VIRTUE EPISTEMOLOGY, EXTENDED COGNITION, AND THE EPISTEMOLOGY OF EDUCATION

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ABSTRACT. How should we, from an epistemological point of view, understand the role of technology in education? On one very natural conception of the epistemic goals of education, such technology can only at best play an enabling role, since ultimately the task of education is to enhance the *unaided* cognitive abilities of the subject. This way of conceiving of the epistemic goals of education can be compounded once one notices that virtue epistemology offers a very natural framework for understanding the epistemology of education. This is because virtue epistemology often tacitly incorporates a commitment to *epistemic individualism*, such that one's cognitive abilities are to be understood exclusively in terms of one's 'on-board', and thus in this sense 'internal', cognitive processes. Hence, when virtue epistemology is applied to the epistemology of education, this seems to confirm the idea that technology can at best only play a supporting role. It is argued, however, that the virtue epistemology framework is in fact entirely compatible with an epistemic anti-individualism which allows technology which is outwith the skin of the subject to nonetheless form a constitutive part of the subject's cognitive processes. It is claimed that such an *extended* virtue epistemology has a number of attractive features, and some of its implications for the epistemology of education are explored.

0. INTRODUCTION

A common cultural battleground when it comes to the education of children concerns generational changes in what is taught (and the manner in which it is taught). In the case of the United Kingdom, for example, one will often find people of more advanced years bemoaning the fact that when they were children they were expected at school to learn to do fairly advanced arithmetic entirely in their heads, but that the children of today are encouraged to make full use of technology (i.e., calculators, or more commonly these days, computing devices, such as tablets or

full-blown desktop computers). The upshot is that the current goals of education are much less demanding than they once were.[1,2]

Like many cultural debates, there is a tendency in discussions of this sort to exaggerate the differences. Although children today have access to technology that wasn't available to their grandparents, and are often encouraged to make use of this technology, this doesn't meant that they aren't also expected to be able to solve arithmetical problems entirely in their head. (Equally, the presence of technology doesn't entail that children are no longer expected to be able to solve mathematical problems with pen and paper).[3] Nonetheless, there is also certainly some truth in this generational conflict.

A good way of drawing this point out is to note that prior to 1971, when decimalisation was introduced, the UK had quite a complex system of currency.[4] Rather than the simple base 10 structure inherent to decimalised currency, pre-decimalised currency incorporated a myriad of coins which bore (by base 10 lights anyway) quite unusual relationships to one another. There were, for example, 4 farthings in a penny, 2 pennies in a florin, 12 pennies in a shilling, 5 shillings in a crown, 20 shillings in a pound, 1 pound and 1 shilling in a guinea, and so on. Given that all citizens need to be able to use money, particularly in a (pre-1970s) society which lacks the means for electronic transfer of funds, it should come as no surprise that schools in the pre-decimalisation period put a premium on children being able to do complex arithmetical sums entirely in their heads. After all, if one lacked this sort of ability, then one would be severely limited in one's day-to-day activities. It is not feasible to expect someone out shopping to be carrying pen and paper to work out whether they are staying within budget (and note that the first mass-produced pocket calculators were not available in the UK until the early 1970s).

Fast forward to the present day. Decimalisation has made using currency much easier, and this has been further helped by the widespread presence of technology to assist whatever calculations need to be made. Rather than having to trust the shopkeeper's calculations when working out one's bill, one can instead rely on an impartial shop till which works out the total for both parties. Moreover, often the transfer of funds involves very little more than scanning one's credit or debit card into a machine, and hence in such cases one doesn't need to work out which configuration of decimalised coins—let alone pence, shillings, florins, crowns, pounds, guineas (etc.,)—one requires in order to settle one's bill.

