

THE EPISTEMIC JUDGEMENT CHAIN TO SUPPORT HOLISTIC PHYSICAL EDUCATION TEACHER DEVELOPMENT

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David Grecic

Research Institute for Behaviour, Sport and Rehabilitation, University of Central Lancashire, Preston, UK

Abstract

Problem Statement Teacher professional development is criticised for not being effective in respect to changes in pedagogy and practice. Epistemology is a valuable lens by which teachers can plan, deliver and reflect upon holistic physical education activities. Little is known however about how to maximise a deeper knowledge and understanding of epistemology and its application. *Approach* A pilot study with 16 trainee Physical Education teachers followed their final year 18 week teaching internship. Teachers were introduced to the Epistemic Judgement Chain (EJC) and mentored in its use. Participants reflected upon the EJC's structure, content and utility. Reflective Thematic Analysis was then applied. *Results* All participants provided positive feedback about the EJC's merit, value and constructs. Two storybook themes were generated; Learning what is out there, and Playing the promotion game. Findings provide evidence that the EJC is an asset in teacher training that makes philosophy to practice and alignment explicit. The trainee teachers were however unaware of many professional and organizational stressors, educational policy constraints, and other hidden influences on the actual PE teaching world. Future studies that evaluate the EJC with diverse PE teaching cohorts is therefore required. The EJC would seem to function as an effective means to shine a light and delve below the surface to improve key PE practices. *Conclusions* The EJC provides a valuable scaffold by which teachers can reflect on their views, experiences, and future plans for implementing a holistic approach to Physical Education. Findings supported the EJC's ability to facilitate teachers' critical awareness of environmental influences on teaching practice. Additionally, the EJC helped teachers navigate a path that was well aligned to their own values and beliefs about teaching and learning. Follow up studies are now needed to investigate the impact of the EJC professional development process on both teacher and student behaviours.

Key words: Epistemology, Trainee Teachers, Holistic Development,

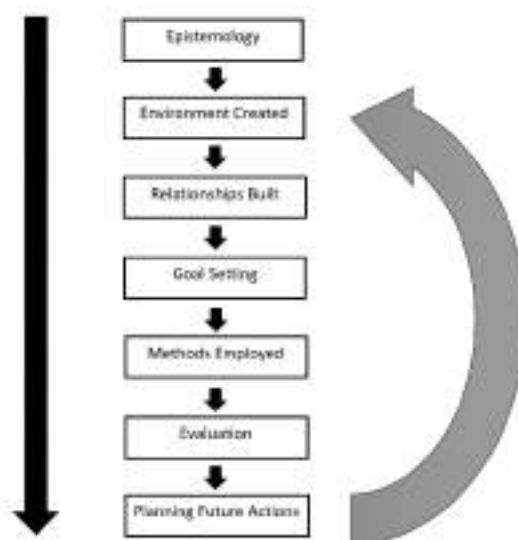
Introduction

Professional development for teachers is not effective in altering practice nor beliefs about the education process (Kennedy, 2016) despite this being important for teacher development (Moon, 2011). A focus on pre-service teachers, henceforth student teachers (STs), during their training phase has great potential to shape such beliefs and have a lasting impact on future behaviour (Graber et al., 2017). When considering the power of one's belief system we need to focus explicitly on the ST's epistemology.

Epistemology is the branch of philosophy concerned with the nature and scope of knowledge. It is concerned with answering the questions of what is knowledge, how is it acquired, and how do we know what we know (or conversely know what we don't know)? Epistemology is important because it is fundamental to how we think and make decisions. Without the ability to understand how we acquire and develop knowledge, we have no coherent path on which to base our thinking (Grecic, 2015). The value of epistemology as a lens by which one can understand and reflect on the teaching process would therefore seem very clear. Early work by William Perry defined Epistemological beliefs as thoughts about knowing and learning that are reflected in views on what knowledge is, how it is gained, and the limits and criteria for determining knowledge (Perry, 1981). Perry's work was later expanded to include multi-dimensional beliefs that matured at varying rates (Schommer, 1994). It was proposed that one's personal epistemology is a belief system consisting of the following five more or less independent dimensions: (1) certainty of knowledge; (2) structure of knowledge; (3) source of knowledge; (4) control of knowledge acquisition; and (5) the speed of the knowledge acquisition (Schommer, 1994) with epistemological beliefs varying along a

