

Abstract

Academic training programs in palaeoanthropology (the study of human evolution) do not often provide professional fieldwork training. Palaeoanthropology students are thus at risk of being unaware of the professional practices and responsibilities that come with a career in this subject area. Here I describe palaeoanthropology in the context of similar field sciences, and make the case for requiring pre-fieldwork preparation through the implementation and evaluation of a seminar focusing on professional practice in palaeoanthropological fieldwork. The seminar was delivered to a small cohort of Master of Science students at Durham University, UK. I qualitatively evaluate the seminar via semi-structured interviews, exploring how students varied in their awareness of and approaches to the topic, what new awareness developed, and how necessary this is to their overall understanding of the discipline and their potential future roles as professional researchers. Interviews show that students recognized the novelty of the seminar topic but varied in their approaches to the material. However, they all selectively focused on aspects of the material that might have a bearing on their future careers. This demonstrates the usefulness of supporting their professional practice training, regardless of whether students intended to conduct fieldwork, palaeoanthropological or otherwise.

Introduction

University educators active in palaeoanthropology (the study of human evolution) often lack the opportunity to formally teach students about professional practice prior to their first experience with fieldwork. Despite some institutions with large programs in this subject area providing seminars dedicated to professional practice and behavior, this is not consistently embedded into many curricula. Offering *in situ* field training is also not possible for most universities given the expense, time, and logistics that this entails. As a result, students may not be fully prepared for the experience of fieldwork (which also includes foreign museum data collection) and its many complexities. While other field sciences such as archaeology may face similar difficulties, palaeoanthropology is known amongst them to be particularly beset with practical and ethical concerns. The discipline has long struggled with significant issues ranging from data ownership in the context of the colonial histories of many of the countries where fieldwork is conducted, to long-term disputes between teams of researchers at field sites, to differing views on scientific methodologies (Dalton 2007; Gibbons 2007; Lewin 1997; Lockwood 2001; White 2000;). Here I outline palaeoanthropology's unique situation in the context of other disciplines' fieldwork traditions and investigate students' need for professional, pre-fieldwork training. I demonstrate this through the presentation of a special seminar session that was developed for Masters students to address the ethics, practicalities and politics of fieldwork with a pedagogical rationale for each element, followed by an evaluation of how student awareness was changed after the implementation of this session.

Palaeoanthropology: a Unique Field Science

Palaeoanthropology is the multidisciplinary study of human evolution, invoking theoretical and analytical aspects of the social, biological, and physical sciences. Its focus on reconstructing the history and behavior of fossil hominins (human ancestors) and humans over evolutionary time situates it in the discipline of anthropology which, broadly speaking, is the study of humanity including our primate heritage, evolution, and the diversity of culture and human experiences around the world. Anthropology was once considered the remit of the lone researcher (Gottlieb 1995), but a number of intellectual trends inspired an awareness that collaborative efforts between researchers in different demographic categories (i.e., students and mentors, Western and non-Western researchers) was a more appropriate, fruitful, and potentially transformative approach to the subject area (Moreno-Black and Homchampa 2008). This translates well for palaeoanthropological studies, as the core of these datasets is comprised of early hominin fossils often found outside of the Western world during field expeditions that require significant human-power, organization, and collaboration.

Without concrete evidence for human evolution in the form of skeletal and artifactual remains, there is no way to approach the subject and, as such, the discipline is fundamentally field-based. Hominin and other fossils must be recovered, as well as comparative archaeological and geological sources of evidence for hominin behavior and the environments in which our ancestors evolved. Much of this fieldwork occurs in remote and climatically inhospitable regions, a characteristic shared with other field-based disciplines and sub-disciplines, such as Palaeolithic archaeology (Sinclair 2008). However, what makes palaeoanthropology unique is what researchers are looking for: extremely rare hominin remains.

The rarity of hominin finds has led to a perception of the “scientist as hero” as fieldworkers scramble to discover hominin remains, especially those that can be ascribed to a new species (Derricourt 2009). This situation has led to a number of disputes detailed in popular science books that document relationships between research teams (e.g., Gibbons 2007; Lewin 1997), as well as news coverage in reputable science journals such as *Nature* (e.g., Dalton 2007). In addition to this, the remoteness and isolation of many field sites and the occasional danger involved in fieldwork have created a dynamic discipline that is characterized by confounding issues including access to and ownership of data/fossils, negotiating relationships with other researchers and foreign governments, safety (particularly for women), and the complex logistics of fieldwork.

Anthropology and Fieldwork

Anthropology and education have been coupled for several decades in both a theoretical and applied sense (Erikson 1982; Pelissier 1991), from ethnographic studies of schools and learning environments (e.g., Wolcott 1975; see review in Yon 2003) to using “culture” as a resource for understanding student learning (e.g., Anderson-Levitt 1987; Foster et al.