The point of the foregoing is that there can be very practical reasons which influence the kinds of core skills that we aim to impart to our children through education. Although I have focussed on a case which is specific to the UK, it ought to be clear that across the word—particularly the developed world, which tends to quickly incorporate new technology into

education—there have been a range of motivations of this general kind which have altered the goals of education. The crux is that given the growth in technology—alongside other practical developments, such as, in this case, the simplification of a country's system of currency—one would expect there to be changes in educational practice which are geared less towards the development of a child's 'on board' cognitive resources (i.e., the child's unaided cognition) and more towards the development of the child's employment of 'off board' cognitive resources, especially technology.

Here is the question: does this shift in educational focus away from developing a child's on-board cognitive resources mean that we are expecting a lot less of our children from an educational point of view than we once did? I will be arguing that while this line of reasoning can look very seductive—indeed, irresistible—it is nonetheless highly dubious. In fact, I will be suggesting that focussing on the real-world cognitive situations that citizens encounter—situations which are these days laden with technology—is entirely the right approach for our educational policies to take. Moreover, rather than this representing a 'dumbing down' of education, this is in fact a demonstration of the flexible nature of education when it is conducted in the right spirit. As we will see, key to my defence of these claims will be a certain conception of virtue epistemology and its role in determining the epistemic goals of education. In particular, we will be encountering the so-called 'extended cognition' research programme in the cognitive sciences, and how this programme dovetails with the particular variety of virtue epistemology that I set out.[5]

2. VIRTUE EPISTEMOLOGY AND THE EPISTEMIC GOALS OF EDUCATION

Although it has its roots in antiquity, virtue epistemology has only relatively recently become a dominant force in epistemology.[6] Virtue epistemologists primarily focus on the *cognitive character* of the subject, as opposed to primarily focussing instead on the epistemic status of the subject's doxastic states. This means focussing on the cognitive traits that make up a subject's cognitive character, such as her cognitive abilities and intellectual virtues.[7]

At a bare minimum, such cognitive traits will be stable and reliable belief-forming process which are suitably integrated with the subject's other cognitive traits.[8] So construed, a cognitive trait is essentially a cognitive skill or ability. But one could build a lot more into the notion of a cognitive trait as it is relevant to epistemology. One could demand that such traits must be acquired in a certain way (through a process of habituation, for example); one could demand that what it takes to integrate a cognitive trait within a subject's cognitive character requires that the

subject undertake a reflective process which epistemically evaluated that trait; one could demand that cognitive traits are accompanied by appropriate motivational states (e.g., a love of the truth); and so on. In so doing one is moving away from the conception of a cognitive trait *qua* skill or ability and towards the idea of a cognitive trait being a kind of intellectual virtue, in the Aristotelian sense.[9]

We do not need to get into this debate here; for our purposes we will understand a cognitive trait (/epistemic virtue—we will use the two notions interchangeably) in the broadest possible way. Those virtue epistemologists of a restrictive bent who solely focus on intellectual virtue will (typically anyway) regard the development of mere cognitive ability as a necessary stage towards the development of what they regard as epistemic virtue proper. And those virtue epistemologists of an inclusive bent who allow mere cognitive abilities to be part of the picture will also (typically, anyway) regard the enhancement of one's cognitive abilities such that they constitute intellectual virtues as nonetheless epistemically desirable. We can thus consider virtue epistemology as concerned with the development of epistemic virtue in the broadest sense without thereby losing too much of the differences between the various kinds of virtue epistemology on offer.

Virtue epistemology, so conceived anyway (i.e., broadly), has a natural application to the epistemology of education. As opposed to a crude conception of the epistemic goals of education which focuses on the child's acquisition of lots of good epistemic outcomes—in particular, lots of facts (i.e., true beliefs)—virtue epistemology instead urges the cultivation of cognitive character, and thus epistemic virtue.[10]

Moreover, virtue epistemologists have an axiological story to tell about the importance of epistemic virtue which is directly applicable to the educational context. According to virtue epistemology epistemic virtue is valuable not merely instrumentally, as a means to certain epistemic goods (such as true belief, which is generally of practical utility), but also non-instrumentally (i.e., finally). In particular, epistemic virtues, as manifestations of cognitive agency, are held to be valuable for their own sake. In addition, epistemic virtues are also held to be, like virtues more generally, constituent parts of a life of flourishing which is valuable for its own sake (this is of course particularly true of the intellectual virtues). Carried over to the educational context, this means that the epistemic and the broadly ethical goals of education start to blur. This is because in promoting the epistemic good in an educational context one is thereby developing the student's epistemic virtue, where this is in turn a route to both instrumentally and finally valuable goods.[11]

