

Thesis submitted

in fulfilment of the requirement of

Doctor of Philosophy

Rekindling Creativity in the Key
Stage Three Classroom: Theory
and Personalised Playful Practice

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Abstract

Key terms: play, creativity, lesson-planning, adolescence, creativity measure, agency

Creativity has emerged as a key attribute for 21st century employability but developing creativity in UK secondary education remains a major challenge. This doctoral research addressed this problem using a three-phase approach: translating and validating a tool for creativity measurement; developing and evaluating teaching methodologies for enhancing creativity; and finally refining and enhancing a lesson planning and delivery system for larger-scale classroom implementation to enhance creativity through delivery of core-curriculum content.

In Study 1, the theoretically robust Italian Widening, Connecting, Reorganising (WCR) test was validated in English (WCR-E). A strong correlation between the WCR-E and the Test of Alternative Uses (TAU) supported the reliability of the new WCR-E. Administration time was less than 15 minutes, providing a fast and reliable measurement instrument.

In Study 2, two lesson-planning methodologies drawn from different pedagogical models were developed. Each was tested in a key stage three (11-12) classroom, paired with a control group matched by age and subject specialism, with data comprising school-generated pre and post attainment, WCR-E creativity measures and post intervention teacher interviews. Initial results indicated a large positive effect size gain in creativity for the play-based Pedagogy of Play (PoP) approach, while the heuristic based student focused (SF) approach, despite

demonstrating a very large decline in creativity, doubled the expected academic attainment.

In Study 3, a hybrid approach, Personalised Playful Planning (PPP) centred around pupil agency, was developed on the basis of both approaches and additional measures of academic self-efficacy included. 138 pupils (11-13) from three subject areas took part in this matched control study. A large positive effect size indicated that PPP enhanced creativity as well as raising attainment above predicted outcomes. Results indicated the new PPP methodology can effectively develop creativity and support attainment with minimal adjustments to teacher delivery and workload.

The original contributions to knowledge are threefold: the validated WCR-E, a short and easy to administer English language creativity measurement tool; establishing a link between adolescent agency and creativity development; and most importantly, a practical and systematic planning approach for secondary teachers that develops pupil creativity and subject attainment.

Personal Statement

Ten years spent teaching in the creative and performing arts in the UK afforded me the privilege of supporting the development of hundreds of young people and gave me a ring side seat in the curriculum changes that led teaching to be more prescriptive, teachers to be more stressed and data driven, and the arts and creativity to be systematically eradicated from secondary provision. A relocation to Denmark for family reasons led me to work at the International School of Billund where I was fortunate enough to be a participant researcher for a team from Harvard University developing the foundations of a new playful approach to teaching. While the methodology was working in the lower school, the academic rigour needed in higher order thinking and teaching were presenting some challenges.

As I planned for a return to the UK, I was able to reflect on the different characteristics of my Danish pupils when compared to their English peers. The Danish children at the school in which I taught were unphased by change or worried about making mistakes when working out a solution to a problem, and their solutions frequently surprised their teachers. This led me to hypothesise about possible connections between the playful approaches embedded at the school, primarily funded by the children's toy company Lego, and the creativity and resilience demonstrated by these young people. I became interested in the ways in which play might be embedded into secondary teaching and wondered how this might best be achieved within the tight prescriptions of the National Curriculum. An opportunity to develop a project based on creativity development for enhanced employability presented itself and this PhD came into being. I have

been able to share my passion for providing a creative learning experience with teaching professionals from diverse subject specialisms and enhance the understanding of planning as a medium to do more than deliver lesson content, but rather as a vehicle to inspire and engender change.

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“The only constant in life is change.”

Heraclitus, c.500BCE

1. Background, Aims and Structural Overview

The world is changing. Heraclitus recognised this in 500BC, and the pace of change is only increasing. The rate of change is governed by disruption to the norm, whether it is a global pandemic transcending borders, a technological breakthrough in connectivity or a localised policy or innovation. From a human perspective, adapting to this frequently rapid change is more than unlearning old ways but also involves creating new ways and understanding in terms of processes, behaviours and resources. It is this need that places creativity at the heart of the skill-set for the 21st Century, driving everything from employability to innovation, resilience, motivation, economic and personal wellbeing and even health (Parliamentary Office for Science and Technology, 2018). Creativity has, in fact, been described as the most important economic resource of the 21st Century (Florida, 2004).

Creativity finds its academic home in a variety of different fields from psychology to technology, with explorations in areas such as artificial intelligence, mathematics, linguistics, economics and science. In addition to scholarly pursuit of creativity as a construct, process or personality trait, creative outputs are celebrated in the arts, fashion and music, with various individuals hailed as a creative genius, ranging from Leonardo da Vinci (Simonton, 2008) to Lin Manuel Miranda (Rajczak-Nelson, 2018). Creativity is variously subjective, spontaneous, strategic, developmental, useful, solution-focused, output-dependent, process-driven or serendipitously generated. Creativity changes depending on age, purpose and place and is as multifaceted as the academic spaces it inhabits. Yet this elusive 'soft' skill is so vital for lifelong success, as change accelerates, that creativity must be developed in our next

generation – it is arguably as much a curriculum need as literacy or numeracy. The challenges inherent in developing this skill are embedded in the fabric of the elusive concept of creativity. This research explores the creative needs of the emerging workforce to identify the aspect of creativity most sought after and understand how best to enhance it. Furthermore, it intends to develop this skill by identifying educational opportunities to enhance it in young people in a supportive, engaging and yet systematic way and provide an effective measurement of the construct in this context to evaluate the success of an intervention designed to target this development.

1.1 Summary of Research Aims

This thesis has a threefold aim. From a creativity perspective, it explores the possibility of creativity measurement as it pertains to the development of creativity as a 21st Century employability skill. From a developmental perspective, it further explores the understanding of the links between play and creativity, particularly regarding a UK adolescent population. And from an educational perspective, it examines the development of creativity as a non-curricular skill through a focus on teacher planning, providing a roadmap for systematic approaches to developing this skill in pupils.

In order to do this, was necessary to validate, measure and evaluate an intervention aimed at changing the pedagogical standpoint of teachers in order to enhance the development of creative thinking skills in pupils alongside delivery of curriculum content. Promoting creativity by means of playful methodologies as part of formal curriculum delivery involves a substantive pedagogical shift. This then needs to be evaluated and expanded by measuring academic and creative effectiveness, ease of use, suitability and training effectiveness. Informed by existing literature, this research

develops an intervention to expand the planning methodologies and pedagogical outlook of teachers to enhance the development of creativity in the classroom in order to better prepare pupils for employment and rapid technological and societal changes. This intervention aimed to increase pupil creativity by allowing more play and self-determination in their learning, allowing them to take responsibility for their own learning and decision-making by being active participants in their own learning journey in a monitored and supervised way.

The three key overarching research questions that are addressed in this thesis each generate their own outputs. In seeking to understand if it is possible to develop a theoretically sound creativity measure that can be used in a secondary classroom setting, this research has validated the Widening, Connecting, Reorganising -English test of creativity (chapter 4). In examining the possibilities of developing a creative pedagogy that can be easily adapted by class teachers in a range of subjects, allowing them to teach their curriculum while adding value in terms of enhanced creativity development in pupils, this research has developed three teacher planning methodologies designed to enhance skills while supporting teachers in managing their workloads (chapters 5 and 6). And finally, in a quest to understand the relative effectiveness of these methodologies, evaluations were carried out, enhancing understanding of how creativity and also learning can best be supported through teacher planning as well as providing evidence for various additional factors that affect both (chapters 5 and 6).

These aims were explored within the setting of the UK secondary education system amidst the legacy of standardisation that remains prevalent. Three key areas of

creativity, play and education were examined through the lens of adolescent needs, to develop an intervention designed to target this skill, in this population and in this setting – with implications for educational practice more generally. This research has developed a systematic and theoretically sound approach to lesson planning and delivery, empowering teachers to enhance creativity while supporting curriculum delivery for the next generation. It does this irrespective of subject specialism, without placing additional burdens on teacher workload and while reassuring educators that core content delivery is secure and to support every teacher to be a teacher of creativity.

1.2 The Structure of the Research

This section provides a brief overview of the structure of the research project described in this thesis and provides links between the three separate studies as well as a brief preview of each chapter's content. In addition to an examination of diverse literature providing a background to this research, the experimental sections of this research encompassed three elements, namely: (1) the validation of a creativity measure; (2) the exploration and refinement phase; and (3) a larger-scale pre-post evaluation of the applied teaching protocol.

