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Pre-service language teacher wellbeing as a complex dynamic system☆

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1. Introduction

Over the past decades, research has shown that pre-service teachers are susceptible to a number of personal and contextual stressors which can threaten their wellbeing, leading to worrying rates of stress, burnout, and attrition (Vesely et al., 2014). Pre-service teachers typically juggle the demands and responsibilities of their dual roles as both students and teachers (Day & Gu 2010; Hong, 2010). They are often involved in limited teaching experiences, teaching in classrooms that are not their own, while at the same time continuing with their university studies. In light of the demands facing pre-service teachers and the alarming rates of attrition and burnout (Birchinall et al., 2019), understanding and supporting their wellbeing during this critical time of their professional development is a key concern for researchers, training programmes, and policy-makers alike.

In this paper, we contribute to the literature on pre-service teacher wellbeing on two levels. Firstly, we seek to understand how this population copes with the challenges of becoming a teacher against the backdrop of the pandemic crisis. The study helps to generate insights into the particular issues facing language teachers in their pre-service lives, but it also casts light on the ways in which they are

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able to draw on their resilience to cope with the specific demands of the pandemic crisis. These psychological and behavioural insights are invaluable for understanding more generally the kind of support that pre-service teachers may need when faced with other types of critical incidents in their professional development, such as working through educational reforms or transitions across different schools. The second related contribution is theoretical. This study looks at wellbeing from a Complex Dynamic Systems Theory (CDST; Larsen-Freeman & Cameron, 2008) perspective to add original insights and depth to current conceptualisations of wellbeing as a construct. To the best of our knowledge, this is the first empirical study drawing explicitly on CDST to examine teacher wellbeing. Earlier research suggests that wellbeing displays some of the characteristics of complex dynamic systems, such as dynamism, interconnectedness, and situatedness (e.g., Lomas et al., 2020; Oxford, 2018). These aspects, however, have been typically examined in isolation, thus only providing a fragment of a more complex picture. Recent research looking at related constructs, such as resilience (e.g., Kostoulas & Lämmerer, 2020) or emotional wellbeing (Oxford, 2020; Oxford & Gnokou, 2020), has shown that examining these constructs as organic wholes can provide valuable, original insights into their complexity that could not otherwise be obtained by looking at their features in isolation. As such, in our study, we look at the wellbeing of each individual participant holistically, in order to obtain a more nuanced and comprehensive picture of the construct, and to reveal its dynamic, complex, and situated nature, while seeking to retain the story about individuality of each participant and their experiences of wellbeing within their own ecologies.

2. Defining wellbeing

Defining wellbeing has proven challenging, given its complex nature (Dodge et al., 2012). Current perspectives seem to agree on three main features characterising this construct, namely, its multidimensionality, dynamism, and context-dependency.

Research on wellbeing typically approaches this construct from either hedonic or eudemonic viewpoints (Ryan & Deci, 2001). The hedonic perspective centres on the notion of happiness, and conceptualises wellbeing in terms of gaining pleasure and avoiding negative affect (Kahneman et al., 1999). From this perspective, wellbeing is typically measured in terms of Subjective Well-Being (SWB), which comprises a cognitive evaluation component, namely, life satisfaction, and the ratio of positive and negative emotions (Diener & Suh, 1997). In contrast, eudemonic perspectives conceptualise wellbeing as the optimal functioning of a person. This involves attending to a person's sense of meaning, authenticity, and fulfilment (Ryan & Deci, 2001). Combining hedonic and eudemonic perspective, Seligman (2011) presented a multi-componential model of wellbeing comprising five elements including an emotional component: Positive emotions, engagement, relationships, meaning, and accomplishment (PERMA). Fundamentally, there is general agreement that wellbeing is a multidimensional construct comprised of diverse multiple components (Dodge et al., 2012).

Several theories on wellbeing have also referred to its dynamism and see positive wellbeing as a state of equilibrium or homeostasis (e.g., Cummins, 2010). Dodge et al. (2012), for instance, argue that stable wellbeing emerges when a balance is found between one's own psychological, physical and social resources, and the challenges they encounter at a specific point in time. Similarly, Gregersen et al. (2020) claim that, "how we experience the balance of stressors and uplifts creates the emotional tenor of our wellbeing" (p. 3), suggesting that wellbeing emerges from the dynamic interplay of 'hassles' and 'uplifts' an individual experiences in their environment.

Other approaches have also gone beyond the conceptualisation of wellbeing as individual and subjective, and acknowledge wellbeing as emerging from the complex interactions between individuals and their environment. An example of this is the framework elaborated by La Placa et al. (2013, p. 11), who conceive wellbeing as "dynamically constructed by its actors through an interplay between their circumstances, locality, activities and psychological resources, including interpersonal relations". This view recognises individuals' sense of agency in respect to their own wellbeing, while acknowledging the complex interactions between societal, contextual, and psychological influences (La Placa et al., 2013). Similarly, Mercer (2021, p. 3) suggests that wellbeing is socially and ecologically defined, as it "emerges from the subjective way a person makes sense of and interacts with their social contexts". As such, wellbeing can be thought of as dynamic and multidimensional with a close connection to context. These are some of the characteristics of a complex dynamic system. Therefore, we decided to examine these data through a complexity lens to assess the validity and merits of taking such a perspective which, to the best of our knowledge, has rarely been used in the context of wellbeing (for an exception in language education, see: Oxford, 2018).

