TEACHING CREATIVITY ACROSS THE CURRICULUM THROUGH DESIGN EDUCATION?

By

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ABSTRACT

This article examines the effectiveness of design as a subject fulfilling its role of developing creativity within students by allowing and supporting the behaviour and its expression. Creativity in education has been a pressing issue for many countries throughout recent history, once again resurfacing as a key topic for discussion, yet the term is still surrounded by mystery and discrepancies. This study attempts to establish teachers' understandings and definitions of creativity, outlining their methods for nurturance, through a triangulation of research. Evidence returned inconclusive of exact definition held by a majority, however multiple themes arose throughout, demystifying and adding to areas of the current body of knowledge. Implications for greater acknowledgment to the creative process rather than exclusively to product that abides by restrictive criteria, were highlighted as steps in the right direction for effective development of creativity within design as a subject, in educational institutions.

Keywords: Creativity, Design Education, Teaching, Teachers' Understanding, Values, Curricula.

INTRODUCTION

The National Advisory Committee on Creative and Cultural Education report (NACCCE) (1999) describes the term as using 'imaginative approaches' in the context of creative teaching. However, this fails to give clear definition, rather passes the confusion on to than defining what it is to be imaginative. Recognising this is not a universal belief, Baer & Kaufman (2012) note that 'creativity refers to anything' when the product or method is 'original to the creator' and 'appropriate to the (initial) purpose.' In relation, some support the interpretation of a cyclical process, whereby all that is, can be classed as an evolution from a previous stage. This then deems notions of creativity as a 'recreation' of that which has been done, given that the route taken to arrive at this destination is entirely unique (Pope, 2005). The authors describe this understanding as 'interpretive replication,' in which inter-contextual knowledge, collected and arranged in a way singular to a particular individual, is used to achieve a desired goal, regardless if that goal has been previously reached by way of another's approach.

1. Background

Opposing schools of thought have argued creativity is originality in the purest form, being an effective method for reaching set goals, entirely unique to human thought, disregarding mere novel application (Ghiselin, et al., 1963). Such speculation favours few in possessing such dexterity, as assuming people are equal in psychological function places a façade over the certainty of unrepeatable identity. Consequently, without acknowledgment of this, Tusa (2003), argues it will 'diminish society's capacity for innovative imagining.'

Comparatively, Montouri (2014) argues that creativity 'avoids premature definitions and categorizations,' 'pushing back (the) boundaries' of previous assumptions and potential expectations of what the result produced may be. Expanding on this, Montouri suggests that it is due to such vague understanding that creativity was associated with the Romantic Movement, labelling it as a 'gift' only found in a chosen few practicing the arts subjects. Lack of clarity remained for over a century resulting in the continuum of mystery surrounding the term, with as little as

0.2% of publications in Psychological Abstracts' were being based on the subject of creativity (Guilford, 1950).

Although in disagreement upon certain aspects of the phenomenon, such opinions stand together in the understanding of creativity as a type of behaviour which refers to productivity and value of achievement in regard to outcome. Gilchrist (1972) explains the 'prowess' as something within all people, with the ability to be actualized if the right direction in development is taken, along which appropriate opportunities for utilization can arise. Fromm (1959) supports such considerations, characterizing it as the 'capacity' to orientate through activities with a proficient degree of awareness of experience throughout the unravelling process. Similarly, one's control, or lack thereof, toward external and internal factors (e.g. environment, emotions), has been contended as potentially a deciding element in the materialization of their creative ability (Sternberg & Lubart, 1999). Assuming so, this places the attribute on a multi-dimensional level, adding extreme depth for exploration, which due to limitations is not feasible to cover in this project. Therefore focus on creativity's inclusion in education, particularly in the subject of design, will be further addressed.

2. Literature Review

2.1 Creativity in Education

During the 1950's a realisation of the lack of innovation and imagination from university graduates became a cause for concern as Cropley (1995) informs of how students were simply applying the 'already known in conventional ways.' With this in mind, many expressed feelings of being 'uneasy about emphasizing creativity,' contradicting the common sensible procedure to counter this increasing problem, although this failed to cease a newly found sense of encouragement for creativity to be written into curriculums.

The 1960's gave way to a focal shift on creativity and its development in children, as opposed to adults, following the publication of 'Torrance Tests,' (Feldman, et al., 1994). Torrance (1962) signifies Guilford's model of divergent thinking as having been the prime basis when designing the test, which opens room for debate as the models association with testing for creativity is not universally accepted. However, from the standpoint of the institution, this approach seemed particularly appealing due to practicality and plausibility, therefore it was widely adopted. Through this, suggestions of a quantity over quality approach being taken arose, as Ausubel (1964) claims 'hard-headed educators…adopted highly unrealistic educational objectives regarding the nurturance of creativity.' Wallach & Wing (1969) criticized such frameworks, as he became a pioneer in renovating institutional attempts in creative development, pursuing the trait as being domain- specific rather than domain-general.