This research was conducted over a three-year period and took the form of three separate, stand-alone but related quasi-experimental studies that are reported as such in this thesis. Each study was informed by a specific literature review that stands as part of the study, in addition to a contextual literature review that forms a separate chapter. The structure of the research is visually represented in figure 1.1.

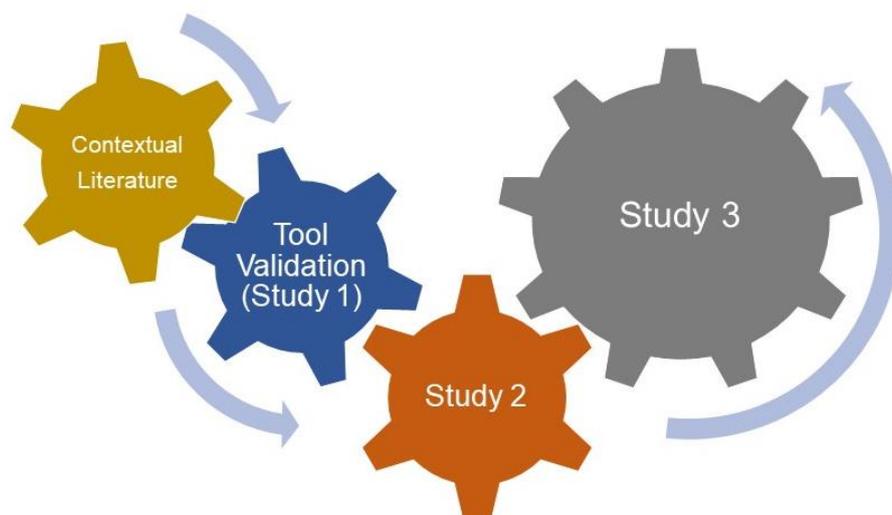


Figure 1.1 Visual representation of the structure of research undertaken.

The first key element addressed in this research is the methodological approaches taken when devising the research framework. The selection of the action research paradigm and the epistemological standpoints are discussed in chapter 2.

Once this had been defined and as illustrated in Figure 1.1, this research comprised four distinct phases. Phase one took the form of an initial contextual literature review to identify the diverse nature and need for creativity from a personal, social and economic perspective, concluding that creativity development could be most constructively addressed as part of the compulsory education program in order to ensure equal opportunities. This overarching literature examination then explored the current role of creativity in England's National Curriculum and the challenges faced from a historical and political perspective, and then examined the particular developmental requirements of the adolescent age group in accessing creativity. It then explored various educational interventions to identify potential problems and recommendations for successful implementation. The investigation concluded with an

examination of the link between play and creativity as a medium for enhancing creativity development. The review of literature focused on the areas shown in Figure 1.2 and is reported in chapter 3.

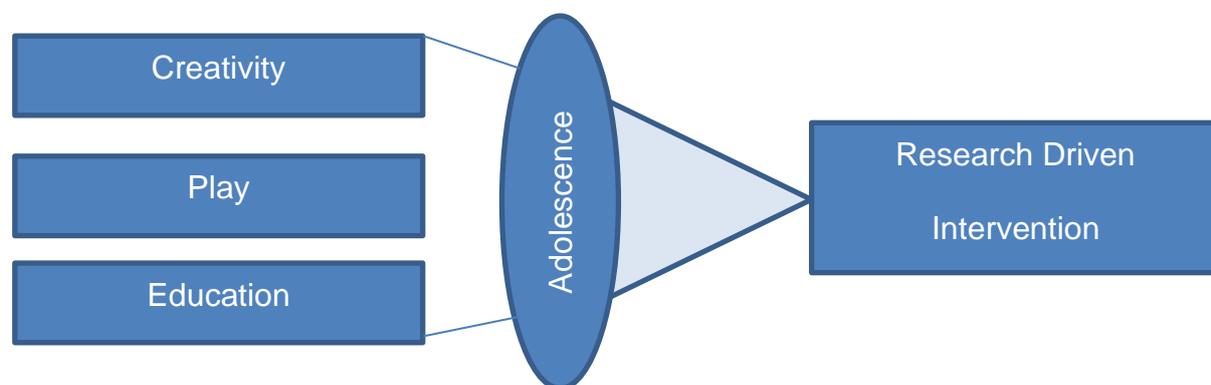


Figure 1.2 Visualisation of background literature focus.

Phase two of the research was the first of the three stand-alone investigations, and it explored the process of selection and validation of a creativity measurement tool that would be suitable for use in the next two phases. Phase two is reported in chapter 4 which describes the identification and selection of the Italian Widening, Connecting, Reorganising (WCR) test of creativity from a theoretical perspective and the procedures undertaken to translate and validate this tool in an English-speaking population. It also explores the relationship between different theoretical backgrounds and provides details of research conducted to develop this tool for use in English as a transformation into the Widening, Connecting, Reorganising-English (WCR-E) testing tool.

Phase three was the first of two quasi-experimental, classroom-based studies in which underlying theoretical and pedagogical principles of play were used to develop a teacher planning method intended to enhance creativity development in an adolescent population and within an educational setting. Chapter 5 describes the development of

the two intervention strategies employed (Pedagogy of Play (PoP) and Student Focused (SF)) which came from two separate theoretical backgrounds. It also outlines the development of materials and training for the intervention strategies and describes the delivery of the intervention. In addition, it evaluates pre and post intervention data on attainment and creativity within the two intervention groups, as well as in a controlled Typical Teaching (TT) group which received no intervention. The data from this study 2 was then analysed and examined for insights. This study was primarily intended to establish testing protocols and to evaluate training and implementation strategies for use in the next phase of the research.

The fourth phase of investigation was the final experimental phase that revised and developed the procedures and protocols used in phase two by examining the data generated in that study. Chapter 6 describes the procedure for using that data to refine and enhance the interventions into an additional hybrid approach of Playful Personalised Planning (PPP). It further details a six-week quasi-experimental implementation of the three interventions (SF, PoP and PPP) alongside matched Typical Teaching (TT) groups from the same age groups and subject areas. It explores the data analysed using two different statistical methods to evaluate the effectiveness of the interventions and explains the outcome, describing key links and similarities between them.

Chapter 7 summarises the research findings and discusses implications beyond this investigation. It suggests further steps that may be undertaken to deepen theoretical and practical understanding of the role of language in creativity testing, the function of teacher planning as a medium for developing non-curriculum skills and the

understanding of the links between play and creativity to enhance development of this
21st Century employability skill.

2. Methodological Approaches

This chapter explores the methodological standpoint from which this research was planned and undertaken and the process that was embarked upon over the course of the three years. It describes how the original contribution to knowledge of creativity testing theory and measurement tools as well as the planning intervention to foster creativity development was investigated, selected, tested and evaluated and the methodological processes through which reflection and improvements were identified.

2.1 Education Action Research Paradigm

Research undertaken with children, especially in educational settings, frequently takes the form of action research. As a process, this is commonly traced to the work of Kurt Lewin and the Frankfurt School of critical theory (Cohen, Manion, & Morrison, 2018), which places emphasis on the social participation and empowerment function of research. The role of the reflective researcher informs a spiral deriving from Lewin's work and demonstrates an awareness of the relationship between the process and the environment in which it occurs. This spiral typically involves four key continuous key stages, namely planning, action, observation and reflection (Cohen et al., 2018; Lewin & Gold, 1999; McNiff & Whitehead, 2000).

Action research, which by its very nature is applied research (Sagor, 2000), extends to all fields where monitoring and quality control are important. From a more academic perspective, a desire to contribute to the existing knowledge base and a requirement of commitment to intentional action and rigorous monitoring underpins and stimulates

the process. From an epistemological perspective then, action research combines both the rational approaches of framing the question and identifying the problem, as well as the empirical data gathering and evaluation that then cycles back on itself to re-evaluate the impact of the new information to addressing the question. Research with early adolescents focusing on developing creativity in tandem with delivering curriculum knowledge must, by definition, be undertaken in educational settings i.e. in schools. In research where the impact is intended to be measured by creative thinking development in adolescents, this monitoring is vital for ethical purposes as pupils' academic outcomes must be carefully observed to ensure there is positive academic progress being made in line with expectations. The close monitoring and reflection on the processes involved as well as the outcome that is a key component of the action research paradigm, makes it useful for employment here.

