female (75%; compared to 72% female teachers nationally [Australian Bureau of Statistics, 2020]), and in the first year of their 4-year programme (89.2%). A small proportion of upper-year students completed the intervention, for example, if

Fig. 1. Example of the scenario-based learning activity and feedback.

Table 1
Psychometric Properties of Study Variables and Latent correlations.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.1. Self-efficacy Pre	–													
2.2. Self-efficacy S1	.882**	–												
3.3. Self-efficacy S2	.670**	.730**	–											
4.4. Self-efficacy S3	.596**	.634**	.820**	–										
5.5. Career intentions Pre	.476**	.479**	.359**	.378**	–									
6.6. Career intentions S1	.431**	.599**	.422**	.399**	.940**	–								
7.7. Career intentions S2	.292**	.378**	.543**	.475**	.739**	.780**	–							
8.8. Career intentions S3	.307**	.402**	.462**	.604**	.688**	.713**	.820**	–						
9.9. Perceived fit Pre	.607**	.571**	.465**	.407**	.700**	.645**	.478**	.446**	–					
10.10. Perceived fit S1	.526**	.734**	.536**	.481**	.579**	.702**	.491**	.486**	.891**	–				
11.11. Perceived fit S2	.427**	.503**	.680**	. 570**	.521**	.575**	.725**	.632**	.689**	.708**	–			
12.12. Perceived fit S3	.389**	.465**	.561**	.714**	.488**	.530**	.604**	.772**	.584**	.625**	.776**	–		
13.13. Teaching grade level	.022	.035	.004	−.005	−.060	−.052	−.058	−.059*	−.003	.007	−.019	−.059	–	
14.14. Year in ITE	.001	.034	.052	.049	−.017	−.027	.040	.016	−.021	−.018	.039	.019	−.121	–
15. N	1,409	1,409	1,360	1,323	1,409	1,409	1,360	1,323	1,409	1,409	1,360	1,323	1,369	1,396
16. M	4.817	5.177	5.071	5.072	5.466	5.564	5.522	5.483	5.138	5.339	5.334	5.343	2.280	1.160
17. SD	.723	.652	.657	.715	.671	.633	.658	.702	.654	.632	.620	.675	.597	.498
α	.782	.803	.813	.862	.873	.897	.908	.932	.773	.831	.835	.890	–	–

Note. *p* < .05; **p* < .01. Pre = Pre-session; S1 = Session 1; S2 = Session 2; S3 = Session 3; ITE = Initial Teacher Education.

they had not successfully completed the module as scheduled in their first year due to illness or for academic reasons (sample participants in Year 2 = 7.0%, Year 3 = 2.8%, Year 4 = 1.0%). Most of the participants (56.5%) were preparing for primary school teaching, followed by secondary school teaching (35.8%), with a minority (7.7%) preparing for early years teaching. The majority (94%) of participants reported the ethnicity of 'white European' or 'Australian'. Teacher ethnicity data in Australia are not routinely collected, but Santoro (2014) reported 87% of teachers with 'Anglo-Celtic heritage' and less than 1% with Indigenous heritage.

The frequency of missing data was <0.10% after Session 1 ($N = 1,409$), 3.6% after Session 2 ($N = 1,360$), and 6.2% after Session 3 ($N = 1,323$). Further analyses into the missing data pattern suggested that data were missing completely at random (Little's MCAR test: $\chi 2$ (33) = 45.630, $p = .071$). Additional *t*-tests were conducted to compare participants who did not participate in Session 2 and those who did participate in Session 2, with results suggesting that they did not significantly differ in their baseline self-efficacy (t [1,407] = -0.456, $p = .648$), career intentions (t [1,407] = 0.946, $p = .344$), or perceived fit (t [1,407] = 0.732, $p = .464$). Similarly, those who did not participate in Session 3 and those who did participate in Session 3 did not significantly differ in the baseline levels of all three study variables (self-efficacy: t [1,407] = -1.156, $p = .248$; career intentions: t [1,407] = 1.029, $p = .304$; perceived fit: t [1,407] = 0.674, $p = .501$). In light of the relatively low rate of missing data, we used full information maximum likelihood (FIML) estimation, meaning that data from all participants were included in the analysis, including the participants who had data missing for one or more of the measurement points, as recommended by Cham et al., 2017.