Fluctuation in belief of importance, along with struggles to perfect approach, although varying in degree, remains a constant trial faced by educators. Once again, the need for creativity to be developed within students through educational institutions has become a pressing issue, concerning multiple countries (such as the UK, Hong Kong, Australia, Turkey, Singapore) who recognise its potential in contributing to social and economic progress when aiming to thrive in a world of rapid change (Lafci, 2009). The Journal for the Education of the Young Scientist and Giftedness (2012) comments on creativity being richer in the 'golden age' of childhood due to their 'fewer prejudices' allowing them to 'experiment and give original solutions' to situations they face. Sternberg & Lubart (1999) expand on this thought, suggesting that they begin to 'suppress' these characteristics when enrolling into the educational system, which limits them to 'draw(ing) inside lines.' Further studies by psychological theorists; view the grouping of individuals with hope of coaxing independent creativity as counterproductive, as each student's creativity is a personal phenomenon (Abra & Abra, 1999). Baer & Kaufman (2012) offer similar thought as they explain in their dissection of motivations, how 'extrinsic motivation (i.e. a deadline) zooms up' on a student, 'depressing creativity.'

In clear contrast they claim that by 'thinking deeply' (creatively) about content knowledge, it begins to cement itself into the memory, yet go on to say that to be creative or indeed think creatively, a significant level of knowledge is needed. Whichever opinion chosen, it can be approached from two further angles; creativity as being domain-general, or creativity as being domain-specific.

Gardner (1983) proposes five constructs of intelligence; verbal-linguistic, mathematical-logical, visual-spatial, naturalist, and musical-rhythmic. Often creativity is associated with the ability to produce unique links between such areas, surpassing the rigid limits of common thought or in the case of educational institutions, strict guidelines between subjects which run as domain-specific as it is the 'safest and most practical course of action,' (Baer & Kaufman, 2012). Commonwealth of Australia (2008) holds the same perspective of the skill as 'limited to artistic domains,' yet stresses the importance of it being encouraged in students whilst in school.

A further independent platform of belief, suggests that the creative process is majorly the product of student exposure to a variety of external factors, used to achieve an outcome. Moreover, with this accounting for a larger contribution, creativity has been argued to be something students should study 'distinctively,' (Feldman, et al., 1994). Arguably, Cropley's (1999) view of conditions for creativity relate to such thought, as he stresses emphasis on opportunity for expression of personality from students, provide the necessary environment for creative disposition. He expands, describing such freedom as paramount within the 'classroom climate,' in order to effectively engage the three psychological dimensions of creativity; cognitive factors, personal properties, and motivation. Instating this approach produces further discrepancies, as school and university students face restrictive mark schemes with little room in criteria for such a freedom, of which they are marked subjectively through the markers understanding of what creativity is. If in disagreement, a lower mark is then awarded which has potentially negative effects on the student, as it may be little Cropley's dimensions of personal properties (e.g. confidence, openness) and motivation.

2.2 The Role of Design as a Subject in allowing an Expression of Creativity

In the National Curriculum for Design and Technology, The Department of Education, UK (2013) states that the purpose of students study is to offer them an opportunity to use 'creativity and imagination,' in order to solve 'real and relevant problems.' It describes its aim as encouraging children to 'apply and build a repertoire of knowledge' so as to develop them into 'resourceful' and 'capable citizens.' Casakin & Goldshmidt (1999) support this theory in explaining how 'general pre-conditions' of understanding about a given subject are needed to develop 'expertise.' They go on to say how design students need not be taught the skill of analogy, as they already possess the 'cognitive capacity,' rather they need to be guided within this mind frame and become attentive to its potential when problem-solving. Findeli (2001) further expands such thought; suggesting design as a subject offers a place for students to be open-minded, utilizing all areas of their intelligence as 'one cannot act upon a system, only within a system.' This may suggest students cannot effectively be designers by exclusively focusing on the skills learned in a design class; rather they must encompass intellect from a broad range of subjects across the curriculum.

2.3 Studies in terms of Creativity in Design Education

Undercutting these above hopes, some comment on lack of enthusiasm from some teachers in providing an environment where students can explore these qualities, alongside the set design briefs being narrow, as a concern within D&T as a subject (Rutland, 2004). Further study into this area found that 'climate to a fairly large extent is in the hands of the manager,' which in this case, leaves ultimate responsibility of ensuring suitability for creativity to the teacher and institution (Ekvall, 1996:122). McLellan & Nicholl (2008:4) report that only 57% of students agree they are allowed to choose the work they do in D&T, yet 93% of teachers believed that offering choices was important, highlighting a lack of consistency in perception. The study goes on to report 26% of said teachers agree it is a 'waste of time letting students' work on design[s] in D&T that ultimately might not work.' Another study, comparing design professionals against design students, found teachers need to push for more experimentation, supporting risk taking and uncertainty, in order to build a student's confidence about partaking in creative process (Klein & Shragai, 2001). It continues, explaining how professionals organise 'dwell' time for incubation and development of ideas, often resulting in positive affirmation when revisited, a process overlooked by many educational systems.

Additional argument comments that design as a subject

must engage students and teachers through sovereignty in challenging projects and the education of complex skills, allowing for motivated, healthy human function from both parties (Deci & Ryan, 1985). Yeomans (1990) states, presently, educational systems confine student experience and limit staff incitement, consequently decreasing opportunity for creative behaviour as they are overcome with academic demand to be suitable for administration. He describes the perceived division between thinking and making, held by most institutions, as 'dangerous' for society, as it is imperative to recognise the link between subject study and subject practice, to develop effectively. He provides further thought, suggesting that design as a subject is the most 'appropriate vehicle' in materializing the interests of citizens as both a taxpayer and a parent. A study by Klein & Shragai (2001) revealed that 'namely everyone can be creative,' followed by stating there are 'means to enhance' this skill, which if true, should be the base for Design as a subjects role on the curriculum. Current approach appears to be addressing this, as The Department for Education (2014) states D&T assessment will not be on a 'set of opaque level descriptions but on the essential knowledge, understanding and skills that all pupils should learn.'