2003; Richardson 1994) to investigating how social roles, networks, and perceptions are replicated in the classroom (Collins 2009 and references therein). However, there is only a small body of literature regarding the approach to or process of learning about anthropology¹, a discipline that students usually come into contact with only at university level². Pre-university students have also usually lacked fieldwork opportunities at school (Barker et al. 2002; Fisher, 2001; Scott et al. 2015), and thus it is the idea of conducting fieldwork that often intrigues and excites new anthropology students. In this regard, there is a body of social sciences literature specifically used to prepare and guide students through human-subject field studies (e.g., AAA 2009; ASA 2011; Coleman and Collins 2006; Hammersley and Atkinson 2007; Srinivas et al. 1979; Watson 1999), as well as fieldwork focused on observations of living primates (Setchell and Curtis 2011). Palaeoanthropological fieldwork has more in common, however, with the survey, reconnaissance, and data collection/recovery strategies typical in archaeology, and geography, earth, and environmental sciences (GEES).

There is a limited body of literature that approaches the specific processes involved in field-based scientific learning; surveyed and summarized by Leon-Beck and Dodick (2012), they identified only three groups of studies pertaining to archaeology (Flash-Gvili and Dodick 2008; 2010), ecology (Bowen and Roth 2002, 2007; Roth and Bowen 2001a, b), and earth sciences (Delamont and Atkinson 2001). These and Leon-Beck and Dodick's (2012) own study of field ecologists explored the process of student learning *in situ*, observing their development in the context of a "cognitive apprenticeship" (Collins et al. 1991) or "scientific apprenticeship" (e.g. Lock 1998) in which knowledge, particularly procedural knowledge, was gained through their joint participation in the professional fieldwork arena under the guidance of a supervisor. Active engagement during fieldwork is reported to foster deeper learning (Allen and Lukinbeal 2010; Boyle et al. 2007; Day 2012; Higgs and McCarthy 2005), which in turn can result in the development of a community of practice through shared decision-making, problem-solving, and knowledge creation (Fuller et al. 2006; Lave and Wenger 1991). Although beneficial to learning, there are reports of pre-fieldwork anxiety in student cohorts (Boyle et al. 2007) and the unpredictable and often uncontrolled nature of fieldwork can impact students' ability to learn and remain motivated from the moment they enter the field (Leon-Beck and Dodick 2012). Regardless of scientific discipline, students must develop robust and flexible mechanisms to cope with these worries before and during fieldwork.

Training students in an authentic palaeoanthropological field situation is difficult given the location of many of the classic early fossil sites in Africa and Asia, and the expense of the few field school training opportunities that exist. Students interested in pursuing palaeoanthropological studies therefore often become involved in fieldwork only as postgraduates, attaching themselves to existing projects through their supervisors. In this sense, palaeoanthropological training is not limited to fact-based learning and the accumulation of declarative knowledge. Practical and logistical training become paramount to the success of a student's research and subsequent career, but issues relevant to the fieldwork component of their education are

not easily situated in a classroom learning environment. This lack of explicit preparation stands out particularly in anthropology departments, given that socio-cultural anthropologists have a stronger tradition of formal pre-fieldwork preparation (i.e., Whyte 1984) where strict guidelines for research with living humans are taught, discussed and monitored.

Palaeoanthropology--with a significant amount of field activity, an emphasis on rare fossil finds, and well-publicized disputes centering on major field projects--presents a unique opportunity to assess the need for pre-fieldwork training. This paper contributes to a small but growing corpus of literature that focuses on fieldwork, but approaches it not from the perspective of how learning occurs on site over time, but from the vantage point of what can be done to prepare students for fieldwork prior to it, when there is little room within a curriculum for integrating long-term training opportunities. With no provision in their formal education for allowing reflection on how the complexities of fieldwork could affect their work, students risk being ill-prepared for it when the time comes. I present below an adaptable one-off seminar plan for conveying the context of palaeoanthropological fieldwork to postgraduates and the results of the implementation of this seminar, assessed through interviews with six postgraduate students.

Pedagogical Rationale

Identifying a learning environment and approach

A lecture format, in its most basic sense, can provide a platform for transmitting specific information (Trigwell et al. 1994), for example, in highlighting some of the specific difficulties in conducting fieldwork that merit later discussion. These issues lend themselves to a less formal or narrative lecture, a format to which students respond positively, particularly when delivered with a high level of enthusiasm (Brown 1987; Evans 2007; Hodgson 1984). However, even if attempts to achieve active learning (Bonwell and Eison 1991) are made through in-class engagement during a traditional lecture, it would not allow the students to deeply explore their own beliefs and preconceptions, nor would it give space for personal reflection.

A small-group, discussion-based seminar environment is arguably more appropriate to the subject matter. Although tutor-led tutorial and seminar formats may sometimes not be the most effective small-group teaching environments (for instance, see Kramer and McGuinness 1998), allowing the lecturer to retain leadership of the discussion ensures that it remains focused on assigned readings and thoughtful reflection of students' reactions to them. It also allows the lecturer to embed informal, formative feedback in the discussion through her/his own reflections. This is particularly relevant because the discussion leader is likely to be the only person present with fieldwork experience of the nature being discussed and is therefore well-placed to comment on these issues which are inherently sensitive, subjective and characterized by the "grey area" of experience and personal paradigms (Yorke 2003).

In order to create conditions appropriate for teaching and learning about the context of palaeoanthropological fieldwork, I use Trigwell et al.'s (1994) penultimate and final of five approaches to teaching which include a student-focused strategy aimed at students *developing their conceptions* and *changing their conceptions*. Formal preparation for the seminar aids in developing their conceptions while discussions during the seminar allow opportunities for further developing or shifting conceptions. The key to these approaches is that the focus is on learning and not the instruction itself (Barr and Tagg 1995); the student's independent thinking and reflection are given priority, promoting a deeper understanding, rather than the transmission of subject-specific fact-based knowledge (Prosser and Trigwell 1998; Trigwell et al. 1999). The seminar encourages students to question not just what they may already believe and why they do so, but how they might react to situations in each of these contexts. Students benefit from the opportunity to reflect on the development of their knowledge and learning processes and to acknowledge their ability to affect change or have an impact (Case and Gunstone 2002; Knight and Yorke 2003).

The seminar is structured around students' perception of three "contexts" – the practical, political, and ethical. These are illustrated below by the kinds of questions on which they may personally reflect.

1. *The practical context* - How do I hire a reliable local driver before arriving? How do I apply for a research permit? Where do I seek medical attention in the field? Should I bring my children with me?
2. *The political context* - Does the foreign government that grants access to fossils/field sites control my data or I do retain control? Are there good relations between local people where I conduct fieldwork? What is the history of fieldwork at my site and what is my role in it?
3. *The ethical context* - Am I required to let other students and colleagues use my data before my research is complete? Why is it necessary and important to ask a local researcher to join my field project?

The political and ethical contexts are clearly related, but a distinction can be made. The political context may be defined as an awareness of facts and circumstances related to both personal and geo-politics, while the ethical context represents a more personal awareness of how one makes decisions and behaves in a transparent and responsible manner with the political knowledge one has.

Learning plan and implementation

A description of the group-discussion seminar is presented below (summarized in Figure 1). The seminar can be adapted for any higher education institution and can be undertaken in one session, thus not having a significant impact on the contents or timing of courses already in place.

Preparation for the seminar requires three separate tasks of the students totaling approximately 3.5 hours of time, but this can certainly vary. The first task includes a set of assigned readings (1.5 hours). The required

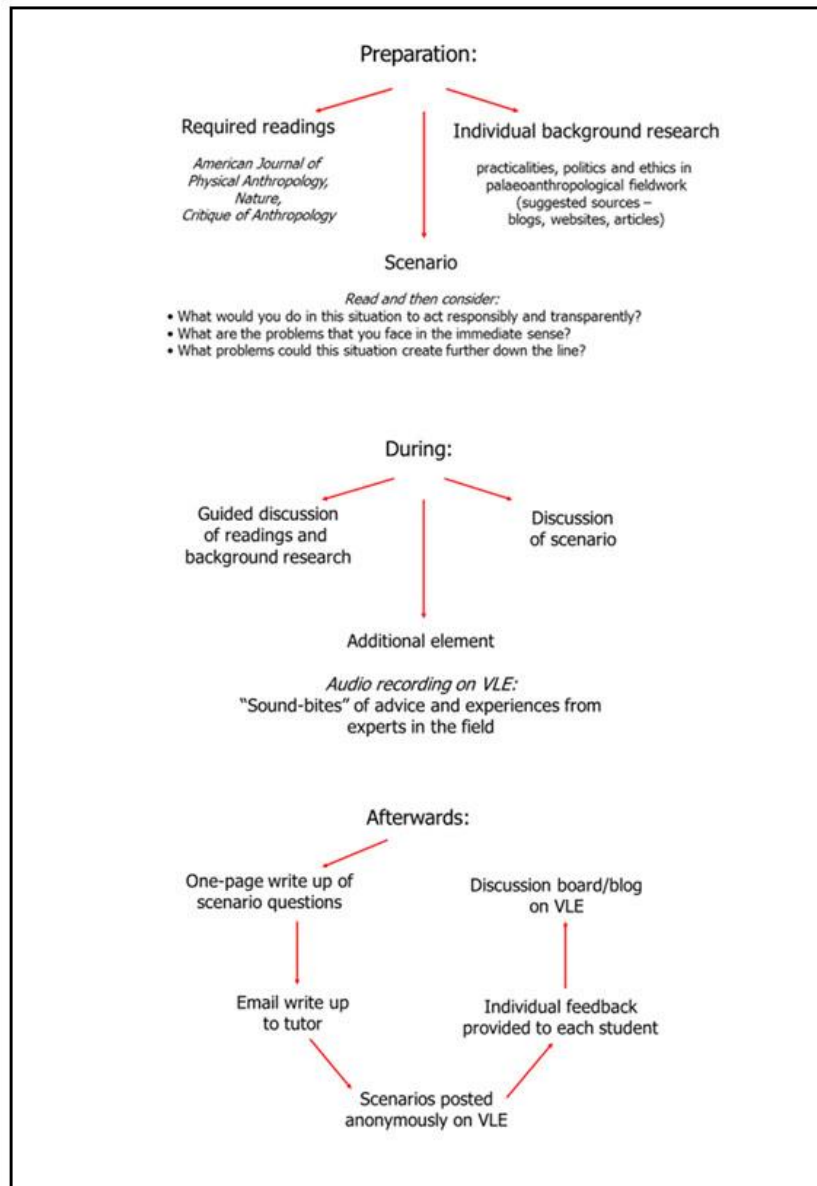


Figure 1. Schema showing the components of the seminar preparation, activities that occurred during the seminar, and activities that followed the seminar. VLE = virtual learning environment.