2.2. Scenario-based learning intervention

The SBL intervention consisted of three 1-h online sessions delivered over three weeks during one semester. Each session consisted of five different, brief video and/or text scenarios; thus, over the three sessions, participants completed a total of 15 scenarios situated in early years, primary, or secondary education levels. The content of the scenarios reflected authentic classroom situations, including managing disruptive students, student-student conflict, classroom transitions, differentiating the curriculum, relationships with colleagues and administrators, and working with parents. A previous study tested the effects of a short-term SBL intervention with secondary-level preservice teachers in the UK, showing significant increases in classroom readiness and teaching self-efficacy (Klassen et al., 2021).

The content for the scenarios in the SBL intervention was created using an iterative approach using best practice design principles. To construct the scenarios, we used a *critical incidents* approach (e.g., Buyse & Lievens, 2011) in which researchers conducted individual and focus group interviews with experienced teachers (i.e., >5 years of teaching experience) to identify authentic classroom challenges likely to be faced by preservice teachers. The development of the scenarios (see Klassen et al., 2021) involved iteratively writing and revising scenario content with a team of content writers that included experienced teachers, and then working with a 'concordance panel' of experienced teachers to create a scoring key for responses (*Rate the appropriateness of the following possible responses …*). Feedback content (i.e., delivered after each scenario) was created through a series of workshops with experienced teachers.

For each scenario, participants watched (or read) a brief classroom scenario, rated the appropriateness of each response option (i.e., for a beginning teacher), provided a brief reflective rationale for each rating, and received real-time feedback based on the alignment of the level of alignment between their responses and responses generated by experienced teachers on how a beginning teacher should respond (see Fig. 1 for example).

2.3. Measures

2.3.1. Teachers' self-efficacy

Teachers' self-efficacy was measured using three items adapted from the Teachers' Sense of Efficacy Scale (Tschannen-Moran & Woolfolk Hoy, 2001), with the short form showing acceptable reliability and concurrent validity in a previous study (Klassen & Durksen, 2014). The three items assessed confidence to manage classroom behaviour, implement effective teaching strategies, and engage students in learning (e.g., *I am confident that I can manage classroom behaviour*). The three items used a 6-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = somewhat disagree, 4 = somewhat agree, 5 = agree, 6 = strongly agree). See Table 1 for more details concerning the psychometric properties of study variables.

2.3.2. Career intentions

Intentions for pursuing a teaching career were measured with three items adapted from Hackett et al.'s (2001) Occupational Commitment scale, e.g., *I am excited to train as a teacher*. The three-item measure used a 6-point Likert scale ranging from 1 = strongly disagree to 6 = strongly agree. The adaptations to the scale included changing the wording to reflect the specific career of teaching.

2.3.3. Perceived person-vocation fit

Person-vocation fit was measured using a three-item, 6-point Likert scale adapted from Chuang et al. (2016), e.g., *There is a close match between my skills, knowledge, and abilities and those required for a teaching career*. The three-item measure used a 6-point Likert scale with scores ranging from 1 = strongly disagree to 6 = strongly agree. Adaptations to the scale included changing wording to reflect the specific career of teaching.

2.4. Procedure

Participants completed the three SBL sessions online on a device of their choice over the course of three weeks (with equal time lag between each session). Each session took approximately 30–60 min to complete and consisted of five text or video-based classroom scenarios.