The specific aims and purposes of this creativity enhancing action research process are:

1. Evaluation of current standpoints and outcomes
2. Exploration of training and processes
3. Monitoring and evaluation of creative thinking in pupils
4. Monitoring and evaluation of impact to academic achievement in pupils
5. Monitoring and evaluation of impact to teacher workload and perception of benefit

These aims give rise an interconnected process that flows through the action research spiral as defined by McNiff and Whitehead (2000) as it moves through planning, execution and evaluation. For the outline of this research there are four key phases, each with their own spiral that sit both integrated with and part of the larger action research spiral. For clarity, this is depicted graphically in figure 2.1.

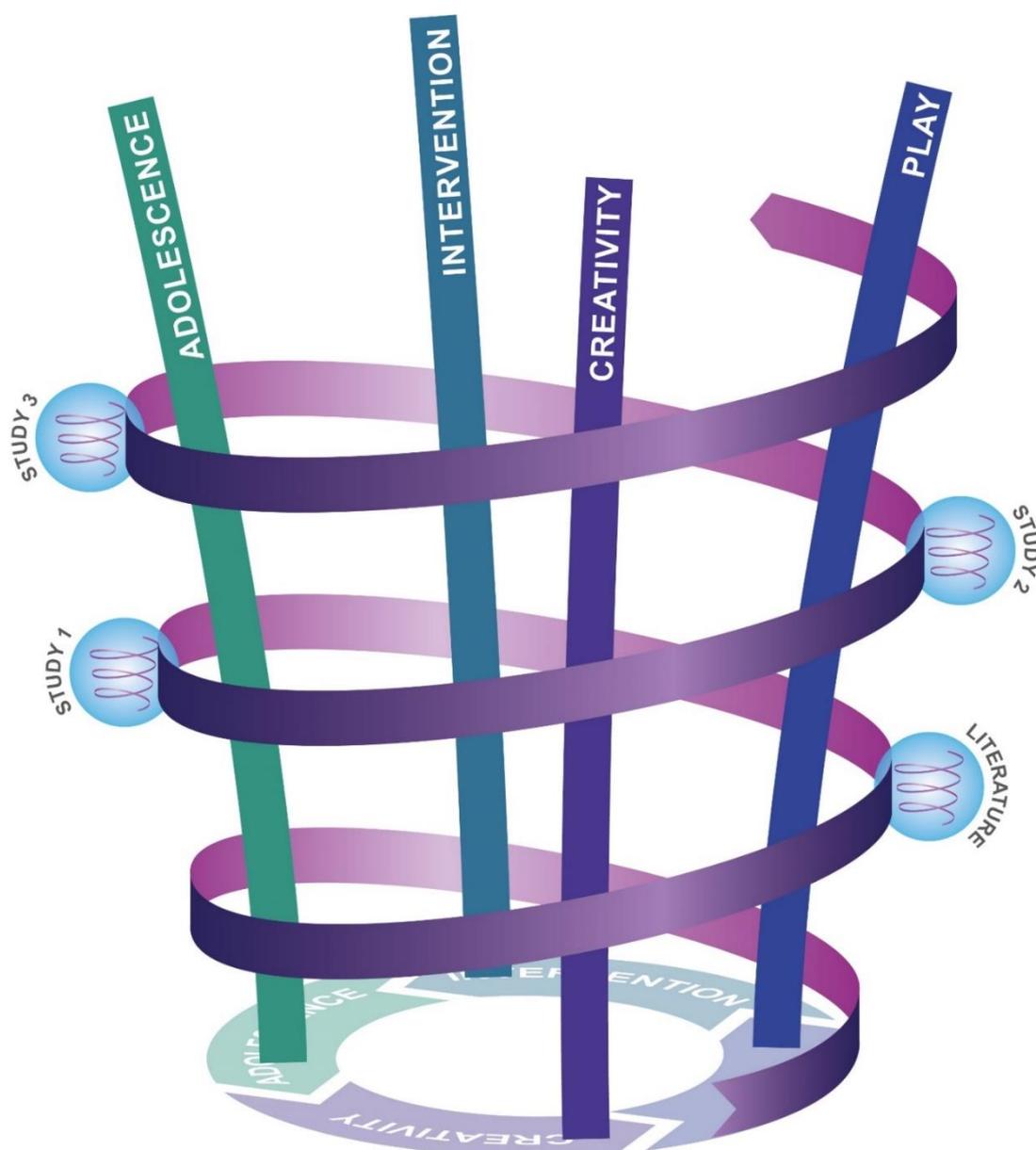


Figure 2.1 Action Research Spirals for this research

Figure 2.1 attempts to capture the interconnected characteristics of this research. The four informing principles that underpin the project are those of creativity, play, educational interventions, and adolescent environmental and societal needs. Broadly speaking, there are four key pillars that run vertically through the research, that of existing knowledge, creativity measurement, intervention development and reflective evaluation.

2.3 Methodological Selections

This section describes the methodological and epistemological standpoint of this thesis and reflects on the selection of analysis methods and approaches for the data.

2.3.1 Methodology

This thesis broadly takes a quasi-experimental, mixed methods approach in the experimental chapters gathering and analysing both quantitative and qualitative data. The approach is not strictly experimental as the groups engaged in this project are volunteered by the recruited teachers and set according to school grouping protocols. This in turn means it is not possible to implement the random assignment that would be expected in a fully experimental model.

2.3.2 Quantitative elements

In order to facilitate the empirical evaluation to assess whether there has been any improvement in the development of creativity, quantitative data in the form of creativity test scores is gathered at pre and post intervention points and analysed to determine effectiveness of the intervention with regards to creativity development. Attainment data is also collected at these two points for the purpose of monitoring attainment from an ethical perspective, to ensure that all students continue to make a minimum of

expected progress. In addition, pre and post intervention attainment data will be analysed and compared to determine whether there is any academic effect in addition to the targeted creativity. The second experimental study also gathers self-reported academic self-efficacy scores and makes comparison at pre and post intervention points to investigate if the planning methods were impacting more general pupil academic self-efficacy.

The methods of analysis in the experimental studies follow two approaches: the first study with three groups (an experimental Pedagogy of Play (PoP) planning group, an experimental control Student Focused (SF) planning group, and a non-intervention control group with Typical Teaching (TT)), which was analysed using a 2x3 ANOVA to compare the outcomes at both pre and post time points across the three conditions. The second in which more variables were included, examined different measurable factors influencing the outcome and employed a combination of paired ANOVAs and then a more complete multilevel modelling analysis to investigate the influences of each factor on the others.

2.3.3 Qualitative elements

Based upon the literature (chapter 3), as well as researcher experience as a teacher, several issues discourage adoption of new interventions in teaching situations. Gathering teacher input and stakeholder experience was vital to the planning and delivery of the intervention as they were the means through which change was being affected. As the research questions were formulated through personal experience of the learning environment in UK secondary schools, as well as an examination of the literature, the purpose of the qualitative element of this research was primarily to gather teacher input into improvements, implementation, key issues such as workload

and training methods and academic impact. As the focus of the interview was to gather teacher insight into implementation, outcome and training of the initiative, a semi-structured interview process was selected with questions derived from these themes identified from the literature as defining barriers to implementation, and also to refine and enhance the training and interventions.

The perspective of teacher stakeholders was of vital importance in this research in order to promote teacher buy-in (Pinkelman, McIntosh, Rasplica, Berg, & Strickland-Cohen, 2015) and ensure the pedagogical perspective was practical and protective of teacher time (Galton, 2008). The semi-structured interviews focused on three key areas: the efficacy and quality of the training given in each planning approach, the engagement of the pupils with the lessons and the teacher professional opinion of the method, with a highlighted area of impact to teacher time. In addition to these areas, data was gathered on how well the teachers adhered to the methods set out in the training in order to gain quality control assurance for the study. The interviews were conducted in schools by arrangement and recorded and transcribed as part of a deductive thematic analysis (Braun & Clarke, 2006; Nowell, Norris, White, & Moules, 2017) This approach was selected as it would enable key questions around identified themes to be pursued while allowing teachers to expand on their own opinions and follow up questions around key themes to be generated.

