

Flourishing Mathematics Teachers: The Effect of School-Based Placements on Preservice Secondary Mathematics Teachers Anticipated Job Enjoyment

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This paper reports on part of a longitudinal project investigating the formation of preservice secondary mathematics teachers' identities at one Australian university. Given that school-based placement experiences impact teacher identity development, the Flourishing Mathematics Teacher (FMT) project focuses on this experience and aims to identify features of placement experiences that enable beginning secondary mathematics teachers to flourish, and remain, in their teaching careers. In this paper, we report on preliminary data exploring changes to 23 preservice secondary mathematics teachers anticipated job enjoyment after their first teaching placement.

The recruitment and retention of teachers are pressing issues both nationally (Australian Institute for Teaching and School Leadership [AITSL], 2021) and internationally (Organisation for Economic Co-operation and Development [OECD], 2020), with shortages especially pronounced in secondary mathematics (Shah et al., 2022). Despite notable financial investment in teacher supply initiatives in Australia (e.g., NSW Government, 2021), teacher shortages remain. Currently, there is a noticeable lack of funding directed towards initiatives aimed at retaining beginning mathematics teachers, despite significant early career attrition (Wyatt & O'Neill, 2021). Retaining quality teachers is vital to Australia's ability to deliver quality mathematics education to all students. The Flourishing Mathematics Teacher (FMT) project addresses an important gap in beginning teacher retention interventions by investigating the conditions conducive to the success and 'flourishing' of beginning secondary mathematics teachers as they navigate through their initial teacher education and embark on their teaching career.

Teacher Identity

Teacher identity is multidimensional and encompasses cognitive and affective elements that influence how teachers view themselves and how they are viewed by others (Kaasila et al., 2012). Teacher identity is constantly formed and re-formed due to complex interactions between the personal, professional, and political (Mockler, 2011). It is shaped by career motivations and goals, and reflects the degree to which one believes they ascribe to being a member of the profession (Richardson & Watt, 2018). Given the fluid nature of identity, teacher identity can be influenced by the experiences they have during initial teacher education (Bobis et al., 2020), making this time crucial in setting future teachers up for success in their career. In this study, we consider teacher identity as "teachers' perceptions of their cognitive knowledge, sense of agency, self-awareness, voice, confidence, and relationship with colleagues, pupils and parents" (Izadinia, 2018, p. 109).

We coin the term 'flourishing mathematics teacher identity' and choose the verb 'flourish' to elicit the literal meaning of the word—"grow or develop in a healthy or vigorous way, especially as the result of a particularly congenial environment" (Oxford English Dictionary, 2023). To define a 'flourishing mathematics teacher identity', we consider motivational and contextual factors that enable the development of positive mathematics teacher identities. First, considering motivational factors, expectancy-value theory describes how career choices are informed by teachers' beliefs, expectancies for success, and values (Eccles & Wigfield, 2002;

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Richardson & Watt, 2018). The “FIT-choice” framework (Factors Influencing Teaching Choice) proposed that motivators to teach include intrinsic values, utility values, and attainment values (Watt & Richardson, 2024). Intrinsic value pertains to enjoyment or interest, utility value can relate to personal utility (e.g., job security) or social utility (e.g., a desire to make a meaningful difference), and attainment value concerns one’s perceived teaching abilities (Wigfield & Eccles, 2000). Teacher self-efficacy and social-utility motivations have been empirically linked to job satisfaction (Zakariya & Wardat, 2023). In addition to these factors, innovativeness and creativity in teaching has also been linked to teacher job satisfaction (Blömeke et al., 2021; Uçar, 2022). Therefore, for preservice teachers, motivational factors that may impact their flourishing teacher identity include their self-efficacy, enjoyment, interest, and ability to be innovative and creative in their anticipated career. A growth-mindset is also pertinent to flourishing as a teacher, given that a growth mindset can support beginning teachers’ resilience (Gero, 2013) and such mindsets have been positively linked to career motivation and engagement for teachers (Nalipay et al., 2021). Second, considering contextual factors and drawing on self-determination theory, a teachers’ intrinsic career motivation can be supported if they feel a sense of autonomy, relatedness, and competence in their anticipated work environment (Ryan & Deci, 2017). Relatedness in particular aligns with the concept of the social identities of teachers, which pertain to interpersonal relationships and group membership (Richardson & Watt, 2018).