3. EPISTEMIC INDIVIDUALISM/ANTI-INDIVIDUALISM

While virtue epistemology has natural application to the epistemology of education, one might think that it also thereby lends itself to a conception of the epistemology of education which is resolutely individualistic. That is, it is natural to think of virtue epistemology as a kind of *epistemic individualism*, whereby a subject's cognitive processes are to be understood as being entirely 'internal' to the subject ('under the skin' of the subject, as we may put it). For virtue epistemologists, after all, epistemic virtue is key, and epistemic virtues are on the face of it 'internal' to the cognitive subject in just this respect. One's epistemic virtues are (at least a key part of) one's 'on board' cognitive resources.[12]

The alternative to *epistemic individualism* is *epistemic anti-individualism*, which argues that a subject's cognitive processes are not entirely 'internal' to the subject in this way. According to epistemic anti-individualism, our cognitive processes can extend beyond our skins and take in environmental factors. We can delineate two main (and potentially overlapping) varieties of such a view: a *social epistemic anti-individualism*, which allows that a subject's cognitive processes may incorporate features of one's social environment (e.g., one's study group), and a *technological epistemic anti-individualism*, which allows that a subject's cognitive processes may incorporate features of one's technological environment.[13] As we might (loosely) put the point, the debate between epistemic individualists and anti-individualists comes down to whether cognition is 'in the head.'[14]

If one construes virtue epistemology along epistemic individualist lines then one is led to a conception of the epistemology of education in which the focus is on the development of the child's on-board cognitive resources, in the sense of her epistemic virtues, individualistically conceived. On this model, while there might be educational merit in making use of technology and other environmental crutches in order to aid educational development, this would merely be a means to the ultimate end of enhancing the subject's on-board cognitive resources—*viz.*, her 'internal' epistemic virtues. Virtue epistemology, when applied to the epistemology of education, thus seems to validate the idea that we should be wary of an over-reliance on technology in education, since the ultimate epistemic goal of education is to enhance the internal, and thus technologically unaided, cognitive traits of the subject.

Note that even on this individualistic way of thinking of the epistemic goals of education, it might still be the case that one ought to generally favour teaching children how to make difficult arithmetical calculations using calculators rather than in their head. For one thing, the cognitive abilities involved in using technology are themselves important on-board cognitive resources, even while they involve the implementation of resources which are outwith the skin of the agent. Moreover, the epistemic goals of education are only part of the entire story of what education is

about. Education is meant to serve practical ends too, and in a society where technological aids of the relevant kind are common, enhancing a subject's arithmetical skills beyond a certain point may be without practical import.

Even so, the point remains that if one combines virtue epistemology with epistemic individualism, then one is led to a conception of the epistemic good of education which treats the development of the subject's on-board cognitive resources as central. Returning to the question about teaching children to do arithmetic in their heads rather than by using other methods (pen and paper, calculators, etc.,), the moral is clear: *ceteris paribus*, and from a purely epistemic point of view at least, one should favour educational methods which develop the 'in the head' process of doing arithmetic over other processes which are technology-assisted.

Is there an alternative way of conceiving of virtue epistemology in this regard? I believe there is. In particular, while virtue epistemologists tend to ally themselves with epistemic individualism, I do not think there is any essential reason why they should. Moreover, I think that their position actually looks rather more attractive when construed along epistemic anti-individualistic lines. Although I think both social and technological forms of epistemic anti-individualism are viable, I will here focus specifically on technological epistemic anti-individualism.

In order to see how virtue epistemology might be allied to epistemic anti-individualism of this type, it will be useful to first reflect on educational practices and work back from there to what a virtue epistemology cast along these lines might look like.