3. Wellbeing as a complex dynamic system

In this article, we adopt a CDST perspective (Larsen-Freeman & Cameron, 2008) to understand the multifaceted, situated, and dynamic nature of pre-service teacher wellbeing within and across individuals. Systems are thought of as being made up of multiple, interdependent components; each of which is itself a system. In order for systems to be recognised as complex and dynamic, they ought to possess the following core characteristics: (a) change over time, (b) interconnectedness and non-linearity, and (c) self-organisation properties (MacIntyre et al., 2020). We will address each in turn, drawing connections to current research perspectives on teacher wellbeing.

Change over time is considered as one of the main characteristics of complex dynamic systems (de Bot et al., 2007). System change emerges from the ongoing, dynamic interactions between the different components of the system (Hiver & Al-Hoorie, 2019; Larsen-Freeman & Cameron, 2008). Previous research on teacher wellbeing has shown that this is not static, but it changes dynamically over time. McCallum and Price (2015, p. 17) argue that wellbeing is "diverse and fluid respecting individual, family and community beliefs, values, experiences, culture, opportunities and contexts across time and change". Large empirical investigations by Day and colleagues have shown that teacher wellbeing emerges from the complex interaction of personal, professional, and situated factors at specific points in time throughout their life and career (e.g., Day & Gu, 2010). However, wellbeing can also change over days or hours depending on the interactions between an individual and their environment. For instance, literature on emotions, which are recognised

as essential components of wellbeing (Fredrickson, 2016) suggests that these can change rapidly in a matter of minutes (Boudreau et al., 2018), implying that wellbeing is also dynamic across multiple timescales.

The second main characteristic of complex dynamic systems is their interconnectedness. There are no straightforward cause-effect relationships accounting for the behaviour of a system; rather, the "multiple interferences between the components' own trajectories result in nonlinear, emergent changes in the overall system behaviour" (Dörnyei & Ushioda 2011, pp. 88–89). Due to the interdependent nature of the various components of a system, it is thus important to view it as an organic whole rather than the sum of its distinct components (Hiver & Al-Hoorie, 2019; Mason, 2008). According to Robertson and Cooper (2011), our sense of wellbeing also emerges from the complex interactions between one's experiences across all life domains, and it can be best understood taking a holistic perspective. They also argue that the importance attributed to each of these domains for one's wellbeing varies within individuals and over time (Robertson & Cooper, 2011); thus, despite similar circumstances, these interactions can produce different wellbeing states for each individual.

When a system reaches a point of equilibrium, it might settle into a stable or preferred state. A metaphor used to describe this state of homeostasis is that of a ball rolling on a surface and meeting a hole – the deeper the hole, the more arduous it will be to remove it (de Bot et al., 2007). Stable wellbeing can also be conceptualised as a state of balance between a person's resources and the challenges they encounter (Dodge et al., 2012). However, not all preferred states are necessarily pleasant states; when looking at wellbeing, tendencies towards workaholism or perfectionism could also represent an attractor state towards which the wellbeing system gravitates.

The third key characteristic of dynamic systems is self-organisation. Due to their open nature, systems can experience critical incidents or perturbations, serving as disturbing forces that can jolt a system out of one attractor state and shift its trajectory (Hiver, 2015). However, they also adapt to the feedback they receive from the environment in order to maintain a certain degree of stability (MacIntyre et al., 2020; Mercer, 2011). Notably, the environment is not conceived as an independent external variable acting upon the system, but rather as an integral part of the system itself; as such, we can conceptualise individuals and their contexts as part of the same system where they mutually shape each other (Ushioda, 2020). This means that individuals are not just responsive to their surroundings, but they can also proactively change their environment by exerting their agency on it (Larsen–Freeman, 2019). It is important to note that contextual conditions alone do not generate wellbeing; from a CDST perspective, wellbeing emerges from the continual interaction between the individual's psychology and the contextual conditions (Mercer, 2021). As such, individuals might respond differently to the contextual conditions of the system based on the particular life and career phase they are in. Goodson (2008) maintains that teachers have different 'centres of gravity' across their life and career trajectories, suggesting that at different points in time, different contextual aspects of the system play a larger or lesser role affecting the state of the entire wellbeing system. In sum, wellbeing is both individually and socially defined, and is "determined by the manner in which an individual responds to the conditions and contexts of their lives" (Mercer, 2021, p. 3).

Our review suggests that aspects of dynamism, interrelatedness and self-organisation are already recognised to some extent in existing literature on wellbeing. Despite the growing call for embracing complexity perspectives in wellbeing research (e.g., Kern et al., 2020), to the best of our knowledge, these fragments have never been brought together to inform a holistic conceptualisation of the construct, drawing explicitly on complexity theories and based on empirical data. As such, in the present study, we aim at exploring the wellbeing of each of these six pre-service teachers as one organic whole, in order to offer new theoretical insights into this construct, while casting light on each participant's unique story and experiences as embedded in their particular ecology.

4. The wellbeing of pre-service language teachers

Although the majority of teachers enter the profession with high motivation to teach (Howes & Goodman-Delahunty, 2015) and a desire to be good teachers (Buchanan et al., 2013), pre-service teachers are known to encounter a number of personal and contextual challenges which might threaten their overall wellbeing and ultimately lead to them leaving the profession early. As they juggle their student and teacher roles (Mairitsch et al., 2021), pre-service teachers typically experience a complex process of transition in their identities and position in the professional domain, which can challenge their sense of self (Hong, 2010; Pietsch & Williamson, 2010; Teng, 2017). Furthermore, they might initially hold naïve and idealistic views of the teaching profession which can make them feel overwhelmed and disillusioned once confronted with the realities of teaching (Hong, 2010). These issues are further exacerbated by the desire 'to get it right' at all times, and the need to appear confident to others (McCallum & Price, 2010). Contextual challenges include excessive workload (Gustems-Carnicer & Calderón, 2013), potentially problematic relationships with mentors (Mahmoudi & Özkan, 2016), and issues in managing classroom behaviour (McGarr, 2021).