A core aim of the wider research project is aimed at the retention of early career mathematics teachers. Previous research indicated that job satisfaction is closely associated with early career teacher retention (Kelly et al., 2019). In addition to satisfaction, Sullivan et al. (2021) found that the enjoyment teachers got out of teaching others was vital to their commitment to the profession. Teachers who exhibit lower levels of satisfaction and commitment to teaching are more likely to leave the profession (Skaalvik & Skaalvik, 2016). The FIT-Choice project affirmed that intrinsic values predicted professional engagement (planned persistence) at the end of initial teacher education when transitioning to the workforce (Watt & Richardson, 2024).

The Flourishing Mathematics Teachers Project

The FMT project measured preservice secondary mathematics teachers’ ratings for the flourishing identity factors enjoyment, interest, innovation, and autonomy, and will track how these change and reasons for changes throughout their initial teacher education program and their first years of teaching. The project will conclude with interventions to support preservice teacher flourishing, whether that be through interventions at the tertiary level or interventions during school-based placements. In this paper, preliminary data on preservice teachers anticipated job enjoyment is focused on and we report how school-based placement experiences influenced one cohort of preservice teachers’ anticipated job enjoyment. Analysis of preservice teachers anticipated job enjoyment is important as research has identified that teachers who enjoy teaching mathematics are more likely to spend time teaching mathematics, have higher self-efficacy, and reduced teacher burnout (Russo et al., 2021). Though the concept of a flourishing identity has been theoretically explained, the FMT project also confirmed the extent to which preservice teachers value each of the examined factors, and this will also be discussed in this paper. The research questions that will be answered in this paper are:

- How does preservice secondary mathematics teachers’ anticipated job enjoyment change as a result of placement?
- What experiences during placement influence preservice secondary mathematics teachers’ anticipated job enjoyment?
- To what extent do preservice secondary mathematics teachers value each of the flourishing identity factors (i.e., self-efficacy, enjoyment, interest, and innovation)?

Methodology

Participants were undergraduate and postgraduate preservice secondary mathematics teachers from one Australian university. There were 54 students in the entire cohort, and 23 students form the final sample as they had completed their first school-based placement in secondary mathematics (the others completed a placement in their other teaching area and had not yet completed a placement in secondary mathematics).

Participants were administered a modified version of Frenzel et al.’s (2009) Teacher Enjoyment of Teaching Mathematics (TETM) questionnaire prior to and after their first school-based placement. The TETM was utilised to answer the first research question and ascertain how placement experiences influenced participants anticipated enjoyment in teaching mathematics. The questionnaire had 5-items, and items were modified to ask participants to reflect on their anticipated career enjoyment, given they were preservice teachers. Each of the TETM items was answered using a 6-point Likert scale with each being scored a value from 1 to 6 (strongly disagree = 1 to strongly agree = 6). Therefore, the minimum possible mean score across all items on the TETM was 1 and the maximum was 6.

Prior to placement, participants had completed one unit of study focused on teaching mathematics and had not yet undergone any formal professional experiences in schools. The school-based placements constituted a four-week teaching experience where participants engaged in observing and teaching secondary mathematics under the supervision of an in-service teacher. To answer research question two and understand reasons for any changes found on the TETM questionnaire after placement, qualitative questions were added to the post-placement survey. These questions were “what experiences on placement, if any, have changed your interest in teaching mathematics?” and “what did you enjoy the most on placement?”