While thematic analysis has come under some criticism as it is a step involved in many different types of qualitative analysis (Nowell et al., 2017), it is also a method of analysis in its own right where the researcher, as in all qualitative approaches, becomes the instrument of analysis. It identifies, organises and analyses data from interviews and allows the researcher to gain insights into the topic. In this case the

process of applying thematic analysis to the interviews, whereby the semi-structured themes informed questions intended to elicit responses on the key issues for interventions in schools and the teacher's responses, allowed a thematic list to be generated for each intervention and then compared and evaluated to identify key issues, along with the qualitative analysis that examined efficacy. Application of the process as advocated by Guest, Greg, McQueen and Namey (2012) indicates that the themes and codes are identified, consolidated, and refined and can be used to compare between settings as well as to enhance a mixed method approach which is how it has been employed in this case.

2.4 Structure

The research undertaken took the form of three distinct, stand-alone experimental studies, the first taking place with undergraduate students, and the two main studies with Key Stage 3 (KS3) pupils (aged 11-14 years old) at a participating secondary school. Each study forms its own chapter and is reported separately with specific methodological details, an exploration of the data – both quantitative and qualitative – and a discussion of the findings examined and feeding in to develop the next phase of the action research spiral (Figure 2.1). The final chapter of the thesis discusses the broader findings of the research and the original contributions to knowledge, both practical and theoretical.

The next chapter examines the different aspects of the literature in context allowing for the different elements of this research to be drawn together.

3. Contextual Literature Review

This chapter offers a broad overview of the literature relevant to this project, providing a broader context for the overall aims of this research. It explores creativity from the dual perspectives of employability and education and identifies commonalities between creativity and play. It explores past and current understandings of creativity research, accepted definitions and frameworks, and examines how this relates to the type of creativity identified as a key employability need. Developing this skill in young people then becomes the focus and the legacy owed by western education systems to the industrial revolution is described. How to explore the development of this 21st Century skill against the backdrop of an education system rooted in the 19th Century is then discussed. The final section of this chapter explores the links between play and creativity as a medium for instigating this creative revolution.

3.1 Defining Creativity

Creativity research as a separate field of scientific study has explored diverse definitions, contexts and dimensions since it was identified by Guilford in 1950. As a concept, creativity has been described and defined in many different ways over the course of the last 70 years. Between 1950 and 1988, Guilford evolved his focus into facets of thinking, including divergent and convergent thinking (Guilford, 1967; Guilford & Hoepfner, 1971; Guilford, 1956; Guilford, 1988; Hocevar, 1980; Hocevar, 1980); Fine (2014) proposed the notion of 'modes of intellect'; and Bear (2015) described different methods of cognitive processing including 'expert', to name a few. Contextual studies for business coined the term 'design thinking' (Brown & Katz, 2009) in any production-oriented field, while the concept of creativity is used variously to refer to

thought processes, techniques and even outputs (Spencer, Lucas, & Claxton, 2014). This leaves the use of the term 'creativity' with different meanings in different fields. Over the last two decades however, a centralised research definition of creativity has emerged incrementally as involving two key dimensions – namely, that which is both original and useful (Cropley, 2011; Mumford, 2003; Runco, & Jaeger, 2012; Stein, 1953a).

3.1.1 A dual definition of creativity: Originality

Guilford (1956) identified originality as a key component of creativity in his situational observations of the survival strategies of airmen in the Second World War. Guilford's own experiences training in the Air Force allowed him to draw conclusions about the thinking styles of airmen under pressure as he observed that the more effective strategies often had elements of novelty. His research identified many areas of intellect that at the time had been neglected in terms of research (Guilford, 1956). While the structures of intellect that he defines in this paper encompass many areas of thought, two key strands of creative thinking are defined, namely convergent and divergent, along with many thought pattern indicators and indices. Guilford's concept of creativity was based on the premise that it is necessary to link more than one discrete idea in a way that is imaginative and novel to solve a given problem. He called this term 'divergent thinking' and developed a measurement tool to test for this tendency in individuals by having them list multiple uses for everyday objects. His test has become 'standard' as a tool for measuring creativity and has been used in numerous studies (e.g., An, Song, & Carr, 2016; David, 2014; Piffer, 2012). Guilford's premise was based on creativity (divergent thinking) including the ability to see beyond an object's intended use: a brick can fulfil its function of building, but could also be used to prop

up a bed or be broken and used to create a painted mural. The process of generating and considering many ideas without seeking to adhere to a single correct answer was his definition of divergent thinking.

The opposite of divergent thinking, also identified by Guilford, was 'convergent thinking'. This entails choosing or arriving at a single acceptable answer that can potentially be a synthesis of the previously generated divergent thought process. Convergent thinking is tested through typical intelligence quotient (IQ) tests. Cave (1970) and Lingle, Jenkins and Kazelskis (1972) started to explore the complex relationship between these types of thinking but concluded that creativity is neither its own entity, nor is it merely an element of abstract intelligence, but rather occupies some unidentifiable space in between. Guilford's initial address in 1950 and subsequent 1956 expansion paper acted as a catalyst for other researchers, including Torrance (1962) as he further categorised the nature of creative thought. Torrance theorised that the original tests developed by Guilford were not expansive enough and that space should be given for responses to images and nonverbal stimuli. The next large study of any note was that undertaken by Wallach and Kogan in 1966, aimed at measuring creativity in relation to verbal and nonverbal intelligence in children. In order to do this, they once again expanded on the theory of divergent thinking proposed by Guilford, although with the added modification that not only should there be fluidity of thinking but also uniqueness of response (Wallach & Kogan, 1966).

Additional theorists such as Campbell (1960), who called his model 'blind variation and selective retention' or BVSR, further supported Guilford's divergent thinking concept. Campbell suggested a Darwinian 'trial and error' approach to creativity; a

focus on the selection shifted the creative process to fruition, rather than only the *potential* for creativity that Guilford's concept has been criticised for. Campbell's model generated a great following and was further explored by Perkins (1981), Johnson-Laird (1983) and Simonton (1999a; 1999b). It is this prevalence in literature and additional support offered by researchers such as Campbell that may have been one of the driving forces behind the popularity of the Guilford's Test of Alternative Uses (TAU) in creativity research.

3.12 A dual definition of creativity: Usefulness

As the idea generation phase explored the 'originality' element of the now accepted definition of creativity, the 'useful' aspect of the dual definition was explored in a more solution focused way. Early research in this area by Mednick (1962) proposed that ideas should be compared with one another to generate Associative Hierarchies. This combining of ideas fitted with the more developmental aspect of creativity explored by Vygotsky (1966; 1967) who illustrated his ideas by describing how a child combines their observations of parental behaviours with their own internal understanding of the world through play to create their own creative and imaginative world. Finke, Smith and Ward (1992) label the idea generation phase of creativity 'pre-inventive'. They hold that random idea generation, in conjunction with a process of combining different ideas with pre-existing knowledge and experience, are needful for creativity to be not only there in potential but also to develop into productivity.

The 'useful' aspect has generally been more problematic to explore. When thinking of creativity, especially in terms of individual creativity such as that demonstrated by da Vinci, much of the focus is on the creative output or product of the creativity.

Application of the term 'useful' to some of these outputs, the Mona Lisa for example, can be challenging. Using the term 'useful' to identify creativity in outputs, for example evaluating the 'use' of a painting or a piece of music may need alternative terminology. Runco and Jaeger (2012) track the evolution of this type of terminology from as early as 1839 in relation to the yet undefined area of research that would become the field of creativity. For the artistic type of creative output, the notion of 'use' has been expressed in terms of 'value', 'effectiveness' or 'practicality' and has always had an element of subjectivity in it, something that is recognised by Runco (2003) and Park, Chun and Lee (2016). The objectivity needed to evaluate the effective or useful aspect of creativity is often, at least for a creative enterprise such as a film, production, artwork or other creative generation, only something that can be achieved with the passing of time, making it more challenging to evaluate creativity in a consistent or useful way.

While the originality of thought, either by concept or by uniqueness, is that which seems to be most beneficial to business as described above, a solution that is merely different to competitors is not useful in the market without it also being helpful in solving a problem, saving costs thereby driving up profits or providing a better experience for consumers (Cooper, 2011). This provides a solid business case for the 'use' of the useful aspect of the definition of creativity over and above the unique aspects that originality might bring.

Creativity is a multi-faceted construct and while an understanding of the definition of creativity is vital, another focus of research into this skill or attribute has centred around how to construct a framework that defines types or situations of creativity to help, not

only evaluate the purpose of it, but also to articulate its boundaries. One of the most widely accepted and enduring of these is discussed in the next section.