With regards to pre-service language teachers specifically, the available literature suggests that additional strains might include a lack of language proficiency (Mason & Poyatos Matas, 2016), language speaking anxiety (Hismanoglu, 2013; Horwitz, 1996), as well as issues related to the low status of language subjects and/or language teachers in certain contexts (Mairitsch et al., 2021). As such, there is a commensurate need to cast light on the wellbeing of the next generation of language teachers to appreciate the kind of support they might need now and for their long-term futures in the profession. Indeed, given the role played by initial conditions in the development of a system (Verspoor, 2014), investigating teachers' lived experiences from the beginning of their career trajectory can provide valuable insights into how to promote wellbeing and avoid attrition and burnout in the long term.

This paper is part of a broader project investigating the wellbeing of pre-service and in-service language teachers across the globe. Due to the unexpected advent of the Covid-19 pandemic, interview data for this study were collected against the backdrop of the first pandemic wave between April and May 2020. Naturally, the pandemic and the subsequent transition to online teaching and learning served as a major perturbation threatening the wellbeing of teachers across the globe (MacIntyre et al., 2020). However, during their lifetimes, pre-service and in-service teachers might experience other critical events in their personal and professional domains

affecting their wellbeing, such as moving schools, changing principal, or deteriorating pupil behaviour. As such, by investigating pre-service teacher wellbeing in the context of the pandemic, we hope to learn more about their wellbeing and resilience in times of challenge and change, and to draw lessons for the future that are relevant beyond the pandemic.

In this paper, we examine the wellbeing of pre-service teachers to understand what socio-contextual variables play a role in supporting or threatening the wellbeing of this population, how they cope with the demands of their roles, and the resources they draw on to preserve their wellbeing. In addition, the analysis seeks to illustrate the ways in which wellbeing can be conceptualised as functioning as a complex dynamic system. As such, our study seeks to answer the following exploratory research questions:

RQ1. In what ways does the wellbeing of six pre-service language teachers behave like a complex dynamic system?

RQ2. In what ways do six pre-service language teachers cope with the challenges of becoming a teacher against the backdrop of the pandemic crisis?

5. Methods

5.1. Context and participants

The data reported on in this article stem from a broader study about language teacher wellbeing across the career trajectory. In an early part of the study, an online survey was distributed across the globe and participants were able to volunteer to take part in interviews by leaving contact details. Eighteen pre-service teachers left their contact details. All of them were contacted and six participants agreed to take part in the interview phase. In this study, we present the data based on these interviews which were conducted during the first wave of the pandemic between April and May 2020. The intention to collect data at this time existed prior to the crisis. However, the crisis offered especially valuable insights for research into wellbeing, in terms of its dynamism and participants' responses to moments of crisis.

All participants in this study (n = 6) were on their path to becoming foreign language teachers. The majority (n = 4) were studying to become an English teacher, one participant studied German alongside English, and one participant was studying to become a French and Spanish teacher. The participants studied in the following countries: Austria (n = 3), Spain (n = 1), Netherlands (n = 1), and the UK (n = 1). Five participants were female, and one was male. They were between 21 and 30 years of age (see Table 1).

The global pandemic emerged around February/March 2020 in Europe (Schleicher, 2020). For many in-service and novice teachers, this meant switching to online teaching and online classes within days or even hours. Many teachers and students had little time to prepare and were required to convert to online teaching often without any formal training (Gregersen et al., 2021; MacIntyre et al., 2020). This situation also affected all the pre-service teachers in this study, who had to switch to online teaching and attend online courses at their universities when the Covid-19 crisis occurred in Europe. At the time when the interviews took place, one teacher attended synchronous classes, four attended asynchronous classes, while one did not provide an answer. Four teachers disclosed that they had switched to online teaching during their practicum, whereas two were unable to teach at all due to the pandemic restrictions.

5.2. Research tools and procedures

Data were collected by means of individual one-off interviews conducted in May 2020. A semi-structured interview design was chosen to enable the investigation of our participants' wellbeing in an exploratory fashion, while allowing for comparison between participants (O' Leary, 2017).

Before the interviews took place, participants were asked to complete an online survey which asked about their current living situation and details of their studies and teaching during the pandemic to help contextualise the interview data and prepare the researchers before meeting online. The interviews lasted approximately 1 h each.

The interview protocol included questions about their learning and teaching experiences prior and during the pandemic, current and past motivations and attitudes towards their career choice, ecologies (e.g., academic and professional support; relationship with students and colleagues; status of the profession), identities and meaning, mental and physical wellbeing, and their perspectives as future teachers. The choice of these categories was guided by teacher wellbeing literature; indeed, all these factors are seen as critical

Table 1
Participants' biodata and demographic information.

Pseudonym	Country of residence	Gender	Age	First language	Subject(s) studied	Teaching format in university classes	Teaching situation in school
Amelie	Austria	F	21	German	English/ German	Asynchronous classes	Teaching online classes
Carmen	Spain	F	23	Spanish	English	No answer provided	Teaching online classes
Noah	Austria	M	24	German	English	Asynchronous classes	Not teaching
Mary	Austria	F	22	German	English	Asynchronous classes	Not teaching
Ella	Netherlands	F	28	Dutch and English	English	Synchronous classes	Teaching online classes
Judy	UK	F	30	French	French/Spanish	Asynchronous classes	Teaching online classes

contributors towards the wellbeing of pre-service and in-service teachers (e.g., Buchanan et al., 2013; Hong, 2010; McCallum & Price, 2010; Pietsch & Williamson, 2010). Furthermore, by including questions about our participants' ecologies, we wanted to ensure an approach which allowed us to understand the interplay of personal and contextual factors underlying wellbeing.