continuum, from naïve to sophisticated. Latterly Hammer and Elby (2002) considered epistemology from a resource perspective whereby the specific context in which epistemology was explored directly influenced those epistemic resources available. Later still Chinn and colleagues applied the AIR epistemic judgement framework to the debate offering that one's epistemic aims, ideals and what one considers as reliable processes have great bearing on what we judge as worthwhile, and trustworthy knowledge and learning (Chinn et al., 2014). Most recently Hofer and other researchers have focused their attention much more on how we justify knowledge and the resources we use to make such assessments (Hofer, 2020). Epistemology as a means to understand and direct one's ideas about knowledge and knowing has therefore been researched in many teaching and learning environments and provided valuable findings for education. Numerous studies confirm a strong connection (or chain) across teachers' beliefs, their classroom behaviours, and the learning environment they create (Hofer, 2002; Kagan, 1992; Nespor, 1987). Research has also explored what teachers believe about the nature of knowledge and learning (Buehl & Fives, 2009; Schommer, 1990) and how these beliefs affect instructional approaches and curriculum implementation (Hofer & Pintrich, 1997). The powerful influence of this relationship between beliefs, decision making, and behaviour has also been evidenced with reference to trainee teachers (Kang, 2008), novice teachers and physical education teachers (Thorburn & Collins, 2003). Finally, research has shown that epistemological beliefs can provide a basis for understanding what and how knowledge is used and how this impacts teachers' professional practice (Brownlee, 2001). Only one of these above studies has applied epistemology to non-generalist teaching, in this instance that of Physical Education. Grecic and Collins (2013) have however considered how epistemology can be applied in such subject areas proposing and testing an Epistemological Chain (EC) and its value for professional development in sport and for sports coaches (Collins et al., 2017; Crowther et al, 2019; Grecic & Collins, 2013; Grundy & Grecic, 2015; Grecic & Palmer, 2021). Here the EC is seen as the "the interrelated/connected decisions made that are derived from high-level personal beliefs about knowledge and learning" (Grecic & Collin, 2013.p.153). See Fig 1. For the purposes of this study however the EC was further modified to include Epistemic Judgement in order to explore the decisions made by teachers of Physical Education at each level of the Chain. (see Fig 2). The aim being to apply this revised model and evaluate its content, application, and value for Physical Education with the specific research question being, Can the Epistemic Judgement Chain (EJC) support professional development for PE teachers? And if so, how would it be conceived to be most effectively applied?

Fig 1. The Epistemological Chain



Material and Methods

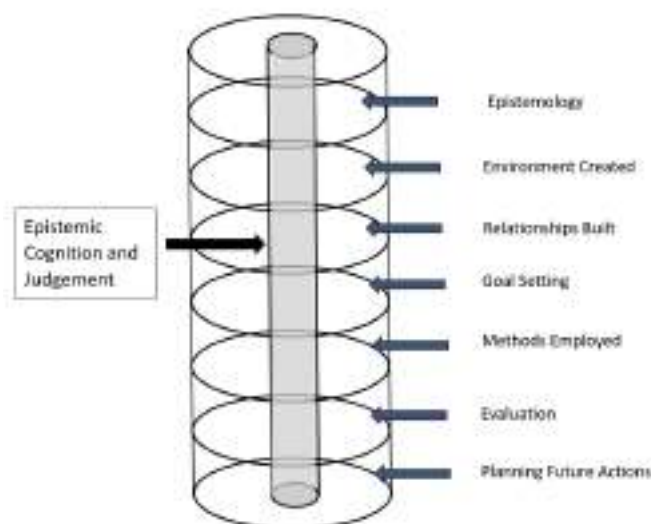
Participants. 16 trainee Physical Education STs from a single teacher training university in southern China were recruited via their institution tutors. All the final year teacher training cohort were briefed about the research study and asked if they would consider being a participant. All were studying the BA (Hons) Joint Programme in Sport and Physical Education taught and assessed in the English language as well as the Chinese Ministry of Education approved Physical Education Major Degree with Full Qualified Teacher

Status embedded. The holistic focus of the degree's ethos and content is based upon the CARE curriculum model of athlete and pupil development (Grecic & Palmer, 2021). This being the driver of ST practice and experiences which they try to apply within their teaching placements. Those who expressed initial interest were provided a participant information sheet about the study and informed consent form. Permission was granted from the College of PE's Dean to undertake the study and the University Ethics Committee consulted. The committee determined that a full ethics submission was not necessary for the focus group approach and the study was approved. The 16 students ages ranged from 21-23 years old (M=22.2). Gender split was 4 female 12 male STs. School placement level varied with 7 Elementary, 9 High school placements.

