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INTELLECTUAL VIRTUE, EXTENDED COGNITION, AND THE EPISTEMOLOGY OF EDUCATION

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ABSTRACT. According to virtue-theoretic proposals in the epistemology of education, a core epistemic end of education consists in the enhancement of the subject's cognitive abilities and intellectual virtues, where this epistemic end is contrasted with that of simply encouraging students to passively acquire information But how is this proposal to be squared with the widespread contemporary reliance on technology in education, such that rather than developing a subject's cognitive abilities one instead allows the subject to 'outsource' a range of cognitive tasks to technology? It is argued that the way to resolve this tension is to recognise two points. The first is the role that *intellectual virtue* plays in the virtue-theoretic account, and the manner in which intellectual virtue is required for the acquisition of understanding, specifically. The second point concerns the relevance of *extended cognition* to the epistemology of education, which is the view that a subject's cognitive processes are not confined to the natural cognitive processes that take place within her skin and skull. According to an *extended epistemology*, a subject can be cognitively augmented in such a way that her use of technology is cognitively integrated into her cognitive character to such an extent that it counts as just as much the manifestation of her cognitive agency as when she employs her innate on-board cognitive abilities. What effects such cognitive integration is, however, intellectual virtue, and thus this second point dovetails with the first.

0. INTRODUCTION

According to a popular, virtue-theoretic view about the epistemology of education, a core epistemic end of education consists in the enhancement of the subject's cognitive abilities and intellectual virtues, where this epistemic end is contrasted with that of, for example, simply encouraging students to passively acquire information.[1] There is, however, a *prima facie* tension between this

proposal and our widespread contemporary usage of technology in education (e.g., the use of internet resources when researching an essay, the use of sophisticated software in laying out a design, and so on). For doesn't this promote a *reliance* on technology at the expense of the development of the student's own cognitive abilities and intellectual virtues (such as the intellectual virtue of intellectual autonomy)? Indeed, it seems that as each year goes by, our dependence on technology in education grows, and thereby the need to develop a student's innate cognitive abilities subsides accordingly. Does it follow that according to the virtue-theoretic view of the epistemology of education, educators should eschew such a reliance on technology, and thereby attempt to mitigate the influence of the modern world on educational practices? Alternatively, if virtue epistemologists do not disdain the widespread use of technology in education, then what is their principled basis for this?

This putative tension between the educational development of cognitive character and the use of technology relates to a more general concern which has recently been expressed in best-selling popular science books by the likes of Nicholas Carr (2010) and Susan Greenfield (2013). These authors emphasise the extent to which technology (and in particular the internet) is—to put the point in the sloganizing form in which it is usually expressed in the media—'making us dumber' in virtue of how it leads us to neglect the development of our innate cognitive resources. Their concern is not restricted to educational practices specifically, but insofar as one grants this general point then it is but a small step from there to the just noted tension in the epistemology of education. If education is about enhancing the subject's cognitive traits, but technology diminishes the development of a subject's cognitive traits as Carr and Greenfield suggest, then clearly the role of technology in education is at best moot.

I will be arguing that this tension is illusory, in that there is no essential reason why a virtue-theoretic account of the epistemology of education can't embrace technology. In order to see why this is the case, however, we need to take on board two points. The first concerns how we understand the virtue epistemology that lies behind the virtue-theoretic account of the epistemic goals of education. In particular, I will be suggesting that properly understood this view affords a privileged role to the subject's intellectual virtues (as opposed to her cognitive abilities and faculties) and, relatedly, to the subject's acquisition of understanding (as opposed to her acquisition of mere knowledge that falls short of understanding). This imposes an important limitation on the way in which technology can figure in the educational development of a subject's cognitive character.

The second point concerns the extent to which we conceive of cognitive processes along

epistemically individualistic or anti-individualistic lines. Drawing on the *extended cognition* research programme in the cognitive sciences, I will be arguing for a kind of technological epistemic anti-individualism which allows for the possibility that technology can become integrated within an agent's cognitive practices to an extent that it becomes a genuine part of the subject's cognitive agency, and not a mere external addition to this agency. Crucially, however, I will also be stressing the importance of the intellectual virtues in the process of cognitive integration which enables technology to form part of a subject's cognitive agency.