To examine the dynamism in participants' wellbeing over time, retrospective questions were employed to address participants' learning and teaching experiences before and during the pandemic. MacIntyre et al. (2020) recommend that, "to capture the dynamics created by interacting systems, data can be collected in an ongoing fashion or retrospectively" (p. 23). As systems develop in an iterative nature, where every state is dependent upon the previous one, a retrodictive approach (Dörnyei, 2014) enabled us to retrace any possible change in our participants' wellbeing system up to the point in time when the interview took place, and to better understand how their wellbeing system may have shifted in response to the changes brought by the pandemic crisis. All interviews were conducted online via Skype or Zoom and audio-recorded. Interview data collectively comprised a corpus of approximately 44,853 words. Interviews were transcribed verbatim with the aid of a research assistant. In order to prioritise ease of reading, minor editing was executed in the excerpts reported in this article.

5.3. Ethics

Before the data were collected, we obtained ethical approval from the Ethics Committee from our institution. A participant information sheet (PIS) and consent form were designed following the British Association of Applied Linguistic (BAAL, 2016) guidelines.

The PIS comprised details about the study, teachers' involvement, rights and any foreseeable risks, as well as our assurance that the data will be stored securely and treated with confidentiality and anonymity.

Upon transcription, any identifiable markers such as personal names and places were removed from the transcript and original recordings were destroyed as soon as the transcription was finalized.

5.4. Data analysis

During the first stage of the data analysis, data were coded line-by-line taking an inductive analysis approach inspired by Grounded Theory practices (Charmaz, 2006) to holistically explore our participants' wellbeing. The initial coding process was adapted from Saldaña (2013) and started with reading the transcripts to gain familiarity with the data and adding memos and comments in the transcript files. Next, a first round of line-by-line, inductive coding was conducted, and emergent categories and sub-categories were identified. Data were repeatedly coded and recoded using the broad categories, sub-categories and individual codes in Atlas.ti. Through this repeated coding process, the participants' ways of coping, resources to preserve their wellbeing, and the roles of the socio-contextual variables in their wellbeing emerged as essential categories to describe pre-service language teachers' wellbeing. From this exploratory phase, it also became evident that our participants' wellbeing emerged from the complex and dynamic processes of co-adaptation between multiple individual, social, and contextual factors at specific points in time, thus revealing some of the key characteristics of a complex, dynamic system. As such, after the first wave of inductive coding, a CDST lens was then deliberately employed for the second stage of data analysis to consider to what extent wellbeing in these data can meaningfully be conceptualised as a complex dynamic system, and to offer a more organic conceptualisation of the construct. This second stage of analysis was thus guided explicitly by CDST perspectives (Hiver & Al-Hoorie, 2019; Larsen-Freeman & Cameron, 2008) and involved two main steps. Having established wellbeing as the system under investigation, the first step concerned identifying the various components of each participants' wellbeing system and examining their interaction. Next, we examined aspects of dynamism and stability within the data; this involved the close investigation not only of dynamic changes in the system over time, but also of how salient attractors, or 'signature dynamics' (Dörnyei, 2014) emerged within the system leading to specific system outcomes. This process was conducted separately for each participant. In the final stage of analysis, we drew a vignette of each participant's wellbeing as a system, focusing on three core properties emerging from our analysis - dynamism, interrelatedness, and self-organizing properties. We deliberately decided to present our findings in the form of individual vignettes in order to maintain a holistic account of the wellbeing of each participant, to do justice to the inherent complexity of the construct, and avoid the perils of simplistic fragmentation of their personal lived narratives (Barkhuizen, 2008).

6. Findings

In this section, we report on our findings by illustrating each participants' wellbeing in the midst of the initial wave of the COVID pandemic in terms of a complex dynamic system. In describing their wellbeing, we focus on how each participant coped with the situation, the resources they drew on to preserve their wellbeing and the socio-contextual variables determining their wellbeing system.

6.1. Amelie

Amelie was taking asynchronous classes at an Austrian university and had just finished her second teaching practicum when the interview took place. The trajectory of Amelie's wellbeing system appeared determined by the constant tension between her workaholism, perfectionism, and sense of pressure, which kept pulling her wellbeing system towards more negative states: "Every semester, I try to do less […] And then I always end up doing more than I wanted". However, Amelie reported being conscious and reflexive about her wellbeing, and engaged in constant efforts for setting it into more positive states. She consciously monitored, made

adjustments, and continually reappraised her wellbeing in a constant feedback loop which revealed the role played by her consciousness and agency in managing her whole wellbeing system.

Yet, despite her efforts, Amelie reported that she could not let go of her obsession towards productivity, suggesting a tension between her conscious efforts and patterns of behaviour: "I know that in my head, and that's why I always try to do less, I know that I should be enjoying that and that I cannot really do it". Naturally, also the sheer volume of workload assigned by her teachers and her response to this was mentioned as critically important for her wellbeing, showing how contextual factors are an inherent part of her wellbeing system as well as how her psychology responds to those contextual demands.