Before completing the first session, participants completed a pre-test questionnaire assessing teaching-related self-efficacy, career intentions, and PV fit. Post-test questionnaires were administered at the end of each SBL session, assessing self-efficacy, career intentions, and PV fit. Finally, at the end of the session, participants received a report which provided an indication of their alignment with the experienced teachers' ratings and suggested strategies for further development.

Participants' scores for each SBL session were based on their level of alignment with the scoring key that was previously developed through concordance panels with experienced teachers. The total score available for each SBL session was 45 (5 scenarios x 3 response options x 3 maximum points).

2.5. Analyses

Construct validity and longitudinal measurement invariance.

Confirmatory factor analysis (CFA) was conducted to establish the construct validity of the study variables. In this analysis, we modelled all study variables (i.e., preservice teachers' self-efficacy, career intentions, and perceived person-vocation fit) across all four data collection waves (baseline scores from the pre-test and Sessions 1–3). We used the comparative fit index (CFI), Tucker-Lewis index (TLI), root mean square error of approximation (RMSEA), and standardised root mean square residual (SRMR) as the goodness-of-fit indices. CFI and TLI values higher than 0.90 and 0.95, respectively, indicate acceptable and excellent fit, and RMSEA and SRMR values below 0.06 and 0.08, respectively, indicate acceptable and excellent fit to the data (e.g., Hu & Bentler, 1999; Kline, 2015).

Moreover, we also examined the longitudinal measurement invariance across the four waves of data collection. Specifically, by following Vandenberg and Lance's (2000) suggestion, we investigated the *configural* (constraining the number of factors to be identical across four time points), *metric* (constraining factor loadings to be consistent across four times), and *scalar* (constraining the factor loadings and the intercepts to be consistent across four time points) measurement invariance of the study variables. In these analyses, we used the change in CFI, TLI, and RMSEA values as the criteria, with a decrease in CFI and TLI scores smaller than 0.01 and an increase in RMSEA score smaller than 0.015 indicating evidence of measurement invariance (Chen, 2007; Cheung & Rensvold, 2002).

2.5.1. Modelling the trend

To examine the changes in preservice teachers' self-efficacy, career intentions, and perceived fit after the sessions, we conducted a series of latent change analyses, using M*Plus* statistical software (Muthén & Muthén, 1998-2017).

We first calculated the means of the manifest variables and used them as indicators of the latent intercept and slope variables. For all the models, we also estimated the parameters using the robust maximum likelihood (MLR) estimator, which is a variant of the maximum likelihood estimator (Li, 2016). We adopted the full information maximum likelihood (FIML) approach to deal with any missing data (Enders & Bandalos, 2001). Finally, since prior studies have suggested that preservice teachers' self-efficacy and motivation may differ according to year level within the ITE programme (Meijer et al., 2011), the teaching grade level (Bowd & Brady, 2003), and sex (Kim & Cho, 2014), we examined models both with and without these demographic variables as covariates. We did not include reported ethnicity in the analyses due to the lack of ethnic diversity in this ITE programme. We also examined both the linear and quadratic growth models to gain a comprehensive view concerning the change of key study variables throughout the sessions.

In total, four models were investigated, with the first two models examining linear growth (Model 1 without covariates and Model 2 with covariates) and the next two examining quadratic growth (Model 3 without covariates and Model 4 with covariates) of participants' self-efficacy, career intentions, and perceived person-vocation fit. More specifically, Model 1 represents an unconditional linear growth model in which we examined the linear change of key study variables across four time points. The model was constructed by setting the loadings of preservice teachers' self-efficacy, career intentions, and perceived fit at all four time points to 1 for the latent intercept factor, and setting the loadings to 0, 1, 2, and 3, respectively, for the pre-session, Session 1, Session 2, and Session 3 for the latent slope factor. The intercepts for all manifest items were set to 0. Model 2 represents the conditional linear growth model with preservice teachers' sex, teaching grade level, and year in ITE programme entered as the covariates of the latent intercepts and slopes of self-efficacy, career intentions, and perceived fit.