Putting these two points together, we are left with an *extended virtue epistemology* that has the intellectual virtues at its heart, and which is aimed at attaining understanding. This conception of the virtue-theoretic account of the epistemology of education is compatible with our widespread contemporary educational reliance on technology to the extent that educational practices: (i) are geared towards the development of intellectual virtue (for which there is no technological substitute), and (ii) enable students to employ their intellectual virtue in such a way as to take cognitive ownership of the technology that they utilise.

1. INTELLECTUAL VIRTUE, UNDERSTANDING, AND THE VIRTUE-THEORETIC ACCOUNT OF THE EPISTEMOLOGY OF EDUCATION

Virtue epistemology puts the cognitive character of the subject centre-stage, where this means the inter-connected web of the subject's integrated cognitive faculties, cognitive abilities and intellectual virtues.[2] A virtue-theoretic account of the epistemic goal of education thus treats the development of the student's cognitive character as central to the educational enterprise. In particular, such an account privileges the development of cognitive character over the mere passive reception of information. So, for example, developing a child's critical reasoning skills so that they can solve problems for themselves is to be preferred, *ceteris paribus*, to simply telling them what the solutions to the problems are so that they learn them by rote.

A key point to recognise when expounding a virtue epistemology, however, is that not all of a subject's cognitive traits are on an epistemic par, and hence that the virtue-theoretic thesis in the epistemology of education regarding the development of a subject's cognitive character does not mean that one should be equally concerned to develop all of the cognitive traits that make up a subject's cognitive character. I noted a moment ago that the subject's cognitive character comprises

of an integrated web of cognitive faculties, cognitive abilities, and intellectual virtues. In order to explain the point that I have in mind, we will need to say a bit more about how these three types of cognitive trait relate to each other.

Cognitive faculties are the innate cognitive traits that subjects possess, such as those involved in perception or memory. While innate, the performance of one's cognitive faculties can nonetheless be improved with training, although this often involves the way in which the subject integrates the cognitive faculty with her other cognitive traits, rather than involving an increase in the reliability of the cognitive faculty in isolation. Cognitive abilities, in contrast, are acquired rather than innate. One might train oneself to be able to solve complex arithmetical tasks, for example, even though one has no innate ability with arithmetical problems. Of course, the cognitive abilities that one acquires will draw upon one's existing cognitive faculties. For example, ordinarily at least, it is only in virtue of having an innate rational faculty that one is in a position to develop arithmetical skills in the first place.

Intellectual virtues are very different from cognitive faculties and abilities, and this is an important point to appreciate. Although intellectual virtues are akin to cognitive abilities in being acquired cognitive traits—albeit acquired in ways which, just like cognitive abilities, draw upon one's innate cognitive faculties—they also differ from them in significant ways.[3] For example, the exercise of an intellectual virtue manifests a subject's motivation to acquire the truth; her *love* of the truth, if you will. This is in contrast to cognitive abilities, which may not be accompanied by such a motivational component, but may rather manifest merely a desire to be better at a certain task than a competitor.

A further distinction to be drawn between cognitive abilities/faculties and intellectual virtues concerns the special axiological status of the latter, particularly in comparison to the former. The intellectual virtues are held to be traits that form part of a good life of human flourishing, and as such ought to be valued for their own sake, and not merely valued instrumentally in terms of their practical use (though they do tend to be practically useful). Cognitive abilities, in contrast, are typically quite rightly evaluated specifically in terms of their practical utility. We can put this point by noting that while the wise person would not willingly give up an intellectual virtue, she might well opt to give up a cognitive ability if it ceased to be practically useful.[4]

A further, though related, axis along which we can differentiate at least cognitive abilities from intellectual virtues is in terms of their specificity. Cognitive abilities tend to be narrowly understood, in that they are often abilities to reliably perform specific cognitive tasks (e.g., as regards simple

arithmetic, as in the example above). Intellectual virtues, in contrast, are very broad cognitive traits of the agent, such as conscientiousness, open-mindedness, and so on. This reflects the general regulative function that intellectual virtues tend to perform within a subject's cognitive economy, in that they guide one's employment of one's cognitive abilities and faculties, rather than *vice versa*. So, for example, a conscientious scientist, recognising the need to double-check her data (because of her concern for the truth), will marshal her cognitive faculties and abilities in the service of this aim.[5]

Once we recognise this distinction between cognitive abilities and faculties, on the one hand, and intellectual virtues, on the other, then we are in a position to appreciate a crucial ambiguity in the virtue-theoretic conception of the epistemic goal of education. On one reading, this conception demands merely that there should be an emphasis in education on developing the cognitive traits of the subject, with no special emphasis placed on the particular kind of cognitive traits to be developed, whether they be cognitive abilities, cognitive faculties, or intellectual virtues. But there is also a more demanding reading, on which the emphasis should be geared towards the development of the intellectual virtues in particular, on account of the special status that they hold within an agent's cognitive economy. It is the stronger reading that I think we should be opting for.