3. Research Methodology

The aim of the research was to establish the understanding of creativity across Key Stages 3, 4, 5 and university curriculums. The objectives were to:

- Investigate teachers' perceptions of creativity and present overlapping ideas.

- Understand how teachers define creativity and use it within their teaching.

- Explore how teachers cater for creative students in their classrooms.

- Understand whether skills for creativity are taught or developed.

- Look at school and university curriculum content and creativity's place within it.

The research questions were:

1. How do teachers define or understand creativity?

2. Do teachers view creativity as an innate skill or can it be developed?

3. How do teachers include creativity in their classes whilst working alongside the curriculum?

4. What creative approaches do teachers use in their teaching?

The research was based on an interpretivist paradigm. Interpretivist is the appropriate avenue of approach for the research subject due to information gathered being of a qualitative nature (Mead, 1964). It is important to acknowledge that the author's own understanding of the subject may be reflected through the research and analysis due to their own background in design education influencing the construction of their own individual perception (Thomas, 2009). Cohen & Crabtree (2006) detail this as transactional or subjectivist epistemology, which suggests individuals cannot separate themselves from their understandings, as it is this what forms our reality. The two continue, claiming ones reality is inherently linked to that particular context, and therefore can be transformed through re-interpretations and negotiations of new observations in each moment.

In an area governed by subjectivity, the employment of social interaction to achieve a set objective (e.g. an interview), guides participants to a mutual understanding of what is expected, resulting in an 'intersubjective consensus,' (Popkewitz, 1984). This therefore, supports the theory of research as being inextricably linked to the researcher's reality, as in that moment, it is a collaborative construct of all parties involved. This is an important factor to highlight, as such a variable will distinguish one author's study of research to another's and is also important to note that due to the areas this research aims to investigate being abstract, such situations are generally 'adequate' or most 'efficient' in outlining depth and clarity of the opinion of the respondent (Glaser & Strauss, 1967).

A collection of primary research data was attained through a methodological triangulation of both questionnaires and interviews conducted with education professionals from secondary and university levels (Denzin, 1978). This arrangement was widely affirmed, addressed as the 'hallmark of the good social science researcher' by Thomas (2009). Through this proposed methodology of two

constructs, each beneficial in their own right, a variety of results and insights was formed, allowing cross referencing to provide well rounded material to analyse.

Participants were given all required information on the reasoning of the questionnaire and interview and instructions as to what to do if they wished to terminate the exercise at any point, or wished for the content provided by them to be removed and/or destroyed.

3.1 Questionnaires

As an instrument for data collection, questionnaires are widely accredited in the social sciences, providing an opportunity for information to be gathered without the presence of the researcher, allowing for an honest, personal response (Thomas, 2009). Open ended questions (shown in Appendix) formed the essence of the questionnaire, the reasoning for this being that the research aims to establish respondents' understandings which can be best achieved with an invitation of free comment (Cohen, Manion, & Morrison 2011). Question wording was then discussed with a project supervisor and piloted with a teaching professional to satisfy that aims and objectives could be met with appropriate responses. Option to provide date of birth was included on the questionnaire, to allow for comparison with their years of teaching which aided assumption on whether or not respondents' had likely worked in industry before their career in teaching, and how, if at all, this may have affected their opinions. Of the 20 questionnaires distributed in Finchley Catholic High School, 8 responses were received. 4 further responses were received through individual contact with university lecturers as shown in Table 1.

3.2 Interviews

In order to delve deeper into the respondents'

Questionnaire Participants	Subjects	Sex	Worked in Industry before Teaching
Teachers (8)	Business /English /Art /D&T	5M/3F	4
Lecturers (4)	Science /Business /Art /P.E. /Design (various areas)	3M/1F	3

Table 1. Participants' Response

understandings, and move further towards clarification of themes which arose throughout the information attained within the questionnaires, interviews were assigned. This was carried out with 3 participants, matching the previously proposed criteria as best possible. Interviews followed a semi-structured set of questions, offering the researchers opportunity to pursue opinions and/or attitudes displayed when discussing the interpretive sociology (Flick et al., 2004).

Three interviews were conducted with teachers in secondary education, taking place on March 5, 2015, each last approximately 20 minutes. Due to ethical procedure and a conformed respondent request, the interviews were transcribed. However, although this meant important data regarding reaction and body language was not collected, the researcher used such behaviours to aid decisions on what avenues of discussion to follow during each interview to entice detailed authentic information. The combination of both questionnaire and complimentary interview allowed for a more balanced haul of complex results, along with opportunity to better understand, and in turn, then organize shared ideas or discontinuities into thematic categories.

3.3 Analytic Approach

Where possible, results were quantified and tabulated to allow for effective and practical analysis. Wording has been categorized into synonyms and opinions in responses to be assessed for themes and patterns and indexed accordingly into set codes. Such a process provides opportunity for effective refinement, organization and comparison of the vast subjective understandings received from each research process (Gibbs, 2007). Findings will then be triangulated for further substantiation and assurance of reliability (Golafshani, 2003). Variables which may have potentially intervened will be reported and considered if they appear to emerge as a particular pattern, followed by discussing to what extent they may have impacted the produced results.