To capture nonlinear change, we tested Model 3, which represents a quadratic growth model that examines the quadratic change of the study variables across four time points. This model was constructed by (1) setting the loadings of preservice teachers' self-efficacy, career intentions, and perceived fit at all four time points to 1 for the latent intercept factor, (2) the loadings to 0, 1, 2, and 3, respectively, for the pre-session, Session 1, Session 2, and Session 3 for the latent slope factor, and (3) the loadings to 0, 1, 4, and 9, respectively, for the pre-session and Sessions 1 to 3, for the latent quadratic factor. Model 4 examined the quadratic change of study variables again with sex, teaching grade level, and year in ITE programme as the covariates.

3. Results

3.1. Descriptive statistics, correlations, construct validity, and longitudinal invariance

Results of the descriptive and correlational analyses can be found in Table 1. Each of the study variables showed significant

bivariate correlations across the four time points, with correlations ranging from 0.584 to 0.820. Fig. 2 shows in graphic form the change of study variables across the four waves of data collection. The most dramatic increases were observed right after Session 1, with the greatest increase observed for preservice teachers' self-efficacy, followed by their perceived fit, and then career intentions. In sessions 2 and 3, preservice teachers' career intentions dropped almost back to the baseline level. Their perceived fit was maintained at a high level across the rest of the sessions, and their self-efficacy dropped slightly in Session 2 and stabilised in Session 3.

Results from the confirmatory factor analysis showed excellent model fit (Table 2), with high standardised factor loadings across all study variables and time points (βs = 0.667-0.918). Moreover, results from the longitudinal measurement invariance suggested that *metric* measurement invariance was established (see Table 3 for more details). However, the more stringent *scalar* invariance was not achieved. More specifically, although the increase in RMSEA was smaller than 0.015, both the CFI and the TLI scores had increases greater than 0.01, thus failing to support *scalar* invariance. The establishment of *metric* invariance indicated that the same constructs assessed had consistent factor loadings across time points.

3.2. Latent change SEM

3.2.1. Model 1: Unconditional linear growth model

The model fit the data acceptably well (Table 2). Results indicated a significant increase in preservice teachers' self-efficacy (B = 0.032, β = 0.178, p = .025) and perceived fit (B = 0.072, β = 0.432, p < .001), but not career intentions (B = 0.011, β = 0.067, p = .095). Preservice teachers with higher baseline levels of self-efficacy (relative to other participants) before the sessions also reported higher baseline levels of career intentions and perceived fit, and those with greater baseline career intentions also reported greater perceived fit. Moreover, preservice teachers who reported an increase in their self-efficacy across the sessions also reported an increase in their career intentions and perceived fit. Those with an increase in career intentions also reported an increase in perceived fit. Furthermore, preservice teachers who started with lower baseline self-efficacy before the sessions were more likely than those with higher baseline self-efficacy to experience an increase in their self-efficacy, career intentions, and perceived fit after the sessions.

