CAN THE STUDY OF STUDENTS’ EPISTEMOLOGICAL BELIEFS AND EPISTEMIC MATCH HELP US TO EXPLORE THE DISCIPLINARY NATURE OF EDUCATION STUDIES?

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Abstract

In the UK, Education Studies degree courses offer students with a range of career plans both inside and outside the formal education system a chance to study the foundations of education. The disciplinary nature of Education Studies has been debated from a variety of theoretical perspectives. This article explores the usefulness of on the concept of Personal Epistemological Beliefs in exploring the issue of disciplinarity in Education Studies and contributing to that debate. An empirical study utilizing measures of Personal Epistemological Beliefs and Epistemic Match sought to establish whether students on an Education Studies degree course in the UK took an interdisciplinary or multidisciplinary approach to applying the disciplines of Education Studies to their assignments. The results show students apparently alternating between these two approaches and thus highlighting some of the potential of personal epistemological beliefs in exploring the nature of Education Studies and other similar courses.
**Introduction**

Since their emergence in the UK in the 1960’s, undergraduate degree courses in Education Studies have become an increasingly popular choice in many UK universities. The content of these courses can vary across institutions but typically consists of some combination of elements including sociology, history, philosophy and psychology. What all the courses have in common is the aim to apply these elements to the study of education. Although originally conceived of as an academic foundation for those on a teacher training degree, similar to the current role of Social Foundations of Education (SFE) in the US, Education Studies is no longer integrated with teacher training in the UK and Education Studies degree courses do not confer a teaching qualification. While many graduates from Education Studies degree courses go on to complete postgraduate teacher training qualifications, just as many go on to education related careers outside of the formal education system. This separation of Education Studies from teacher training in the UK means less of an expectation on Education Studies to demonstrate its value in terms of its impact on teaching practice compared to the expectations on similar courses in other countries (see Benchik-Osborne 2013, Pope & Stemhagen, 2008). However, in establishing itself as an independent entity, Education Studies has faced the challenge of needing to define itself in terms of both its purpose and fundamental nature.

Indeed, the nature of Education Studies has been hotly debated since its inception. In the UK, an important part of this debate is the question over whether Education Studies is a discipline in and of itself or a field of study to which other disciplines are applied
This issue is of particular interest to practitioners in the UK because of its relevance to debates over the structure of UK Education Studies courses. The view that Education Studies is a field of contributing disciplines is a viewpoint shared by many of those who argue that we should be emphasising those disciplines as distinct components within our Education Studies courses (Ward 2006). By contrast, those who wish to de-emphasise the contributing disciplines, thus giving them the flexibility to marginalize disciplines they see as off-putting to students for example, may rely on the viewpoint that Education Studies is a discipline when justifying their approach (Ward, 2006). Comparable debates are occurring in similar courses in other countries; as to what constitutes the study of education and what structure or purpose a course that is exploring the foundations of education should have (Biesta 2011; Lewis, 2013; Tozer and Miretzky, 2000). As I will show later on, the question of ‘discipline or field’ can be reinterpreted as a debate over the form of disciplinariness to be found in Education Studies. This paper seeks to make a novel contribution to this debate in the form of an empirical measure, based on the concept of personal epistemological beliefs (Perry 1970), which can be used to study disciplinariness in Education Studies.

The concept of personal epistemological beliefs refers to an individual's beliefs regarding knowledge and includes such things as their beliefs about where knowledge can be found and how to evaluate it. Research has suggested that our personal epistemological beliefs can influence how we search for information, when we study or even how we approach our learning as a whole (Hofer and Pintrich 1997; Psycharis, Botsari and
Chatzarakis 2014). Consequently, it may be possible to employ an empirical measure of personal epistemological beliefs to study whether the students on an Education Studies course employ disciplinary knowledge from their course in an interdisciplinary or multidisciplinary manner when completing their assignments.

It is worth noting that using the concept of personal epistemological belief explore the issue of disciplinarity in Education Studies is just one of its potential uses. A measure of personal epistemological beliefs could also be used to track changes in the epistemological beliefs of students completing an Education Studies or SFE course. This takes on greater significance when we consider that personal epistemological beliefs have been found to predict teachers’ pedagogical beliefs and practices (Cetin-Dindar, Kirbulut & Boz, 2014; Chan & Elliott., 2004). Thus, a change in epistemological beliefs may result in a corresponding change in pedagogical practice; an outcome which might have important ramifications in the debate over the value of SFE and similar courses in terms of their impact on teaching practice (Benchick-Osborne, 2013; Pope and Stemhagen, 2008; Tozer and Miretzky, 2000). However, before we can consider such wider applications we must first establish if the personal epistemological beliefs concept can be used to study the nature of Education Studies.