Over a shorter timescale, it was possible to observe alternate phases of disruption and relative stability as Amelie's wellbeing system adjusted to new environmental conditions. The shock brought by the pandemic and lockdown had a number of implications which reverberated throughout her wellbeing system, including the switch to online learning and teaching, an increase in study workload and decrease in teaching workload, initial social isolation, difficulties in communicating with her professors, but also more free time as she did not need to commute to university. In response to these contextual changes, Amelie's wellbeing system appeared to temporarily shift into an overall more negative state; she reported feeling "a bit overwhelmed by it".

However, her wellbeing system as a whole seemed to adjust to this shock and settled into a state of relative stability once she gradually adapted to the changes brought by the pandemic and developed weekly and daily routines. During this period, Amelie reported taking deliberate actions in response to the new contextual conditions. When she realised that social isolation was harmful for her mental wellbeing, she moved in with her partner, where she consciously tried to divide her personal and work physical spaces to protect her wellbeing. Another way in which she proactively exerted her agency to enhance her wellbeing was to connect with family and friends daily, and to use her free time to engage in daily sport activities. She reported, as a result, a stronger sense of social connection, and a better work-life balance which appeared to set her wellbeing system into a more positive state, despite the continual ongoing influence of her workaholism.

A critical perturbation to the system occurred shortly before Amelie was interviewed, namely, going back to work on weekends. In response to this disruption, Amelie developed a new daily routine where she felt there was little space for leisure activities: "It's more like sitting at my desk for the whole day". This work-life imbalance appeared to set again her wellbeing into a more negative state.

6.2. Carmen

Carmen was based in Spain and was teaching online private classes to adult students at the time of the interview. Throughout the year preceding the pandemic, Carmen's wellbeing system had settled into an overall negative state. A key attractor in Carmen's system was her workaholism: "I'm the kind of person that cannot stay up there and do nothing". This, combined with salient contextual contingencies such as working in shifts during her MA studies, had pulled her overall wellbeing towards a consistently negative state. Carmen mentioned that, during that time, her wellbeing was determined by a work-life imbalance which she reported led to physical and mental exhaustion, poor eating and sleep habits, an overall depressive state and the perception that her motivation in relation to her studies stemmed from merely extrinsic reasons, namely, obtaining her Master's certificate: "It didn't have a meaning for me. I wanted to be certificated". Carmen perceived her overall wellbeing system as constrained by external forces out of her control, and felt she could not exercise her agency to change its trajectory towards a more positive state. The start of her practicum in January, however, marked a change in the contextual conditions of her system. She retrieved a stronger sense of meaning and motivation with respect to her role as a teacher: "My mind changed a little bit because like practicing gave me a little bit, 'Okay. That matters what you are doing, that matters'".

Naturally, as with all the pre-service teachers, an even stronger perturbation affecting Carmen's wellbeing system was triggered by the pandemic and lockdown. Her system went through an initial period of instability in response to the switch to online classes and the fact that her job as a receptionist was put on hold: "At the beginning we were completely lost […] everything was really, absolutely completely different". This massive shock seemed to have pulled her system out from the negative attractor state in which it had settled in the previous year:

> The pandemic has taught me that I have to have more time for myself, more time to be alone, more time for things […] I don't have to complete all my day doing a lot of things because actually it's not what I want to do.

Carmen's perception of her wellbeing system shifted in response to the changes brought by the pandemic; she started to become aware of her new options and of her ability to influence the trajectory of the system by managing her time and goals, of which now she recognised the value: "I think I am reaching the goals because I set it, not because someone set it". Her system appeared to have settled into a stable state of more positive balance, and a change was her awareness of her agency and sense of control over her wellbeing: "I'm quite happy in general. I do things in order to maintain me happy". Carmen exercised her agency in various ways to shift her overall wellbeing towards a positive state; she started to wake up early, established a schedule for her day where she balanced her leisure and study time, exercised on a daily basis and started to learn Italian. This shift in her system reveals the importance of a sense of agency to affect wellbeing and the role of conscious feedback loops to be aware of potential affordances and action steps that could be taken.

6.3. Noah

When the interview took place, Noah was in the final year of his studies at an Austrian university. The trajectory of Noah's wellbeing had already undergone a shift in the few years preceding the pandemic. He reported that the lack of practical teaching experiences during the past three to four years had made him grow detached from his studies and lose his motivation and enthusiasm.

He mentioned being "a little bit lazy" throughout this time and felt that "everything was kind of all over the place". During the semester before the pandemic, Noah started his second practicum. This served as a critical incident positively affecting Noah's wellbeing. As a result of being actively involved in teaching, Noah reported regaining a sense of meaning and motivation in relation to his studies and future profession, suggesting that his practical teaching experiences served as a key attractor in his wellbeing system. However, he still considered himself as a student, rather than a teacher: "I'm definitely still a student and not a teacher yet". During his practicum, he developed a routine where he studied and worked in the morning at university, where he felt overall more productive and engaged, and could get involved in leisure activities from the afternoon onwards. These boundaries and structure appeared to lead to Noah's wellbeing system settling in a more positive state.

The start of the lockdown brought a critical perturbation which disrupted this positive state. In the midst of the first wave of the pandemic, Noah's wellbeing system appeared in a state of tension between the constant worrying about work, and his absence of motivation and lack of focus in relation to his studies. He reported that, prior to the start of lockdown, the university environment put him into a productive mindset where he felt motivated to engage in his studies. In contrast, he now lacked any pressure or structure while working from home: "There's nothing that forces me to do it right now". Noah reported that other aspects in relation to his physical wellbeing also shifted in response to the new contextual conditions of the system: "I'm not getting particularly much exercise […] I'm always going to university by bike".