When analysis of results has been completed according to the findings, potential generalisations and assumptions about the wider population may be made (de Vaus, 1986). However, due to the limitations of opportunistic sampling

and low number of respondents, each generalization will be critically assessed for credibility in the discussion (Robson, 2011).

4. Results

4.1 Questionnaires

In order to determine patterns in the participant's understandings and definitions for creativity, answers for questions 1 and 2 were tabulated, to allow quantification of recurring words associated with the term. Throughout the questionnaire, many participants mentioned additional words when addressing the term, which were too counted, abiding by Cohen & Crabtree's (2006) claim of understanding being a constant development through each moment and its context. In doing so, the results were then easier to analyse in regards to making generalisations of a teacher or lecturer's perception of the word. Due to the vastness in response, particular words were grouped together according to dictionary definition, as many were synonyms of each other. This allowed for a closer degree of clarification on key features related to the word and emerging trends, regardless of the synonym used, by accommodating varying vocabularies. Additionally, responses from teachers and lecturers are presented separately, providing room for comparison.

As you can see from the results, the pattern most common is the view of creativity involving something original, unique, individual, novel or new, with 'new' accounting for 7/16 mentions. Closely following, is opinions of creativity being linked to a 'thinking outside the box' approach, which accounted for 5/11 mentions. Aside from the 'adaptable,' and possibly the 'innovative' groups, all others are not inherently linked to a positive product or achievement, arguably sharing under currents to description of rather a process or approach. However, although there is majorly consistency throughout in regards to correlation of answers provided, only one of the lecturers explicitly put forward the term as being a thought process or the use of imagination (Table 2).

The same process of tabulating results where possible for quantification was then applied for the first section of the results for question 3. Once again, teachers and lecturers were separated for comparison. The quantified results in

Question-naire - Q1.	Mentioned in Q1-Teachers	Mentioned otherwise-Teachers	Mentioned in Q1-Lecturers	Mentioned otherwise-Lecturers	Total
Innovative	2	0	1	0	3
Challenging tradition /Outside the box/Risk Taking	3	1	4	3	11
Original /Unique /Individual /Novel /New	5	2	5	4	16
Adaptable /Flexible /Survive	2	1	1	1	5
Different	1	1	2	2	6
Thought process	0	0	2	1	3
Experimentation	1	1	1	1	4
Imagination	0	0	2	3	5
Behaviour /Attitude	1	1	0	1	3

Table 2. Result from Questionnaire Q1

Questionnaire - Q3.	Teachers (8)	Lecturers (4)	Total
Creativity is an innate ability, some are born with	4	0	4
Creativity is a capacity all are born with	4	4	8
Creativity can be taught/developed	7	4	11

Table 3. Result from Questionnaire Q3

Table 3 show clear disagreement in creativity being seen as something those who possess it were born with and it being seen as a potential within all humans in the responses from teachers. Comparatively, all lecturers held the opinion of creativity as a capacity within all. Furthering review, all bar one respondent agreed with the possibility of creativity being taught or developed. Many expand on their response, highlighting the key role of a student's environment as a deciding factor for such learning and development. One lecturer goes as far as to provide the metaphor of creativity being like a 'muscle,' implying potential for strengthening and growth through correct exercise, with another claiming all nature itself is creative, as it must be to survive.

Question 4 seeks findings of a completely qualitative

nature, therefore removing opportunity to quantify and tabulate. However trends and pattern did arise, revealing common methods for catering for creative students whilst working alongside a set syllabus. 5/8 of the respondents who were teachers, along with 1/4 who were lecturers comment on allowing relative freedom of individual expression on a project to begin, promoting confidence and increasing interest of the student, which they then work on refining to meet the criteria of the syllabus. Another trend arose, with 2/8 teachers and 2/4 lecturers mentioning suggestion and encouragement to go beyond the set project, asking questions that aim to entice imaginative responses, and build confidence in conviction and risk taking.

Question 5 prompted respondents into viewing themselves as creative in their teaching, hoping to encourage confident description of teaching methods they use and believe to be an expression of this. Strong trends surfaced, deeming need for adaptability in regards to the use of 'different' methods for varying student personalities to be the paramount approach when teaching creatively. This was explicitly mentioned by 2 from each group. Arguably, this was further supported by repeated mentions of using a range of tasks and technologies to effectively deliver the subject to all students, engaging the rational, logical, kinetic, and visual learners. One teacher suggests challenging a student's ideas and understandings is their own way of teaching creatively as through this they claim it can 'open their thinking,' relating back to the recurring definition in question 1 of creativity as 'thinking outside the box.' In contrast, one of the lecturers stands in complete disagreement to the opening statement of the question ('All teachers are creative, they have to be'), stating their teaching methods are not creative, rather 'tried and tested.' Furthermore, they offers advice, articulating the need to 'not confuse being creative with creative teaching.'

4.2 Interviews

Three interviews were conducted with a participant from each of the 0-3, 4-7, and 12-15 years of experience category in the hope to determine whether or not differences in understandings and methods used may have subsequently been effected by level of national interest at the time. All three were males, had previously worked in an industry related to D&T, and now taught the subject in Key Stages 3 and 4, alongside teaching Product Design at A level. Participant 1 (12-15), had a degree in product design and previous career background in engineering. Participant 2 (4-7), had a degree in product design and previous career background in a variety of design disciplines, having also lectured product design for 2 years at the University of Leeds. Participant 3 (0-3), had a degree and previous career background in architecture.