Therefore, in the remainder of this paper, the case for the utility of personal epistemological beliefs is offered based on the current research, which applied this concept to a group of staff and students on a UK based Education Studies course. The research took as its starting point an argument made in numerous previous studies on
personal epistemological beliefs that there exists a set of epistemological beliefs within each discipline that is ‘expected’ of those who study that discipline. Another argument taken from previous studies was that the match or mismatch between a student’s beliefs and these expected beliefs in a discipline could, in part, predict a student’s academic performance in that discipline. Based on these arguments, the current research proposed that the link between epistemic match and performance might then reveal which epistemological beliefs and by extension, which disciplinary knowledge the student is employing in their assignments. In this way, I aim to demonstrate the utility of personal epistemological beliefs by using them to reveal details about disciplinarity in Education Studies; such as, whether students in Education Studies use an interdisciplinary or multidisciplinary approach to applying the knowledge from the contributory disciplines. This may influence debates in the literature over the nature of Education Studies by contrasting some of the theoretical positions on the disciplinarity of Education Studies with students’ experiences of the disciplinarity of Education Studies “in practice”. It could raise a number of interesting questions as to who/what determines the disciplinarity of Education Studies. For example, as we will see later, the students’ experience of the form of disciplinarity on their course may not be the same as the one intended by those who designed the course (Palaiologou, 2010). However, before we evaluate what the current research can tell us about Education Studies we should first establish some of the context and key questions in the debate on the nature of Education Studies.

The Nature of Education Studies
When we talk about the nature of Education Studies, it’s important to distinguish between Education Studies as a discipline and Education Studies as a course of study. Barnett (2005), King and Brownell (1996) and others have defined a ‘discipline’ as a community of scholars with a shared focus / project as well as shared histories and traditions. By contrast, Barnett (2005) defined a ‘course’ as something that exists as a curriculum and associated pedagogies aimed at students for the purposes of studying it. In the published discourse regarding the nature of Education Studies, the concepts of Education Studies ‘the discipline’ and Education Studies ‘the course’ are often used interchangeably. One of the reasons for this may be, as Parker (2002) puts it, that we are shaped by our discipline. We learn to adhere to the norms and conventions of the discipline, its methods and structures. Becher (1989) viewed academic disciplines as being like tribes with their own customs and culture. We should be careful how completely we embrace the tribal metaphor and anthropological terminology in an educational context. Nonetheless, the central idea of academic disciplines having a shared identity and values is a useful metaphor for understanding the process by which students enter into these disciplines. Choi and Pak (2006) suggest that the development of normative values, shared knowledge and homogeneity within a discipline are key to establishing its identity as a discipline. From this perspective, one of the purposes of a degree course would be to induct the students into the norms and shared knowledge of that disciplinary ‘community’ (Grossman and Stodolsky 1995). Sin (2015) argues that disciplinary enculturation is not just a natural by-product of learning; it is a desirable aim for us as educators because this initial induction will ease the student’s later transition into a professional career related to that discipline. As such, it would be valid to study Education Studies as a course to learn
something about Education Studies as a discipline. However, we should be cautious about how much we infer about the discipline by scrutinizing the course. While it is reasonable to expect the course and the discipline to be related, they are not synonymous. As Ward (2006) found, there can be numerous contingent factors such as the economic or political factors that influence the higher education sector, which may shape the design of the course but have little to do with the nature of the discipline. This is important to keep in mind whenever we draw conclusions about the nature of Education Studies as a discipline via the examination of students or curricula on an Education Studies course.

Returning to the question of whether Education Studies is a discipline itself or a field of study, we must first consider how well it fits the definition of a “discipline”. Definitions of a “discipline” like those of Barnet and McCulloch would require Education Studies to have commonly agreed boundaries and focus. Given the long-running debate over the constituent disciplines of Education Studies mentioned earlier it would appear to be unlikely that it could meet such a requirement. However, Becher (1989) argues that there are many kinds of disciplines. Some disciplines are convergent with a mutual identity, common methods and focus while others are divergent, ideologically and methodologically fragmented. Education Studies would therefore be an example of a discipline situated towards the divergent end of the spectrum. Davies and Hogarth (2004) describe Education Studies in much these terms; emerging as a discipline but still in need of better established parameters and more coherence in order to avoid a drift toward greater fragmentation. Then again, to the proponents of Education Studies as a field (e.g. Peters 1963; Tibble 1971) such a loose definition of a discipline could be seen as
functionally equivalent to defining Education Studies as a field of study. To Peters (1963/1980) a field of study has no distinct practice or knowledge of its own but instead is an amalgam of practices and knowledge drawn from contributing disciplines. Given this potential overlap between the loosest definition of a discipline and that of a field, the question of ‘discipline or field’ could be reinterpreted as a debate over which form of disciplinarity best describes the nature of Education Studies.