In addition to measuring participants anticipated enjoyment, their values were explored. Using the framework for flourishing teacher identity, participants were asked pre- and post-placement to rate the importance of enjoying, having autonomy, being interested, and having flexibility to be innovative in their job. This allowed the third research question to be answered. Each of the values were rated on the same 6-point scale as the TETM and were scored in the same way.

Findings

Pre-Placement

Table 1 shows the descriptive statistics for each of the TETM items.

Table 1

Descriptive Statistics for the Pre-Placement TETM Questionnaire (n = 23)

Question	Mean	SD	σ^2
I anticipate that I will really enjoy teaching mathematics	4.83	1.07	1.10
I anticipate that I will look forward to mathematics lessons	4.88	0.92	0.81
I anticipate that teaching mathematics is so enjoyable that I will like preparing and planning my lessons	4.45	1.12	1.20
I anticipate that when teaching mathematics, I will be good-humored	4.83	0.88	0.75
I anticipate that teaching mathematics will give me many reasons to be pleased	4.73	1.05	1.06

Participants responses on the pre-placement TETM questionnaire had an overall mean score of 4.74 (SD = 1.02), demonstrating that the cohort anticipated that they would find enjoyment in teaching mathematics. This mean is indicative of high anticipated enjoyment when compared to participants in Frenzel et al.'s (2009) study with 71 German teachers (Mean = 3.69, SD = 0.68).

To explore the significance of the results outlined in Table 1, participants' ratings for the importance of each of the flourishing teacher identity factors in their prospective workplace illuminate the most important values for this cohort (Table 2). Of the explored factors, enjoyment was the highest rated followed by interest. Participants rated the importance of enjoying their job, on average, higher than their anticipated enjoyment.

Table 2

Descriptive Statistics for Values Questionnaire Items (Prior to Placement), (n = 23)

Question	Mean	SD	σ^2
Enjoying my job is important to me.	5.40	0.78	0.59
Having autonomy in my job is important to me.	5.00	0.90	0.78
Being interested in my job is important to me.	5.34	0.71	0.49
Being creative in my job is important to me.	5.04	0.93	0.83

Though the cohort's overall TETM mean indicated high anticipated enjoyment, analysis of individuals responses revealed variation among the cohort. Some participants, prior to embarking on a school-based placement, reported low anticipated enjoyment of their job on the TETM. To explore this further, participants with a mean overall score of 4 or below ($n = 4$) on the pre-placement TETM survey were identified and their responses to the career values importance questions were analysed. Of these four participants, two rated "enjoying my job is important to me" as strongly agree and one rated this question as agree. The combination of low anticipated enjoyment and agreeing that enjoyment is important categorises these four participants in an "at-risk" category for not flourishing in their career due to potentially low enjoyment, which could indicate potentially lower levels of satisfaction with a teaching career and a greater likelihood of leaving the profession (Skaalvik & Skaalvik, 2016).

Table 3

Descriptive Statistics for the Post-Placement TETM Questionnaire (n = 23)

Question	Mean	+/-	SD	+/-	Var	+/-
I anticipate that I will really enjoy teaching mathematics	4.86	+0.03	1.18	+0.11	1.33	+0.23
I anticipate that I will look forward to mathematics lessons	4.73	-0.14	0.96	+0.04	0.89	+0.08
I anticipate that teaching mathematics is so enjoyable that I will like preparing and planning my lessons	4.30	-0.15	1.18	+0.06	1.34	+0.14
I anticipate that when teaching mathematics, I will be good-humoured	4.79	-0.04	1.04	+0.16	1.05	+0.3
I anticipate that teaching mathematics will give me many reasons to be pleased	4.97	+0.24	0.98	-0.07	0.92	-0.14

Note. +/- denotes the difference from pre-placement questionnaire.

Post-Placement

Table 3 shows the descriptive statistics for the post-placement TETM, and the differences in the pre- and post-placement item means. The overall mean score of the post-placement TETM was 4.73 (SD = 1.07), demonstrating little overall change in anticipated enjoyment.

The question where participants were asked to assess whether teaching mathematics would give them many reasons to be pleased scored higher in the post-placement questionnaire. This higher score suggests that the placement experience had given participants more cause to anticipate that their future mathematics teaching careers would be satisfying. A further, qualitative question added to the post-placement questionnaire asked participants about the most enjoyable aspect of their placement. It was striking that 87% of responses (20 out of 23) mentioned an element of student interaction as the most enjoyable aspect of their placement, with individual participants saying they enjoyed “connecting with the students, and seeing them become more motivated” (participant 1), “seeing the students actually learned something” (participant 2), and “the interaction and relationships I got to build with the students” (participant 3). The ability to relate to and interact with actual students is a unique component of school-based placements, which cannot be easily replicated at university. The ability to interact with students seemed to be the feature of placement that preservice mathematics teachers found most enjoyable and rewarding.

Post-placement, participants were asked again to rate the flourishing teacher identity values. Each identity value mean score was the same pre- and post-placement apart from innovation, which scored lower post-placement (change in mean = -0.3). Of the flourishing identity factors, enjoyment was still rated highest, further affirming the need to scrutinise anticipated enjoyment for potential teacher flourishing.

When analysing individual responses on the TETM, eight students reported no difference in their anticipated enjoyment pre/post placement. Seven students reported increased anticipated enjoyment post-placement and cited reasons noted above about the rewarding nature of interacting with students. Concerningly, eight students reported decreased anticipated enjoyment post-placement. Qualitative responses from these students indicated that their placement experience had demonstrated to them that teaching was a more challenging profession than originally anticipated. Encapsulating this, one participant stated, “I’ve realised that the reality of teaching is a lot more difficult than I expected it to be” (participant 4). Supporting this finding was the quantitative data from the entire cohort, where a decline in anticipated enjoyment was observed for the TETM items relating to planning and teaching lessons. This suggests that the realities of planning and teaching impacted preservice teachers’ anticipated job enjoyment. One student who reported decreases in anticipated enjoyment reported that difficulties with their supervising teacher made the placement experience less enjoyable than hoped, “my supervising teacher constantly correct me in front of students and peers, damaging my confidence ... I now am unsure about a career in teaching” (participant 5).

Of the four students who were identified as “at-risk” pre-placement, two reported decreases in anticipated enjoyment, one reported no change, and one reported an increase but did not report an overall TETM score above 4 (classing them as “at risk” still). No students moved into the “at risk” category in the post-placement TETM. Given that all students who were originally identified as “at risk” remained so after placement potentially demonstrates that the TETM items can be a useful measure of determining students’ risk status prior to teaching placements. It also indicates that a typical placement with no additional intervention is not effective in increasing their anticipated job enjoyment and can potentially be detrimental.

Discussion

The results of the TETM questionnaire indicate that the placement experience overall did not have a substantial effect on the cohort’s anticipated enjoyment in teaching mathematics. Given that the pre-placement questionnaire indicated that many students anticipated that they would enjoy teaching mathematics, these results suggest that placements have overall not materially dampened or enhanced their predicted enjoyment in teaching mathematics. This may be a positive finding for a cohort who already reported high anticipated enjoyment, however it

is somewhat surprising that there was no meaningful increase (even small) in anticipated enjoyment after a practical experience in a school. Whilst the cohort reported high anticipated enjoyment as a whole, variations among individuals are worth noting as some participants did report decreased anticipated enjoyment or consistently low anticipated enjoyment.

As evidenced in the minimal change in the TETM overall mean after placement, it seems plausible to suggest that most participants had a good understanding of what to expect on the placement experience. The small shifts seen in individual TETM items suggest that placement had shown them that teaching is a challenging profession that places significant demands on teachers. However, for this cohort, placement also affirmed that the profession is enjoyable and working with students is rewarding. The qualitative responses of participants suggest that the strongest influence on preservice teacher enjoyment was that that they were able to teach actual students. For these participants, this placement was their first opportunity to teach students in the classroom. The placement experience gave them a sense of relatedness with students, which has been showed to improve career motivation (Ryan & Deci, 2017). In addition, making connections with students should serve to help participants value the profession by improving the social utility of their work in schools, where they can see the fruits of their teaching (Wigfield & Eccles, 2000; Zakariya & Wardat, 2023).