Question 1: posed the question of whether or not Design as a subject on the curriculum actually allowed students to be creative.

Participants 1 and 3 expressed similar opinions on programmes of study in Key Stage 3, being restrictive toward creative teaching and output, as they stemmed from more of a theoretical base, covering a broad range of areas in the subject. Participant 3 comments on how this directs the curriculum away from creativity and toward a 'factual and informative' process. Participants 1 and 3 continue in agreement, explaining how Key Stages 4 and 5 allow 'greater opportunities to be creative' as projects 'come from the individual,' giving them 'ownership' of the project. The two provide further response, stating they do believe design allows for creativity, with the OCR syllabus offering many marks when exercised. However, Participant 3 goes on to say, teachers gain a sense of 'fear' in these stages, as lack of control over these freedoms often reflects badly in academic performance, therefore the process is often diverted back towards 'box ticking.'

Comparatively, Participant 2 makes no comment on the curriculum itself, nor a set syllabus, instead he reports on how although programmes of study do make creativity sound 'exciting,' it only concerns its ability to produce results and products that may contribute economically to the country, rather than creating an 'environment for creative pattern of thought and opportunity.' He continues, noting that design as a subject, is a template, open to interpretation of institutional management, who often show little interest, therefore 'falter[ing]' the nurturance of their students creativity.

Question 2 (i): invited participants to expand on such views in regards to increasing involvement of creativity in the curriculum, and how this may have effected their opinions through time:

Participant 1 responded by claiming that involvement in Key Stage 3 had 'majorly stayed the same,' providing base knowledge to be used later on, yet believes it has been 'increased and encouraged' in Key Stages 4 and 5. Participant 3 believes little change has occurred although there does 'appear to be a shift in this direction.' Participant 2, once again, gives response from a completely different angle, explaining how his generation grew up in the era of the Keele Project, which focused on how to effectively produce designers. He continues, suggesting that it is due to this generation now being in influential positions, that such attempts to develop these skills are being revisited and perceived with upmost importance.

Question 2. (ii): probed deeper into this area, seeking examples of how each participant has adapted to such changes:

Participant 1 details the use of new technologies such as interactive white boards, flip-boards, etc., within his teaching, expanding methods for delivery to cater for the 'modern student,' although he does point out that the content delivered is majorly the same. Participant 2 states he feels that during his time teaching, nurturing creativity has become increasingly difficult, as the time that is needed to do so is often supressed to ensure the completion of recording statistics, facts and figures to increase academic success. He believes that this reason is what is 'holding back the development of many students.' He remarks that this is a drain on a student's energy, leaving them unfit to thrive in an exercise driven by levels of relaxation and mood. Countering this however, he explains how he has 'adapted by being selective and tries to outwit the system.' He expands on how he does this in his response for Question 2.iii. Participant 3 gives little in response, explaining how he 'attempt[s] to encourage creativity,' which he has found becomes futile as academic success is favoured.

Question 2. (iii) raised the issue of how to cater for creative students in the classroom whilst meeting the demands of the syllabus:

Participant 1 takes the approach of promoting independence through beginning a project with students having free reign on choice of idea. He explains how this will result in enthusiasm as the student chooses a subject of interest, which is the only way a student can be at their most creative. Once a direction is taken, he begins to 'stretch' their ideas and opinions in order to develop refinement of how such a solution would work. Participant 2, gave a similar answer, as he provides extra opportunity during his personal time, for outside work and development, where he questions the student's work, making suggestions and links to the wider subject area, to better round them with a broader knowledge for ideation of appropriate solutions. Participant 3 bases his answer on marking the work of a creative student, re-emphasizing how he encourages creative effort, and rewards students who have shown this by taking risks through their design process, rather than exclusively marking the end product.

5. Discussion

5.1 Defining Creativity

The literature review began by stating the NACCCE's (1999) ambiguous description of creativity, which can be viewed as closer related to purposeful process with some value in the outcome, than simply product of high achievement. They perceive 'originality' and 'value' as 2/4 equally accounting factors embodied within creativity, acknowledging the subjective nature of evaluating this, yet fail to outline how 'value' of produce will be determined fairly. Following this, they say 'creativity is obviously to do with producing something original.' Studies from this project found close relation, as grouped synonyms of the word 'original' governed respondents' definitions of creativity, yet neither the NACCCE, respondents or dictionary definitions of the words in the synonym group explicitly mention level of achievement of the outcome.

Branching arguments, focused on if originality was concerned with being new in the eyes of the creator(s), or new to human thought entirely. Baer & Kaufman (2012) and Pope (2005), support the former, agreeing that as long as the product meets previously set conditions, it is creative. Some of the results found, were supportive of this view,

revealing respondents linked creativity to adaptation, flexibility and survival, each closer related in definition to recreation than creation. However, once again, there is no definitive process in determining how well conditions are met or differentiating between what it is to survive and what it is to thrive. From these results, opinions of creativity being only a process or product of original human thought can be ruled out.

