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Exploring Creativity as a Component of the Manufacturing or Making Process: Implications for Assessment

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Abstract
Creativity is acknowledged to be an essential feature of design and technology (D&T). However, the current literature which explores aspects of creativity in D&T tends to portray the creative process as residing more in the design or problem-solving arena, as distinct from the action of manufacturing or making an end product. (Atkinson. 2002, Barlex. 2003, Davies T. 2002b, Davies L. 2002a, LTS. 2001, Rutland. 2002).

This paper will set out to explore whether aspects of creativity are actually present within the manufacturing or making domain. It will investigate whether the creative process is an action which can only occur in the process of manufacture or making, or if the creative process can be implicitly embedded within the actual finished product itself.

The paper will argue that there are two distinct forms of activity involved in the process of manufacture, which I will term ‘artistic craftsmanship’ and ‘technical craftsmanship’. The first type, it will be argued, involves a creative process whereas the second involves a skill process.

By exploring the distinction between ‘artistic craftsmanship’ and ‘technical craftsmanship’, moreover, the paper will explore whether creative endeavour can be recognised as an implicit value inherent within some end physical form. For example, does Michelangelo’s ‘David’, as an actual physical object, exhibit some inherent quality that in itself, demonstrates some form of creativity. Would a copy be considered creative?

The paper will finish by considering the implications for the assessment of an end product. If ‘artistic craftsmanship’ is not inherent and embedded in the end product, the assessment of the finished product alone can take account of only ‘technical craftsmanship’ displayed in the quality of the product. Creative aspects, it will be argued, are not displayed in the product alone, and cannot, therefore, be assessed in the product alone.

"Now thou knowest that no man can manifest any skill, nor exercise any power, without tools or material; that is the material of each craft, without which it cannot be exercised...[therefore I desire material with which to exercise power, that my skill and power should not be forgotten and lost sight of. For every kind of skill and power quickly grows old and is passed over in silence, if it is devoid of wisdom; because no one can manifest any skill without wisdom, since whatsoever is done foolishly can never be accounted as skill". King Alfred's Version of Boethius written in the eighteenth century (Cook and Tinker, 1968:2)

Creativity is an ambiguous and problematic term. The creativity of an actor upon the stage is not the same as that which the artist displays at her easel nor the wood turner at her lathe. The ‘Creation’ in Biblical terms is yet another manifestation and the wildly imaginative justification given by the pupil for failure to hand in homework, although different in form, can certainly be defined as creative, albeit frustrating.

However, one common feature inherent within the concept of creativity is that something manifest is brought into being. The actor brings a character into being, the artist a painting, the turner a bowl. The earth was given physical form by its creator according to the Bible and the pupil's excuse is manifest in the form of a narrative. But inherent within this common feature, is a tension, a duality of forms. The action of ‘bringing something into being’, requires that ‘something’ to take one of two forms: three-dimensional physical form, or one that transcends the physical, as in a performance. These two forms can, in some cases, become reliant upon each other, as in a musician playing an instrument, but the object brought into being is only ever constituted in one form or the other: the performance of the musician creating music on the instrument, or the physicality of the instrument itself. Observing the sculptor sculpt qua observing the sculptor sculpt, is different from appreciating the end product the sculptor has sculpted, and for some audiences, one will be preferable to the other.

Whichever form the bringing into being takes, whether perpetrated by the actor, wood turner, artist or even the devious pupil, the object of the activity (that which is produced), requires some form of intentional activity to be enacted upon it by the subject (the producer), in order to ‘bring’ the creation ‘into being’. The quality of the resultant object will
depend upon the perceived experience and ability of the subject, or more simply, their level of skill in that particular domain.

The object of their craft, whether or not it is in physical form, requires some demonstrable and perceivable end product that results from a deliberate, cognitive and intentional action. Where an action is devoid of these instruments it is unintentional, accidental and cannot, ipso facto be creative. Putnam (2002:524) offers an interesting analogy for this; he makes the case for an ant, which, crawling on a patch of sand, traces out a recognisable caricature of Winston Churchill. ‘Has the ant traced a picture of Winston Churchill, a picture that depicts Churchill?’. Most would be unlikely to attribute to the ant the requisite skill in caricature. Indeed, even if the ant had seen Churchill or a picture of Churchill, most would seriously doubt that the ant had the capacity to remember that image and subsequently recreate it. Whilst fantastic, it would nevertheless be an act of serendipity. The ant, I would contend, had no intention of depicting Churchill. This notion indicates that for any deliberate creative action to occur, there must exist some form of intentionality on the part of the creator.

This intentionality may, however, be consequential upon factors external to the creator. Whilst it may be happenstance that an opportunity presents itself and is subsequently incorporated into the ‘product,’ it nevertheless involves a subsequent deliberate, cognitive intention on the part of the creator. The pupil, like the actor, when ‘caught out by circumstances,’ may ad lib by drawing upon her wit and prior experience. The wood turner, as she shapes the bowl, may come upon a knot which she decides to incorporate as a feature. Whether the result of predetermination or serendipity, a deliberate intervention is constituted at some stage in the process. Without this, we return to ants and Churchill.

Aristotle (2000) regarded skill as an essentially productive state that must involve reason. Crucially, he saw skill as connected with ‘bringing something into being,’ where the skill is not in the product itself but is, instead, embedded within the process. For Aristotle then, the first principle of something coming into being lies in the producer and not in the product. Thus the exercise of bringing something into being is concerned with the production of things that do not have their own essence, that distinctive quality which constitutes or marks the true nature of anything, ruling them. For Aristotle, creativity as essence cannot reside in the artefact.

Sartre (1997), moreover, sees this essence of a product as preceding its existence. In other words, the notion of what a product actually is exists in the mind of its creator prior to its manifestation, whether in the form of a performance, a painting or the manufacture of a vacuum cleaner. This distinction between existence and essence, or between the concepts of ‘that it is’ and ‘what it is’ appear to be two independent dimensions of being. Feenberg (2005), exemplifies this in his outline of the Greeks’ notion of technē where the idea, the essence of the thing is a reality, independent of the artifact or the maker. The purpose of the object made is included in its idea.

It is in the eye of the beholder, however, that the notion of creativity is invested upon the actor’s performance, the painter’s painting or the vacuum cleaner’s design. It is thus the signature of the creator and not the manufacturer (unless they are one and the same) that resides in the object which, in terms of form or function, is subject to external cultural validation. The performer may feel surges of creativity whilst practicing alone but will always need another human consciousness to endorse that feeling (Kainz, 1994).

Creative development is consequently reliant upon social factors. If there is no reciprocity, or feedback, the creative process cannot be established. Vygotsky (2000) makes the distinction between natural or genetic animal attributes and the unique human characteristic of making. The distinction is that creativity cannot be a process of nature or biological development. A flower does not make a conscious decision to be yellow nor to shed its petals. Furthermore it does not seek attention for so doing. (Humans may intervene but the flower does not seek attention). An ant does not design and build an anthill; it is genetically disposed to so do. Ants do not ‘improve’ their environment over time. Creativity is inextricably linked with human sociocultural inheritance, which involves activity and interaction with others. Without this collaboration, there can never be any certainty for the performer that her act was indeed creative. Action and endorsement are thus necessarily constituted within each other before any creative act can evolve. Moreover, any synthesis between creative performance and public endorsement is reinforced by the cultural value placed upon the event.

An example of this cultural endorsement can be seen in law and copyright legislation. The term ‘works of artistic craftsmanship’ appears in the copyright legislation of Canada, the US, Australia and the UK, as well as many other countries. It is considered a type of work for which the creator is entitled to copyright protection (Rushton, 2000).
Under United Kingdom statute law, Section 4 of the Copyright, Designs and Patents Act of 1988 defines ‘artistic work’ as including ‘a work of artistic craftsmanship’. Copyright law in Australia, which is contained in their Copyright Act of 1968, has strong similarities with the UK. For an artifact to be protected by copyright as a work of artistic craftsmanship, the maker must have used ‘craft’ and intended the article to have aesthetic appeal, rather than being purely functional (Australian Copyright Council, 2001).

This suggests that, from a copyright point of view at least, there exists a distinction within ‘artistic craftsmanship’ between the ‘artistic’ and the technical aspects of ‘craft’. This is exemplified in the court case under Scots Law of Radley Gowns Ltd v Costas Spyrou [1975] FSR 455:

‘The plaintiff company claimed that it owned copyright in a prototype dress, sketches of the dress and cutting patterns. It was held that the prototype dress was not a work of artistic craftsmanship because the artistry was provided by the drawings of the dress and the craftsmanship was provided by the cutter and the seamstress. There was therefore a division of the artistic elements of the work and the plaintiffs’ action failed’ (Radley v Spyro, 2004)

In this case the craftsmanship of the cutter and the seamstress is seen to take on a purely instrumental or utilitarian role. This is echoed in contemporary US copyright law which protects:

‘works of artistic craftsmanship insofar as their form but not their mechanical or utilitarian aspects are concerned; the design of a useful article … shall be considered a [copyrightable] work only if, and only to the extent that, such design incorporates pictorial, graphic, or sculptural features that can be identified separately from, and are being capable of existing independently of, the utilitarian aspects of the article’ (In Rushton, 2000).

Essentially, the artistic or creative acts involved in the production of an artifact exist only within the process and the creator and not within the product or maker.

There is, I would suggest, an overwhelming consensus that Michelangelo’s ‘David’ constitutes more than a modified slab of marble. It is, undoubtedly, made from marble which is a natural geological construct formed over many years. It required to be carefully separated from a larger mass of marble using the appropriate technologies available at the time. This would have required careful planning or intentionality, and precise work by the artisans at the quarry. The intention had to be worked out in advance. The separation of a slab this size could not be left to chance. If the project failed and the slab was destroyed the artisans would be considered as technically incompetent and certainly not craftsmen. This notion of technical craftsmanship applies as much today as it would have then. For Collingwood (1958) and Arendt (1998), technical craftsmanship, is the distinction between means and ends. The actions required to achieve the separation of the slab of marble are the means and the separate slab of marble is the end. Collingwood, moreover, like Sartre, sees the essence of the end product, in this case a separate, intact slab of marble of certain dimension, as preceding its means of separation.

‘The craftsman’s skill is his knowledge of the means necessary to realize a given end, and his mastery of these means. A joiner making a table shows his skill by knowing what materials and what tools are needed to make it, and being able to use these in such a way as to produce the table exactly as specified’ (Collingwood, 1958: 28).

The means in the form of the actions of the artisans at the quarry vanished after the ends had been achieved. (‘The process disappears in the product’ as Marx said). Given that a slab of marble had been constituted according to Michelangelo’s specification, their technical craftsmanship could in some sense be reified in the object of their craft just as the skills of the child are reified in the finished product in the classroom. But this reification can only exist as long as the object exists in its crafted form and is explicitly related to the particular craftsman or child.

Arendt (1998: 143-144) sees this distinction between technical and artistic craftsmanship correlating with whether or not the artefact’s end is beyond doubt. For her, where the subject’s purpose is merely to apply his body, mediated only by tools, towards the production of a pre-specified end which has ‘…a definite beginning and a definite, predictable end [which] is the mark of fabrication, [and] which through this characteristic alone distinguishes itself from all other human activities’, is an act of technical craftsmanship.

This instrumental notion of the process of making constitutes the distinction between technical craftsmanship and artistic craftsmanship. Michelangelo would have had the intention to create ‘David’ and therefore have some conception of its final form. He would also have made many planning sketches. The significant difference, however, is that where a joiner exercises technical craftsmanship in manufacturing or making a table based upon a
This distinction between technical craftsmanship and artistic craftsmanship can perhaps be better illustrated by considering the creation of the anglepoise lamp. The design of this lamp is credited to George Carwardine (1887-1948). He designed the lamp as an office or desk lamp which enabled the user to control the position and direction of the light source. Carwardine, like Michelangelo would have made several planning sketches as he worked towards his final design. The inspiration for the mechanics was derived largely from the biological functioning of the human arm, where a spring substituted for muscle. However, unlike Michelangelo, Carwardine would have produced a precise set of working drawings and specifications for the lamp. These were then handed to Herbert Terry in Redditch who set up a mass production system in order to fabricate the lamp. Jacob Jacobson, a Norwegian engineer, bought the production rights and refined the design into what is considered to be a classic design of the twentieth century.

The creative element in the production of the anglepoise lamp was thus clearly embedded in the process of design and the fabrication rested with those workers on the production line. The difference in this example from that of Michelangelo, is the complete separation of design from fabrication. The designer of the lamp has no need to be involved in the fabrication process. He may make a prototype model in order to refine his design and some other being may be involved in the ‘design for manufacture’ process. However, an individual or complete workforce will be responsible for fabrication which will be a completely separate process. This process will require technique which implies a degree of skill. However, that skill is situated completely within the domain of means, the ends having been firmly established prior to fabrication. Moreover, mass production, as in the case of the anglepoise lamp, has instituted evermore sophisticated automation to take over the lower order skills once offered by a human, thus the domain of means is more and more reduced to ‘automated machine ends’, which ultimately will exclude the human from the fabrication process altogether. In this case, if a machine was responsible for the complete fabrication of the anglepoise lamp, (which is not beyond the realms of possibility), from the cutting and shaping of the raw materials through to the final assembly or fabrication of the lamp, the creative process could only rest with the human designers of the lamp and to an extent, those who designed the manufacturing process. As we move closer towards complete and evermore sophisticated automated production we become evermore reliant upon computer control. This control has to be programmed by humans. Until an automated production line is capable of intentional, cognitive and deliberate free expression, creativity will rest with the human designer and not the automated or human fabricator.

There must therefore exist some creative element beyond technical craftsmanship which resides within the human and not within the object. It is artistic craftsmanship in ‘which the artist transcends his skill and workmanship in a way similar to the way each person’s uniqueness transcends the sum total of his qualities’ (Arendt, 1998, p210). It is within artistic craftsmanship that resides both creativity and technical skill, and artistic craftsmanship cannot be reified in the product alone in the way that technical craftsmanship can.

Implications for assessment
An instrumental view of assessment relies upon an expert/transmission model in which positive technical knowledge is related to prescribed outcomes. These outcomes are subsequently assessed in a summative way to provide quantitative results which society, through Government, can exploit for future production and potential economic development.

‘In this context, the only role positive knowledge can play is to inform the practical subject about the reality within which the execution of the prescription is to be inscribed. It allows the subject to circumscribe the executable, or what it is possible to do. But the executory, what should be done, is not within the purview of positive knowledge. It is one thing for an undertaking to be possible and another for it to be just’ (Lyotard, 2001:36).

If an artifact is assessed in order to establish the positive level of skill that the child has developed, and this positive (or negative) level of prescribed skill is manifest in the object, then this forms the basis of what Lyotard describes as ‘the reality (the
artifact) within which the execution (making) of the prescription (taught skills) is to be inscribed (reified). It is thus the reproduction of a prescribed set of skills involving the use of tools, which evolve out of socio-historical and cultural inheritance that is being assessed. The positive (or negative) level of the prescribed psychomotor skills in the use of tools is made manifest in the quality of the artifact produced. This is subsequently assessed by an expert (the teacher) who assigns a number, which in turn informs the child about how close the execution of their psychomotor skills in the use of tools conforms to the norm. The less they do so, the more the child is expected to concentrate on perfecting these skills. In so doing a shift in emphasis occurs. Instead of Kimbell and Perry’s (2001:8) notion of creative environments such as a design and technology classrooms being ‘packed with opportunities to explore and exploit designerly hunches’, there is movement towards a conformity of performance model, in which strategic skill development or ultimately perhaps, work avoidance resulting from failure, becomes the norm.

Martin (2000:90-91) illustrates this model when describing what he terms ‘stasis’ in any conformist non-creative activity: ‘…the complexity of the manufacturing process, and its sequential nature, in which each step is crucially dependent upon the meticulous and precise completion of the previous stage, tends to produce ‘lock-in’. Variation and innovation become increasingly hazardous’.

If a child has difficulty with the manipulation of a particular instrument or tool and this results in a poorly formed artifact, it is our duty to help in some way, not impose some degree of hierarchical measure upon it. To do so produces the potential for any creative impulse which might lead to the achievement of optimal performance in manufacture to be completely obscured by the child’s failure, or fear of failure. Self-efficacy in relation to creative potential becomes conditional upon the instrumental aspects relating to efficiency in the psychomotor domain. These skills will develop in children at varying rates. Levels of proficiency attained will, moreover be dependent upon the individual child’s degree of interest in making. This is clearly more likely to be enhanced in an environment which is ‘packed with opportunities to explore and exploit designerly hunches’ (Kimbell and Perry, 2001) than where performance goals (the end product) are considered more important than learning goals (the process) (Dweck, 2000; Ames, 1992). Creative ability is not contingent upon sophisticated psychomotor skills. Moreover, as argued in this paper, innovation or creativity cannot be assessed from the artifact.

Creativity and innovation must rather be assessed within a social-constructive framework. This requires a major pedagogical shift away from transmission models of teaching towards a model where dialogue takes place, where failure is acceptable, where risk is encouraged and where the development of psychomotor skill in the use of tools is secondary to the creative process and as a consequence, is not assessed.

If design, innovation and creativity constitute the design and technology bulwark, then the ‘assessment for measurement of the artifact’ paradigm must be removed from the citadel and the real purpose of design and technology education restored. That purpose must be to help the formation of ‘creative’ citizens in a technologically mediated world by introducing them to a design and technology environment which assesses, develops and encourages the essence of the child’s creativity rather than the product of the child’s labour.

References


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