Procedure. Driven by a pragmatic philosophy and aspiration to make a difference to the PE profession and the research question itself, an interpretivist approach was applied to the study to gain insights, thoughts and experiences from its participants. Specifically, a pilot study was conducted with 16 trainee Physical Education teachers with a focus group method applied to gain participant reflections on the EJC's merit, operation and recommendations for its future use. Reflective Thematic Analysis was applied to the data with results informing the research questions and providing pragmatic learning to be taken forward.

Instrument. The revised EJC (Fig 2) was used to guide discussion about the decisions each student teacher had made during their latest and final 18-week full time teaching placement.

Fig 2. The Epistemic Judgement Chain



Data Collection and Analysis. Data collection took place at the STs' home university in the College of PE's conference room. The process involved the STs first being introduced to the EJC by way of a short presentation by the lead author and then supported to work through each of the EJC elements in turn by considering the judgements they had made in attempting to apply a holistic PE approach during their final placement. The entire process lasting for 90 minutes with a later follow up review meeting lasting 22 mins. Following the presentation and briefing where the participant information was again repeated, the STs were first asked to consider their philosophy at the highest level such as based on performance, humanism, equality and inclusion, altruism, etc and what factors they felt bear influence upon these considerations. Primers here included questions about 'What it is to teach?' 'Who merits our support and help?' 'What do you want from teaching?' 'Who do you want to influence and impress?' 'How will you know if you are a success?'. Discussions also uncovered organisational, professional, and personal pressures, education and training, acculturation within PE (and sport). Here EJC considerations identified who, what and how were the teachers being directed towards one particular philosophical approach and in what manner were they considering and then discarding alternative positions. Once the STs' personal philosophy had been articulated the EJC elements were taken in turn as described as follows: *Epistemology*. This started with questions about the five dimensions in order to make the teacher's assumptions about the source, reliability, complexity, speed, and propensity to learn front and centre of the discussion. Here STs were challenged to

consider the evidence behind the drivers and motivations for their selections. Once again prompts about the STs' developmental, education, work and social histories were crucial in uncovering any hidden influencers. Finally the STs were asked to describe the environment in which their epistemology would need to operate ie. the school, and how the other social actors in that environment ie. the pupils, peers, managers, and parents would impact upon it. *Environment created.* Here the focus was intentionally directed to the STs' placement school delivery site. First STs were asked to reflect upon the desired environment in which their teaching would happen, followed by a more realistic simulation whereby the actual experiences and location from their placement school were used. *Relationships built.* This area focussed on how others could help the STs achieve their personal and professional goals and what options were available in terms of developing a relationship management strategy. The environmental social actors were the prime focus of discussion with virtual role plays utilised to run through the various options in respect to different pupil groups, teaching peers, line manager, parents, and senior leaders. *Goal setting.* Here STs were encouraged to adopt a nested approach for this element at macro, meso and micro levels for their practice. Macro level looked at personal goals and longer term vision for their own personal professional development or pupils long term progress. The Meso level asked about the 18 week placement goals whilst the Micro level asked the STs to reflect on what goals they set for individual lessons or group of lessons, such as adopting certain behaviours, attitudes, outlooks, or to achieve the intended outcomes of these on their pupils. We paired STs and asked them to become critical friends for each other in order to rationalize goal selections and articulate expected outcomes.