4. SCAFFOLDING IN EDUCATIONAL THEORY

A common metaphor that is used in educational theory is that of 'scaffolding'.[15] The educator is concerned to create the conditions under which the student can learn, where this is the temporary scaffold against which educational goals can be attained. So, for example, a teacher would not teach a student a new language by introducing the student to lots of new and complex vocabulary, but would instead begin with very simple exercises and build up to more difficult material. Along the way, the teacher is facilitating the learning on the part of the student by using their expertise to judge just how much the student can manage on each occasion (i.e., enough to 'push' the student, but not so much as to overwhelm and discourage them).

The scaffolding metaphor is apt, since the whole point of scaffolding is that once it serves its purpose it is taken down and the structure can stand on its own two feet once more. So construed, the metaphor would seem to speak in favour of epistemic individualism. The educator—and, through the educator, technology and other aids—is a kind of epistemic 'crutch'

who enables the student to develop their cognitive abilities. Once this development has achieved its end, however, the crutch is removed and what is left is the educated agent with their more sophisticated cognitive abilities. Crucially, since the crutch has now been removed, the agent's developed cognitive abilities are entirely self-standing—what has been achieved by education is the development of the purely on-board, and thus internal, cognitive processes of the subject.

There is a different way of thinking about the scaffolding metaphor, however, which fits better with epistemic anti-individualism rather than epistemic individualism. For think about how scaffolding is actually employed. Think, for example, of the scaffolding employed in, say, the construction of a bridge over a gorge. Here the scaffolding, while still temporary, enables a structure to be built (which couldn't otherwise be built, or with much more difficulty anyway) which when completed spans from one side of the gorge to another, and thereby forges a permanent connection between two previously unconnected bodies of land.

Following through on the metaphor, we can distinguish between two kinds of scaffolding. The first, which we'll call *non-extended scaffolding*, supports the development of purely 'internal' cognitive processes, such that the scaffolding is indeed nothing more than a temporary epistemic crutch. The second, in contrast, supports 'extended' cognitive processes—let's call this *extended scaffolding*. In terms of the latter, we can envisage educational scaffolding which functions like the scaffolding at work in the building of a bridge over a river gorge, in that it facilitates the creation of cognitive processes which extend beyond the skin of the subject and involve 'external' technology (and possibly other epistemic agents, where the extended cognitive process is of a social variety) Indeed, I think that quite often the use of technology and social factors to facilitate scaffolding in an educational context is of this latter, extended, sort.

Think about the case of arithmetic again. Here is an example of non-extended scaffolding in action. The teacher constructs sums on the whiteboard in an effort to demonstrate to the child in an accessible way how to do basic arithmetic. In time the child develops the ability to do these sums by themselves—such as on a whiteboard or with pen and paper—and ultimately to do the sums in their head. Eventually, the child develops the means to do fairly complex arithmetic in this way. Here the use of technology—in this case the whiteboard, and to a lesser extent pens and paper—is a mere epistemic crutch to aid the student's development of their own on-board cognitive capacities.

Contrast this case with a student who is initially taught to do basic arithmetic in the very same way—so that they have a grip on the nature of arithmetic (i.e., what is involved in adding, subtracting, multiplication, and so forth)—but who is subsequently encouraged to use, as the calculations become complex, a computing device (i.e., a calculator, tablet etc.,). Moreover,

imagine that the reason they are being taught in this way is that such computing devices are entirely common features of their cognitive environment, such that they can reasonably rely on their presence in normal cognitive conditions. (This is pretty much the situation in the developed world today as most people have ready access to this level of computing—e.g., on their mobile phones, which most people carry around with them).

In both cases the scaffolding leads to the development of the student's on-board cognitive capacities—*viz.*, their ability to undertake basic arithmetic. But whereas the first form of scaffolding is ultimately designed only to develop the student's on-board cognitive capacities, the latter form of scaffolding takes a different direction entirely. In particular, while the technology employed in the first case is merely a means to an end, and so becomes over time incidental to the cognitive process at issue, the technology employed in the second case remains a key part of the resultant cognitive process. Moreover, notice that this is by design and reflects the nature of the cognitive environment which the subject inhabits.