Throughout the lockdown, Noah made a conscious attempt to change the trajectory of his system towards a more positive state. For instance, he tried to "take a walk or every now and then", and to set clearer boundaries in his physical surroundings to "get some spatial distance". He also attempted to build a regular structure for his workday: "I try to sort of to work every day from about 9 to 12 […] and then do some university stuff if there is anything I can get myself to do". Despite Noah's proactive use of agency to improve his physical wellbeing and work-life boundaries, however, he reported that he still struggled to find a balance and motivation to engage with his studies.

6.4. Mary

Before the pandemic began, Mary had already finished all of her practica; she was mostly taking asynchronous classes at an Austrian university and tutoring. Mary's overall wellbeing system appeared to have settled into a positive balance throughout the time period preceding the pandemic crisis. Mary mentioned being aware of the importance of setting boundaries between her academic and personal life domains, and implemented a number of concrete strategies to maintain a balance in her wellbeing system, such as going to the gym, reading, cooking, and spending time with her friends.

Mary reported feeling in control of the trajectory of her wellbeing system through setting boundaries and finding a structure that accommodated her preferred work-life balance. However, this sense of agency in relation to her wellbeing appeared in contrast with her response to obstacles: "While becoming a teacher you're going to have obstacles that you need to overcome […] a lot of professors or classes or practica or whatever else it is, they kind of like, put in your way". Her perceptions regarding herself as a future teacher also appeared conditional on mentorship, suggesting that also her sense of efficacy was bound to other individuals: "I feel like if you get this mentorship in school as well with another language teacher then I feel like I can definitely manage it".

The relative balance in which Mary's wellbeing system had settled in appeared upset by the start of the lockdown and the transition to online learning. Mary kept relying on her organization skills and self-care strategies to maintain an equilibrium among the components of her wellbeing system. However, changes in contextual conditions such a lack of clarity and consistency in communicating with professors shifted her wellbeing towards a more negative state. Mary felt less agentic as she felt her potential for action depended upon her professors' input: "They're not responding to my emails or ignoring my questions. And I have a really hard time sitting down and actually doing the assignments for those classes". She perceived her wellbeing as heavily dependent on the actions of others which was disempowering for her and led to a more negative state overall.

6.5. Ella

At the time of the interview, Ella was based in the Netherlands. She was taking synchronous classes at university and was teaching online classes Monday to Friday. Before the start of the pandemic, in Ella's wellbeing system, a long-term attractor was her inability to find structure and organisation in managing her professional and personal life domains. Ella proactively sought to shift her overall wellbeing towards a more balanced state; she mentioned that she started to organise her time schedules in the attempt to accommodate both work commitments and leisure activities. However, finding a structure was still, for her, "the main issue […] it always used to be an issue". This suggests an attractor state that remains relatively consistent over time but also her awareness of this and subsequent use of agency to shift her wellbeing to a more positive and balanced state.

About a month before the start of the pandemic, Ella reported feeling that her overall wellbeing system had settled into a negative state; a critical incident shifting her system towards this state was experiencing an illness which debilitated her physical wellbeing. She reported being worried and depressed, and struggling in keeping up with her studies and managing her mental wellbeing over this time period: "I was just about managing everything, mentally".

The start of the lockdown served as another critical perturbation in Ella's wellbeing system. In response to the shifts brought by the pandemic, she struggled even more to find balance and structure, and relied on her classmates for organisation during this time: "We have a WhatsApp group, thank God. Otherwise, I would be completely lost". She reported having to "relearn how to teach things" and heavily missing social interaction. Throughout the course of the lockdown, however, Ella's wellbeing system appeared to adapt to the new contextual conditions and to gravitate towards a much more positive state. She reported finding new, creative ways of teaching,

which she reported, "make me a better teacher in the end". However, like the majority of participants, she reported still being in the process of negotiating her student/teacher identity: "I'm kind of in that weird middle space between being a student and like a fully graduated adult". Her physical wellbeing also improved under the new contextual conditions: "Ironically, I've been doing much more sports, because I used to have to travel about two and a half hours a day". Overall, not only did Ella perceive a stronger potential for action in her system, but she also concretely exercised her agency in seeking to shift its trajectory: "When I wake up now, I have a look at the day, what am I going to do today, what do I need to prepare […] those things are the most important".

6.6. Judy

Judy was based in the UK. She was taking asynchronous classes at university and teaching online private lessons when the interview occurred. A key attractor in Judy's wellbeing system was her constant seek for balance and structure. The start of the pandemic and transition to online teaching and learning led to a period of disruption in Judy's wellbeing system. Nonetheless, she consciously employed her agency to take action in response to the new contextual conditions of the system, and developed a series of concrete strategies to take active care of her wellbeing. She planned her day to reach a balance between the personal and professional domains: "I try and do something for me every day, and something about my studies everyday as well". She also proactively kept herself busy during this time, as she felt it was important for her overall wellbeing: "I am quite busy, I guess I think it's useful. It's actually necessary to keep busy everyday if I can". As she had more free time during the lockdown, Judy also read more and ate healthier than before and took active care of her physical wellbeing. She also actively nurtured her social connections, which she reported played an important role for her wellbeing.

Despite the constant striving to maintain a positive balance in her wellbeing system, one of the biggest disruptions to her wellbeing was the sense of unpredictability she experienced during the pandemic. This involved not knowing when she would be able to meet her family again, which was a key concern for her: "I don't really know when I'm going to see them next as well […] it's like just uncertainty and feeling that there might be someone at risk". This sense of uncertainty also concerned her future career plans and identity as a teacher, which she could not envision in an online setting:

> Especially now it's really uncertain because I don't really know what's going to happen or how the schools are going to reopen. And if they reopen with this option of teaching a group of 12 every two weeks or just doing online stuff all the time, I think that's going to really question my identity as a teacher and probably I'll probably just run do something else […] right now, it's really hard for me to picture myself as a teacher.