Methods employed. The various Methods ie pedagogy, didactics and instructional strategies that could be adopted were then discussed as a group. The STs explored various pedagogical approaches, teaching styles, strategies, theories, and models, aligning their choices with their goals and epistemological beliefs. They then were asked to conduct honest self-appraisal of competence, confidence, knowledge, and their motivation to apply the different methods within and beyond their teaching placement. *Evaluation.* Here the focus group examined how experiences and learning can inform future action, involving key stakeholders and considering strengths and weaknesses of approaches. The STs were presented a range of options for appraising and evaluating teaching practices, linking back to philosophical beliefs and the purpose of PE. They were then asked to utilize epistemic judgment to align evaluation methods with stated epistemology, goals, methods, and their desired teaching and learning environment. Here environmental factors including stakeholders' needs, resource requirements, and data utilization were considered in the evaluation process. *Planning Future Actions.* Finally the STs' knowledge and views about Planning were examined with various options provided on how experiences and learning taken from the placement could feed into their next cycle of action. The STs were asked what and who to include and why they made their choices. They were then asked to reflect on who would be interested in their planning process, who needed to see their plans, and who would be able to allocate any needed resources. At the end of the EJC process the group were brought together and asked for their perceptions, their experiences of applying it to their teaching placement and their feelings about its value and potential future use. All responses were recorded using Microsoft Teams and full transcripts created that were later checked against the audio files and edited accordingly. A second focus group was arranged for the following day where the STs were asked to simply reflect on the EJC's merit and value. This was again recorded via Microsoft Teams and the transcript produced for analysis. Reflexive Thematic Analysis (RTA) (Braun & Clarke, 2013) was selected as being the most appropriate data analysis selection aligned with the interpretivist approach and the qualitative data collected via the focus groups. Within RTA the researcher has a unique role in the analysis process with input viewed positively given the unique experiences, insight and contextual understanding that is integral to the process (Braun & Clarke, 2019). Here data analysis then becomes a creative as opposed to strictly technical process. The quality of the results that are constructed by the researcher are explicitly due to the interaction between the researcher, what they bring to the research process (their experiences, knowledges, values and biases), and the data they are working with (Terry et al., 2017). Importantly, this positioning clearly reflects the underpinnings of an interpretive research philosophy and ultimately leads to RTA as a useful tool in exploring what participants think, feel, and do (Braun et al., 2019) and promotes that the reflexive process is fully applied to the data (Braun & Clarke, 2019). RTA follows a six-stage process identified by Braun and Clarke (2013). Familiarisation (step 1) of the data occurs through reading and re-reading of transcripts, whereby initial codes are then generated (step 2). Once initial coding is completed, themes are created (step 3) and reviewed (step 4) to ensure data is reflective of the themes. Finally, themes are defined (step 5). Reflecting the idea that good themes are those that tell a coherent, insightful story

about the data in relation to the research question (Braun et al., 2019) the final step (i.e. step 6) is the creation and writing up of ‘storybook themes’. With the researcher’s own position being critical to the construction, development and presentation of meaning, here it is pertinent to explain the author’s positionality. As an ex-PE teacher, University PE lecturer, course leader, PE teacher trainer, researcher and now Professor of Sport and Physical Education the author brought all this experience, knowledge and understanding of the profession and its needs to the analysis process. In addition the author has a strong grasp of the Chinese PE context having worked in China for over 20 years, publishing about transnational education, as well as being a Board Member of the China based World Physical Education Alliance, and the Ministry of Education approved joint research and knowledge exchange center for Sport and Physical Education. It is this level of cultural, educational and profession understanding and experience that informed the identification and building of the research themes.

Results

Following the analysis of both focus group data two storybook themes, four major themes and 10 sub themes were constructed, See Table 1 below. Student teacher data is assigned by ST and number (1-16).

Table 1. Generated Themes of EJC Student Teacher Perceptions

Storybook Theme	Major Theme	Sub Themes
Learning what is out there	Seeing connections	<ul style="list-style-type: none"> - Interlinkages everywhere - Need to go backwards to go forwards
	Gaining insight about the sector	<ul style="list-style-type: none"> - Uncovering where the power is - Pressure points and demands - Not allowing ideas to flourish
Playing the promotion game	Planning the ‘future me’	<ul style="list-style-type: none"> - Knowledges needed to develop as a teacher - Wanting to become an expert - Supporters and Gatekeepers
	Digging deeper to be more self-aware	<ul style="list-style-type: none"> - Limited scope of action - Gap analysis and action planning

Learning what is out there – This storybook theme was built from the two major themes of Seeing connections, and Gaining insight about the sector. With respect to STs seeing how their epistemology and beliefs about knowledge and learning was operationalized during their placement many described how the EJC made them reflect on how true to themselves their actions and behaviours had actually been. ST6 explained,

Looking at the model (EJC) makes me think, I want children from different backgrounds to be positive about PE. I want pupils to choose activities, arouse critical curiosity, participate in the whole class because of the positive relationships they have built and the responsibility they own. I want the students to lead the class and I am just the guide. I want students to improve their knowledge and understanding on sports, health, cooperation, teamwork, and to be motivated to love sports, love being active for their life.