The first form of scaffolding is thus of the non-extended variety, while the second is a form of extended scaffolding. In both cases, there is a sense in which the scaffolding is temporary. In the first case, this is straightforward, in that the technology introduced by the educator goes from being an essential part of the cognitive process to being an inessential part. The second case is very different, in that the technology remains a central part of the cognitive process. But this is because in the second case the technology is a core part of the extended cognitive process that is being facilitated by the scaffolding. The technology itself is thus not part of the scaffolding in this case. Instead, it is rather the specific way in which the technology is introduced by the educator which is the scaffolding.[16]

5. EXTENDED COGNITION AND THE EPISTEMOLOGY OF EDUCATION

We can thus distinguish between extended and non-extended cognitive processes, where the use of extended scaffolding in an educational context is specifically designed to enhance cognitive processes of the former type. It is an interesting question what, exactly, marks the difference between an extended and a non-extended cognitive process. When is a subject's use of an instrument just that, and when does the instrument instead become a proper part of the cognitive process? But we can set such demarcation issues to one side for our purposes. The point is that there are cognitive processes which are quite naturally construed as being extended in this way, and that in concert with this we can also envisage a particular kind of educational process which

would be devoted to creating such an extended cognitive process.

Of course, any virtue epistemologist who explicitly endorses epistemic individualism is thereby committed to rejecting extended cognitive processes, and hence they are also obliged to dispute the idea that there could be such a thing as extended scaffolding in educational practice. Presumably, the way they would approach any putative case offered of extended scaffolding would be to insist that what really counts is the development of the subject's on-board cognitive processes, and in this way re-characterise such a case as being instead a variety of non-extended scaffolding. So, for instance, in the example of extended (on my view) scaffolding just given they could argue that what is in fact being developed here is just the subject's on-board cognitive capacity for using technology in a certain way.

But while the combination of virtue epistemology and epistemic individualism is undoubtedly in principle at least a live theoretical option, there are also various difficulties with this approach. In particular, there are difficulties with this approach that don't afflict the combination of virtue epistemology and epistemic anti-individualism. Thus, given that the alliance between virtue epistemology and epistemic individualism is largely a tacit one—in that it is not argued for, but merely presupposed—one might well wonder why virtue epistemologists should be so keen to retain this commitment once it is made explicit.

One problem which faces the combination of virtue epistemology and epistemic individualism concerns the variety of virtue epistemology in play. For as I have argued at length elsewhere, while virtue epistemology in general might be in principle compatible with epistemic individualism, a particular popular version of virtue epistemology—what I refer to as *robust virtue epistemology*, which is defended in one form or another by Ernest Sosa (1988; 1991; 2007; 2009), Linda Zagzebski (1996; 1999), and John Greco (2003; 2007; 2009), amongst others—is almost certainly untenable if allied to epistemic individualism.[17] At best, then, it is only a particular kind of virtue epistemology—one that hasn't been as influential in the recent literature as robust virtue epistemology—which is compatible with epistemic individualism.[18]

Even setting these concerns to one side, a further difficulty remains for this individualistic way of conceiving of virtue epistemology, which is that it pits virtue epistemology against a popular trend of contemporary cognitive science. In particular, it is increasingly common in the cognitive sciences to view cognitive processes as extended in various ways, such that we should conceive of factors beyond the skin of the agent—in particular, technology, at least where the technology is widely available to the subject and easily accessible—as constitutive parts of the subject's cognitive processes. To take one of many examples from the literature, the way one's memory functions is very different if one has ready access to environmental factors (such as

technology, or other informants) which makes information that one would otherwise need to recall easily accessible. In such a case, the subject in effect 'off-loads' part of their cognitive process onto the technology, and in so doing is able to 'remember' a far greater body of information than before (i.e., when they relied only on their on-board cognition).[19]

There is plenty of empirical evidence that it is in the nature of the development of human cognition (and perhaps not only human cognition) that it involves the 'off-loading' of cognitive resources onto factors in one's environment in this way. Indeed, one can view the development of something so basic to our cognition as language as being driven by the need for such cognitive off-loading.[20] If virtue epistemology wishes to deny extended cognition then it puts itself at odds with a vibrant and progressive research programme in the cognitive sciences, and this is not a comfortable place for an epistemology of our cognitive processes to be.