Notice that this is a distinction which has important practical implications. We can bring this point out by noting that the latter, more demanding, virtue-theoretic conception of the epistemic goals of education would gear the subject towards gaining understanding as opposed to merely knowledge that falls short of understanding. That is, where education is focussed on the epistemic goal of promoting the intellectual virtues, then it is thereby geared towards the promotion of understanding.

It is quite common in contemporary epistemology to differentiate between knowledge and understanding, at least to the extent that one can possess the former while lacking corresponding instances of the latter.[6] For example, I could know that a certain arithmetical sum is correct simply because I have been told this by someone authoritative, but such testimonial knowledge could co-exist with a failure to understand why this sum is correct. Indeed, one could learn how to complete arithmetical tasks—and thus be able to know the answers to arithmetical questions all by oneself (i.e., without recourse to someone's testimony)—even while lacking any understanding of arithmetic, as when one learns these answers purely by rote.

As the foregoing examples illustrate, where knowledge falls short of the corresponding understanding, it is clearly lacking in important epistemic respects. While it is clearly generally preferable to know arithmetical truths rather than not know them, it is much, much better that this

knowledge is accompanied via an understanding of what it is that one knows. There are various reasons for this, but one explanation is that understanding is *ampliative* in a way that merely knowing is not. When one understands arithmetic, then one can use that understanding as a basis from which to gain further knowledge and understanding, as when one uses it as a foundation to master algebra or other areas of mathematics. In contrast, mere knowing is often an epistemic dead-end in this regard.[7]

This distinction between knowledge and understanding is important for our purposes since it reminds us that when we say that we want education to promote the cognitive character of the subject what we have in mind is specifically an improvement of cognitive character which is weighted towards the intellectual virtues. The cognitive ability to answer arithmetical questions is obviously useful, but what we really want to achieve is that the student has the desire to understand why these answers are correct, a desire for the kind of interconnected set of truths which is relevant to understanding that only comes with the intellectual virtues. Indeed, what we want as educators to achieve is that the student would be dissatisfied with mere knowledge of the answer to the questions in hand, such that—*ceteris paribus* anyway—only understanding will satisfy her intellectual curiosity.[8]

What is crucial for our purposes is that a version of the virtue-theoretic account of the epistemic ends of education that didn't privilege the intellectual virtues would be compatible with educational strategies which promoted the acquisition of knowledge at the expense of understanding. For example, it would be compatible with educational practices which focussed on ensuring that students can solve arithmetical puzzles by rote, without acquiring any understanding of why the solutions are true. After all, the acquisition of such cognitive skills would constitute a development of the subject's cognitive character, and thus her epistemic virtues, broadly conceived. But while there might well be a proper place for such rote learning, what we ultimately aspire to promote in students is understanding rather than mere knowledge. And that requires the development not just of the student's cognitive faculties and abilities, but also more specifically of her intellectual virtues.

In the arithmetical case, for example, what this means in practice is educational strategies which go well beyond rote learning by encouraging students to work out new solutions by themselves, to be able to explain to someone else how they reached the solution, to demonstrate that they have understood what they have learnt by being able to put these skills into use with regard to novel arithmetical problems, and so on. Such strategies are focussed on developing the student's understanding, and they work by developing her intellectual virtues: her intellectual autonomy, her

critical reflection, her intellectual conscientiousness, and so on. The development of understanding and the development of intellectual virtue go hand-in-hand, and is mutually reinforcing: enhancing the intellectual virtues better positions one to gain understanding (to ask the right questions, to seek out the answers, and so on), and in gaining understanding one will thereby be pursuing strategies which will likely enhance one's intellectual virtues.

How does recognising the primacy of the intellectual virtues in a virtue-theoretic account of the epistemic ends of education help us to resolve the tension between such an account of the epistemology of education and our widespread reliance on technology? The key point is that what counts is the way in which we are relying on technology. If one thought that the acquisition of knowledge is all that really matters, then if that knowledge is more easily available via technological means than by using one's own on-board cognitive resources—if it's easier to solve arithmetical puzzles with a calculator, rather than working them out oneself, for example—then one should simply switch from developing the on-board cognitive resources to equipping students with the know-how to employ technology. This would indeed be a conception of our reliance on technology which is in *prima facie* tension with the virtue-theoretic account of the epistemic goal of education, in that the growth in the use of technology would run counter to the development of the subject's cognitive character.