Montouri's (2014) view of assumption and expectation as 'boundaries' likely to be broken when creativity ensues, was too found to have recurring support, with respondents repeatedly referencing creativity as 'thinking outside the box' or 'risk taking' by 'challeng[ing] tradition.' Continually, no indication of product or product value is made; suggesting definition resides in the area of process. Despite this, only one respondent distinctively expressed such words, possibly implying Gilchrist's (1972) definition as a 'potential' being the better suitor, as the majority of respondents agreed creativity is a capacity all possesses.

5.2 Creativity in Education

Fromm's (1959) views of awareness to experience and intercontextual links were found to be determining factors in such a potential being realised, possibly explaining the frequent view of why creativity seems to be more apparent from one to another. Results from all lecturers supported this angle of opportunity for growth to be common in all humans, yet a clear divide in teachers' opinions was found, as half believed it was a talent only existent in some, reinforcing openness to interpretation. It was further established that all bar one respondent (who cannot be included, simply as a response was not provided), believed in the capability of creativity being developed. Bearing in mind to develop means to 'improve' or 'advance,' Castro-Fajardo, et al. (2014) comment of childhood being a 'golden age' of richness in creative behaviour, would imply amplification throughout schooling if educational institutions actually developed creativity. However, it was found that, Sternberg & Lubart's (1999) suggestion of such behaviours receiving incremental suppression once children enrol into a school, was supported by teachers, claiming they struggle to encourage students to 'think outside the box' whilst the syllabus requires them to 'draw inside lines.' Arguably, this may be the case when considering Baer & Kaufman's (2012) remark on necessity of substantial knowledge to express creativity in a given area, presenting the issue of schools needing to provide sufficient education into multiple areas to ensure they cater for each individual. Research findings outlined opportunity for individuality to be regarded as highly important, yet agreed with Ausubel's (1964) consideration of current approaches to do so as 'unrealistic,' as demand for higher grades, seemingly achieved through quantity over quality approaches, restricted this.

Expanding further, respondents predominantly held the understanding of creativity being domain- specific, as opposed to common institutional understanding as being domain-general, a system suggested to be detrimental towards individual actualization (Abra & Abra, 1999). Acknowledging this, the ability to adapt methods of teaching to meet the differing needs of students was repeatedly emphasized itself as being creative by respondents, aligning with Cropley (1999) and Ekvall's (1996:122) advice to realise the importance of correct environment and climate. Opinions in the findings further expressed that when such a median is found, students will gain confidence in themselves and their work, with increased levels of interest, inducing progression in self-development. Extensively, support for Cropley's (1999) warning that failure to categorize this as academic success and not awarding marks appropriately, often lowers student confidence in creative expression, surfaced as being a present reality viewed by multiple respondents. However, this should not be equally assumed of all institutions, as majority of respondents were from the same workplace, and it is widely recognized in both this study and others, that approaches to education and to what extent areas are valued often varies.

5.3 The role of design as a subject in allowing an expression of creativity

As previously mentioned, it is said that to be creative, and indeed acquire expertise, 'general pre-conditions' concerning relative knowledge to the subject are fundamental (Casakin & Goldschmidt, 1999). This reason is a likely justification for Key Stage 3 programmes of study to

have been deemed restrictive in content by participants, as well as The Department for Education UK (2013) stating the intent for the subject to expand the students 'repertoire of knowledge.' Later findings revealed it was majorly agreed that Key Stages 4 and 5, through allowing students choice in project, did provide some space for creativity, but was viewed as limited and enigmatic, provoking 'fear' into those who ventured in, as they could risk gaining academic success when pursuing a project with uncertainty. One participant describes this as being the result of poor judgement from society, as its main concern is proven economical contribution, overlooking the benefits of an environment which nurtures creative thought, due to its irregularity. Such speculation refers back to Cropley's (1995) point of design students being taught how to efficiently navigate machines, but lack awareness and experience in successful design process, undercutting The Department of Education UK's (2013) aim to produce creative solutions for 'real and relevant problems.'

Participant response goes on to coincide with Rutland's (2004) claim that D&T departments contain unenthusiastic teachers, as it was found that the management of institutions often have 'little interest' in anything other than academic results, downplaying developments in the subject syllabus and methods of delivery as content remains generic. Such findings could explain McLellan & Nicholl's (2008:4) data revealing a significant amount of teachers disregarding projects in D&T that lack clarity, as participants in this study felt pressured into 'ticking [criteria] boxes,' and consequently believed this held back their students.

Recent updates saw The Department for Education UK (2014) state that grade descriptors would no longer be 'opaque,' yet participants disagree in this being materialized. Klein & Shragai's (2001) highlighting of the need for increased support in process and experience does not seem to have been actualized either, as one participant openly admits to having to 'outwit the system' in order to effectively promote independence, build confidence and increase enthusiasm to better round them as a proficient designer. Similarly, it was found that another participant in agreement of the need to implement such

support, practiced this by awarding fair marks for creative effort rather than exclusively to outcome.

6. Overview

Both primary and secondary research further reinforced the fact that creativity is ambiguous in exact definition due to varying individual interpretation. However, relative themes do arise when investigating perceptions, some of which were given support through findings in this study, allowing for easier understanding and comparison. Despite this, words put forward from both theorists in the literature review and respondents of this project's study, were usually unclear in their own definitions, and subjective to the concerning individual. Mystery continued, as uncertainty and conflict was apparent in the process, product or both debates, with considerable theory supporting each angle. Once again, it is an arguable view, but perception of creativity as a process was found to be prevalent, supported by much current literature, studies results, and the author. Furthermore, some of the chosen wording, along with the context in which it was used, often contradicted that of another opinion, which illustrated the dangers surrounding the expression of creative behaviour from an individual with an opinion that opposes the opinion of their external environment. As a result of this, although many associations were clarified as common thought, research failed to find a majority view, leaving the term indefinite.