But the most telling count against individualistic virtue epistemology on this score is not the fact that it is tension with a leading movement in contemporary cognitive science, but rather that there is no principled reason for virtue epistemology to *not* be cast along extended cognition lines. The core idea of virtue epistemology, recall, is that we should focus on the cognitive character, and thus the epistemic virtues, of the subject. This core idea entails, for example, that when a subject attains a cognitive good, such as knowledge, then her cognitive success ought to be significantly creditable to her cognitive agency. But that there is nothing in this story which precludes the idea that cognitive processes, and thus the cognitive subject, extends beyond the skin of the agent.

In order to see this, consider again the student in our example of extended scaffolding above. Once the student has mastered the use of the technology in question, we are to think of the cognitive processes in play as genuinely extended, such that they include the technology employed. But it does not follow from this fact that the subject's cognitive successes in this regard are no longer significantly attributable to the exercise of her cognitive agency. In particular, what we need to remember is that the successes produced by the extended cognitive processes are no less attributable to the subject's cognitive agency than the successes produced by her non-extended cognitive processes. It follows that that virtue epistemologists can consistently endorse extended cognition while nonetheless retaining their core commitment to the idea that a subject's acquisition of a cognitive good involves cognitive successes which are significantly attributable to her cognitive agency.

6. CONCLUDING REMARKS

We have thus argued that virtue epistemology is entirely compatible with an extended conception

of cognitive processes, and that there are a number of benefits of construing virtue epistemology this way, not least that it conforms with a dominant trend in contemporary cognitive science. Where does this leave us with the question on which we began—*viz.*, whether the use of technology in education by its nature constitutes a 'dumbing down' of educational goals?

I think it ought to be clear that this debate as it is usually understood effectively presupposes a conception of cognitive processes which is essentially individualistic. On this way of thinking about cognitive processes, it is inevitable that educational practices which involve a dependency on the part of the student on technology can lead to a lessening of the student's cognitive powers, since on this view those powers are understood exclusively in terms of the on-board internal cognitive resources of the agent. On an extended view of cognitive processes, in contrast, the matter is much more complex. For on this proposal, one can, in the right circumstances at least, think of a subject's cognitive processes as being *enhanced* by technology.[21]

This way of conceiving of education has other important implications, and I want to close by flagging one of them. For notice that the debate between an extended *versus* a non-extended conception of the epistemic goals of education has an important bearing not only on the way in which we should teach students new skills and knowledge, but also on the way in which we should assess their educational performance. On a non-extended view of the epistemology of education, given that one ultimately aims to enhance the internal cognitive processes of the subject, educational assessments should ideally be done 'solo'—i.e., such that the student does not have access to technology. In contrast, where the educational goal is explicitly to enhance a student's extended cognition, then an educational assessment which involves technology could be an optimal way of evaluating educational process.[22,23]

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NOTES

[1] Note that where I talk without qualification about 'education' I will have in mind the education of children specifically (and not, for example, the kind of 'higher' education which takes placed in the University system).

[2] This debate about educational goals is mirrored in a more general public debate about whether technology, and the internet in particular, is making us dumber. See, for example, Carr (2010), which was an international bestseller. I comment on this more general public debate below—see endnote 21.

[3] Indeed, it is worth remembering that, strictly speaking, pen and paper is itself a form of technology in the broad sense of that term (i.e., tools designed and created to solve a particular kind of practical problem). So construed, our current reliance on technology in education differs in degree rather than kind from the level of technological reliance on display in previous generations.