As we have seen, however, a virtue-theoretic account of the epistemology of education will place particular emphasis on the development of the intellectual virtues and, relatedly, on the epistemic good of understanding. Merely off-loading one's cognition onto technology would not develop one's intellectual virtues, and indeed would be anathema to the intellectually virtuous. It wouldn't tend to lead to understanding either, but only knowledge which falls short of understanding, as when one trusts the word of an expert without understanding why what the expert says is true.

But consider now what the use of technology looks like when the intellectual virtues, and thus understanding, are given due prominence. It's not enough for the student to simply know how to, for example, consult Wikipedia on a topic and thereby find an answer to a question. Instead the educator will want to see how the student critically reflects on this topic, how she integrates this information into the wider body of knowledge that she has acquired, how she brings this new knowledge to bear on related topics, and so on. This reflects the fact that the educator wants to see the student developing her intellectual virtues, and in the process gaining understanding and demonstrating that understanding in action (as opposed to merely knowing the answer to a specific

question).

Another way to put this point is that while a reliance on technology can make the development of some of our cognitive abilities and faculties redundant—perhaps there will be no point in the future in learning how to make certain kinds of calculation if the technology is always on hand to do the work for us, for example—there is simply no technological substitute for intellectual virtue. This means that a virtue-theoretic account of the epistemic goal of education which has intellectual virtue at its heart will ultimately treat technology as a mere handmaiden to cognitive development.

Once we understand virtue epistemology correctly, then, we do not need to choose between the development of the subject's cognitive character and making widespread use of technology in educational contexts. So long as this technology is at the service of the development of intellectual virtue and the subject's acquisition of understanding, then this is entirely compatible with the goals of a virtue-theoretic epistemology of education.

2. VIRTUE EPISTEMOLOGY AND EPISTEMIC INDIVIDUALISM/ANTI-INDIVIDUALISM

Although I think that getting clear about the right way to understand the virtue-theoretic account of the epistemic goals of education helps us to remove much of the *prima facie* conflict between this proposal and our reliance on technology, I don't think that it deals with the problem entirely, in that there is weaker version of this tension lying in the wings. In order to see why we first need to consider the epistemic individualism/anti-individualism distinction.

Virtue epistemology, and indeed epistemology more generally, tends to be wedded to *epistemic individualism*, whereby a subject's cognitive processes are to be understood as being entirely 'internal' to the subject—i.e., the natural processes which take place in the brain (and possibly also the central nervous system) of the subject ('under the skin' of the subject, as we may put it).[9] For virtue epistemologists, after all, epistemic virtue is key, and epistemic virtues—i.e., the subject's cognitive faculties, cognitive abilities, and intellectual 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.[10]

Although epistemic individualism is widely, if tacitly, endorsed in epistemology, it runs counter to an influential movement in the cognitive sciences—*extended cognition*, as it is known—which emphasises the way in which cognitive processes can extend beyond the skin and skull of the subject to take in features of the subject's environment. Applied to epistemology, extended cognition would amount to a form of *epistemic anti-individualism*, whereby a subject's cognitive processes are not entirely 'internal' to the subject. We can delineate two main (and potentially overlapping) varieties of such a view. The first is a *social epistemic anti-individualism*, which allows that a subject's cognitive processes may incorporate features of her social environment (e.g., her study group). The second—which will be our focus in this paper—is a *technological epistemic anti-individualism*, which allows that a subject's cognitive processes may incorporate features of her technological environment.[11] As we might (loosely) put the point, the debate between epistemic individualists and anti-individualists comes down to whether cognition is exclusively something that takes place 'in the head.'[12]

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, 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. Thus, even granting the point made in §1 regarding the proper role of intellectual virtues in a virtue epistemology, and the limitations that this imposes on the extent to which the educational development of the subject's cognitive character could be replaced by technology, there is still a sense in which a widespread reliance on technology could be in conflict with virtue epistemology. For if virtue epistemology is cast along epistemic individualist lines, then the educational development of a subject's on-board unaided cognitive traits should take precedence over the use of technology, particularly where the use of technology might diminish the development of those cognitive traits. So given that our reliance on technology almost certainly leads to a diminished development of our on-board cognitive abilities, we are back to a version of our original tension between a virtue-theoretic account of the epistemic goal of education and our widespread contemporary reliance on technology.

I think that the key to resolving this further tension is to realise that virtue epistemology is

naturally allied to epistemic anti-individualism. Indeed, as we will see, a virtue epistemology which has the intellectual virtues at its heart need have nothing to fear from being wedded to this position. In the next section I describe what such an *extended virtue epistemology*, as I call the view in question, looks like, and explain the central role that the intellectual virtues play in such position.

3. EXTENDED VIRTUE EPISTEMOLOGY

Even proponents of epistemic anti-individualism—i.e., an 'extended' epistemology—would agree that sometimes an agent's use of an instrument is just that, in that it doesn't constitute an extended cognitive process. So what marks the difference between extended and unextended cognitive processes? The issue is whether the instrument is integrated within the subject's cognitive practices to the extent that it is functionally on a par with the subject's on-board cognitive processes. That is, proponents of extended epistemology endorse a kind of *epistemic parity principle*, such that any process that is functionally on a par with a natural cognitive process that takes place within the skin and skull of the subject—such that our only basis for *not* regarding it as a cognitive process would be that it is taking place outside of the subject's skin and skull—should be treated as a *bona fide* cognitive process.[13]

In order to see this point in practice, consider the contrast between remembering phone numbers by using one's biological memory, and 'remembering' phone numbers by looking them up on one's phone. It used to be the case that one would routinely learn by heart a whole raft of phone numbers, but given that one has ready access to a mobile phone, there is now no need to do this. Does the phone thereby constitute part of one's extended cognitive processes, according to epistemic anti-individualism? That depends. The crux is whether the information in the phone is functionally on a par with the information stored in one's biological memory. Is the former as readily accessible as the latter? (Does one always have the phone with one, is it always working and reliable, and so on?). It also matters to what extent the subject has been trained to rely on the phone, through repeated and successful usage which reinforces trust in this device, such that the information is taken at face-value in just the way that one's normally functioning memory is taken at face-value. Relatedly, it is important that throughout this process of cognitive integration the agent has been diligent in her epistemic use of this device—for example, that she was alert to the

possibility of error, and would have spotted error if it were apparent. If these conditions are met, then I would suggest that in keeping with the epistemic parity principle we should regard the subject's use of the phone in accessing the phone numbers as part of an extended cognitive process. In contrast, if these conditions are not met, then this is merely the normal cognitive use of an instrument in a way that both epistemic individualists and anti-individualists would agree upon.[14]

A crucial point to notice about cognitive integration is the role that the intellectual virtues play in this process. I noted above that it is critical to the process of cognitive integration that the subject displays due diligence in making epistemic use of the device, and this will involve the manifestation of intellectual virtues like conscientiousness. This manifestation of intellectual virtue is not incidental to cognitive integration, but rather a key element, in that without it we would lose a grip on the idea that the subject has actively integrated this device into her cognitive practices. This point should remind us of our discussion of intellectual virtues earlier, and in particular the idea that when virtue epistemology is properly understood they play an overarching role in one's cognitive economy.

At this juncture, a few points of clarification are required in order to forestall some possible sources of confusion. First, it is important to emphasise that the manifestation of intellectual virtue need not require any specific process of reflection (though of course it may involve this). The point is that we should be wary about over-intellectualising the intellectual virtues, and thereby making their manifestation involve an unduly high level of intellectual sophistication. Indeed, I would suggest that unnecessarily reflecting on one's epistemic position is a sign of intellectual vice rather than virtue. A related point is that one can manifest intellectual virtue without actually doing very much. That is, a subject can manifest intellectual virtue by certain counterfactuals being true of her, such as that she would have spotted counterevidence were it to have been present. Given that there is in fact no counterevidence present, there may be nothing that the agent does specifically to exclude it (other than being appropriately observant in the usual kind of way, etc.,).

Second, notice that we are here talking about a specific kind of cognitive integration which involves incorporating an instrument into one's cognitive practices. Thus the conditions we are laying down for this kind of cognitive integration may not cross over to other cases. Earlier we drew a distinction between a technological and a social version of epistemic anti-individualism, and our focus thereafter has been on the former. What is required for cognitive integration in the latter case is thus a further question (though there are likely to be commonalities with cognitive integration as it applies to both kinds of epistemic anti-individualism). There's also the tricky question that's posed by the possibility of cognitive augmentation involving instruments which occurs from birth, or at

least from a very early pre-reflective stage in a child's development. As I've argued elsewhere, it is plausible that the conditions on cognitive integration might be significantly weaker in such cases.[15]

A final point of clarification is that we should keep the claim that cognitive processes can be extended apart from the much stronger thesis—also associated with extended cognition—that mental states can themselves be extended. Some have suggested that in cases of extended cognition of the general type as that just described the subject's memorial beliefs are 'stored' within the external device, such that the subject's mind is in a sense extended too.[16] This is not the claim that I am defending here, but rather the weaker claim about the extension of cognitive processes. This thesis is entirely compatible with conventional views about the nature of the mind.

With an anti-individualist conception of virtue epistemology in play, one that retains the central role of the intellectual virtues, consider now the putative tension between virtue-theoretic accounts of the epistemic goal of education and our reliance on technology. We saw that one aspect of this tension is removed by recognising the central role that the intellectual virtues play in a virtue epistemology, in that while there might be adequate technological substitutes for certain cognitive abilities, there is no technological substitute for the development of intellectual virtue, and hence that will remain a core part of educational practices on this view no matter what technological advances come our way.

But we also saw that there is a second aspect of this tension, which concerns how a reliance on technology appears to invite us to continually off-load more and more of our on-board cognitive abilities onto external devices, and thereby undermine the development of the cognitive character of the subject as a whole. How is that to be squared with the virtue-theoretic account of the epistemic goals of education?

We have seen that in order for this concern to get a grip on the virtue-theoretic account, then it is crucial that this view is cast along epistemic individualistic lines. For it is only then that the widespread reliance on technology amounts to a diminution of one's cognitive character as a whole. In contrast, I have been arguing that virtue epistemology is best understood as cast along anti-individualistic lines, such that it can, in particular, embrace technological epistemic anti-individualism. So construed, however, our reliance on technology has the potential to incorporate this technology into our cognitive character, such that the use of technology does not diminish the cognitive development of the subject but rather enhances it. The subject's cognitive capacities are not limited to the natural cognitive processes that take place under her skin and skull, but also includes the technology that has been appropriately cognitive integrated into her cognitive practices.

As we also saw, the intellectual virtues are again central to this point, in that the very process of cognitive integration requires the manifestation of intellectual virtue. The development of a child's intellectual virtues thus remains a core epistemic goal of education on this view, whatever technological innovations come our way.[17]

Whether this line of argument fully resolves the putative tension in play depends on how extensive cases of extended cognition are. Thus far, I have been primarily arguing for the *possibility* of an extended virtue epistemology, and claiming that when cognitive processes are extended the development of the subject's use of technology can nonetheless constitute an enhancement of her cognitive character. But that line of argument is compatible with the idea that cognitive extension is rare, such that most of the uses of technology in education are of a non-extended variety. If that were true, then this point about extended virtue epistemology would not gain us much purchase on the problem in hand.

Nonetheless, I think that there is reason to think that a virtue-theoretic approach to the epistemology of education, one that embraced epistemic anti-individualism and which had the intellectual virtues at the centre, would lead to educational practices which encouraged the employment of technology in an extended rather than merely non-extended sense. Think, in practical terms, about how an educational strategy that had the intellectual virtues at its heart would approach the use of technology. Would the educator, informed by this theoretical perspective, be happy with a student's passive use of technology as a mere aid to learning? Wouldn't she instead want the student to be utilising her intellectual virtues in her employment of technology, such that she takes cognitive ownership of the means by which she is acquiring information from this technological source?

The crux of the matter is that when educational practices guided by virtue-theoretic views that have the intellectual virtues at their heart play out they lead to a very particular use of technology in education, one that promotes an engagement with technology which is at least in the ball-park of cognitive extension, if not a *bona fide* case of cognitive extension. While it is no doubt true that many students' engagement with an educational resource like Wikipedia is essentially passive, it is crucial that the kind of intellectual engagement with a source of information that is advocated by a virtue epistemology centred on the intellectual virtues would not sanction such a passive engagement with an information source, even if it led to the increased production of knowledge on the part of the subject. What is important is rather that the student takes cognitive ownership, via her intellectual virtues, of the information source in question. This means that in practice a virtue-theoretic

approach to educational practices will tend to lead to extended cognitive processes, even if it is consistent with non-extended cognitive processes.[18]

4. CONCLUDING REMARKS

The foregoing points suffice to deal with the putative tension between virtue-theoretic accounts of the epistemology of education and our reliance on technology that we began with, in that on any plausible conception of the former there is nothing particularly epistemically amiss with the latter. More specifically, we have noted two ways of thinking about this tension, and found both of them to be lacking teeth.

The crude worry was that virtue epistemologists seemed committed to eschewing any reliance on technology in education for fear that this diminished the cognitive capacities of the subject. We noted that this concern was based on a faulty conception of virtue epistemology, one on which the development of the subject's cognitive abilities and faculties was on a par with the development of her intellectual virtues. While such a view might sanction the educational use of technology instead of the subject unaided cognitive abilities/faculties, any such use of technology would be guided by the subject's intellectual virtues, and we saw that there is no technological substitute for intellectual virtue. The point is that when virtue epistemologists urge the developing of the subject's cognitive character, they do not have in mind that all aspects of that cognitive character should be equally worthy of development. Instead, the overarching focus is on the intellectual virtues, as these cognitive traits play such an important regulative role in the subject's cognitive economy, and are key to the subject's acquisition of understanding as opposed to mere knowledge. So while the use of technology might be incompatible with the development of some of a subject's cognitive traits, it is entirely compatible with the development of the intellectual virtues. There is thus a crucial sense in which a virtue-theoretic epistemology of education can allow a reliance on technology while maintaining that educational strategies should be focussed on the development of the subject's cognitive character.

We found, however, that a second, more subtle, worry remained. We brought this concern out by noting how virtue epistemology, like epistemology more generally, is tacitly wedded to epistemic individualism—the idea that one's cognitive processes cannot extend beyond the skin and skull of the subject. Since virtue epistemology advocates the development of the subject's cognitive

character, wedding this proposal to epistemic individualism has the consequence that the educational development of a subject's on-board unaided cognitive traits should take precedence over the use of technology, particularly where the use of technology might lessen the development of those cognitive traits. So given that our reliance on technology almost certainly leads to a diminished development of our on-board cognitive abilities, we are back to a version of our original tension between a virtue-theoretic account of the epistemic goal of education and our widespread contemporary reliance on technology.

In response to this worry, it was argued that we should reconceive of virtue epistemology along anti-individualist lines: *extended virtue epistemology*. We again saw the importance of the intellectual virtues in this regard, since educational strategies advocated by virtue epistemologists, which have the development of intellectual virtue at their heart, will inevitably lead not to a passive employment of technology, but rather the very kind of epistemically active employment which would by anti-individualist lights lead to cognitive extension. Again, then, we saw that the tension between a virtue-theoretic epistemology of education and our contemporary reliance on technology is imagined, in that, properly conceived, such a view does not licence the educational use of technology in the problematic fashion as alleged.

Either way we might understand the putative tension between the virtue-theoretic account of the epistemic goals of education and our contemporary reliance on technology, the tension is illusory. The crux of the matter is to recognise the primary role that the intellectual virtue play in such an account, and how this enables virtue epistemology to incorporate the anti-individualistic insights of extended cognition.[19]

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NOTES

[1] 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) and Kotzee (2014). For some important defences of virtue epistemology in the contemporary literature, see Sosa (1991; 2007; 2009), Greco (1999; 2000; 2009), and Zagzebski (1996).

[2] For some useful recent overviews of virtue epistemology, see Axtell (1997), Kvanvig (2010), and Greco (2011).

[3] Note that this is not to deny that a necessary condition for possessing a particular intellectual virtue is that one also possesses a certain set of relevant cognitive abilities. Indeed, a subject bereft of all cognitive abilities is unlikely to be able to possess any intellectual virtues.

[4] 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*c*; 2009*d*) and Pritchard, Millar & Haddock (2010, chs. 1-4).

[5] For some key discussions of the intellectual virtues, see Montmarquet (1993), Zagzebski (1996), Roberts & Wood (2007), and Baehr (2011).

[6] As it happens, I have argued at length elsewhere—see Pritchard (2009*a*, 2009*b*, chs. 3-4; 2009*c*; 2012*a*) and Pritchard, Millar & Haddock (2010, chs. 2-4)—for the stronger claim that knowledge and understanding come apart in both directions, but it is not essential to rehearse these arguments here, and hence I will set this point to one side.

[7] See Whalen (2012) for further discussion of ampliative understanding.

[8] Does this mean that the intellectual virtues involve not merely a love of the truth, but moreover (or perhaps instead) a love for specific epistemic standings like understanding? While some in the literature have made such a dialectical move, I think the reasoning behind it, while admittedly superficially attractive, is problematic, as I explain in Pritchard (2014*b*).

[9] Note that it is important to stress that the internal cognitive processes are natural, since one can imagine forms of cognitive enhancement which occur *under* the skin and skull of the subject; what is sometimes known as *neuromedia*. For ease of expression, however, in what follows I will take it as given that extended cognitive processes take place outside of the skin and skull of the subject.

[10] 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:

> "[*A*] competence is a disposition, one with its basis resident in the competent agent, one that would in appropriately normal conditions ensure (or make highly likely) the success of any relevant performance issued by it." (Sosa 2007, 29)

[11] Note that the contrast between technological and social epistemic anti-individualism is not a sharp one. For example, one can imagine types of social epistemic anti-individualism where the social interactions in play are mediated by technology (such as via an online discussion forum).

[12] Or, at any rate, 'in the head and central nervous system' (i.e., under the skin). Note that, as I explain below, allowing that cognitive processes can extend beyond the skin of the agent is not yet to endorse the so-called 'extended mind' thesis, as famously defended by Clark & Chalmers (1998). I discuss epistemic individualism/anti-individualism in further detail in Kallestrup & Pritchard (2011; 2012; 2013). See also Pritchard (2010), Goldberg (2010; 2011; 2012), Vaesen (2011), Hetherington (2012), Kirchhoff & Newsome (2012), Green (2012), and Carter *et al* (2014).

[13] For more on epistemic parity principles, see Carter & Pritchard (*forthcomingb*). Note that there are some methodological issues raised by parity principles of this general kind, whether (as here) they are being used to motivate

epistemic anti-individualism or (as is more common) to motivate the stronger thesis of the extended mind—see especially Clark & Chalmers (1998), who introduced parity principles to the philosophical literature. For some key critical discussion of parity principles—with an inevitable focus on their use in arguments for the external mind thesis—see Adams & Aizawa (2001), Rupert (2004), Clark (2007; 2010), Menary (2006, 2007), and Rowlands (2009)

[14] For further discussion of what is involved in cognitive integration, see Palermos (2014). One interesting question here is the extent to which the conditions we would place on technological epistemic anti-individualism mirror the 'glue and trust' conditions that have been put forward with regard to the extended mind thesis. For more on these conditions, see Clark & Chalmers (1998) and Clark (2010). For a very helpful overview of the scientific literature with regard to memory and socially extended cognition, see Sutton *et al* (2010). For a survey of a recent scientific study regarding memory and technology, see Sparrow, Liu & Wegner (2011). Although this piece doesn't extract the extended cognition moral, the results it describes are amenable to such a reading, as explained in Wheeler (2011).

[15] See Pritchard (2010).

[16] See Clark & Chalmers (1998) and Clark (2008). For two key critical treatments of the extended mind thesis, see Adams & Aizawa (2008) and Rupert (2009).

[17] I explore some of these anti-individualistic ideas in the specific context of the notion of 'scaffolding' as it is used in educational theory—see, for example, Wood & Middleton (1975), Foley (1994), and Simons & Klein (2007)—in Pritchard (2014*c*).

[18] I think that when virtue epistemology is understood along anti-individualist lines, and has intellectual virtue at its heart, then it also has the resources to respond to the situationist challenge that has been posed for this view (e.g., Alfano 2012; *forthcoming*). See Pritchard (2014*a*). See also Carter & Pritchard (*forthcominga*) which specifically extends this point to the epistemology of education.

[19] This paper was written as part of two inter-related projects hosted by the University of Edinburgh's *Eidyn* Philosophical Research Centre: the AHRC-funded 'Extended Knowledge' project and the Templeton Foundation-funded 'Virtue Epistemology, Epistemic Dependence and Intellectual Humility' project. I am grateful to the AHRC and the Templeton Foundation for their support of this research. Many thanks to Jason Baehr for detailed comments on an earlier version of this paper. Thanks also to Jason Baehr, J. Adam Carter, Jesper Kallestrup, Ben Kotzee, Chienkuo Mi, Orestis Palermos, John Ravenscroft, Lani Watson, Alex Whalen, and Mike Wheeler.