readings are published in reputable scientific sources, addressing the difficulties that experts perceive as hindering our ability to conduct fieldwork and objective scientific investigations (e.g., Dalton 2007; Lockwood 2001; White 2000) or which provide a theoretical and historical framework for understanding the hero-scientist phenomenon described earlier (Derricourt 2009). Secondly, the students are asked to conduct individually-directed background research into one of the three contextual areas, with resources suggested as a starting point (1.5 hour). This activity helps them develop their own ideas in the context of the many issues and opinions that exist; blogs and other media are useful here as starting points and these can be easily updated year to year. Finally, students are asked to consider a scenario in which s/he is posited as the “actor” (30 minutes). The scenario introduces

SCENARIO:

You are in the second year of your PhD and have been collecting morphometric data on skulls at a museum in a different country for over two months. Your supervisor arrived with you to make the relevant introductions after obtaining your research permit and paying the museum bench fee for student researchers. However, your supervisor left a few weeks ago and you have been getting on with your work.

The lab manager where you are working has been very kind in allowing you access to the collections after hours and has given you personal tours of collections that are normally not open to study. The lab manager obtained her PhD from your institution, but studied under the academic rival of your supervisor. Your respective supervisors have not spoken in years and continue to criticize each other's work in publication.

The manager has recently asked if you would lend your equipment to her so that she can collect data on a particular skull that you have not been allowed to study under the terms of your permit. It is a sensitive piece of equipment that belongs to your university and costs a significant amount of money. She and her colleagues are interested in a topic that is very similar to your project. Initially, you decline to let her use the equipment feeling that the decision is out of your control.

A week later another employee at the museum asks if you would help with some research he and his colleagues are working on because the proper equipment is not owned by the museum. He asks if you would collect the data yourself on the skull and give it directly to him and his team, which consists of the lab manager and other researchers including your supervisor's academic rival. He notes that "time is of the essence" because your permit will expire soon.

Now what?

Consider:

What would you do in this situation to act responsibly and transparently?

What are the problems that you face in the immediate sense?

What problems could this situation create further down the line?

Figure 2. A scenario and set of discussion questions based on the one presented during the implementation of the seminar. The scenario was given to students in preparation for the seminar. Students were asked to read and consider it prior to attending. Following discussions they were asked to write up their responses to the questions posed and email them to the tutor for personal, private feedback, after which comments were posted anonymously on the VLE with permission.

students to a fictional data collection situation and presents questions formulated to make them reflect deeply on the outcomes that could potentially result, as well as how their behavior may influence the outcomes in both the immediate and long-term sense (Figure 2).

To support further learning after the seminar a short piece of reflexive writing is requested. This provides space to express changes in their understanding and an opportunity for informal and confidential formative feedback. Additional space to continue discussion can easily be provided in an online environment, such as moderated class blogs or discussion boards, if debates are likely to continue. During the implementation, each student was required to email the tutor with their answers to the questions posed in the scenario. With permission, these were posted anonymously on the course's website, although students also received individual feedback that did not critique their comments, but encouraged a positive attitude and a healthy motivation to become informed about the issues at hand in order to make responsible choices regarding their careers in the future (Nicol and Macfarlane-Dick 2006).

Student sample

The seminar was implemented halfway through a 20-week graduate module³ at Durham University, UK, with a cohort of six students registered for a typical one-year Master of Science degree in Evolutionary Anthropology. The degree (which has subsequently been withdrawn) drew students from a variety of backgrounds, typically archaeology, anthropology, the life sciences, and

psychology. The six student participants, three males and three females, varied in their prior educational backgrounds, current dissertation project topics, and future career plans (Table 1):

Student A: part-time, male, non-traditional student who had retired from a career in medicine and public health and had extensive experience travelling in Africa for purposes of health work. He chose to pursue a dissertation topic that was related to later stages of human evolution. He had no plans for further study.

Table 1. Student sample summary.

	Gender	Status	Degree/Career background	Dissertation subject area	Career intention
Student A	Male	Part-time	Public health	Palaeoanthropology, human behavior	None, retired
Student B	Male	International full-time	History	Palaeoanthropology, archaeology	Intended further study
Student C	Male	International full-time	Social sciences	Evolutionary psychology	Possible further study
Student D	Female	Full-time	Psychology	Palaeoanthropology	Possible further study
Student E	Female	Full-time	Zoology	Palaeoanthropology	Museum collection work
Student F	Female	Full-time	Natural sciences	Palaeoanthropology	Possible further study

Student B: male international student who had recently completed an undergraduate degree in history in Greece. He possessed less background in the sciences compared to the other students. He chose a dissertation topic that was palaeoanthropological. He expressed an interest in pursuing studies at the doctoral level in future.