The Centre for Educational Research and Innovation report (CERI 1972) proposed that disciplines could exist in several forms including multidisciplinarity, pluridisciplinarity, transdisciplinarity and interdisciplinarity. Multidisciplinarity involves the disciplines operating alongside one another but making separate inputs independently of each other (Petrie, 1976). Interdisciplinarity involves the disciplines operating together in such a way that their inputs are combined and can influence each other (Petrie, 1976). Thus, questions regarding the nature of Education Studies is a field or a discipline could be reconceptualised as a question over whether the contributory disciplines within Education Studies operate in a Multidisciplinary or Interdisciplinary manner.

How best then, to study the way in which the contributory disciplines operate within Education Studies? An exploration of the disciplinary nature of Education Studies through interview of staff or students might tell us what the intended approach was, but this might not be how the course actually functions or how the students engage with it. Palaiologou (2010) states that although many Education Studies courses claim to take an interdisciplinary approach what they actually offer better resembles multidisciplinarity, a
mixture of disciplinary elements that fails to be truly integrated. An empirical study of the approach taken by Education Studies students in applying the knowledge from the contributory disciplines to their studies could shed light on how intentions match practice. In this context ‘applying’ disciplinary knowledge refers to drawing on specific elements that knowledge (e.g. a sociological view on Marxian theory) in order to formulate an answer to a question in class or in an assessment. Thus, we could study how students apply those disciplines in key areas such as their assessments, investigating whether they do it in a multidisciplinary or interdisciplinary manner.

In order to do that we must first identify a suitable theoretical concept to represent the way in which students apply disciplinary knowledge on their Education Studies course. This is complicated by the fact that we have multiple contributing disciplines. Therefore, any concept we chose would need to accommodate the idea of a student applying the varied knowledge from those different disciplines to their studies in an interdisciplinary or multidisciplinary way. As we will see, the psychological concept of personal epistemological beliefs is a good fit for all of these requirements.

**Personal Epistemological Beliefs and Discipline Specificity**

The concept of personal epistemological beliefs refers to an individual's beliefs regarding knowledge (Perry 1970). Personal Epistemological Beliefs theory (Hofer and Pintrich 1997; Schommer 1990) suggests that epistemological beliefs can be conceptualized as a series of belief dimensions. An individual’s epistemological beliefs can then be
represented by finding the position on each belief dimension that represents their viewpoint, known as their ‘orientation’ on that belief dimension. Collectively, these orientations on each of the different belief dimensions are referred to as their ‘set’ of epistemological beliefs.

Further research in this area has suggested the existence of discipline specificity in epistemological beliefs. Discipline specificity refers the concept that each of us is capable of holding several sets of epistemological belief orientations, each one related to a specific discipline (Bahçivan 2016; Hofer and Pintrich 1997). For example, students studying a combination of Psychology and Health Studies were found to have two distinct sets of epistemological beliefs, one for each discipline (O’Siochru and Norton 2014). As such, it would be possible for an Education Studies student to have separate sets of epistemological beliefs, one for each of the contributing disciplines.

If we were to find multiple sets of discipline-specific epistemological beliefs, we could learn more about them by studying their relationships with other aspects of the student’s learning. By studying how personal epistemological beliefs predict academic performance we may be able to infer how students apply the knowledge from those disciplines to their assessments. For example, if we found that epistemological beliefs of individual disciplines predict performance independently of each other, this might suggest that students are taking a multidisciplinary approach. Alternatively, if the epistemological beliefs from the multiple disciplines must be combined before they can predict performance that would suggest an interdisciplinary approach. But, before we can
consider the potentially complex relationship between epistemological beliefs and performance in Education Studies we must first review what has previously been learned about this relationship elsewhere.

*Epistemological Match and Performance*

Previous research has explored the link between epistemological beliefs and various other educational processes including study strategies (Rodriquez and Cano 2006) and learning styles (Psycharis, Botsari and Chatzarakis 2014). The link between epistemological beliefs and performance has been harder to understand though, with considerable disagreement as to which dimensions of belief will predict performance (Hofer 2000; Trautwein and Ludtke 2006). However, this difficulty in relating epistemological beliefs to performance may be resolved if we consider the ‘disciplinary expectations’ perspective on epistemological beliefs. This is a challenging perspective, which states that each discipline has its own characteristic set of expectations both in terms of the way knowledge is assessed but also in terms of the epistemological beliefs that are expected of students within that discipline. Let us consider the case for this perspective.