Of the flourishing identity factors, it was clear that enjoying their job was important to this cohort. After enjoyment, interest was scored highest in the values questionnaire. People who do what they like enjoy their work and find it interesting (Benz & Frey, 2008). The data from this survey suggests that the participants want to do what they like. Therefore, for these preservice teachers to flourish it is important that they view mathematics teaching as what they want to do professionally. The data from the TETM suggests that most participants are doing what they want, but the variation in overall TETM scores among individuals indicates that some are not yet convinced that mathematics teaching is what they want to do. Therefore, where the TETM questionnaire appears to be most valuable in supporting beginning teachers to flourish is analysing their individual scores rather than only observing cohort means.

At an individual level, several students were identified as “at risk” prior to placement and this worsened or did not change after placement. These “at risk” students reported that they did not anticipate they would enjoy a career teaching despite reporting that it is important to them that they enjoy their work teaching. Potentially the TETM is a valuable tool to evaluate at risk status, as intervention is likely needed for these teachers as the typical placement experience was not sufficient to address their low anticipated enjoyment. For these at-risk students, frequent mention of “the realities of teaching” seem to indicate that some had mismatched expectations of the placement experience. A potential intervention to address this issue could occur at the university level, where we consider how well teacher training is preparing students for “the realities” of the classroom. Alternatively, intervention could occur at the placement level where supervising teachers consider strategies that better induct preservice teachers to classroom teaching, allowing for a smoother transition from university learning to professional practice. Comments from “at risk” students highlight the detrimental impact of negative interactions with supervising teachers, highlighting the importance of careful selection of supervising teachers. To further aid in design future interventions, the broader Flourishing Mathematics Teachers study will conduct case studies with preservice mathematics teacher’s during their placement experiences to better understand where and why this mismatch in expectations occurs.

Conclusion

The data presented in this preliminary study on the what preservice teachers valued in their future work environment, and the impact of school-based placements showed that enjoyment and interest are highly valued factors for preservice secondary mathematics teachers. The

participants anticipated that they would largely enjoy teaching mathematics, and this is a positive finding given that enjoyment has been proposed as crucial to flourishing as a mathematics teacher. Placement experiences did not affect the anticipated enjoyment of the cohort overall. Responses to qualitative survey questions indicated that placement had shown these preservice teachers that teaching was a challenging but rewarding career. This was evident in the enjoyment they derived from connecting with students and seeing their knowledge grow. The social identity (Richardson & Watt, 2018) that preservice teachers developed during placement due to interactions with students seemed to be most meaningful for developing a flourishing teacher identity. For participants who did report low anticipated job enjoyment, this finding was of concern given they rated enjoyment as important. Reasons for low anticipated enjoyment centred on a mismatch of expectations when faced with the realities of the classroom, and negative interactions with supervising teachers. It is worthwhile conducting further studies to ascertain whether “at risk” students remained so because they lacked the right type of experiences to develop the same positive social identity as others, or if those experiences were not sufficient to overcome the mismatch in expectations and negative experiences with supervising teachers.

The project from which this paper is drawn will conduct further research into preservice teacher placement experiences by carrying out multiple case studies to develop a deeper understanding of the factors that determine perceived enjoyment in teaching, along with the other flourishing teacher factors. These case studies will help to further illuminate the impact of initial placement experiences on the preservice teachers’ perceptions of the teaching profession and how those perceptions change through engaging in classroom practice. Completing the remaining stages of the broader study will allow for deeper analysis and identification of supports that assist the flourishing of secondary mathematics teachers as they enter the teaching profession.

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