The STs did appreciate how the block placement had had various compulsory elements which had driven practice but were able to make strong judgements about whether the decisions they had made had been aligned or in conflict with their own teaching philosophies and values of human development. In some circumstances the curriculum expectations and the final teaching outcomes (end of year final assessment the Jao Koa or Goa Koa) had blocked the potential for them to be more creative and experiment with their preferred student-centered pedagogy. For example ST2 noted, “We need to teach to the test, to help students improve their skills, just the skills they need to pass. If it is volleyball, then just this (demonstrates how hands are together in a ‘dig’ position), nothing else”. For others the pressure to conform to existing methods was directed from the school’s full time PE teachers and even from the school children themselves. ST4 explained “There is a traditional PE method. We must start with a warm up, explain the skill, practice the skill then test the skill”. STs also explained that using the EJC had helped them understand the different facets of the teaching process and how many of the different concepts they had covered in their degree linked into each other in practice, as ST1 described, “I will use what I have learnt, the ideas, the theories for each section to help the Chinese students. I will use the methods that students find most comfortable and develop a relationship with them like a friend to help them improve”. One clear observation about the

EJC was that its linear nature, whilst helpful in structuring the focus group discussions, it did not fully reflect the dynamic and interconnected nature of each of its elements. Indeed many STs commented on their wish to go back to their prior thoughts provided about previous elements or to re-order the EJC elements to meet their needs once new recollections and realisations has been made. ST10 explained, “I’d put Goals first then plan everything from there”, whilst ST7 valued the development of relationships most as he stated, “I’d put relationships first so that I can understand the students and set the goals with them and then decide on the methods we will use”. ST2 even stated that, “All are connected to all others, we need arrows everywhere”. Whilst using the EJC discussion about how these different elements were delivered in their placement schools a number of challenges to their implementation were uncovered. The idea of how power is exerted in schools as well as the relative STs’ powerlessness was a reoccurring topic. For example ST14 explained that, “My school was a Football Campus school so we had to follow the approved lessons and delivery methods as set down for each class by them (the Chinese Football Association and Ministry of Education). In addition ST 7 noted, “I told my school tutor (Senior PE teacher) about what we had covered but was told that that wouldn’t work here as we had too many children and not enough space or time to try it. I had over 50 students and needed to keep control of them”.

Playing the promotion game This second storybook theme was made up from the two major themes Planning the ‘future me’, and Digging deeper to be more self-aware. Here the EJC prompted the STs to think about what was required from them in future for them to have a successful career as a PE teacher. Conversations fluctuated between personal reflections of current strengths and weaknesses, and considerations of what was expected of an expert PE teacher who would be valued by peers, managers, students and parents. Interestingly this discussion provoked much less input from the STs who seemed reluctant or unable to easily reflect on themselves in respect to future interactions with others. They did however seem to use the EJC as a crutch to hold on to with ST6 stating, “I will use the EJC. I will learn more about all the theories in each area. I will learn more and be better”.

Statements like these led the focus group to the exploration of ST knowledges either assumed, or deemed to be important in order for them to make their teaching and learning decisions. This in turn led to some STs moving onto a needs analysis based on their current levels of understanding for each of the EJC elements and what they needed to be better on. ST14 gave an example from his ‘football’ school. “I want to be better at skill development. I want my players to improve and be more successful”. This process did provide an additional benefit however as it highlighted to the STs that *they didn’t know what they didn’t know* and helped them commit to creating a career action plan to further their knowledges post graduation. A valuable addition to note here also was that during the final Planning stage the STs started to consider who could be the greatest help to them in their quest. They discussed the needs of schools’ Headteachers and how they could use this for their professional development with ST14 continuing, “My school headteacher wanted our team to be successful, win championships, be the best. He sends the teachers to extra courses and National Training for football. If I work there I will get much better too”.