Student C: male international student who had recently completed an undergraduate degree in social sciences in North America. His dissertation and general academic interests were in the sphere of evolutionary psychology and philosophy.

Student D: female student who had graduated from university with a degree in Psychology, and had pursued these studies from an evolutionary perspective. Her dissertation was palaeoanthropological, involving museum-based data collection. She also expressed an interest in pursuing further study, but had no specific plans for such.

Student E: female student who had earned an undergraduate degree in Zoology. Her dissertation topic was specifically palaeoanthropological, but she had no intention of following the Masters with a career in further human evolutionary research, but wished to move more into the related area of museums and collections work.

Student F: female student who had an undergraduate degree in Natural Sciences. Her dissertation project was palaeoanthropological. Her plans for

the future were tentative, but included the possibility of doctoral studies in the same or a related field.

Evaluation of the seminar

The seminar was qualitatively evaluated through a series of interviews with the six student participants registered for the module. Given the small cohort and, more importantly, biases observed in self-assessments and student lack of awareness on how to self-evaluate (e.g. Dunning et al. 2003; Kruger and Dunning 1999; Osterhage et al. 2019; Pallier 2003), there was no formal evaluation of skills and factual knowledge either before or after the seminar. Rather, the aim was to explore variations in student preparation for and learning about the seminar subject, as well as student *awareness* of the issues following its implementation. The semi-structured interview method, oft applied in smaller-scale case studies, was chosen for its flexibility, and because it allows students to focus on their experiences of the seminar, best provided via narrative accounts (Bryman 2016; Drever 1995; Gubrium and Holstein 2001; Seidman 2013). To this end, a series of 18 questions were developed (Figure 3).

The interviews took place one month following the seminar's implementation. They were not time-restricted and were held over a one week timeframe, always in the afternoon in the seminar leader's office at the university. All of the students were familiar with this space and had previously visited during scheduled office hours. The interviews were recorded and consent forms were signed prior to the interviews commencing. Ethical approval was given by Durham University.

Results

Prior Awareness and Initial Reactions

Prior awareness of the issues covered during the seminar varied amongst the students. Although a few stated some vague awareness of academic disputes specific to palaeoanthropology, all of them expressed some deficiency in knowledge regarding the ethical issue of how long data can be withheld before publishing or sharing it and the difficulties one may face in seeking access to fossil materials for study. All of the interviewees expressed surprise to see that a seminar was devoted to these topics in the first place, with none claiming to have covered similar issues as undergraduates in their respective disciplines. Response to this was positive, with students describing their initial thoughts towards the delivery of the material as variations of "a good thing," "interesting," "more relaxed," and "less formal." There was a clear recognition that the topic was non-traditional in the context of an otherwise scientific course. Student B summarized his understanding of the seminar as focusing on the process of conducting science rather than the science itself:

"(usually) we just focus on the empirical evidence for this and that. We don't actually talk about the real world in terms of making it work, and what are some of the consequences you'll face when you're really

INTERVIEW QUESTIONS: 1. What is your academic background? <i>Feelings prior to seminar:</i> 2. How did you feel about this seminar when you first read the notes about it? 3. Is this different to how you feel about other seminar topics? 4. How important did you feel this topic was to you personally? <i>Prior awareness:</i> 5. Before preparing for the seminar, were you aware of any practical, political Or ethical issues in palaeoanthropology? 6. What were they? 7. How did you learn about them? 8. Were there any topics covered by the readings and during the discussion that you had not previously been aware of? <i>Preparation for seminar:</i> 9. How did you prepare for the seminar? 10. Is this different to how you prepare for other seminars? <i>Career intentions:</i> 11. Is your MSc dissertation topic palaeoanthropological? 12. Are you thinking of pursuing a professional career in evolutionary anthropology or specifically in palaeoanthropology after your MSc? 13. Do the issues covered during the seminar have anything to do with this decision and, if so, how? <i>Scenario:</i> 14. How did you feel about being asked to think about the scenario? 15. Did your reaction to the proposed scenario change after the seminar discussion and, if so, how? 16. How do you feel about your ability to personally handle or address the issues we discussed? <i>After the seminar:</i> 17. Can you reflect on how the things you learned during this seminar have affected you? 18. Are there any specific ways in which the things you learned in the seminar Will affect you in the future?
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Figure 3. Interview questions posed to the six participants one month following the implementation of the seminar.

trying to collect data in the field... it was the first one [seminar]... that was more geared towards some of the real world application of information."

Initial responses to the seminar topic were largely impersonal, except in two circumstances pertaining to the female students and the non-traditional student. All three female students expressed surprise that they had not previously reflected on how their field experiences might be different from those of men, whether or not this was related to child-rearing. Student E articulated that this aspect of the seminar had the most potential for personal relevance because of a preconceived notion of how women would fit into the discipline:

"I think the one [topic] that sort of made me think this one [seminar] might be more related to me was the women in anthropology... because I am a woman in the subject, would there be any sort of difference? I just sort of assumed it would be the same for everyone, I guess..."

She continued to return to the subject of female researchers in the field during the course of the interview, simultaneously expressing dismay that she had not previously considered how women might experience fieldwork or the discipline differently:

“...I couldn’t believe I hadn’t really thought about it. I guess because I didn’t want to, really. I didn’t want to, you know, differentiate myself.”

In regards to other topics discussed during the seminar, including data sharing, access to fossils, collaboration, and the logistics of fieldwork, only the non-traditional student’s (Student A) initial thoughts were distinctly personal, tying his own experiences working abroad in medicine to his reflections on palaeoanthropological research, but he was unable to extrapolate how or why they could differ. Although describing the seminar content as providing a “different perspective,” he did not move far beyond his own previous familiarity with working in a foreign country and his initial reaction to the seminar topic was thus firmly situated in personal experience.

Preparation and Learning

Questions aimed at illuminating the students’ process of preparing for and learning about the seminar material highlighted that the more traditional resources, such as journal articles, were approached similarly to those assigned for other seminars.

Despite widespread acknowledgement that the topic was unique, the students began their preparation for it the same way they would any other seminar, by first reading the required articles and often making notes. Two students were motivated to follow this up with recommended readings, but approached it through an unstructured skimming of several sources, stopping for deeper contemplation only when the material grabbed their interest. Student D explained:

“I look at the reading and then I just read sort of the core ones... I read those and then I usually try to look for articles around it... but as soon as I read it and I just highlight and make notes of it, it has gone in and it usually sticks. I am not very good at re-writing out notes. They don’t seem to be particularly beneficial for my learning.”

The student conceptualizes learning as an accumulative process where readings provide information that “sticks,” filed away for future use. She has reflected on her ability to learn in other ways and developed a technique that she feels works for her. However, a later response indicates that this approach may not be the best for the topics covered, as she indicates some confusion. She first expressed the opinion that her approach to the seminar was the same as any other, but quickly contradicted herself by referring to it as a change:

“It was no different from anything else. It was just a way to be able to get your own personal opinion across rather than, sort of, having to back up hugely with evidence... it was a refreshing change.”

This was a common pattern that emerged during the interviews. The students felt the topic was unique, yet approached the required readings largely the same as they would any other topic. Student A, whose reflection on the

seminar as a whole was the least personal of any of the interviewees, admitted that he was compelled to read all of the required readings:

“...for other seminar topics I thought, well, this is what we need to know. But on the other hand, I did read all the stuff recommended to us on this one. I suppose because it was novel so that makes you... tends to spark interest.”

This was the only way in which he deviated from his normal approach to seminar preparation and insisted that his motivation to read the entire suite of assigned articles was entirely academic and involved no personal interest (although his prior knowledge of the topic and reaction to the seminar was distinctly personal). With the exception of this student, the others approached the second part of their preparation – to conduct background research into either the practicalities or politics and ethics of palaeoanthropological research – based on personal interest filtered through the lens of career intentions. It was, however, less structured and goal-driven than their approach to the required readings. Student E’s perception that this seminar was different from others in the module may have relieved her of the usual routine by which she approaches learning:

“... for this one [seminar]... I read some points from that book and had a little look elsewhere, but I think just because it wasn’t something I hadn’t really thought of, in a way I did kind of see it as kind of a distinct seminar from the others.”

This student obtained a recommended book and described her approach to this as flipping through it, stopping only when she noted recurring hominin species or researcher names. She also looked at recommended websites and blogs, but found these too general for her liking.

The students who proclaimed an intention to pursue further studies at the doctoral level in future focused their background research for the seminar on topics that would bear directly on this and the success of their dissertation projects. Those with greater interests in palaeoanthropological research emphasized issues such as access to fossil material. Student D articulated her reasons for investigating the ethical implications of research with ease:

“...the ethical implications... access in other countries... obviously is going to be quite a big issue if I want to do research within this, where it actually means working with fossils and being able to get access to places... materials that aren’t within my country or aren’t within my domain. I guess I didn’t realize how challenging that could be.”

Student F, who was also writing a palaeoanthropological dissertation, stated that the logistics of obtaining permits and research clearance in order to gain access to collections in foreign countries had been previously unknown to her and that she looked into this and related issues as part of her background research. Interestingly, where students did not have any desire to pursue palaeoanthropology or other academic work, they also conducted

background research on issues that would bear on their future chosen career. Student D, with no intention of an academic career, but who had previously expressed surprise that she had not realized the experience of research could be different for women, commented:

“There are some issues that we came across [in the seminar] that would affect you whatever you were doing... there might always be that issue of being a woman or starting a family... the things we did cover can be applicable to lots of other situations, not just palaeoanthropology and academia.”

The third activity required to prepare for the seminar was the consideration of the scenario. Student responses to this were quite different from their more traditional approach to the readings and personal, unstructured approaches to the background research. Student C, who admitted that he did not remember taking any notes about the scenario during preparation, felt positively towards it:

“I thought that it was quite fun to read something like that, it was different and interesting... nobody asked me before to write [sic – consider] a scenario, so it was unique in a way.”

All of the students recognized that this activity was novel and that it generated a personal sense of learning more than the other two areas of preparation. Student E commented:

“...I found that the scenario was kind of helpful in the way... that I could sort of visualize what kind of problems there would be... I didn’t have a sort of personalized approach in a way, so reading the scenario just made me think this could happen, this sort of thing could happen to me.”

Discussion

Variations in student learning

One shared characteristic that was clearly identifiable from the students’ responses to the interview questions was their perception of the seminar topic as novel relative to others. Their first impressions were, however, not generally defined by a personal connection to the topic and they began preparation for the seminar by approaching the required readings relatively formally, using the same tried and true methods they had developed as students (note-taking, highlighting passages, etc.). Differences emerged where their approach to the background research was concerned, which was more unstructured.

In the classic sense of Marton and Säljö’s (1976a, 1976b) dichotomy between surface or deep conceptions of learning and, by extension, processes of learning, the students could not be easily pigeon-holed into these two categories. They took different approaches to the types of material even though they each expressed a belief that the topic was “different” and

interesting. For example, Students A and D prepared for the seminar in the same way they would normally do, by reading the required articles and accumulating knowledge in a structured way. Student E, however, deviated from her normal approach by skimming through recommended sources and following leads that interested her as and when she found them during her background research, which was very much a surface approach.

The scenario that was posed to the students fostered a deeper and more transformative learning process. Students D and E claimed the scenario allowed them to think about or visualize the situation personally and suggested that this made them think differently. Student D's feelings about the scenario even changed after the class discussion:

"...that it was in another country that you were not from and the implications that that would have. That, actually, you're a guest in a foreign country... I hadn't really considered that to be a big issue...so definitely that was something I hadn't really thought of."

She went on to explain that she felt she would be quite able to handle the same problem as that proposed in the scenario, despite the new realization that competition both in the field and in foreign countries is high. She concluded by noting that the seminar had been a good way to think critically of the entire discipline rather than just one topic.

"... it was quite a good reflection of the discipline... it was a really useful tool for me. It made me think slightly differently about the discipline."

Her experience with the scenario indicates that it was a process, one that was not goal-directed, but both experimental and personal. Unlike the assigned readings or background research, the scenario enabled the student to create personal meaning and her engagement with it was transformative. Her final reflections on the seminar overall are colored more by what she learned in the scenario exercise than anything else – *"It made me think differently about the discipline."*

The one student who differed substantially from the others in many of his responses to the interview questions was Student A. He was the only one who described his interest in the seminar as entirely "academic," without personal relevance and admitted that the scenario did not change his feelings about the larger issues at hand. But, when asked about how he felt when asked to consider the scenario in the first place he referenced personal experiences:

"...well, it's part of working, part of working abroad in a different culture. Things you have to be able to deal with, um, I found them difficult, relatively difficult, but yeah, I had some difficulties getting to grips with it when I first went to Nigeria when I was young.".... Did your reaction to the scenario change at all after the seminar, so once we'd all had a chance to talk about it and share ideas? - "No, not really."

When prompted to reflect on whether the scenario had any specific effect on him, he said:

“No, I don’t think so... it was an interesting situation. In some respects similar to what I’ve had to deal with so I just, I suppose, I took it in my stride.”

Although he had considered the factual information presented in the seminar, there was no indication that Student A felt he had learned anything new or found any aspect of the seminar personally transformative. Interestingly, Student A introduced a phrase that proved quite influential to the rest of the group. He described the palaeoanthropologist in the scenario as a “guest” in a foreign country and used this metaphor to describe what he felt was the correct behavior in that situation. This idea of being a scientific guest was referenced in four out of the six written final reactions to the scenario (which were completed after the seminar).

The necessity of awareness

Each student consistently emphasized one issue during the interview that had personal relevance despite the breadth of subjects covered; other issues were mentioned, but each student had a “recurring theme” to which they returned at various points during the interview. It is well-known that students often strive to learn what will be advantageous to them in the sense that they are aiming to perform to the lecturers’ expectations as measured by assessment (e.g., Elton 1987). In the case of the postgraduate interviewees, this has translated into a motivation to learn what will be advantageous in the long-term -- not exams and coursework, but their careers. Student D articulates a clear intention to pursue a career in palaeoanthropology where she studies hominin fossil material directly; her recurring theme was the one issue that has the greatest potential to disrupt this – access to and sharing data and fossil material. Similarly, Student E focuses on the issue that may affect her career even though she has no intention of becoming a professional palaeoanthropologist – her gender. In regards to this she commented that the scenario was:

“...good to get me thinking... I hadn’t placed myself in that situation. So, I thought it was a good idea and beneficial to get us thinking about...all the things we have to consider...”

Student C reflected a similar sentiment:

“...in my life or my career I will come across such a situation, it’s very likely to happen. You don’t have to be specifically a palaeoanthropologist...”

Most of the students thus personalized their reflections on the seminar and generalized new knowledge derived particularly from the palaeoanthropological scenario to their individual career intentions, suggesting that integrating a consideration of professional practice into a

learning program is necessary to their professional development. The response from Student A supports this to a certain degree. He does not personally need to develop this sort of knowledge, as he did so during his previous career; hence the disconnect between the way in which he felt about and reacted to the seminar – it was “academic” and he did not further develop any understanding -- but his reflections consistently harkened back to his past career and what had been useful and necessary to him then. He knows the topics covered are important from these prior experiences. In a sense, his input functioned similarly to my own as the tutor; we both possess experience in field situations and have had to personally contend with many of the practical, political, and ethical issues raised. The experiential knowledge he passed on was carefully considered by the others, as evidenced particularly by their co-option of his concept of foreign researchers as guests in a foreign country.