3.2 In search of an organising framework: Rhodes and the four P model

Rhodes (1961,1987) proposed a framework for evaluating creativity, breaking creativity down into the *person* (who is creating, the creative trait), the *process* (cognitive processes involved in the creation), the *press* (the environment in which the creativity takes place as well as external forces that form part of the creativity) and the *product* (the creative output). Rhodes' model is attractive as it fits well with the divisions within the field of psychology, with the majority of the psychological focus fitting into the 'process' (cognitive psychology and neurobiological approaches) or 'person/trait' (personality, social and individual differences) areas, with some overlap showing with the 'press' of environmental factors of which a socio-psychological approach would be a part. Each of the four Ps from Rhodes' framework is discussed in more detail in the following sub-sections.

3.2.1 The four P model: Person

Exploring creativity from a neuropsychological approach offers some support for the 'person' aspect of creativity. Research conducted by Jung Rex, Mead, Carrasco and Flores (2013) suggests that there is a structural difference in the brain's white matter in more creative individuals. Participants' brains were scanned and the resultant images of 'more creative' individuals were compared with those who were 'less creative', with measures of creativity undertaken using the Guilford Test of Alternative Uses (TAU) in conjunction with verbal and drawing creativity tasks. It added to the findings of a 2010 study by Jung, Grazioplene, Caprihan, Chavez, & Haier, where fewer branches of white matter in the brain structure were evident in more creative

individuals. More recent research also corroborates the idea that there are structural differences in individuals with different types of creativity. A 2017 report by Shi and colleagues explored brain differences in those identified as creative in the sciences and the arts, respectively. They found differences in the areas in which grey matter is concentrated in the brain for these two groups, suggesting that there are clear differences between creativity in the arts as compared to creativity in the sciences (Shi, Cao, Chen, Zhuang, & Qiu, 2017).

Neurological differences in creative individuals are further supported by a study that found moments of insight were accompanied by evidence of general preparation (Kounios et al., 2006) and then a burst of gamma waves (Jung-Beeman et al., 2004), which is a very high frequency brain emission encompassing the entirety of the brain, originating from the anterior superior temporal gyrus. The key point to highlight here is that the right hemisphere of the brain is characterised by broader branches in the dendrites leading to connectivity across wider spans in the brain. While this area of research is fast-moving, the prevailing conclusion in the previously outlined research seems to be that fewer white matter branches support a wider arcing of activity, encouraging connection of ideas that may at first seem unrelated. Although this emerging knowledge base offers an exciting glimpse into the neurological correlates of creativity, it is important to bear in mind that this evidence is indicative rather than definitive, and that there is no evidence linking the absence of these concentrations of white matter with an absence of creativity.

Considering the creative individual from a group perspective results in a greater richness of possibility, as creativity is often enhanced by collaboration – groups of

researchers, members of a production team or a business team, for example. When constructing such a group, diversity in group members and experiences has been observed to promote creativity (Nemeth & Nemeth-Brown, 2003), particularly when incorporating those with experience of living in more than one country (Leung, Maddux, Galinsky, & Chiu, 2008). Creativity in groups does not simply focus on the individual traits but stems from a combination of experiences being greater than the sum of its parts (Shin, Kim, Lee, & Bian, 2012). An example of a feature film may be given, with a collaboration of multitudes with different specialisms coming together to produce a large-scale creative product outside of the capabilities of a single individual. In other words, creativity in isolation appears to be enhanced by collaboration, and thus, comparative creativity, as in creativity relative to other team members, and diversity of thinking approaches enhance the generation of creative ideas and usefulness of output.

Consideration of the creative person, as defined by Rhodes (1961) and discussed in this section, led to the necessary exploration of the environment in which that person may work and Rhodes' structural designation of press which is discussed in the next subsection.

3.2.2 The four P model: Press

One of the factors in Rhodes' (1961) model is that of the creative environment – the 'press' of creativity or the environmental factors that influence creative output, inspiration and new connections that support creativity. This once again returns the argument to Heraclitus and the constant change with which this introduction began. Necessity being the mother of invention (proverb), it is the environment, in macrocosm

or microcosm, that may support creativity (Garcês, Pocinho, Jesus, & Viseu, 2016). While numerous businesses have deliberately sought to support and foster a creative environment (Coleman, 2016), environmental press can also be more serendipitous in nature, such as the famous discovery of penicillin growing in an unwashed petri dish (Rosenman, 1988). Business motivation for the deliberately designed creative environment lies with the drive for competitive innovation, but innovation, while part of creativity, is a slightly separate construct (Levitt, 2002) and manipulating environments to support creativity, and thus innovation, may not be as vital as Google suggests (Hoff, 2014). The environmental factors also extend to specific environments for which the creative product is intended, supporting specific solutions to specific problems, as is discussed further in section 3.2.3.

As noted by Heraclitus, change has indeed been a constant in human existence; however the rate of change is increasing exponentially. The rapidity of change is not limited to obvious societal alteration such as the emergence and dependence on digital media (Metzger & Flanagin, 2008; Zaber, Karoly, & Whipkey, 2019), nor are they independent of national boundaries, with situations such as the coronavirus pandemic of 2020 affecting almost every nation on earth. Arguably one of the greatest of these global challenges is the cyclic problem of climate change, both caused by humans (Kaser, Hardy, Mölg, Bradley, & Hyera, 2004; Linden, Leiserowitz, Rosenthal, & Maibach, 2017) and now driving innovations to combat these changes (Beebe, Cooper, Mottram, & Sweeney, 2009; Berkhout, Hertin, & Gann, 2006). While changes such as these drive creativity, preparing the global workforce to embrace these rapid changes will also support adaptation and innovation, ultimately playing a part in securing economic and personal wellbeing. 21st Century education leavers will enter

a global job market, with applicants sourced from across the world facilitated by travel and communication networks.

While the person who is being creative and the press or environment in which the creativity takes place are important, the nature of the output or product, as defined by Rhodes (1961) is a typical understanding of creativity and is frequently the most visible and subjective element of creativity and is discussed in section 3.2.3.

3.2.3 The four P model: Product

Although the four P model uses the term 'product' for this construct, the output of creativity is not always an item to hold in your hand, or even an abstract fleeting thing such as a theatrical production, artwork or piece of music to experience (Rhodes, 1961). Product can refer to the innovative solution to a problem, the insight that provides clarity in terms of visualisation of a problem in a different way, a novel use for a familiar item (as used by Guilford (1956) as a measurement tool), or the application of personal understanding of an individually challenging concept (for example, remembering 'everything is easier when you can use your thumbs' to help understand directionality when changing gears on a bike). Evaluating the 'use' or 'value' of these 'products' in terms of the dual definition of creativity is more subjective and is often a function of the environment in which these 'products' exist. The most beautiful piece of music would be of little use or value in a noisy factory and a 'trick' solution to a hot office would be of little use if you are based in a cold location. Evaluating the use of creative products, then, while open to some subjectivity, is also partially determined by the environment (press) and by the person making that evaluation.

Supporting the evaluation of this 'output' element, Kaufman and Beghetto (2009) propose an embedded subframe in the form of their Four C model. It separates creativity into four categories that are used to support the 'useful' element of the dual definition and are also a product of the environment in which the creativity occurs. A 'mini-c' creative categorisation occurs on a personal level, such as an individual learning or interpretation, useful on a personal level and occurring within the understanding of an individual. A 'little-c' creative demonstration is the everyday creative problem solving that could be defined in the 21st Century as 'life-hacks', which are a product of their environment and include things like ingredient substitution in recipes or personal cleaning methods. The other two C's in the model involve Pro-C creativity demonstrated by people creative in their professional life, for example a packaging designer, even if not considered as an eminent designer outside of their profession, and this type of creativity only works in its particular environment. The final category is termed 'big-C', the large-scale innovative breakthroughs that are judged as such in their field, from art and music to science and industry, even including medical breakthroughs such as the coding and conceptualising of DNA.

The three 'P's' already explored- person, press and product (Rhodes,1961)- examine creativity according to individual differences and personality, creative environments and the more subjective creative product. The process by which creativity takes place form the final part of the framework (Rhodes, 1961) and has been the subject of much exploration and research from a psychological point of view which is further examined in section 3.2.4.

3.2.4 The Four P model: Process

Rhode's (1961) framework also makes allowance for inclusion of the process of creativity, with this aspect aligning well with both individual differences and neuropsychological aspects of psychology. Focusing first on the cognitive process of creativity, it is possible to synthesise the previously discussed neurobiological processes, for example the improvisational nature of Jazz music with the use of an fMRI or EEG machine (Limb & Braun, 2008; Lopata, Nowicki, & Joanisse, 2017) and the processes of thinking exemplified by the 'six hat' theory (de Bono, 1988), the design thinking framework with its constant refinement (Brown & Katz, 2009) or metacognitive aspects of creative thinking. The neurological components explore the physical 'how' of thinking creatively while the procedural 'how' is demonstrated by diverse frameworks of specific actions or processes designed to support a systematic approach to creativity and how and when different types of thinking are best deployed.

Having explored the definition and Rhodes' (1961) framework of creativity that has been adopted in terms of most subsequent creativity research, the next section explores the place of creativity in industry, thereby allowing key areas to be identified as targets for development in an emerging workforce.

3.3 Creativity in the Workplace

There are two main forces involved when looking at the emerging needs of a flexible workforce. Firstly, there is concern that the changing job market will render large sections of the existing workforce obsolete with the increased focus on technological efficiency savings (Rainie, 2017). Secondly, it will be necessary for educators to prepare the emerging workforce for the '85% of jobs that don't exist yet' (Elmes, 2017),

which is a continuation of a trajectory illustrated by the fact that many top paying jobs in 2016 did not exist in 2006 (Hallett & Hutt, 2016). The World Economic Forum (WEF) (Thomson, 2016) places emphasis on the 'soft skills', such as creative thinking, that the employees of tomorrow will need to be successful. It is necessary, therefore, to help students prepare for new ideas and ways of thinking to ensure that they are adaptable in a changing job market. To do that, we must ensure that our education systems, policies and processes are designed to support the emerging workforce to be prepared and capable of taking on the challenge of this change.

An Adobe commissioned report (Forrester Consulting, 2014) showed that 82% of businesses believed there was a connection between creativity and success in their business model. This finding, along with reports from Human Resource Experts (Lorenz, 2009) citing the 'ability to think creatively' as a key employability skill, has led to the development of a business understanding of the word 'creativity' and a new vocabulary used to describe it. Buzzwords such as 'blue sky thinking' (Wrigley, Bucolo, & Straker, 2016) – the unconventional thinking that is not grounded in current trends – 'outside of the box' (Notar & Padgett, 2010) – describing an idea that is unexpected for a given set of circumstances – and indeed, the very concept of an entrepreneur begin to illustrate the business benefits of creativity. Individuals like Sir Richard Branson famously succeeded with minimal academic achievement but with an abundance of economic and performance creativity, which led to financial success (Shavinina, 2006). While such individuals are clearly the exception rather than the rule, their success is held up as an example for struggling students. The difference here invariably will have many factors such as determination and personality but will also inevitably include the individual's ability to think in creative ways.

Creativity is used in the business world to enhance profits through creative problem solving, leading to cheaper solutions in areas such as production or distribution (Thompson, 2001), faster development of new products to outpace competitors (Stevens, Burley, & Divine, 1999) and of course advertising and marketing campaigns (Smith & Yang, 2016). Creativity has value in many areas, and by defining the aspects of creativity that are valued amongst employers (2014) and examining the economic landscape and the opinions of business leaders (Florida, 2004; Thomson, 2016), consistent reference is found to two key elements: innovation and problem-solving. As already discussed, innovation, while related to creativity, is not entirely part of the same construct and thus for this research, the focus will remain on creative problem solving and, focusing on the workforce of tomorrow, enhancing creative potential.

If the focus on creative problem solving is adopted as that which will be of most use to an emerging workforce, it is necessary to explore the education system which prepares young people to enter this world, how it intends to meet the need and if it is not, then the reasons for this. To that end, the next section of this chapter will explore the heritage of the English Education system and the place that creativity has within it.

3.4 Creativity in Education

Western, and indeed all, education systems strive to prepare students for the world beyond their academic experience. As a general principle, education systems developed with the primary aim of equipping young people with the knowledge and skill needed to make a contribution to their society. This section explores how creativity

has been developed (or not) through formal education in schools, with a primary focus on the UK education system.

3.4.1 Historical Legacy of Education in England

The earliest mass educational attempts (as opposed to individual tutoring for the elite) in England were church based and focussed on social control. The contemporary education model that is employed in the West has its roots in the aftermath of the industrial revolution with the focus on a basic level of education for the masses as a weapon in the arsenal of an 'arms race' for economic growth amongst western countries (Ramirez & Boli, 1987). While formal school had been in place for wealthy children (particularly boys) in the UK since 1496 (Lawson & Silver, 1973) and many grammar and church schools had been founded by nobility, the first being in Canterbury in 598 AD, the early curriculum was dictated by the needs of the most wealthy and the doctrine of the church because most schools fell within their remit. It was only from 1750 onward that universal education became the aim, including the first tentative and sporadic provisions for the poor and for women. It was not until 1836 when Thomas Wyse published his paper 'Education reform' or 'The necessity of a national system of education' that education became an aspiration for all. It was from these beginnings, with the production line and factory mindset of the industrial revolution as the backdrop, that the concept of a national curriculum was born in England (Lawson & Silver, 1973). The first regulations about what that curriculum should contain was set out in 1871 by the 'Code of Regulations' (Gibbs, 1875) establishing the junior age curricula focus and starting to expand education areas for older pupils.

Mass education was approached in the same way as mass production in factories (Ramirez & Boli, 1987) and the rationale was to better society by allowing children to elevate their status; a one-size-fits-all approach to learning that was intended to elevate educational and moral understanding and promote economic growth. The methodology used to teach the masses worked well when opportunities were limited to service positions for most of the lower-class workforce, but modern society has changed drastically and yet classrooms look much the same now as they did 100 years ago. The décor has changed, and the content of the learning has been updated, but in general the teacher remains the 'sage on the stage' (King, 1993) and the same curriculum is followed by all, with England's National Curriculum (Department for Education, 2014a) an updated version of the principles identified in the code of regulations (Gibbs, 1875). The problem is that today, opportunities are no longer limited by social class as much as they are limited by the creativity and determination of the individual, and one-size-fits-all education no longer prepares learners for all roles, futures and ambitions (Elmes, 2017; Zaber et al., 2019). Teaching all children in the same way, even with differentiation possibilities in the classroom, does not inherently develop the creativity and determination that will support the success of a future entrepreneur or business manager.

While the historical legacy of the English education system retains much of its underlying structure, some change, both politically motivated as well as internally advocated, has supported by overlaying alterations onto the more historic system. Some of these changes and the reasons behind them are discussed in section 3.4.2.

3.4.2 Political or Internally Driven Educational Change

Although the standardised education system does stand as a legacy of the industrial revolution, additional disruption points have acted as stressors leading to major developments in UK education in terms of policy, curriculum, practice and format. The changes to leaving age (in 1893) to 12 (in 1898), 14 (in 1918) then 15 (in 1944) to 16 (in 1972), 17 (in 2013) and most recently, 18 (in 2015), starts to demonstrate the importance placed upon education by successive UK governments (Senate Media, 2020). Standardised national exams (gov.uk, 2018) and the phasing out of grammar schools and the new movement into Academy Trusts (Simon, C. A., James, & Simon, 2019) as a lasting legacy of Tony Blair's 1997 election cry of 'Education, education, education!' have all changed the landscape of secondary education. Alongside an increasingly prescriptive curriculum (Department for Education, 2014a), requirements have been instituted for teachers to produce a range of metrics to check that learning has been progressing, further standardising learning. Thus, responses to the political stressors described have been to include further standardisation. The 1902 Education Act, created during the time of female suffrage, abolished the previous centralised school boards and devolved educational provision to newly created Local Education Authorities (LEAs), requiring all LEAs to have women on the board and providing local and national standardisation in provision. The response to the growing criticism of the dual class system represented by the 11-plus exam and grammar schools led to their abolishment and the standardisation of the exam boards. Standardisation of learning leads to an increased similarity of experience in pupils, generally reducing the diversity amongst the future workforce needed to generate the most creative teams (Nemeth & Nemeth-Brown, 2003).

National policy changes also happen in response to global pressures such as the global education league table (Programme for International Student Assessment, 2018) bringing with it increased standardisation as the UK tries to emulate the educational systems of higher-achieving nations. Some changes happen fast and on a global scale, occasionally bringing lasting repercussions. Seldom has disruption been seen on the same scale as the global Coronavirus pandemic that led to all UK schools closing in March 2020 and most other global countries adopting this as part of a wider strategy to contain the virus' spread. Schools responded quickly to move some content online or to send home packs and it is yet to be seen how lasting this disruption will be to teaching and learning strategies and environments.

The UK handling of the GCSE and A level results in August 2020 (Richardson, 2020) based on an algorithm that appeared to unfairly disadvantage individual high-performing pupils in historically low-achieving schools (OFQUAL, 2020) seemed to apply punitive measures based on systemic social deprivation and historic grade accomplishment in the schools they attended. The use of historic data in generating grades led to an exceptionally fast change in policy, when four days after the initial announcement, under huge public pressure, grades moved to teacher predicted grades- provided they were higher (Richardson, 2020), a rapid change and adaptation in a situation that will lead to still further adaptation at the next educational phase, as pupils and students who have now been without formal education for six months must adapt to learning at a higher level. It is possible that this situation will act as a catalyst for educational reform by forcing policy-makers to revisit the assumptions that are made during the standardisation of national assessments and as such, this creativity

research that also explores elements of individual and personalised learning could not be better timed.

3.4.3 Creativity in Education- The current state of play

While creativity has been recognised as a need in an education setting, it has primarily been identified as a method of supporting academic attainment rather than a skill to be developed in its own right (OFSTED, 2010; QCA, 2004). This opinion is also highlighted in the 1999 report by the National Advisory Committee on Creative and Cultural Education (NACCCE). The report argues for a broader curriculum to develop the capacity for idea generation in pupils, although the authors note that political educational pressures are having a detrimental effect on creativity in education. Teachers under pressure to perform to league tables find increasingly that they are discouraged from taking 'risks' in their teaching (NACCCE, 1999). This report was further echoed in the Durham Commission report on Creativity and Education (2017) where it was noted that the largest gap in creative education opportunities was appearing among the most socio-economically deprived pupils.

The drive towards a neoliberal agenda of empirical assessment that has been explored here in terms of increasing assessment pushing performativity, accountability and the introduction of the English Baccalaureate mean that many of the declines in creativity seen within education, are happening in the secondary school sector. The increased marketisation of education and autonomy achieved through the drive towards academy schools with business partners, ensure that performance tables in this sector are increasingly used to measure success within the country and the drive towards higher international scales on the PISA rankings, push an attainment led

secondary sector at the expense of creative opportunities (Durham University, 2019; NACCCE, 1999)

It was pleasing then to note that PISA has been working on a new test to form part of the assessment for 15-year-olds that are included in the rankings, for the first time in 2021 (delayed due to the COVID-19 pandemic) (OECD, 2019) a creativity assessment will be included (Programme for International Student Assessment, 2018). This is an additional measure that is optional for all countries although the increase in testing itself could be seen as an extension of the neoliberal approach that is driving the testing and accountability regime in the first place. The UK however has elected not to participate in this element of the test (Civiniti, 2019), further evidence of the current political agenda with regards to creativity in schools and thereby indicating that this area is key to address within the framework of the existing curriculum model.

2.4.3 Business Driven Changes to Education

Whether change happens gradually as the result of a long consultation process, or suddenly as a reaction to a global crisis, the primary function of schools from a political point of view has not changed – the aim is to prepare children for post-education success, thereby growing the economy while embedding culture and social expectations (Ramirez & Boli, 1987). In order to achieve this economic growth, there is an established pattern to the academic year and familiar routes into business and other careers (gov.uk, 2012), but recent global disruptions have caused even this to be re-evaluated.

In 2008, a global recession caused traditional routes such as legal internships, graduate recruitment schemes and unpaid work experience opportunities to be

disrupted (Gregg & Wadsworth, 2010). With a similar recession on the horizon for 2020 graduates, more creative approaches need to be taken to building a worthy CV, just as graduates explored creative alternatives as a response to the earlier crisis (Chan, 2020). The ability to explore different employment opportunities required a creative approach. In the last 20 years there have been two global recessions, one in 2008 and one that is just beginning as the UK's GDP drop for April 2020 has been reported as 20.4% (Partington, 2020) and a bleak financial outlook for the rest of the world (World Bank, 2020). A change in the world that education is preparing children for requires a change in the education that is provided, as discussed in the next section.

3.4.4 Creative Education in Changing Economic Times

'A curriculum should be built around the great issues, principles and values a society deems worthy' (Bruner, 1930, p52), an oft quoted observation that places learning in context of the needs of the society. 21st Century society is built upon the foundations of change and flexibility necessitated by free trade, global mobility, power and a technology enhanced employability climate. Given the changing needs of education and the ability of creativity to enhance business performance, this section explores the current curriculum content in England and Wales for the creative dividend- this being the economic benefits of creativity (Forrester Consulting, 2014).

From the perspective of educating the emerging workforce, then, to promote the political need for economic growth and to try to meet the need for creative thinking in business, General Certificate of Secondary Education (GCSE) specifications in business studies include 'non-routine thinking' in the 'transferable skills' element of

their subject specification (Edexcel, 2017). The tension created by the business needs for creative thinking, the perceived importance of creativity in the workplace and the lack of significance given by parents and governments to creative subjects (Lee, 2017) leaves educators and policy-makers in a challenging position. Reported perception of the importance of 'academic basics' taking precedence over developing creativity and independence shows that public opinion is following that of governmental policy, or indeed vice versa. There seems to be a mismatch in the employability skills needed by industry and the education that many parents and governmental education authorities seem to feel is best (Forrester Consulting, 2014; Lee, 2017).

Teaching creative thinking skills is no less challenging than teaching a concrete 'hard skill' such as mathematics. It was encouraging then, that on the 14th September 2017 the Rt Hon. Justine Greening, the Secretary of State for Education, announced a funding boost to teachers' continuing professional development in order to focus on developing 'better' teachers (MENA, 2017). This money has typically been spent on basic numeracy and literacy initiatives in primary settings, Science, Technology Engineering and Mathematics (STEM) and Physics teacher development for knowledge, and on a devolved teacher training centre to help schools develop their own in-service (INSET) programmes (MENA, 2017). Despite creativity also being important in STEM subjects, much teaching in this area has been reduced to focus on learner's knowledge acquisition (Lockhart, 2009), and missing from the list of uses for this money is any reference to the more traditionally creative arts subjects or creative teaching methods at a secondary school level. The new English National Curriculum, first rolled out in 2014, is far more prescriptive and exam-based, listing the many facts and abilities that pupils must demonstrate. In addition, there has been a change to the

way schools are judged in league tables with the implementation of Attainment 8 and Progress 8 (Department for Education, 2014b). This, as well as the emphasis placed on the English Baccalaureate, have left traditionally creative subjects such as art, design, music and drama rather neglected. Whether creativity can be fostered when teaching a range of different subjects, given the economic and societal dividends of creative thinking, is the subject of this research, seeking to bridge the gap between creative subjects, and creative skill enhancement.

While the focus of education from a purely political point of view is to promote economic growth, the social, cultural and philosophical ideologies behind education are of equal importance and these are also undergoing a period of rapid change, something that is discussed in section 3.5.

3.5 Societal Dividends of Creativity

As initial education in the West had its roots in the church (Lawson & Silver, 1973) and initial literacy in the UK was driven by the reformation and an ecclesiastical desire for all to read the Bible in English (Spolsky, 2009), education is a primary means by which culture is transmitted. The ruling classes and systems, once led by the church and the moral choice to promote literacy for access to the Bible (Spolsky, 2009), are now led by political agendas against extremism in the form of 'British Values' (Hunter-Henin & Vincent, 2018).

The quote often attributed to Churchill but in reality lost in the mists of time and language, would have that 'history is written by the victors', but it would appear that those who set the curriculum have a large role to play in that, too. Education content has been appropriated for the transmission of ideology, as exemplified by the content

of history curricula around the world, for example in South Africa during Apartheid (Msila, 2007), America during the civil rights movement (King, 2014) or Britain's colonial past (Winter, 2018). There is evidence that society is reacting to the unbalanced nature of these choices, for example with the gender pay gap illuminating the lack of recognition of female accomplishments, which are ignored in favour of prominent men (Francis-Devine, 2020), or the Black Lives Matter movement starting a discussion about systemic racism, ranging from lack of medical training for doctors in terms of symptoms in different skin tones (Louie & Wilkes, 2018) to police brutality (Carney, 2016) and educational opportunities (Assari, Boyce, Caldwell, & Bazargan, 2020) in addition to attempts to decolonise the curriculum (Begum & Saini, 2019).