Those who started with relatively lower career intentions before the intervention were more likely than their counterparts with higher career intentions to report an increase in their career intentions after all the sessions. Finally, preservice teachers who started with relatively lower perceived fit before the sessions were more likely than others to benefit from the sessions, reporting a greater increase in career intentions and perceived fit after the sessions. No significant relations were observed between the baseline levels of career intentions or perceived fit and the change in preservice teachers' self-efficacy (see Table 4 for more details).
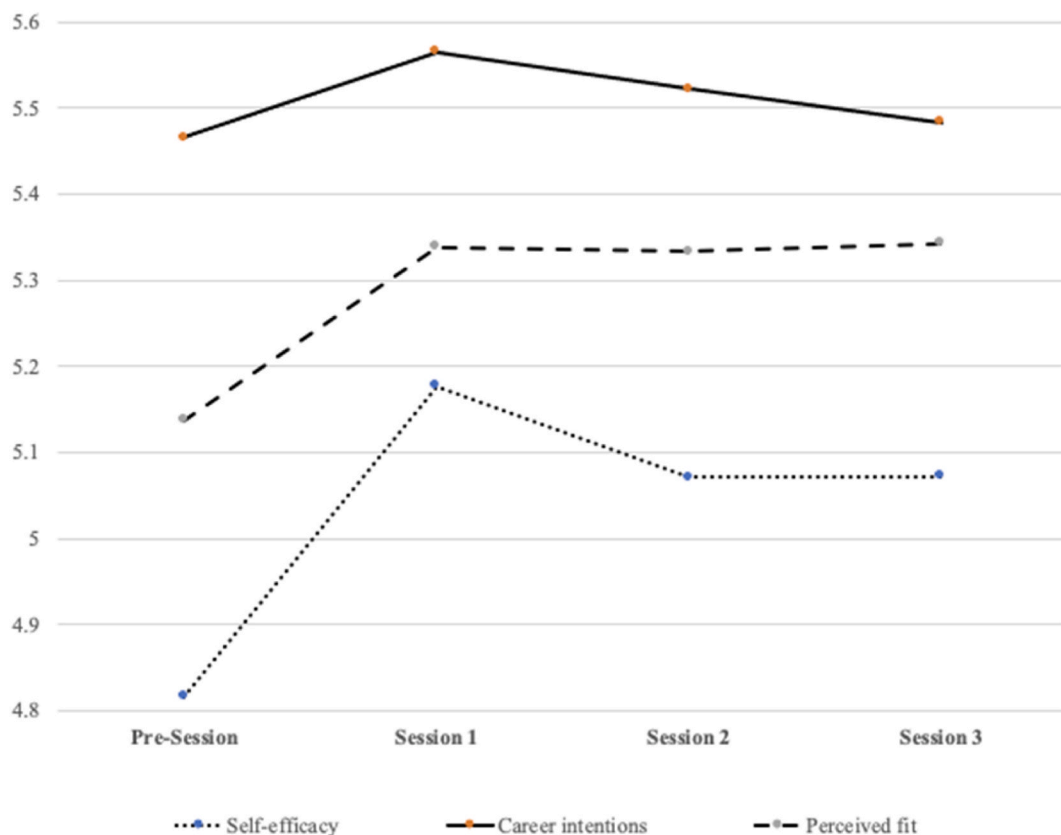

Fig. 2. Mean levels of study variables across four time points.

Table 2
Model fit indices for the confirmatory factor analyses and latent change structural equation modeling.

Models tested	CFI	TLI	RMSEA	SRMR	χ^2 (*df*)
Measurement model	.983	.977	.027	.035	963.225 (474)***
Model 1: Unconditional linear growth model	.959	.926	.071	.076	297.374 (37)***
Model 2: Conditional linear growth model (with covariates)	.963	.931	.060	.062	322.086 (55)***
Model 3: Unconditional quadratic growth model	.976	.879	.091	.030	163.412 (13)***
Model 4: Conditional quadratic growth model (with covariates)	.976	.890	.076	.016	191.814 (22)***

Note. ***$p < .001$.

Table 3
Longitudinal measurement invariance.

Description	MLR χ^2 (*df*)	CFI	TLI	RMSEA	IC 90%	χ^2 (*df*)	CFI	TLI	RMSEA
Configural invariance ($N = 1,411$)	.963.225 (474)*	.983	.977	.027	[.025; .029]	–	–	–	–
Metric Invariance	1,020.934 (501)*	.982	.977	.027	[.025; .029]	57.709 (27)*	−.001	.000	.000
Scalar Invariance	1,681.142 (528)*	.960	.952	.039	[.037; .041]	660.208 (27)*	−.022	−.025	+.012

Note. *Statistically significant at $p < .05$.

Table 4
Correlations between latent intercepts and slopes in the unconditional linear growth model (model 1).