Becoming aware of the issues covered in the seminar and how they may affect each individual personally, and being able to reflect on one's potential involvement in them, represents a significant shift in most of the students' thinking about “doing” palaeoanthropology in a professional sphere. They implicitly acknowledge this by linking their specific interest in the seminar to an issue that relates to their intended profession. This is in contrast to previous research conducted on how fieldwork itself impacts on career choice, which has produced mixed results. In a large study of GEES, students did not feel strongly that fieldwork skills would be important in their chosen careers (Boyle et al. 2007), although a much smaller study found that confidence in fieldwork and related skills was an important factor for students choosing specifically to pursue a research degree (Fuller et al. 2010). This is likely to represent the difference between being a student *learning* about a field discipline and actually *being* a scientist in that area, which requires confidence in a skillset that can be obtained only when afforded the opportunity to learn outside of the classroom. Although a far cry from fieldwork, the seminar presented herein allowed the students to consider many of the issues that could impact on their experience of palaeoanthropological fieldwork and, where there was no clear intention to do this in future, the issues were applied instead to future career intentions. The scenario in particular fostered a change in any preconceived or newly developed ideas the students had (*sensu* Trigwell et al. 1994) regarding palaeoanthropological fieldwork and their future professional lives.

It is possible that the collective practicalities, politics and ethics of palaeoanthropology represent a broad threshold concept (Land et al. 2005; Meyer and Land 2003; 2005) specific to this sub-discipline, but generalizable to other field disciplines as evidenced by the students' response to the seminar topics in light of their individual career intentions. The students may have been facing their own palaeoanthropological threshold concept; just as disciplines may be conceptualized differently (Saunders et al. 2005), so may be the threshold concepts within them. Threshold concepts cannot be empirically scrutinized because of their shifting, personal nature (Rowbottom 2007), but they are useful heuristic devices that can be used to identify and describe that liminal place in a student's education where they are facing a

shift in thinking, one characterized by “troublesome knowledge” about their discipline (Meyer and Land 2003; 2005; Perkins 1999). All but Student A expressed that they were experiencing this to a certain extent, describing frustration with their new awareness (or lack of previous knowledge) regarding the seminar subject matter. This is particularly interesting where the female students are concerned, expressing surprise at having not thought about their gender in light of field research. Previous writings on fieldwork have described it as an overtly masculinist environment where women struggled to be accepted or treated with equality (for instance, see Maguire 1998; Rose 1993). More recent work has demonstrated that female students, although more likely to express anxiety prior to field courses, did not differ from males in their beliefs pre- and post-fieldwork training (Boyle et al. 2007). However, these studies were conducted with cohorts of undergraduates on university level field courses where equality, safety and general “atmosphere” may be more carefully monitored. The research reality may be quite different in the field. This was raised during the seminar, bringing to light issues that female students today may not have had to need to consider as explicitly, but which certainly require thought prior to fieldwork. Coming to the realization that one’s own gender is potentially problematic may be argued to represent a practical type of the “troublesome knowledge” so characteristic of threshold concepts.

Summary

I have outlined a teaching and learning issue specific to the study of palaeoanthropology, but which has can be brought to bear on other field sciences. The practical, political and ethical contexts of fieldwork are not often formally introduced to students, putting them at a disadvantage when they embark on fieldwork as a new researcher. I have discussed from a theoretical and practical perspective a small step towards rectifying this situation through the presentation of a seminar plan that aims to provide students with a useful format for recognizing the realities of a career in palaeoanthropology and for deeply reflecting on their ability to react to difficult circumstances in a responsible and transparent manner. Although the sample size was small (n=6) and follow-up interviews were conducted with only this cohort, evidence from semi-structured interviews following implementation of the seminar suggests that it was an appropriate element of their education, providing a space where less traditional issues relating to professional practice could be discussed and necessary new knowledge gained. Science has a great deal to gain from the positive, informed decisions that today’s students will make in the future, but they need to be provided with the necessary tools to make these decisions.

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Notes

¹The anthropology of learning and education is well established with the journal *Anthropology and Education Quarterly* which began in 1976 after brief incarnations as the *Council on Anthropology and Education Newsletter* and the *Council on Anthropology and Education Quarterly*.

²In the UK an A-level (pre-university) course in anthropology began in 2010, but was withdrawn after the 2014-15 school year. There are, of course, some opportunities for pre-university exposure to the discipline in the UK; for example, via the The Royal Anthropological Institute's educational resources for teachers: <https://therai.org.uk/education> Similar resources are available in other countries (see American examples collated by the American Anthropological Association: <https://www.americananthro.org/LearnAndTeach/Content.aspx?ItemNumber=2643>). However, a formal, structured introduction to the discipline is not embedded into national education programs prior to university-level education.

³A “module” in the UK is the equivalent to a “class” in North American higher education institutions.

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