Discussion and Conclusion

Reflecting on the results and the STs’ engagement with the EJC process it was clear that by exploring each of the EJC’s elements the STs developed a more comprehensive understanding of their teaching practice as well as their future role and their career development needs. All participants firmly supported the holistic focus of their degree course but noted the challenges they faced when attempting to apply many of the student-centered pedagogies and values within their placement delivery. This is not unexpected given the relatively newness of this approach in Chinese education, the student-centered Physical Education and Health Curriculum was only introduced in 2017 (MoE, 2017), coupled with the undoubted occupational socialization that will have occurred within the traditional school system (Richards et al., 2014). In addition the strong cultural foundations of China and Confucian values of respect, hierarchy, and power, present further challenges to our STs’ attempts to implement innovative change (Child & Warner, 2003). With respect to the EJC itself all participants provided positive feedback about its merit, value and constructs included. What was interesting however was that during discussions the STs often pushed back and asked to link elements out of order, or even circled back to amend their feedback and answers about a previous element. This clearly demonstrates the need for the EJC to encompass more feedback loops and a dynamical systems approach rather than the linear model that guided this process. One must therefore considered how best to accommodate this need and look towards other related domains such as sports coaching literature for any parallels and inspiration such as those proponents of more ecological, non-linear pedagogy and

coach education approaches (Wood et al., 2023) Despite these minor difficulties however the STs' subjective feedback was that although they found the process challenging they enjoyed using the EJC and clearly saw how the approach could enhance professional development and decision-making about how to embed holistic approaches into PE teaching. From a facilitator's perspective however several modifications seem to be warranted following the process reflection. For example despite good engagement from all focus group members, evidenced by their willingness to put forward their points of views and critique others' ideas and opinions, a great deal of prompting and even teaching was required in order for the group to look beneath the obvious and the experiences they had had on placement. The group seemed largely unaware of many professional and organisational stressors that bear impact on teaching practice. In general, they also lacked awareness of many individual, social, economic and political environmental influences on the PE subject which is not unusual for pre-service teachers (Graber et al., 2017). In future it would therefore be prudent to spend time describing the bio-ecological environment in which human development and the PE teacher role exists (Bronfenbrenner, 1988) as well as the hidden barriers and enablers that may influence thought and behaviour. Here the position of Critical Realism could be used to make the STs' hidden worlds explicit to them (Bhaskar, 2010). In addition, the EJC could be applied to teachers with a range of experiences, roles and years in post. The pre-service nature of the participants with the associated knowledge base this presents was one of the study's limiting factors. One must also consider other potential issues within the data. For example, the author/facilitator's status and role was known to the participants which presents the challenges of potential power dynamics and self-presentation issues shaping responses (Goffman, 1959). In addition the Chinese values of *Mianzi* (the need to save face), *Li* (respect for the social norms, traditions and the hierarchical roles within any system), *Guanxi* (the importance of long term relationships) and *Ren* (search for harmony) may have tempered any criticism of the STs' placement school interactions, perceptions of school staff, or willingness to offer new ideas as these may be deemed disrespectful (Child & Warner, 2003). The fact that the study was conducted in English which was not the participants native language must also be considered. In respect of these concerns several mitigating actions were adopted. Firstly time was spend reassuring the participants of the study's purpose and their role within it, as well as the fact that all their responses would remain anonymous and would not be shared with their placement schools or university lecturers. Great attempts were also made to develop trust and rapport between all participants. The author reinforced on numerous occasions that there were no wrong answers just opportunities to express opinions, share experiences and offer ideas so that the EJC tool could be evaluated. The author also spent time describing his own role, how it related to this study and why he was so invested in gaining participants' views and insights. English being an additional foreign language was also mitigated somewhat through the selection of the final year student group as all volunteer participants had had at least 3 previous years of study and assessment in English and had therefore already reached the IELTS 6.0 level of proficiency. In addition, where a participant seemed to hesitate or struggle to find the preferred English word the author asked for help and translation from fellow participants. To conclude therefore, despite a number of potential limitations the EJC in the present study's format would seem to function as an effective tool for teacher professional development especially when considering the decisions and judgements made on which their teaching actions and behaviours were based. In this specific context the EJC provided a valuable scaffold for STs to explore their views, experiences, and future plans for implementing a holistic approach to Physical Education. As ST16 explained, "I will use this, step by step, to help my future teaching". Findings supported the EJC's ability to facilitate teachers' critical awareness of the environmental influences on teaching practice but in future this could and should become a more explicit element to help teachers dig deeper behind the scenes and help plan future actions. Finally the EJC helped STs identify a professional development path that, as well as being aligned to their own values and beliefs about holistic approaches to teaching and learning, was reflective of the challenges and opportunities they would face throughout their careers.

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