This appeared in tension with her constant tendency to plan and set structures which was an attractor in her system: "For me, the biggest challenge is sort of picturing, because I'm a very visual person, how we would be in September". Furthermore, the interaction with students was central to her sense of meaning for being a teacher and was a key control parameter for her whole wellbeing system: "I really value the social aspect of school a lot more". In lack of this interaction, she found herself reconsidering her career plans: "One of the great things about school and being in school is that you interact with others […] if this does become the norm, I am going to try and think of doing something else".

7. Discussion

This study examined the wellbeing of six pre-service teachers through the lens of CDST (Larsen-Freeman & Cameron, 2008). From this perspective, the findings in this study highlight the complex, dynamic, and self-organizing nature of wellbeing.

7.1. Complexity

Our analysis revealed that the wellbeing of our participants was not static, but it emerged from the dynamic interplay of multiple social, contextual, and intrapersonal components. By retracing the developmental trajectories of their wellbeing over time, we could observe that different psychological, social, and contextual factors interconnected in complex ways to generate new states of the system. Among these components, some that appeared common across participants were social connections, physical health, motivation, workload, and the immediate physical environment. Across individuals and time, however, certain attractors played larger roles than others in pulling the wellbeing system towards more positive or negative states, or in retaining its stability. For instance, workaholic tendencies appeared to play a more important role in regulating Amelie's wellbeing system, while in Judy's case, social connections made a larger contribution in guiding the trajectory of her overall wellbeing. Furthermore, depending on whether our participants recognised their identity more as students or teachers, some factors such as relationships with professors or students varied in significance across individuals, highlighting the complex process of identity making which is defining for pre-service teachers (e.g., Hong, 2010). However, the impact of these factors was not linear and proportional, but it was contingent upon the interconnections of multiple other interdependent components at a given moment in time for an individual.

7.2. Dynamism

In all participants' wellbeing, the pandemic served as a critical incident setting new environmental conditions within the system which affected its trajectory, depending also on initial conditions and existent attractor states. In the earlier stages of the pandemic, the abrupt transition to online teaching and start of lockdown brought a huge shock to each participant's system, which went through an

initial period of volatility and chaos. This is in line with Kostoulas and Lämmerer (2020) who consider that, "a large perturbation, such as a professional crisis or a major transition, might lead to a radical restructuring of the system" (p. 95). The initial conditions of our participants' wellbeing system before the pandemic appeared to play a key role in informing its response to this shock, showing that wellbeing, like all systems, changes in an iterative manner, where every state is dependent upon the previous one (Larsen-Freeman & Cameron, 2008). For instance, the disruption brought by the pandemic contributed to jolt Carmen's system from a negative attractor in which it had previously settled, while in Noah's case it disrupted the positive balance of the system, thereby generating further chaos and tension. This reveals how the dynamism within each participants' wellbeing system emerged from the interactions between an individual's psychology and the contextual conditions of the system, thus leading to different pattern of dynamism for each participant. For instance, Noah's wellbeing shifted towards a more negative state during the pandemic, as he lacked external pressure to regulate and complete his studies; in contrast, the sense of autonomy and intrinsic motivation acquired during the pandemic by Carmen led to an overall more positive wellbeing during this time. This reveals how contextual factors are an inherent part of each participant's wellbeing system, and how individual's perceptions of these factors can determine a system's behaviour and outcomes.

7.3. Self-organisation

Over time, our participants' wellbeing appeared to adjust to its new systemic conditions, underscoring the adaptability and self-organisation properties of wellbeing as a system. Some participants gained awareness of the new contextual affordances and action steps that could be taken to shift the trajectory of their own wellbeing to more positive states, suggesting the key role played by feedback loops of consciousness and agency within the wellbeing system. The notion of agency typically refers to an individual's will and capacity to act (Gao, 2010). Our participants exercised their agency in different ways to improve the conditions of their wellbeing. This was the case, for instance, when they took deliberate action to set clear boundaries in their physical environment in order to divide their personal and professional domains, or when they consciously structured their day to accommodate both work commitments and leisure activities. These data foregrounded how these individuals were not just adaptive and reactive to their environment but had the capacity to influence its trajectory through their agency (Bandura, 1986). However, when the participants felt that their potential for action with regard to their wellbeing was contingent upon factors outside of their control, they felt helpless to change it. This occurred, for instance, when they felt that their capacity to act was solely contingent upon their professors' guidance, as in Mary's case. This has led us to better understand the critical role played by an individual's sense of agency in determining the trajectory of their wellbeing development. It suggests the importance of helping people feel agentic about their wellbeing to empower them to make changes to the trajectory of their wellbeing system. However, this is not to deny the integral role played by contextual conditions which determine the potential affordances available for individuals to respond to and draw on (cf. Mercer, 2021).