[4] The UK still for the most part employs an imperial system of weights and measures, alongside a much simpler metric system (of a kind employed in continental Europe).

[5] Note that although we are focusing on the increasing use of technology in education, similar points apply to an increasing dependence in education on the student's *social* environment (e.g., group work), including their *social-cum-technological* environment (e.g., the use of technology like Google which effectively increases the range of available informants). Much of what I will be arguing about the employment of technology in education will apply, *mutatis mutandis*, to an educational reliance on a student's social environment, though for reasons of space I will not be drawing out these implications in this piece.

[6] Thanks largely to the seminal work of Sosa (e.g., 1988; 1991; 2007; 2009).

[7] Henceforth, when I talk of 'cognitive traits' I will specifically have in mind those cognitive traits which can form part of a subject's cognitive character (as opposed to a broader conception of a cognitive trait, typically operative in the cognitive sciences, on which *any* cognitive process by which the subject gains a purchase on reality, whatever its epistemic pedigree, constitutes a cognitive trait).

[8] Actually, cognitive traits needn't have outputs which are beliefs, specifically. One could, for example, conceive of cognitive traits which reliably generate other propositional attitudes, such as acceptance. I take it, however, that the fundamental role of cognitive traits is to generate beliefs. So, for example, a scientist working in a highly theoretical domain where the results of scientific investigation are particularly provisional might well properly accept a claim that it wouldn't be appropriate for them to believe. But the scientist's judgements about what to accept will be nonetheless importantly responsive to her beliefs; indeed, it is presumably because of her accurate beliefs about the nature of the domain—formed via her reliable cognitive traits—that she will opt to merely accept the scientific claim in question as opposed to believing it.

[9] For an example of a very minimal virtue epistemology which is cast along broadly reliabilist lines, see the agent reliabilist position defended in early work by Greco (1999; 2000). For a very different neo-Aristotelian virtue-theoretic proposal which incorporates responsibilist elements, see Zagzebski (1996). For an excellent overview of contemporary virtue epistemology, see Axtell (1997).

[10] That education should be focused on the development of what we are here calling epistemic virtues rather than the mere transmission of good epistemic outputs (like facts) is a familiar point in the philosophy of education. In a recent survey piece on the epistemic ends of education, for example, Robertson (2009, §1) writes, citing Siegel (1988) and Elgin (1996; cf. Elgin 1999*a*; 1999*b*), that "the goal [*of education*] is not information *per se*, but, rather, knowledge that is significant and organized in patterns that contribute to perspective and understanding in orienting thought and action." I offer my own virtue-theoretic take on the epistemology of education in Pritchard (2013). See also MacAllister (2012).

[11] For a recent survey on the contemporary debate about epistemic value, which deals extensively with the contributions to that debate from virtue epistemology, see Pritchard & Turri (2011). See also Pritchard (2007; 2009*a*; 2009*b*) and Pritchard, Millar & Haddock (2010, chs. 1-4).

[12] Here, for example, is Goldman, in a seminal work in epistemology:

> "Clearly, the causal ancestry of beliefs often includes events *outside the organism*. Are such events to be included among the "inputs" of belief-forming processes? Or should we restrict the extent of belief-forming processes to "cognitive" events, i.e., events within the organism's nervous system?" (Goldman 1979, §2; *italics in original*)

After choosing the second option, Goldman explains that epistemic standings like knowledge result from cognitive operations and that ""*cognitive*" operations are most plausibly construed as operations of the cognitive faculties, i.e., "information-processing" equipment internal to the organism." (Goldman 1979, §2; *italics in original*) In later work Goldman reiterates his endorsement of epistemic individualism:

> "One thing we do not want to do is invoke factors external to the cognizer's psychology. The sorts of processes we're discussing are purely internal processes." (Goldman 1986, 51)

Goldman is far from being alone in taking epistemic individualism as given in his understanding of cognitive processes. Sosa, for example, understands cognitive abilities in terms of what he calls 'competences', which he characterizes, in line with epistemic individualism, as follows: