

The Science of Teaching: Where We Must Stand and Why We Must Stand There

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ABSTRACT

This paper introduces some educationally related aspects of the work of G. B. Vico. It describes Vico's discovery that knowledge is the sole product of the human imagination and that our notion of truth must derive from this. Truth is made by the connection of things previously unrelated via a metaphor. We are exactly the sum of these creations, and society is no more than the sum of the things we have passed into the *sensus communis*. This leads to the conclusion that those things which we can know are made by us. Professions have made their own values, standards and practices and must be judged by these rather than against more abstract and general criteria. The notion of 'action research' is evaluated in relation to this view of truth and it is seen that Vico's notion of fitness for purpose, of things being as they are and being done as they are because that is the way we have been and are, is important. The work concludes that science is not a thing of formal experimentation in the 'hard' world but of imaginative action in our inner world. Teaching therefore cannot be other than a science, a 'new science' of the imagination.

Discussion of the meaning, purpose and techniques of education are as old as civilization itself and debate as to the possibility of developing a science of teaching has gone on in one form or another at least since the early nineteenth century when science began to be redefined in its various ways of relating to the physical world. The debate needs constant revisiting, not least because changing times mean that education itself is in flux. How then may we fix the situation? Are there discoverable, everlasting principles on which to base

practice, or must pedagogy be merely a process of continuous reaction to social forces which are now perhaps (as we are frequently told) beyond the influence of a single 'educated' nation, let alone of that of its educators? Such principles are in essence a matter of our epistemology, of the ways in which we know ourselves, our society, the worlds they inhabit and how we describe these. If our epistemology is inadequate so too will be our education. This has been recognized by, for example, Brown, Collins and Duguid (1989: 41), who observed that 'much common education practice is the victim of an inadequate epistemology. A new epistemology might hold the key to a dramatic improvement in learning and a completely new perspective on education'. It is argued here that such an epistemology is that discovered by Giambattista Vico, an obscure eighteenth-century Neapolitan lawyer, philosopher, philologist and genius, a revelation long known but little esteemed and not at all acted upon deliberately in education. His philosophy tells us what human beings are, what constitutes knowledge, why we need to educate and so on. The 'scientific' status of these matters is a question which can be answered satisfactorily only by a philosophy which is capable of universal application to human development, one for which there is evidence and in which the methods used are those accepted by the 'community of enquirers'.

Our notions of what constitutes education, and hence pedagogy, then depend on the meanings and significances which we attach to certain ideas and the interrelatedness of these ideas. The hinge of these debates is not whether pedagogy can be turned into a science in the usual sense in which we use the word, not become like physics or even like psychology, but is a much deeper matter. It depends upon what we mean by 'science'. It is argued here that, if the term is used in Vico's older and truer sense, not only does a science of pedagogy become a possibility but we can see that teaching cannot be anything else. It can be nothing other than a science because social activity, our engaging to the full in society and so fulfilling our natures and destinies, is what science is.

Vico was born in Naples in 1688 to humble parents. As a young man he had adhered to the Cartesianism which with the discoveries of Newton was the fashion among the avant-garde of the time. As he followed his legal studies, he became aware that the Cartesians' view of history was a grave error. The 'world of men' was important because it was all we had but it was not something which could be reduced to mathematical precision: to attempt to do so would be to do no more than to 'spend your labour on going mad rationally' (Vico, 1988: 98). Passed over for a valuable promotion within the University of Naples, he decided instead to develop his theories. His published work began by looking at legal, juridical and philological problems, but he then developed

an epistemology which has influenced thinkers, knowingly or otherwise, until our time. Rightly described as the ‘virtual inventor’ of the social sciences, and of much else besides – for example, in mathematics his reasoning was so revolutionary that ‘full justice could scarcely have been done to it until . . . the twentieth century’ (Berlin, 1976: 3) – his brilliant *New Science* of 1725–44 is a compendium of insights into the early and classical worlds and day-to-day contemporary events, scholarly and mundane. Appointed professor of rhetoric in 1699, his annual public orations and his earliest major works, the *On the Study Methods of Our Time* (1709; 1990 edition) and the *On the Most Ancient Wisdom of the Italians* (1710; 1988 edition), had at their heart questions relating to the process of education (Miller, 1993).

Vico’s legal training had given him a deep understanding of the nature of words as well as a wide knowledge of them. He studied the relationship between the *ius nature*, the laws which seemed inherent to social life, and the *ius gentes*, or civil law, which had developed as new social situations arose. He noted that these did not always coincide: whereas many laws, like that on murder, were more or less the same from one society to the next, others such as those on property or sexual relations varied widely. He took from his observations some then–new conclusions: that man did not have an unalterable, eternal nature; that man’s ideas had been made by man and that through them we could know the men who lived when they were made; that things were not preordained; that we could understand the past only through the eyes of the past; and that the future could not be predicted by the past although it depended on it. He went further. Truth does not come into but goes out from men. It is not an object, not a thing, not a measure of correspondence between an outer object and an inner idea of it, but things are true because

the human mind contains the elements of the truths that it can order and compose; and it is through the disposition and composition of these elements that the truth they demonstrate arises; so that demonstration is the same as construction, and the true is the same as the made. (Vico, 1990: 65)

This, the *verum factum convertuntur* principle, was his most important discovery, but it led to others, ‘major advances in thought, any one of which by itself is sufficient to make the fortune of a philosopher’ (Berlin, 1976: p.xix). Because true things were what we had created, we could only understand human things. We could understand some things ‘from the inside’ because being human we could grasp some part of the creators’ minds. The more distant these were in space, time and in cultural patterns and habits,

admittedly, the more difficult this became, but we could do it. Languages and history were especially open to us for this reason since words were our classification of things and things were in time. He investigated the nature of mathematics, the most abstract of human activities, and realized that this too gave truth and was certain not because it described an outer world but because it took place completely within our inner world. The things mathematics described were so because we could make them no other way: mathematics was not a hidden, inherent language of the physical world but an expression of mind. Numbers, the fundamental concept of mathematics, for example, exist nowhere except in the mind. There are occurrences of two, two birds on a branch say, but this kind of statement depends upon our grouping and classifying things. All we know of the physical world is based on such generalization, a peculiarly and exclusively human (as far as we know) activity. Nothing in nature has so far been demonstrated 'beyond reasonable doubt' to be identical to anything else for, as Heisenberg has shown, even the fundamental particles of matter are in flux, being 'created from other particles or simply from the kinetic energy of such particles, and . . . can again disintegrate into other particles . . . [and there seems to be] complete mutability of matter' (Northrup, 1968: 24).

As Vico had realized, matter was a thing of probability, chance and contingency, so it was a mistake to claim that we could achieve truth of the physical world by the eternal and immutable principles of mathematics. Such 'science' of the physical world was merely a labelling of God's work. The power of and interest in such science was what it told us about our minds, about how we defined, ordered, classified, reasoned, accounted for gaps in the record and so on, how the mind 'did science', not what it told us about a universe which was unknowable to us. Vico's final thesis was strongly opposed to Cartesianism, but he was a sincere admirer of the progress being made in exploring the physical world and he accepted it as a valuable way of knowing, one way among many human ways of doing human things. Science then is not the movings of the physical but of the human world, and 'scientific concepts . . . are only our interpretations of natural phenomena . . . We merely make a temporary invention which covers that part of the world open to us at the moment' (Bronowski, 1978: 96). Making science depends on time and place and its 'laws' are the codes by which our minds (which are nothing else) are regulated. They are created from the mind, by thinking, by the use of *ingegno* to make *fantasia*. We create or engineer images which are more than mere observation of the physical world or the manipulation of remembered ideas (although it may involve these), but are new speculations born from the nature

of the mind itself. This natural poetic and imaginative process gives rise to truths more real than those of the unpredictable physical world where 'there is neither straightness nor unity, neither sameness nor rest' (Vico, 1988: 92). These truths, knowledge, are the metaphors we make by relating things in our minds which we had not connected before. As others later realized, we do not learn by doing, learning *is* doing. This discovery led Vico to his understanding of the role that myths, the things we believe about the world, play in human affairs. The statement that 'the moon is made of cream cheese' in this light is not a wild and pointless nonsense fit only for the immature or idiotic, but is an act of genius, a truly scientific insight in which someone perhaps connected the physical features of two known objects via the metaphor 'is made of'. Such reasoning is no less scientific than that which has led to our current description of the moon as a mass of minerals of a specific gravity approximately 2.65, since modern science depends in the same way on imaginative connection of knowns to progress to the unknown. This discovery has important implications for our science of teaching for this is how ideas are born and the language we use made. In the earliest times, it is true, men invented words to describe events, but the propensity for this was wholly human, indeed it was the definition of humanity. We have language because we have minds rather than vice versa, so we must first and foremost understand what the mind is.

Are we able to control imagination, or are we victims who must necessarily call true any daft fantasy we may have created? What restrained our imaginings and made them useful? How can we communicate the truth we make? Vico developed his notion of the *sensus communis*, the pool of ideas, beliefs, notions, etc. which a society held in common. Man was inherently social because this was the way his mind was: we cannot have ideas which do not relate to prior social experience because all thought experience is social. When, for example, as children we created our light notion, the fantasy which was our explanation of an observed physical phenomena, we had no word to describe it, leaving us with the option of creating one or taking one from society. Someone told us it was called 'light', and later that such and such manifestation of light is called 'orange', and later again that orange light has a wavelength between those of the light called red and that called yellow and so on. It is the creation of 'light thoughts' and the observation of their relationships which is the mind – we cannot guarantee that each individual's physical reaction to orange light is the same, only that each of us labels it the orange light experience. While individuals naturally and inevitably would label things and their relations to each other and would too create labels which related labels, we need next to compare the fruits of our imaginings with those of others. We check these

new-to-us discoveries against the *sensus communis*, the store of ‘judgement[s made] *without reflection* (without philosophical analysis), shared by an entire class, an entire people, and entire nation, or the entire human race’ (Vico, 1994: para. 142). If they stand comparison, if they ‘make sense’, we communicate them – we may need new words to do this if we cannot combine existing words – and some will be accepted by our fellows and will in turn be absorbed into the *sensus communis*. Others will be rejected and we move on to other imaginings. This common sense is both a point of reference and a store of these creations. It is what all together we are. We have created society in this way, by the day-to-day thoughts and reactions of individuals who are each no more and no less than their history. Society is the sum of what we have made and it is as it is because that is how we have been, evidence for which is everywhere within us in the myths we have created to explain it.

What a society is then depends upon what has gone before, but we are different, know different things and have a different common sense from our predecessors. We are creating the conditions under which our children will make their society, but we are not determining it. There is only this law, ‘that this world of nations has certainly been made by men and its guise must therefore be found within the modifications [growth processes] of our own human minds’. The key to understanding ourselves is in understanding our development. In this way we become divine, able to create and manipulate, to understand; after all, ‘in God knowledge and creation are one and the same thing’. Vico experimented with these modifications, testing the unknown against the known, by

reflecting whether our human mind, in the series of possibilities it is permitted to understand, and so far as it is permitted to do so, can conceive more or fewer or different causes than those from which now issue the effects of this civil world.

He asked the ‘what if’ questions, probing ideas as to how things had become as they were. What he was doing was science, which was ‘at once a history of the ideas, the customs and the deeds of mankind’, and it was this ‘[from] *which the metaphysics of the human mind must proceed*’. It was science because from these he could ‘derive the principles of the history of human nature, which we shall show to be the principles of universal history’ (Vico, 1994: paras 349, 345, 368, 347, 386, 368). With universal principles we could achieve a scientific understanding of what it is to be human, to know and understand the mind not as an outsider or as an observer, which is what our modern ‘sciences’ would have us do, but as participants and makers of minds, creating them

with the same power with which the Almighty had created the physical universe.

This creative power, the ability to make knowledge and establish it in reference to the common sense, to make myths about ourselves, is important to a science of teaching. We are no more than the stories we use and our society itself is no more than the product of the myriad of decisions individuals have made in creating these. What we are today is the outcome from what we have been so far and the stories which describe this are the only 'reals' in our existence. Our subgroups, those groups whose common sense extends in a limited or special way to specific situations or conditions, are also made by the experience of their predecessors. To say this is to do more than merely to repeat the obvious: not only do individuals have myths, so do groups and if we wish to change a culture individuals must change. They can only do this by changing their myths in the way Vico has shown, by the creation of new metaphors, new knowledges of a changing situation. Changing a culture by conscious act is difficult, Vico knew that people are 'naturally drawn to the pursuit of the true, [and] their desire of it, when they cannot attain it, causes them to cling to the certain' (Vico, 1994: para. 1027). The difficulty of changing the culture of the subgroup of teachers has been noted by Gates and Calderhead (1993), McKernan (1991) and others. It is agreed that teachers are the people who can change it, a view wholly consistent and (albeit unknowingly) derivative of Vico's discovery of the nature of the *sensus communis*. Vico's discoveries are wide-ranging and can fruitfully be applied to any aspect of education but, using Vico's own mistrust of generalities, we can use one quite bounded but important area as an example of how this may be done.

Action research is an important aid in developing the culture of teaching because in many ways it might enable a challenge to teachers' myths about themselves as a group. It allows teachers not just to 'go with the flow' of history but to make it in Vico's sense because it makes use of 'curiosity – that inborn property of man, daughter of ignorance and mother of knowledge' (Vico, 1994: para. 189). What are the generally accepted reasons for advocating the use of action research? One pragmatic reason is that, unless teachers change themselves, other groups will force change on them and this may not be in anyone's best interests (Elliott, 1991). There is a significant difference between the kind of developmental change Vico discovered to be taking place and that which might be enforced with difficulty and which will yield uncertain outcomes from outside a *sensus communis*. Vico did note the possibility of rapid and dramatic change, much in the same way as Thomas

Kuhn was to do later, but both were talking about change from within rather than change from without a culture. The question remains as to the extent and kind of change: the question of necessity for change does not arise since teachers are themselves part of a wider society which changes continually. This boils down then to a question of intervention, a matter not of who *will* manage the change but of who *can* do so?

Among the advocates of action research (for example, Elliott, 1991; Halsall, 1998) there is near-unanimous agreement that this cannot come from academic researchers. Applying Vico's reasoning, it is not difficult to see why. Professional academic researchers have a substantially different culture from teachers and so will create different metaphors from data which themselves may differ between the groups. It is not, in Vichian terms, just a possibility therefore that the groups will at best eye each other warily but a likelihood. The relationship between the groups can be one fruitful of paradoxes, contradictions and misunderstandings. Unless teachers then can themselves generate the ideas, ideology, practices and standards of a new form of investigation, they will need to fall back to some extent on the established bodies of knowledge about this, on the methods of the existing much wider community of enquirers. There is a strong Vichian case for saying that the means which we have developed, all of them from the psychological novel to the statistics package, for investigating our social world are as they are because they have been made by humans, that the way they are is because that is the way our minds are. Moreover, since one of the aims of action research is that its fruit be made public (McKernan, 1991), a degree of standardization in method should not be objectionable.

To find this we are forced back on the nature of the mind which is the source of method. Joycean experiments in language-making are not especially needed although, as we have seen, the creation of new terms may be a necessary part of the creation of new knowledge. To say this is not to preclude the possibility of the development of a new vocabulary, but there are dangers in this. Such new knowledge, for example, must not become gossip, formless and trivial stories. Rather their creators must have the genius of the great story-tellers. Such stories, called in the technical literature 'case studies', will need to be much, much more than lists of events, but should be storehouses of what Vico called 'poetic wisdom', the wisdom which is creativity and a record of engagement with thought. Experience had shown Vico that man

becomes all things by *not* understanding them; . . . for when man understands he extends his mind and takes in the things, but when he does not understand he

makes the things out of himself and becomes them by transforming himself into them. (Vico, 1994: para. 405)

Poetic wisdom cannot be proscribed, but we can recognize it because we can see the mind of its creator, and we know the means by which it comes about. Although higher-order analytical thinking may not be a prerequisite for poetic wisdom, proficiency in communicating and clear description of what we have been about is.

Not only must there be clarity in terms of the definition of the action research, there must also be a clear understanding of its function. It is not enough to say that the function of action research is 'to improve practice rather than to produce knowledge' (Elliott, 1991: 49). This is a claim based on a false dichotomy because it assumes that to act, to have practice, is in some way divorced or different from knowing, but as we noted above knowing is creating and to have created is to have changed, to have done something. Practice cannot but depend upon and be altered by the act of creating knowledge and cannot stand alone from it because it *is* the act of knowing. The demonstrable falseness of dualities of this kind was among Vico's greatest discoveries. The function of action research must be to provide a model from which teachers can improve their knowledge of the professional common sense of which they are part, in the knowledge that this is the only way in which the professional common sense can be changed.

What then is the method we must apply? Vico knew that, presented with new data, 'men at first feel without perceiving, then they perceive with a troubled and agitated spirit, finally they reflect with a clear mind' (Vico, 1994: para. 218). This is a good approximation of what scientific thinkers actually do. Most commentators on the field of action research advocate a method or methods based on the 'hypothetico-deductive' method. First, the story goes, there is an observation, a noticing that something is unusual or out of the run of established and settled things. This provokes a reaction in the observer which takes the form of speculation on the possible causes of the event. Such speculation iterates towards a likely explanation. This is the stage at which a hypothesis, a statement which links the observed event to its supposed cause, is formed. Having formed a hypothesis, the observer tests it. Then the 'fitness-usefulness-validity-and-whatever' value of the hypothesis is evaluated and the hypothesis accepted with reservations or rejected. In the latter case the observer will reform the hypothesis to take account of the new situation. How do Vico's discoveries amplify, illuminate and improve on this process?

First, they provide an understanding of why the event is noteworthy. It

acquires this status in virtue of its standing outside the common sense, or at least the part of it which is the individual who is observing. Curiosity, the natural property of the mind 'has the habit, whenever it sees some extraordinary phenomenon . . . of asking straight away what it means' (Vico, 1994: para. 189). Children deal with events and things without generalizing or generalize 'incorrectly' because they have fewer groups of events and things to classify new events with. Teachers on the other hand have professional experience, have been forced to classify for a variety of reasons and so make fewer observations of the 'sunburst' kind. They have themselves been schooled by events and events dull genius. For Vico, 'doctrines must take their beginning from that of the matters of which they treat' (Vico, 1994: para. 314). Action research theories suggest rightly that we turn from generalization to specificity, that we look at individual events and situations for meanings.

Secondly, Vico tells us about the process of hypothesis-forming, 'the order of ideas must follow the order of institutions' (Vico, 1994: para. 238). The things we know, the institutions (Vico is talking in the sense of things established) must have undergone the to-humans necessary act of classification. When we connect them by a metaphor we are thinking, linking causes and effects which even though they may have a physical manifestation are more importantly thoughts or ideas themselves. Sometimes we just link ideas. Many experiments never get beyond this stage. 'Just sitting thinking' is the most 'real' thing we can do (provided that it is 'real' thinking of course: daydreaming about unlikely events like winning the National Lottery may be a different thing), because our thoughts generate our common sense and that is what we are. A thought changes us, releases 'words which are flying and can never be recalled'.

In many cases we take this a stage further, experimenting with physical things, splitting atoms or smiling back at someone because we form a hypothesis that their smile calls for that response – Vico's discoveries work at any and every level and scale, which is one of their many strengths. Thirdly, then, Vico shows us how to test things. We set them first against our own 'common sense', the term being used in both Vico's technical sense and in the now more common vernacular meaning of 'horse sense' or the knowledge that some things just do or do not work. Because

the order of human ideas is to observe the similarities of things first to express oneself and later for purposes of proof. Proof . . . is first by a single example, for which a single likeness suffices, and finally by induction, for which more are required. (Vico, 1994: para. 424)

We compare our true new knowledge with the common senses of our class, gender, age and ethnic group and in this case our occupational group. Where the observations and the hypotheses they engender are situation-specific we are very likely to use those parts of our common sense most appropriate to that area: genius on the other hand transcends time and place. We can become so by practising the Vichian art of juxtaposition of things disparate to generate metaphor. We can practise it and we can be taught it. Juxtaposition Park is the place in which the sudden insights, the explosions of understanding, the 'Eureka experience', take place.

Vico's discoveries next tell us why we should accept or reject the outcomes from our trip into the Park. The events which take place there are true because they have been created, they exist in the only place in which truth can exist, in the mind, but they only become effective if they 'pass muster' in some way in comparison with the common sense for 'the human mind is naturally impelled to take delight in uniformity' (Vico, 1994: para. 204). Vico himself used the notion of stages of social development and realized that certain ideas would occur when the times were ripe for them. As he was well aware later in his life, some ideas were too far ahead of their time to take root – his own work was, save for a local, contemporary reputation as a clever academic lawyer and erudite teacher, more or less ignored. Those ideas which enter the common sense do so when the time is ripe. Often others are thinking the same things, or have been prepared by events and their own thoughts about these things, so the acceptability of an idea into the professional common sense is dependent on the time and place in which the individual's truth is generated, it depends on the zeitgeist, the 'spirit of the age'. The genius we have been shown how to become transcends this, but it also shows us how to create it.

We are minds, and minds create first and manipulate afterwards. We create in doing and can only know in this way. Such made knowledge is truth. We create ideas and language and impose them onto the world and so make our world. Our creations depend upon the society in which we made them and our society is in turn made by them. This is not a matter of choice because we have no choice about our human nature, about what we are and where and when we start to be and how we become that. These are profoundly scientific notions based on evidence discovered and evaluated by a method acceptable to the community of enquirers and capable of universal application. A science of pedagogy, a subset of our science of society, something which effective teachers have always had, can spring only from understanding what it is to be human and Vico's principles supply this. To argue for these is not to argue for a 'rule-free' relativism – as John Dewey said, to be open-minded is not to be

empty-minded – but rather to argue for a ‘rule-adaptive’ science, rigorous and controlled, based in knowledge of what minds are and how this tells us what humans can be. Nor is it to argue against the use of ‘modern science’ in this enterprise, but a science of pedagogy can only depend on ‘rational’ thought, analysis and the ‘discovery’ of ‘laws’ which we imagine will operate always and everywhere (but whose main interest lies in fact in that they are evidence for and of a point in history) to the extent that this science is itself only part of human activity. To try to make pedagogy a wholly modern science is to doom the enterprise since this has comparatively little to tell us about the mind. If our new science of pedagogy involves in the main empathizing with what it is to be human, to be a mind, to be a member of a society, to learn about and to learn from and to create the common sense, to synthesize our experience and that of our fellows, and to match our teaching to these understandings, then it will succeed because it will conform to our human natures. To use such a science would make us a people ‘exact in science, clever in practical matters, fluent in eloquence, imaginative in understanding poetry or painting, and strong in memorizing what we have learned in our legal studies’, we would reason, and we would not ‘with pedestrian slavishness, refuse to accept any viewpoint unless it has been sanctioned’ by an authority (Vico, 199: 19). Vico’s inclusive old *New Science* has much to offer.

Notes

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