The evidence majorly found creativity to be seen as a capacity within all, which had a variety of techniques available in order for it to be enhanced, yet it was put forward that current educational systems have failed to administer such processes. Considering this, it cannot be overlooked that core knowledge and skill is needed to work in a field effectively, before creativity can be exercised. It was found that institutions are believed to have misjudged this, hoping to teach creativity through a syllabus and mark it against a fixed criteria, rather than teaching skills followed by furnishing an environment where individuals and creative expression may flourish. The author would be in support of such a portrayal, as personal experience was reflective of such dictatorship over the enjoyable freedom of what creative expression should be. It was

communicated that too much focus is placed upon end results equating to academic success, misinterpreting the process of development as a constant throughout creative behaviour. Furthermore if all work is marked against a set criteria of what is known or expected, and something completely new, but unproven is submitted, effective assessment cannot be completed if it is against preconceptions of the former, restricting academic success to only what is already known.

In the lower Key Stages such restrictions are appropriate, as knowledge and skill must be attained through strict and efficient practice, yet it appears institutions forget that this is not the be all and end all. Continuum of such systems into later academic life however, is inappropriate, as doing so incapacitates provision of an environment with opportunity for individual creativity. This then is the reasoning for production of merely 'capable' designers being ill-equipped and slow in discovering opportunity for social or economic leaps, which are, as Gilchirst (1972) says, usually realised and applied by creative individuals. This appears to be due to misinterpretation and ineffective approach towards the development of creativity on behalf of the institutions, as it was found students do not perceive D&T projects as having substantial freedom for pure creativity. If so, then it will require insightful change, understanding that it is the students' perception that is paramount, as only once their needs are met, and they are comfortable and interested in meaningful challenges set, will they generate and realise clever solutions and become creative designers.

Conclusion

Concluding this study, understandings of creativity have been established to be broad in range between individuals, with some opinions opposing others, yet a sense of mystery can be said to still surround the word. This is apparent even between directly linked parties such as The Department for Education UK, its educational institutions and their teachers. It was found that the curriculum does show intent to nurture creativity, but due to it and the set syllabus' interpretations being different to that of many teachers and their students, they currently appear to be failing to accomplish this. Much of the research indicated

that creativity is closer linked to process than product, and therefore project process should be celebrated as academic success, understanding that the key development of such a prowess lies within support, guidance and opportunity. Although D&T as a subject and programme of study appeared to be struggling to actualize this, it had clearly gained the recognition of some design teachers, who took the initiative to step ahead of the curriculums current misjudgements, informing students of the need for experimentation and awareness to experience in order to enhance their creative abilities.

Recommendations for Further Work

A topic such as this has much room for further study and investigation, with key considerations to be given to vague areas found within this project. Lack of variation and quantity stifled reliability in this study, something which should not be repeated in any further studies that wish to have clarity and significant credibility in conclusions. Ethically, it was neither appropriate nor practical for this study to work closely alongside children studying the subject of design at each Key Stage, however this should be an approach to be contemplated, as student perspective on a subjective element of their education will provide important insight and depth for further analysis. Furthermore, additional methods or research practices such as creative activities may offer alternative viewpoints to analyse from and compare against questionnaires and research.

References

[1]. Abra, J, & Abra, G. (1999). Collaboration and competition. In M. A. Runco & S. R. Pritker (Eds.), *Encyclopedia of Creativity,* 283-293. San Diego: Academic Press.

[2]. Ausubel, D. (1964). Creativity, General Creative Abilities, and the Creative Individual. *Bulletin of the Council for Research in Music Education,* 1(3), p.i-v.

[3]. Baer, J & Kaufman, J. C. (2012). *Being Creative Inside and Outside the Classroom.* Rotterdam: Sense.

[4]. Casakin, H. & Goldschmidt, G. (1999). Expertise and the use of visual analogy: Implications for design education. *Design Studies,* 20(1), 153-175.

[5]. Castro-Fajardo, L., E., Santamaria, A., Bernal-Hernández, K. L. & García-Cepero, M. C. (2014). How Do Educational Professionals Understand Creativity? A Study of the Implicit Theories on Creativity in A Sample of Educators. *Journal for the Education of the Young Scientist and Giftedness,* 2(2), 41-48.

[6]. Cohen, D., & Crabtree, B. (2006). *Qualitative Research Guidelines Project.* Retrieved from http://www.qualres.org/HomeInte-3516.html

[7]. Cohen, L., Manion, K. & Morrison, K (2011). *Research Methods in Education,* 7th Eds. London, Routledge.

[8]. Commonwealth of Australia. (2008). *Report of the Australia 2020 Summit Creative Australia.* Canberra: Department of Prime Minister and Cabinet.

[9]. Cropley, A. J. (1995). Fostering creativity in the classroom: General principles. In M. Runco (Ed.), *The Creativity Research Handbook* (Vol.1), Cresskill, NJ: Hampton Press.

[10]. Cropley, A. J. (1999). Education. In M. A. Runco & S. R. Pritker (Eds.), *Encyclopedia of Creativity,* 283-293, San Diego: Academic Press.

[11]. de Vaus, D. A. (1986). *Surveys in Social Research.* London: Allen & Unwin.

[12]. Deci, E. & Ryan, R. (1985). *Intrinsic Motivation and Self-Determination in Human Behavior.* NewYork: Plenum.

[13]. Denzin, N. K. (1978). *Sociological Methods.* New York: McGraw-Hill.

[14]. Department for Education. (2013). *Design and Technology Programmes of Study: Key Stage 3.* Retrieved from http://www.nationalarchives.gov.uk/doc/open-government-licence/

[15]. Department for Education. (2014). *D&T National Curriculum for England 2014.* Retrieved from https://www.data.org.uk/for-education/curriculum/dt-national-curriculum-for-england-2014/

[16]. Ekvall, G. (1996). Organizational climate for creativity and innovation. *European Journal of Work and Organizational Psychology,* 5 (1), 118-123. Retrieved from http://www.academia.edu/673511/Organizational_climate_for_creativity_and_innovation , [accessed on 19/03/15].

[17]. Feldman, D., Csikszentmihalyi, M., & Gardner, H. (1994). *Changing the World.* Westport, Conn.: Praeger.

[18]. Findeli, A. (2001). Rethinking Design Education for the 21st Century: Theoretical, Methodological, and Ethical Discussion. *Massachusetts Institute of Technology Design Issues,* 17 (1), 5-10.

[19]. Flick, U., von Kardoff, E., & Steinke, I. (Eds.). (2004). *A Companion to Qualitative Research.* London: Sage Publications.

[20]. Fromm, E. (1959). The creative attitude. In H. H. Anderson (Ed.), *Creativity and its Cultivation.* New York.

[21]. Gardner, H. (1983). *Frames of Mind: The Theory of Multiple Intelligences.* New York: Basic Books.

[22]. Ghiselin, B. Taylor, C. & Barron, F. (Ed.), (1963). *The Creative Process and its Relation to the Identification of Creative Talent.* New York: Scientific Creativity.

[23]. Gibbs, G. (2007). *Analysing Qualitative Data.* Los Angeles: SAGE Publications.

[24]. Gilchrist, M. (1972). *The Psychology of Creativity.* Melbourne: Melbourne University Press.

[25]. Glaser, B. & Strauss, A. (1967). *The Discovery of Grounded Theory.* Chicago: Aldine Pub. Co.

[26]. Golafshani, N. (2003). Understanding Reliability and Validity in Qualitative Research. *Qualitative Report,* 8(4), 597-606.

[27]. Guilford, J. P. (1950). Creativity. *American Psychologist,* 5(9), 444-454,

[28]. Klein, N. & Shragai, Y. (2001). Creativity and the design approach: A proposed module. *IDATER Conference,* Loughborough, Loughborough University.

[29]. Lafci, D. (2009). Drama and the Enhancement of Creativity: A Review of Research. In Crouch, C. (Eds.)., *Subjectivity, Creativity, and the Institution,* Boca Raton: Brown Walker Press.

[30]. McLellan, R. & Nicholl, B. (2008). The importance of classroom climate in fostering student creativity in Design & Technology lessons. In Norman, E.W.L. & Spendlove, D. (Eds.), *The Design and Technology Association International Research Conference.* Wellesbourne: The Design and Technology Association, 29-39.

[31]. Mead, G. H. (1964). *On Social Psychology.* Chicago: University of Chicago Press.

[32]. Montouri, A. (2014). Educating for Creativity, World Futures. *The Journal of New Paradigm Research,* 70(5-6), 338-342.

[33]. N.A.C.C.C.E. (1999). *All our Futures: Creativity, Culture and Education.* London: DfEE.

[34]. Pope, R. (2005). *Creativity.* London: Routledge.

[35]. Popkewitz, T. (1984). *Paradigm and Ideology in Educational Research.* London: Falmer Press.

[36]. Robson, C. (2011). *Real World Research,* 3rd Ed. West Sussex: Wiley and Sons.

[37]. Rutland, M. (2004). *DATA International Research Conference 2004 on Creativity and Innovation.*

[38]. Sternberg, R. & Lubart, T. (1999). *Handbook of Creativity.* Nueva York: Cambridge University Press.

[39]. Thomas, G. (2009). *How To Do Your Research Project.* Thousand Oaks: SAGE Publications Ltd.

[40]. Torrance, E. (1962). *Guiding Creative Talent.* New York: Prentice-Hall.

[41]. Tusa, J. (Ed.) (2003). *On Creativity: Interviews Exploring the Process.* London: Methuen.

[42]. Wallach, M. & Wing, C. (1969). *The Talented Student.* New York: Holt, Rinehart and Winston.

[43]. Yeomans, M. (1990). The Future of Design in Further and Higher Edcuation. In Thistlewood, D. (Eds)., *Issues in Design Education.* New York: Longman.

Appendix

Interview Questions

1. Mind-map what the word 'creativity' means to you.

2. In your own words define creativity.

3. Do you believe creativity is something we are born with or is it something which can be taught or developed? Please give reasons for your answer.

4. Do you believe Design as a subject on a curriculum, actually allows pupils to be creative or is it just a template?

5. How comfortable are you tackling challenges in which you have no expertise?

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