A number of studies have found significant similarities among groups of individuals all studying the same discipline (Hofer 2000; Lonka and Lindbloom-Ylänne 1996; Paulsen and Wells 1998). For example, Lonka and Lindbloom-Ylänne (1996) found strong similarities among medical students in terms of their epistemological beliefs, especially when compared with the beliefs of students from other disciplines. Paulsen and Wells
(1998) found that the epistemological belief in the certainty of knowledge was common among engineering students whereas the belief that knowledge is changeable was common among humanities students. In addition, they found that education students were more likely to believe in the simplicity of knowledge (i.e. seeing knowledge as a collection of separate facts) whereas a belief in the complexity of knowledge was common among science students.

What these studies suggest is that for each discipline, while still allowing for some individual variation, there appears to be set of epistemological beliefs that is typical for individuals studying that discipline. This set of epistemological beliefs could be characterized as the ‘expected’ epistemological beliefs for that discipline. The same research which supports the argument for an expected set of epistemological beliefs within each discipline has also found systematic differences between the disciplines in terms of their expected epistemological beliefs. These differences between the disciplines as to expected epistemological beliefs may be related to differences in disciplinary practices and characteristics. For example, Paulsen and Wells (1993) found that the more applied a discipline was the less “sophisticated” the epistemological beliefs would be among the students of that discipline. Perry (1970) had characterised certain epistemological beliefs orientations (e.g. being less likely to question knowledge from authority sources) as less sophisticated beliefs. Thus, even relatively minor differences between the disciplines of education studies in terms of how applied they are in their approach to studying education may be paralleled by differences in the expected epistemological beliefs in each discipline. Of course, it is also possible that two or more disciplines will share some commonalities
in their expected epistemological beliefs, while each retains some variations that are unique to that discipline akin to the “porous epistemological border” between history and sociology proposed by Morrison (2017).

Proposing the concept of an expected set of epistemological beliefs associated with each discipline should not be interpreted as an attempt to present any discipline as one homogenous group in terms of its epistemology or methodology. We saw earlier that Becher (1989) argued that a discipline could be ideologically and methodologically fragmented and yet still considered as a discipline. In a similar vein, Biglan (1973a) looked at the emergence of a paradigm within academic disciplines. Biglan suggested that a paradigm exists in all disciplines but that in some disciplines it was well-defined and widely accepted while in others the paradigm was more ill-defined and contested. In much the same way, the level of consensus within each discipline regarding the expected set of epistemological beliefs may vary considerably. And yet, from that variety an expected set of epistemological beliefs can still emerge as a consensus or compromise point between the different sides. In this way, the appearance of consensus, which the expected set of epistemological beliefs may create, still allows for considerable dissent and debate within a discipline over the nature of knowledge in that discipline.

One additional point we should consider is the extent to which this epistemological debate will be made evident to undergraduate students in the earlier part of their academic career. In the classes they teach, teachers of a discipline may not always represent the knowledge of their discipline in accordance with their own personal epistemological
beliefs. Indeed, a number of studies (Bahçivan 2016; Schraw and Olafson 2002) have shown that contextual constraints, such as curriculum, policy, past experiences and traditions in teaching, might cause teachers to adopt methods that were more in accordance with the expectations of the course than their own beliefs. Consequently, in the current study we posit that, irrespective of variations in the personal beliefs of their lecturers, students on an Education Studies course will be presented with lectures and seminars that reflect an expected set of epistemological beliefs for each of the contributory disciplines. This raises a further question as to how these expected epistemological beliefs might affect the approach taken by the staff to evaluating and assessing the learning of their students.

By presenting the expected epistemological beliefs of their discipline, the staff teaching that discipline are likely to consciously or unconsciously encourage their students to adopt those beliefs and demonstrate them in their assignments. Indeed, in a previous study we found that staff were more likely to look favourably on an assessment submission which treats knowledge in accordance with the expected beliefs of that discipline (O’Siochru and Norton 2014). Therefore, as Schommer-Atkins (2002) points out, no single orientation of epistemological beliefs is going to be appropriate for all disciplines. For example, a high level of belief in the certainty of knowledge may be appropriate to one academic discipline, and thereby lead to higher grades, but be completely inappropriate for another discipline and thus lead to lower grades. This may explain the inconsistencies in previous studies which try to link epistemological beliefs with performance without taking into account what the expected epistemological beliefs of that
discipline were. The solution to this problem would be to establish first what the ‘expected’ epistemological beliefs are in each discipline.

Expected epistemological beliefs can be presented through implicit or explicit cues in teaching and assessment methods, indicating the "target understanding" that the teachers require of their students (Entwistle and Smith 2002). For example, a sociology lecture that explored changing definitions of the concept of ‘capital’ would convey the viewpoint that knowledge in sociology is changeable. A comparison between a student’s epistemological beliefs in a discipline and the expected epistemological beliefs of that discipline would enable us to measure the level match or mismatch between the two, a concept referred to as ‘Epistemic Match’ (O’Siochru and Norton 2014). A closer epistemic match represents the student being more attuned to that discipline with personal epistemological beliefs that are similar to the expected beliefs of the discipline. Our previous study found that levels of epistemic match successfully predicted performance across a number of disciplines (O’Siochru and Norton 2014).

In the current study, I intend to utilize this apparent relationship between epistemic match and performance to explore how Education Studies students apply the knowledge from the various contributory disciplines to their assessments. If epistemic match in a specific discipline is a predictor of performance on an assessment, it suggests that the student is employing knowledge from that discipline in that assessment. This is based on the rationale that the appropriateness of a student’s epistemological beliefs, as represented by epistemic match, is only likely to affect an assessment if the student employs
knowledge gathered in accordance with those beliefs in that assessment. By extension, if the students’ epistemic match in any individual discipline is the best predictor of an assignment grade, that would appear to indicate that the student is drawing on their understanding of that discipline independently of the others, suggesting a multidisciplinary approach. On the other hand, if assignment grades are best predicted by an average of their epistemic match across several discipline this suggests an interdisciplinary approach.

**Current Study**

Therefore, the current study aims to critically examine the effectiveness of an empirical measure based on personal epistemological beliefs and epistemic match in studying the form of disciplinarity to be found in Education Studies. The effectiveness of the measure will be tested in two ways. Firstly, by determining whether Education Studies students hold multiple distinct sets of personal epistemological beliefs for the contributory disciplines. Secondly, by examining the relationship between epistemic match and performance on assessments to see if Education Studies students apply the contributory disciplines to their assessments in a multidisciplinary or interdisciplinary manner.
Method

Context

The study was carried out in a UK university and involved students and staff from the Education Studies undergraduate course. The course is structured around four contributory disciplines (Philosophy, Psychology, History and Sociology) and describes itself in the course materials as encouraging students to take a multidisciplinary approach. At the start of the year, the researcher explained the research to the entire student cohort. The Personal Epistemological Beliefs measure (PerEB) was then distributed to the students four times during the year, once for each discipline, each time in the final two weeks of the block of seminars focusing on that discipline. Student performance data were collected at the end of the academic year. All staff participants were approached also at the end of the year. The research was explained to them and they were asked to complete the Expected Epistemological Beliefs measure (ExpEB) once for their primary discipline.

Participants

152 university students participated in the study. All were in the first year of their university degree with a ratio of 4:1 between women and men. Students were recruited through their seminars by their seminar tutor.
15 staff participated in the study. While all staff taught across the entire Education Studies course each staff member would consider one of the four disciplines as their primary discipline. This would typically be the discipline that was the basis of their doctorate. The distribution of staff primary disciplines across the four disciplines was as follows; three in History, three in Philosophy, four in Psychology and five in Sociology.

**Materials**

The main method used in this study was quantitative with some qualitative elements included. Using a quantitative measure of student personal epistemological beliefs is relatively commonplace in studies that employ the concept of personal epistemological beliefs. One reason for this may be that epistemological beliefs are said to operate at the level of metacognition or even deeper, meaning that they underlie and influence other forms of knowledge and belief (Kitchener 1983). It can be difficult for an individual to articulate the impact that metacognitive processes are having since our awareness tends to be focused on the cognitive processes that the metacognition is influencing (e.g. the study techniques) rather than on the metacognition itself (Hofer 2004c). Consequently, a structured qualitative questionnaire can be a very useful approach to help people to unearth aspects of their own beliefs and knowledge that they might not have reflected on previously or have much conscious awareness of.

The Personal Epistemological Beliefs measure (PerEB) was based on the domain-specific epistemological beliefs measure I used in O’Siochru (2006) and contained twenty items. Each item comprised a statement and a five-point Likert scale, ranging from 5
(Strongly Agree) to 1 (Strongly Disagree). The twenty items were divided to four belief dimensions; “certainty”, “source”, “responsibility” and “evidence”. An example of an item from the certainty belief dimension is, "What is true in Psychology doesn’t change". Four versions of the PerEB measure were produced, one for each of the contributing disciplines. The different versions contained virtually the same items, except that the discipline referred to in each item was changed. For example, the same certainty item in the Sociology version of the PerEB would read, “What is true in Sociology doesn’t change”. The students completed each of the four versions once at different times across the academic year with the version they completed each time corresponding to the discipline they were studying at that point.

The PerEB produced four total scores, one for each belief dimension, each total being the sum of the scores for all of the items belonging to that dimension. A high score in the ‘certainty’ dimension indicates the belief that knowledge in the discipline rarely changes. A high score in ‘source’ indicates the belief that knowledge in the discipline originates from authority sources. A high score in ‘responsibility’ indicates the belief that judging the authenticity of knowledge is the personal responsibility of each individual. Finally, a high score in ‘evidence’ indicates the belief that scholarship is the true basis for knowledge in the discipline while a low score indicates that practitioner’s experience is the true basis for knowledge.

In order to measure the expected epistemological beliefs for each discipline the Expected Epistemological Beliefs measure (ExpEB) was completed by the staff. To create
this measure, the 20 items of the PerEB were reworded to ask the staff how much they felt that a particular belief was expected of students when studying their discipline. The staff were asked to consider how their course design, delivery and assessment might intentionally or unintentionally encourage certain beliefs about knowledge in the students. The rewording of the previous sample item would be, “Students are encouraged to believe that what is considered to be "true" in your discipline does not change”. The instructions asked the staff to consider all the items in relation to their primary discipline alone. There were four versions of the ExpEB, one for each discipline in the same way as the PerEB, Each staff member only completed one of the four versions corresponding to their primary discipline. The items in the ExpEB were scored and totalled in the same way as those in the PerEB in order to produce four totals for the same four dimensions in both measures.

Students’ grades on their end-of-year exam were utilized as the measure of academic performance. The exam paper had two parts which were marked separately. The first part required the student to answer an ‘interdisciplinary question’ using any combination of two or more disciplines of their choice as the basis for their answer. The second part had four questions to choose from, each question linked to one of the four disciplines. The students were required to choose one of the four questions and their answer was to be based mainly on the discipline that question was linked to.

Once the statistical analysis was complete, a focus group involving some of the same staff that completed the ExpEB was arranged to discuss the results. They were asked
to reflect on the findings of the statistical analysis and consider what those findings suggested about the way in which the students had approached the course.

Results

Performance and Epistemic Match

The first analysis sought to establish if the students held distinct epistemological belief sets for each of the four disciplines. Mean scores in each of the four belief dimensions were calculated separately for each of the disciplines. In each discipline, these mean scores were derived from the students’ responses to the version of the Personal Epistemological Beliefs measure (PerEB) for that discipline. A summary of the mean scores for each of the dimensions of belief in each of the disciplines can be found in Table 1.

<table>
<thead>
<tr>
<th>Belief Dimension</th>
<th>Psychology (n=118)</th>
<th>Philosophy (n=96)</th>
<th>History (n=86)</th>
<th>Sociology (n=92)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Certainty</td>
<td>14.32</td>
<td>14.23</td>
<td>15.95</td>
<td>14.64</td>
</tr>
<tr>
<td>Source</td>
<td>11.00</td>
<td>9.86</td>
<td>12.05</td>
<td>10.55</td>
</tr>
<tr>
<td>Justification</td>
<td>15.68</td>
<td>15.56</td>
<td>14.04</td>
<td>14.52</td>
</tr>
<tr>
<td>Evidence</td>
<td>12.04</td>
<td>11.78</td>
<td>12.70</td>
<td>12.26</td>
</tr>
</tbody>
</table>

Note: * p < .05
Four repeated measures ANOVAs were carried out. Each ANOVA compared the student epistemological belief totals in one of the four belief dimensions across all the disciplines. The results of the analyses on the ‘certainty’ and ‘evidence’ belief dimensions found no significant difference across the disciplines on those dimensions. The results did show a significant difference across the disciplines on the belief dimensions of ‘source’ (MS=18.246, F=3.826. \( p < 0.05 \)) and ‘justification’ (MS=16.035, F=3.810. \( p < 0.05 \)). A post-hoc analysis of the ‘source’ belief dimension found that philosophy was significantly different from both history and psychology. The post-hoc analysis for the ‘justification’ belief dimension showed that history differed from philosophy and sociology. These results appear to confirm that the students have multiple distinct sets of epistemological beliefs for the various contributing disciplines.

The second analysis aimed to study the relationship between students’ epistemic match scores and their academic performance. Calculating the epistemic match scores involved two steps. In the first step, the ExpEB scores for all staff within a given discipline were averaged to create mean scores for that discipline on each of the belief dimensions. For example, the five staff whose primary discipline was sociology of education had their scores on the Certainty belief dimension of the ExpEB averaged to produce a mean expected Certainty belief score for Sociology. The same was done for the other belief dimensions to produce mean expected scores for those dimensions in relation to Sociology. These mean scores represented the staff consensus on the epistemological beliefs that students were expected to have in relation to Sociology. Then, in the second step, the personal belief scores for each student were compared to these expected scores
and the match between the observed and expected scores in each dimension was represented as the absolute difference between the two numbers. The match scores across all four dimensions were summed to produce one total match score for that student in that discipline. A high score here indicated the student's personal beliefs were very different from the expected beliefs in the discipline, or in other words a poor match between the student and the discipline. This calculation was carried out four times for each student, once for each discipline. In addition to these disciplinary epistemic match scores, an overall epistemic match score was calculated for each student by getting the average of all their disciplinary epistemic match scores.

In order to study the relationship between students’ epistemic match scores and their academic performance a series of linear regressions were conducted. In the first two of these regressions, the student's overall epistemic match was the predictor variable, while the outcome variables were the exam grades for the two parts of the exam. Overall epistemic match successfully significantly predicted the grade for both exam part A, the interdisciplinary question, \( B = -0.529, \ SE \ B = 0.209, \ \beta = -0.224, \ p < 0.05 \) and exam part B, the disciplinary question \( B = -0.502, \ SE \ B = 0.221, \ \beta = -0.200, \ p < 0.05 \). The negative relationship between overall epistemic match and performance in both cases indicates that lower scores in epistemic match were associated with higher scores in performance. Since lower scores in epistemic match mean a better match between student beliefs and the expected beliefs this result would appear to confirm that a good epistemic match is associated with higher levels of performance.
Following this, in order to ascertain if any one of the disciplines was a predictor of performance independently of the others, a series of multiple regressions were run. This time each of the disciplinary epistemic match scores were included as separate predictors with the exam grades as the outcomes again. The regression which looked at grades in the part A of the exam found that the disciplinary epistemic match score for history emerged as the only significant predictor ($\beta = -0.482, p = .036$). Regarding the analysis of the grades in the part B of the exam, four separate analyses were conducted, each one looking at one of the four questions on offer in part B. In each regression, all four disciplinary match scores were the predictors and the grades for one of the part B questions as the outcome. Only those students who chose that question were included in each analysis. The result was the same for all four part B questions, none of the disciplinary epistemic match scores was a significant predictor.

These results would appear to support the view that when it came to the part A exam question the students seem to have employed a multidisciplinary approach where their knowledge of History had a significant impact independently of all of the other disciplines. In relation to the part B exam questions the results appear to show the students taking an interdisciplinary approach, applying knowledge from all four disciplines without any one discipline being applied independently from the others.

**Discussion**
This study was examining the effectiveness of an empirical measure based on personal epistemological beliefs and epistemic match in exploring the issue of disciplinarity in Education Studies. To this end, firstly I sought to determine if students on an Education Studies course would have distinct sets of epistemological beliefs related to the different contributory disciplines. The results appear to confirm that students had several distinct sets of epistemological beliefs, each set related to one of those disciplines. This showed that personal epistemological beliefs could be used to represent the structure of student beliefs about knowledge in the various contributory disciplines of Education Studies, highlighting both similarities and contrasts in those sets of beliefs. The strongest contrast observed was between history and philosophy. Students showed a significantly greater inclination to accept authority sources and less inclination to take personal responsibility for determining the truth when studying history compared to philosophy. This pattern, showing higher levels of belief in authority sources coinciding with lower levels of belief in personal responsibility mirrors a similar pattern I found in O’Siochru (2009) thus adding support to the validity of the measure. However, the higher level of belief in authority sources in history is itself a novel finding and so worthy of further discussion.

A higher score on the belief in authority sources dimension could be interpreted as a greater level of deferral of the responsibility for determining the validity of knowledge to external “expert” sources. These “experts” could be in the form of individuals such as the teacher or print sources such as historical archives. The higher score might not represent an absolute deferral to external authorities in history but rather a perception (by these students) of the greater impact that external sources can have on determining the
validity of knowledge in the study of history relative to the study of sociology or philosophy. We should be careful not to infer too much from this relatively small data set but it does raise some interesting possibilities, which would benefit from future study. For example, would this greater belief in external sources change how these students approach the teaching of history should they go on to become teachers themselves?

It’s also worthy of note that when we looked at the sets of epistemological beliefs for the four contributory disciplines we found significant differences between most disciplines but not all. Both history and philosophy were significantly different to all the other disciplines on one or more of the belief dimensions. This suggests that students have a distinct epistemological belief-set for each of these two disciplines. Psychology and sociology, on the other hand, were not significantly different from each other on any of the belief dimensions. This suggests that as far as these students were concerned knowledge in both disciplines operated in much the same way. This is not surprising given the similarities between psychology and sociology in terms of their aims and methodologies. It raises some potentially far-reaching questions regarding whether the students see the two disciplines as distinct in any way. Indeed, students may see knowledge in the two disciplines as interchangeable, treating them more as one unified ‘social science discipline’ rather than two separate disciplines. This raises the possibility that in a similar manner, students may incorporate elements of other disciplines such as economics or politics alongside the knowledge from the contributory disciplines without recognising them as distinct disciplines either. In this way, the students’ actual practices could present a critical challenge to the rhetoric and debate that I mentioned at the start of
this article regarding which disciplines are officially considered as contributing to Education Studies and which are not. These findings may also inform the reflective practice of those who teach Education studies, challenging them to consider how they react to students applying knowledge from disciplines not formally included on the course in their assignments.

I also sought to determine if this empirical approach could shed any light on the question of whether students were taking a multidisciplinary or interdisciplinary approach to their studies. To do this, I looked at the relationship between epistemic match and academic performance. The results showed that the students’ overall epistemic match score did predict performance on questions in both parts of the exam such that a closer match predicted higher performance. The students getting higher grades tended to hold epistemological beliefs that are more in line with those epistemic beliefs expected of them by staff. This finding supports O’Siochru and Norton (2014) where we found a similar relationship between epistemic match and performance in other academic disciplines. Of course, epistemic match is not the only factor likely to influence performance and so is not alone in predicting it. None the less, this result supports the validity of a link between epistemic match and performance thus showing the value of including epistemic match as one of the factors to be considered when we wish to understand a student’s performance. That being said, looking at the relationship between the overall epistemic match score and performance was only one part of the picture in terms of the question of disciplinarity in Education Studies.
To get the full picture, the relationship between the individual disciplinary epistemic match scores and performance was also analysed. Performance in the first part of the exam was predicted by the epistemic match score for history alone. This result appears to show a multidisciplinary approach in that the impact of a single discipline’s knowledge, independent from the other disciplines, is detectable in the result. However, none of the individual disciplinary epistemic match scores predicted performance in the second part of the exam. This leaves the overall epistemic match score was the only predictor of performance for the second part of the exam. This result suggests an interdisciplinary combination of the knowledge from several different disciplines, intermixed and indistinguishable, being applied by students to the assignment.

Thus, the results appear to show students approaching Education Studies through a combination of inter- and multidisciplinarity. If correct, this demonstrates that an empirical measure based on personal epistemological beliefs can be used to study the question of disciplinarity in Education Studies. What it tells us about that question is that there may be more than one form of disciplinarity operating in Education Studies at the same time. However, it also raises new questions as to what determines the approach the students use in different situations. When do they favour a multidisciplinary approach and for what reasons? In the focus group, the staff suggested that the phrasing of the first exam question, although intended to be equally relevant to all four disciplines, came across as being more relevant to the history of education then the other disciplines. This might, in part explain why the students took a multidisciplinary approach there. If so, this would be a good example of the potential for student’s experiences of a course to deviate from those
intended by the course designers (Palaiologou, 2010). Regarding the second part of the exam, again the focus group discussions among the staff offered some clues. Reflecting on the wording of the exam questions in the second part some staff concluded that while the questions encouraged students to focus their answer on one discipline they did not prohibit them from making some links to the other disciplines in the answer. As such, it is possible that the students might interpret this as sanction to take an interdisciplinary approach to this part of the exam. Why they did so, given that each of the questions in the second part of the exam clearly favoured the discipline at which they were aimed, is unclear and worthy of further study.

Finally, we should remember that these findings are based on the responses of students on a UK Education Studies course which explicitly teaches the disciplines as separate entities. It would be interesting to find out what results we would get from students on an Education Studies course in the UK or an SFE course the in the US which included different disciplines or which took a more interdisciplinary approach and did not teach the disciplines as distinct entities.

**Conclusion**

Ultimately, the purpose of this study was to demonstrate the utility of personal epistemological beliefs, and the related empirical measure, as a valid method of studying disciplinarity and thereby contributing to the discourse on the nature of Education Studies
and other similar courses inside and outside of the UK. It is important to acknowledge that the interpretation of disciplinarity, interdisciplinarity and multidisciplinarity presented here are contested. However, the potential value of the empirical measure is not linked to any one definition. It is offered as a general tool that could be used to explore a variety of definitions or other aspects of the nature of Education Studies. I would not suggest we reduce the exploration of Education Studies to an exclusively empirical search for statistical relationships and causal effects. An empirical approach would seek to influence the debate not replace it. Nor is the concept of personal epistemological beliefs limited to helping us to explore the issue of disciplinarity in Education Studies alone. Butin (2005a) argues that an essential element of the value of SFE courses is their impact on the thinking and beliefs of pre-service teachers. Future research could explore if the personal epistemological beliefs of students change during the completion of an Education Studies or SFE course as well as studying the impact that potential change has on pedagogical beliefs and practices of these students post-graduation. This approach is unlikely to resolve the complex discussions over the role of SFE in teacher training by itself; however, as Pope and Stemhagen, (2008) state, empirical research on this issue is “speaking a language that those in power can hear” (p249) and so such studies can make a worthwhile contribution to those discussions.
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