7.4. A new perspective to examine wellbeing

Finally, our analysis has shown that looking at wellbeing from a CDST lens can offer an innovative theoretical perspective to look at this construct. The majority of work conducted on wellbeing to date has mostly examined its features in isolation, identifying generalisable factors or reducing it to a set number of components across individual and contexts, thus presenting only fragments of the bigger picture. In contrast, approaching wellbeing as a complex dynamic system enables us to examine it from a holistic perspective, revealing the dynamism, interconnectedness and emergent qualities of the construct which can only become apparent when looking at it as one, organic whole. Specifically, these data and this theoretical lens have shown that even in the event of a strong perturbation, such as the pandemic, wellbeing as a system adapts and self-organises in response to the new contextual components. They have revealed how agency plays a key role in guiding the trajectory of the system, and how one's sense of agency depends on the individual's perceptions of the affordances within the environment. The individuality present across the data reveals how an individual's psychology interacts with their perceptions of their socio-contextual conditions, leading to different outcomes for each participant, underscoring the unique subjectivity of an individual's wellbeing. The study has also shown how a major perturbation to a system, such as the pandemic, can either disrupt an attractor state, or strengthen and reiterate it, depending on diverse initial conditions of the system. Finally, our findings have revealed that these attractor states of wellbeing can have a range of positive or negative valence.

8. Conclusion

The purpose of this study was to illustrate the wellbeing of six pre-service teachers during the pandemic crisis from a CDST perspective. This perspective accounts for the dynamic, situated and multifaceted nature of the construct, thereby allowing us to offer a more holistic way to look at this construct which enables a better understanding of an individual's trajectory in its unique complexity. Future research might draw on a CDST perspective to examine wellbeing as a system across different timescales, contexts, and teacher career phases, to generate new insights into the dynamism and complexity of teacher wellbeing.

One key finding of this study concerns the key role played by agency within participants' wellbeing systems. This appeared contingent upon the affordances perceived in the environment, highlighting the socially and contextually-situated nature of the construct. As such, wellbeing cannot be entirely considered in terms of individual responsibility (see also Mercer, 2021). In practical terms, this implies that teacher training programmes could offer pre-service teachers the resources and explicit strategies to manage and sustain their wellbeing. The first critical step pre-service education programmes could take is to normalise the process of reflecting about wellbeing and of advocating pastoral support from mentors, professors, and academic supervisors. Teacher education programmes could also train pre-service teachers to recognise symptoms of stress and burnout, and offer explicit recommendations not

only to cope with but, especially, to prevent stress-related issues. As seen in our data, many of our participants were only prompted to reflect about their wellbeing in the context of the pandemic. However, it would be critical to foster the process of actively monitoring and taking active care of one's wellbeing as early as possible in teaching education programmes. Indeed, one of the key challenges for novice teachers is the lack of awareness and appropriate strategies to protect their wellbeing, which can make the transition from pre-service to in-service particularly challenging (see also Sulis et al., under review). As such, offering pre-service teachers practical strategies to take active care of their wellbeing can empower them with a sense of agency and control. However, although we are keen to empower and enhance the agency of pre-service teachers, the data also shows how their wellbeing emerged in the interaction with systemic factors. Thus, institutional and educational systems will also need to change to provide more support and affordances for pre-service teachers' wellbeing.

Our data also revealed that a sense of support from university professors can play an important role in fostering or inhibiting wellbeing, as seen in Mary's case. As such, professors and teacher trainers could devote some time at the beginning of their lessons to inquire about their students' feelings, wellbeing, and lives more broadly, in order to foster a sense of emotional support and connectedness. They could also invite pre-service teachers to incorporate wellbeing practices in their own lessons. Furthermore, our data showed the critical role of practical teaching experiences in fostering pre-service teachers' intrinsic motivation. It is known that there are gaps between the preparation received during teacher training programmes and the realities of the language classroom (Baguley, 2019). Thus, offering extensive in-class teaching opportunities during teacher training programmes can not only critically foster pre-service teachers' motivation and sense of meaning in relation to their future profession, but also better prepare them to deal with the practical challenges of the language classroom.

This study has several limitations, the most prominent being that participants were only interviewed once in the midst of the pandemic crisis. Dense, longitudinal data conducted at various points during the pandemic would have certainly provided a richer and more dynamic picture of their wellbeing. Another issue to consider is that all our participants voluntarily took part in our research and, as such, could be particularly sensitised or have a pre-existing interest in the topic of teacher wellbeing. One more limitation is related to the fact that all our participants were based in Europe when the interviews took place. Other continents' situations were varied; some countries did not have a lockdown while some started resuming in person teaching much earlier than others. In this way, different contexts could have revealed a very different picture of the challenges and stressors experienced by pre-service teachers during the first wave of the pandemic.

Despite these limitations, this study has helped to generate insights into the ways in which our participants coped with the challenges brought by the pandemic crisis and drew strength and resilience during these challenging times. Such insights are not just relevant for the context of the pandemic crisis, but also for other critical situations in the future, in which pre-service teachers may face a strong perturbation that may threaten to their wellbeing such as transitioning across contexts or facing a major educational reform. There are valuable lessons that these individuals have learned for their future professional wellbeing and the educational systems they work within now have the chance to move forward with a greater sensitivity and awareness of the kinds of support pre-service teachers need to cope with being a student and a teacher concurrently. Supporting them with systemic changes alongside critical self-care skills could go some way to reducing the high rates of attrition that are currently threatening the profession across the globe.

CRediT authorship contribution statement

Giulia Sulis: Conceptualization, Investigation, Methodology, Formal analysis, Writing – original draft, Writing – review & editing. **Sarah Mercer:** Conceptualization, Methodology, Writing – review & editing, Funding acquisition, Supervision, Project administration. **Astrid Mairitsch:** Investigation, Methodology, Writing – original draft, Writing – review & editing. **Sonja Babic:** Investigation, Methodology, Writing – original draft, Writing – review & editing. **Sun Shin:** Writing – original draft, Writing – review & editing.

Declaration of competing interest

None.

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