	1	2	3	4	5	6
1. I_self-efficacy	–					
2. S_self-efficacy	−.453**	–				
3. I_career intentions	.465**	−.112	–			
4. S_career intentions	−.196*	.517**	−.426**	–		
5. I_perceived fit	.611**	−.189	.635**	−.263**	–	
6. S_perceived	−.222*	.593**	−.174	.675**	−.476**	–
M	5.000**	.032*	5.488**	.011	5.173**	.072**
SD	.606	.107	.628	.158	.605	.167

Note. I = intercept; S = slope.
*$p < .05$; **$p < .01$.

3.2.2. Model 2: Conditional linear model with demographics as covariates

This model fit the data acceptably well (Table 2). Preservice teachers who were female tended to report higher baseline career intentions ($B = 0.102$, $\beta = 0.076$, $p = .016$), and they were more likely to experience an increase in perceived person-vocation fit than their male counterparts ($B = 0.108$, $\beta = 0.083$, $p = .007$) after the sessions. No other significant paths were observed concerning the year of ITE programmes or teaching grade levels.

3.2.3. Model 3: Unconditional quadratic growth model

The model fit was acceptable but worse than the linear models (Table 2). Model results suggested that preservice teachers experienced increases in all three factors, including self-efficacy, career intentions, and perceived fit. However, the rate of increase was not consistent across sessions, instead, it was lower (hence, a negative quadratic slope) in the later sessions. Preservice teachers who

Table 5
Correlations between latent intercepts, linear slopes, and quadratic slopes in the unconditional quadratic growth model (model 3).

	1	2	3	4	5	6	7	8	9
1. I_self-efficacy	–								
2. S_self-efficacy	−.742**	–							
3. Q_self-efficacy	.293	−.548*	–						
4. I_career intentions	.447**	−.245	.135	–					
5. S_career intentions	−.193*	.24	−.088	−.537**	–				
6. Q_career intentions	.000	.091	.170	.298*	−.767**	–			
7. I_perceived fit	.547**	−.249	.071	.624**	−.312	.151	–		
8. S_perceived fit	−.051	.221	.025	−.328*	.490*	−.239	−.642**	–	
9. Q_perceived fit	.065	−.056	.136	.303*	−.442*	.467**	.449**	−.793**	–
M	4.839**	.348**	−.090**	5.466**	.110**	−.035**	5.140**	.207**	−.047**
SD	.629**	.195	.077*	.659**	.286*	.089**	.636**	.324*	.077*

Note. I = intercept; S = slope; Q = quadratic.
*$p < .05$; **$p < .01$.

started at lower baseline levels or those who experienced more rapid increases in earlier sessions tended to have a lower rate of increase in later sessions, for all outcome variables (see Table 5 for more details).

3.2.4. Model 4: Conditional quadratic growth model with demographics as covariates

The model fit was also acceptable but was still worse than the linear models (Table 2). As compared with Model 2, the same findings were observed concerning the effects of demographic variables (i.e., female preservice teachers reported greater baseline career intentions and perceived fit).

4. Discussion

A key developmental task during teacher education is the transformation from student to teacher, with professional identity evolving during the various elements of the ITE programme. Previous research has shown that preservice teachers experience low self-efficacy related to the challenges associated with classroom practice (e.g., Chan, 2008), and report doubt about their commitment to the profession when teaching confidence is low (Chesnut & Burley, 2008). In Australia, retention during ITE programmes and the early career phase is a concern (e.g., Heffernan et al., 2022; Weldon, 2018), and interventions that boost self-efficacy and perceptions of fit can play a role in preparing preservice teachers for classroom teaching. Teaching placements play a crucial role in a novice teacher's professional identity formation, but teaching experience gained in actual classrooms is a high-stakes, high-risk endeavour, not just for the preservice teacher, but for the reputation of the ITE programme, the receiving school, and not least, the pupils in the classroom. Simulated classroom experiences such as those provided by SBL interventions could provide a useful transition step not just to prepare preservice teachers for actual classroom teaching during the teaching placement, but to build their teaching confidence and their sense of fit with the profession. We explored the relations between a brief, repeated measures online intervention on preservice teachers' self-efficacy, intentions about teaching as a career, and perceived fit with the profession. Overall, we found that the intervention had the expected association with preservice teachers' self-efficacy and PV fit, and a less clear-cut association with career intentions.

4.1. Patterns of change

An advantage of studies with more than two measurement points is that one can observe the shape of change over time. We tested both linear and quadratic models, and although the linear model fit the data better overall (showing overall positive growth in self-efficacy and PV fit, but not career intentions), the quadratic model provides additional clarity about how preservice teachers responded to the individual sessions. We observed that self-efficacy, career intentions and perceived fit all showed significant positive associations after the first round of the SBL intervention, suggesting that a one-off intervention is associated with a significant, positive (albeit temporary) change in teaching-related attitudes immediately after the intervention. However, the picture is more nuanced than one of straightforward linear growth: tracing the pattern of change after the completion of another two SBL sessions showed (a) a slight drop in teaching self-efficacy, although levels were still significantly higher than at the start, (b) an increase in career intentions after Session 1, but a return almost to baseline after Sessions 2 and 3, and (c) a plateauing (or maintenance) of the growth in perceived fit after the initial measurement. These results are consistent with previous research on preservice teacher self-efficacy (e.g., Klassen et al., 2021). In addition, the results confirm the possibility that preservice teachers experience a kind of 'reality shock' or recalibration of teaching-related beliefs after exposure to teaching experiences (e.g., Kim & Cho, 2014).

A closer look at the data from the latent change SEM showed that the three outcome variables operated in tandem at least at the beginning stages of the intervention, with increases in self-efficacy associated with increases in career intentions and PV fit, replicating the findings of Chesnut & Burley, 2015 systematic review which showed that teacher self-efficacy and professional commitment are closely linked. Participants with relatively lower levels of the three outcome variables benefited most from the intervention; for example, participants with lower career intentions were more likely to report an increase after the sessions, and those with lower PV fit displayed increases in career intentions and PV fit after the sessions. The observation that the highest growth occurred in participants with the lowest starting points (i.e., intercept) in the latent change models suggests that the intervention has the potential to benefit those preservice teachers who are at the highest risk when they enter the classroom. Dicke et al. (2015) pointed out that the reality shock associated with beginning to teach can lead to high levels of stress and decisions to leave the profession. For those preservice teachers who already doubt their capabilities and their fit with the profession, an intervention based on SBL has the potential to not only strengthen their perception of their identity and how they fit into the profession, but their confidence to manage the challenges associated with the job.

The trajectory of self-efficacy after the SBL intervention in this study replicates the findings from Klassen et al., 2022 that used a UK sample of preservice teachers who were enrolled in a 1-year ITE programme. Building teaching-related self-efficacy should be an explicit goal of ITE programmes because higher levels of self-efficacy are associated with vocational development and commitment (Bandura, 1997), and levels of self-efficacy are a powerful predictor of career interests, occupational consideration, and career choice for preservice teachers (Frazier et al., 2019; van Rooij et al., 2019). The findings across two studies, with samples from two countries and two types of ITE programme (4-year and 1-year models), suggests that SBL interventions built on the theorized sources of self-efficacy have a pronounced and meaningful association with the teaching confidence of preservice teachers. The novel contribution of the current study is that we can also show that the intervention is associated not just with teaching-related self-efficacy, but with aspects of career-related beliefs, especially perceived fit with the profession.

4.2. Implications for practice

The differing patterns of change have implications for the delivery and design of the SBL intervention, for ITE programmes, and for designing future iterations of the intervention. For large ITE programmes, such as the one involved in the current study, building and maintaining relationships with prospective schools for teaching placements is a perennial challenge, and providing preservice teachers with the skills and knowledge in advance to better navigate their teaching placements can protect these relationships. The evidence is beginning to converge (over the course of two repeated measures studies in two different ITE programmes in two countries) that an SBL intervention can build teaching self-efficacy in preservice teachers. The combination (based on Bandura's hypothesised sources of self-efficacy), of enactive experience (developed through exposure to authentic scenarios), with vicarious experience (the modelling provided by experts in their feedback), and verbal persuasion (developed through the messages on the level of alignment with experts), provides a boost to teaching-related self-efficacy for preservice teachers, and especially for those with a lower self-efficacy starting point.

The evidence for the associations of the SBL intervention with PV fit in this study is promising with potential for application for the teaching pipeline: we know from previous studies (e.g., De Cooman et al., 2019) that 'fit matters' for a host of desired work-related outcomes (e.g., retention), but we do not yet know how PV fit fluctuates during training, or how fit changes upon entry to the profession. Results from this study showed a short-term growth and then stabilisation of perceived fit, but the robustness of perceptions of fit is likely affected by environmental factors such as other ITE programme elements, and the relative success of the preservice teacher during actual teaching placements. Furthermore, the more equivocal results of the intervention on teaching career intentions (i.e., initial boost followed by a decline back to baseline) highlight the difficulties of trying to shift career intentions through a brief intervention. We can see from our results that career intentions are associated with self-efficacy and PV fit, but career intentions are more difficult to shift, and a stronger and longer-term intervention may be necessary to move the needle on preservice teachers' intentions to pursue a teaching career.

4.3. Implications for further research

The effectiveness of the elements of ITE programmes is not always examined in detail, but in this study, we explored how one intervention delivered in an ITE programme has the potential to influence preservice teachers' attitudes about teaching. We do not yet know what works for whom and for how long, and extensions of this study should include a longer-term evaluation of the relations of the intervention with longer-term follow-up that includes career decisions, i.e., actual decisions to enter the profession. In addition, although we found some modest demographic effects (i.e., female participants reported higher baseline career intentions and were more likely to experience an increase in PV fit than males), additional exploration of differences associated with other demographic differences (e.g., ethnicity and minority status), would be beneficial for further study.

4.4. Limitations

The SBL intervention was administered alongside other usual ITE programme elements, and the patterns of change may not be solely attributable to the intervention. The lack of a control group that did not receive the intervention means that the observed associations may derive from other ITE activities running in tandem with the intervention. In this setting, ITE programme staff were not able to support alternative research designs, such as using a waitlist control group, but an experimental design that includes a control group would provide additional confidence in the findings. A second limitation is the close proximity of the measurement periods, which could increase the correlation of measurement errors, and the absence of measurement of longer-term outcomes, i.e., the maintenance of the identified effects. A further study to explore longer-term relations with attitudes and behavioural indicators (e.g., attrition rate and supervisor ratings of teaching during the placement) is in the planning stages. Despite these limitations, the findings from this study reinforce previous findings on the link between SBL and teaching self-efficacy and provide new evidence that a relatively brief and scalable intervention is reliably associated with preservice teachers' professional identity and fit with the profession.

4.5. Conclusions

Building the competence and confidence of preservice teachers is one of the goals of ITE programmes in Australia and internationally, but recent years have seen an increase in the number of trainees who leave their ITE programme before completion, who decide not to pursue a teaching career at the completion of their programme, or who leave the profession early in professional practice (Heffernan et al., 2022; Weldon, 2018). Multiple approaches to build the confidence and professional identity of prospective teachers are needed to ensure that the teaching pipeline remains strong: new and scalable interventions, such as SBL, that provide preservice teachers with simulated classroom experiences, the opportunity for reflection, and real-time expert feedback, have the potential to contribute to protecting and building the teaching workforce.

Credit author statement

Robert Klassen: Writing, conceptualisation, methodology; Hui Wang: Writing, data analysis, writing-reviewing; Jade Rushby: Methodology, original draft preparation.

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Data availability

Data will be made available on request.

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