The potential for creativity to play a part addressing the missing curriculum and redressing the balance is significant, and an example of which is the musical *Hamilton* (Miranda, 2016). It tells the story of a 'forgotten' American founding father, Alexander Hamilton, who was written out of history by the more successful men due to his race (he was a mixed-race son of a Scottish sailor and a Dominican Mother) and his moral compass (he had an affair while married and published the details in order to clear his name of financial wrongdoing). The musical, although not entirely historically accurate, has creatively addressed two elements: firstly, it has moved historical learning out of the classroom and into theatres, placing it into popular culture (Churchwell, 2016); and secondly through a combination of the medium, predominantly rap, and casting choices to disregard skin colour in the stage production (Kail, 2020) led to an African-American playing George Washington, a well-known slave owner. This incongruity has also promoted conversations regarding slavery and immigration (Horsey, 2017) and creative approaches like this, moving education out of the classroom, may be one

solution to these societal challenges. Creativity of this nature may form part of the solution to addressing, or redressing, historic imbalances, providing a positive way forward for individuals and society without causing fresh resentment.

3.6. Individual Dividend of Creativity

Creativity is not only necessary from a political, economic or societal point of view. In terms of human development, creativity has played a key role in our evolution as a species and formed a key component of our personal development as individuals (Montouri, Combs, & Richards, 2004). The development of creativity as part of our personality and self-identity can be traced back to childhood development (Feldman, 1999) and there is evidence to suggest that it develops in tandem with cognition (Urban, 1991). Although there has been research into the development of creativity and its measures in childhood (Torrance, & Goff, 1989), the 'useful and original' definition that has become the accepted understanding of creativity (Runco, & Jaeger, 2012) is more suited to those with more developed cognitive function, primarily due to the concept of 'usefulness'.

In childhood, the understanding of usefulness is different to that which we embrace in adulthood. The creative function of a previously discarded item, such as a recycled egg box, might serve in childhood to become craft materials to make an object with personal significance and beauty. The 'useful' nature of this object or even the time used to construct it might be called into question by adults, but the perception of the child is different. Similarly the 'creative' play of 'let's pretend' used to evaluate creativity in research in children (Mullineaux & Dilalla, 2009; Russ & Dillon, 2011) has limited usefulness in adulthood, focusing as it does on puppetry and object substitutions.

While this may serve as something of a precursor to the adult training programmes that use role play, it is important to recognise that personal definitions of 'useful' change developmentally and societally. Something that is perceived as 'useful' to a child, possibly something that enables better or easier play (such as the creation of a new rule in a game or the adaptation of an item for another purpose), is unlikely to have the same significance to adults.

Play is central to all childhood development, including the development of creativity (Hoffmann & Russ, 2012; Mullineaux & Dilalla, 2009; Russ, 1998; Russ, Robins, & Christiano, 1999; Russ, 2003; Tsai, 2012; Vygotsky, 1967). Creative and pretend play enable exploration of and interaction with things, such as mark making that might later turn to writing, or rehearsing everyday experiences such as pretend tea parties and shopping trips that allow children to develop their understanding of expectations in a socially safe space, where 'mistakes' are part of the game and do not have 'real world' consequences. Application of the dual definition of creativity to children's play may serve to demonstrate more clearly how play is related to the development of this key skill. The role of imagination in creativity may form part of the development of the 'original' aspect of the dual definition, as it is this which enables uses and scenarios to be conceptualised and explored, and may thus develop into the generation of original ideas. The journey toward the other aspect of the definition, 'useful', may potentially be centred in the cognitive development of the individual, and how play changes in response to individual and societal development (Russ & Dillon, 2011) altering the meaning of the word 'use' or even 'value' by age and social need. The point at which play becomes obsolete, either for the individual or from a socially acceptable point of view – if indeed play does disappear – is still open to debate.

3.7 Developing Creativity through Play

Piaget (1932) and Vygotsky (1966; 1967) lead the theoretical understanding of the function of play in creativity development. Both of these theorists focused on development through childhood and research has followed this trend, primarily conducted in early years settings (Bergen, 2002; Frost, Reifel, & Wortham, 2012; Gorden, 2014; Gray, 2008; Gray, 2013; Hoffmann & Russ, 2012; Mullineaux & Dilalla, 2009; Russ, 1998; Russ et al., 1999; Russ, 2003; Russ & Dillon, 2011; Sicart, 2014; Verenikina, Harris, & Lysaght, 2003). These researchers exemplify the exploration of play as a developmental tool for young children. Creativity development is given space here (Hoffmann & Russ, 2012; Leikin & Tovli, 2014; Russ, 1998; Russ et al., 1999; Russ, 2003) with play universally being seen as key in the development of this skill in a young child population. In a review of the literature linking play and imagination with creativity, Tsai (2012) makes a strong case for linking the constructs, but his review again focuses on early childhood experiences.

While early childhood play does seem to lay the foundations for developing creativity through play, it has also been used in adult populations to enhance learning and creativity. Nørgård (2017) advocates the use of play in Higher Education settings to support learning, and Mardel and the International School of Billund (2017) support play in managing staff meetings. Huizinga (2009) has also suggested that the changes occurring in the 21st Century and our increasing dependence on technology makes us more active game players than ever before. Sicart (2014) goes further and argues that play is part of our human identity, irrespective of the age of the player. This connection to the human experience as well as the use of play to develop creativity in young

childhood makes play a potential medium for supporting creativity development in different age groups.

3.7.1 Creativity and Play in Adolescence

Mullineaux and Dilalla (2009) longitudinally tracked creativity in adolescents who had engaged in imaginative role play games aged five, and found that early realistic role play can serve as a predictor of adolescent creativity, although there are a variety of confounding factors between game play at age five and creativity at age 13. Studies have been conducted into the trend toward online or video games and the effects on young people, exploring whether play for this age group has moved entirely online (Griffiths & Hunt, 1998; Sahin, Gumus, & Dincel, 2016; Verenikina et al., 2003; Witherspoon & Manning, 2012). There is, however, a lack of literature focusing on non-technology-based play for young adults in the same way it has been explored in younger individuals. Rosenblum, Sachs, and Schreuer (2010) validate the use the Children's Leisure Assessment Scale, and thereby claim that adolescents do not want to play in the same way that younger children do. O'Connor, Schaefer and Braverman (2015) and Weber and Haen (2005) describe play therapy approaches for adolescents, suggesting that one avenue of access to 'play' or at least playful therapeutics, for this age group is through creative mediums – such as art or music. Weber and Hean (2005) and Gallo-Lopez (2005) also suggest that interventions offered to adolescents should be somehow age-adapted but do not offer suggestions as to how or why the adaptations should occur.

The International School of Billund and Project Zero Team (2017) have been exploring a Pedagogy of Play approach and suggest that when it becomes socially acceptable

to play, and adolescents are presented with the right opportunities, such as in the context of a classroom-based game, play – even ‘childish’ play – is engaged in with much enthusiasm. The working research group at the International School of Billund (ISB), exploring ‘Play and Academics’ published the Playbook on the ISB website (<https://isbillund.com/academics/pedagogy-of-play>) to serve as inspiration for practitioners with play in mind. Experiences of teachers in the Middle Years Programme at ISB (which lines up directly with the UK secondary age group), showed that when learning Maths, German or Danish, skipping games, Kahoot and many other techniques provided a good assessment of prior knowledge or worked well as a consolidation tool.

While there is evidence that play and creativity are linked (Hoffmann & Russ, 2012; Russ, 2003; Tsai, 2012; Vygotsky, 1967), and that adolescents experience play differently (Hellström, Nilsson, Leppert, & Åslund, 2012; Zill, Nord, & Loomis, 1997), the exploration of play to enhance creativity in this age group has not been the focus of much research. Play for the purpose of increasing academic engagement (Fine, 2014) or engagement with technology (Vasudevan, 2015) has been touched on, as has the use of playful principles in education using the term ‘active learning’ (Bellanca, 1997; Bronwell & Eison, 1991; Freeman, Eddy, McDonough, & Smith, 2014; Meyers & Jones, 1993), also for the purpose of academic engagement but with additional benefits of behaviour management. Other than this, a gap appears to exist in the literature on the use of play to enhance creativity in this population.

3.7.2 *A Pedagogy of Play*

The Lego Foundation funds research on play, creating university posts in the UK (BBC, 2017) and commissioning research in Denmark and South Africa (Harvard Graduate School, 2017), to explore how playing with certain products is educationally stimulating. The International School of Billund and Harvard's Project Zero Team are using a new research paradigm, that of the teacher-researcher, to develop a new pedagogical approach (Mardell et al., 2016).

The underlying principles of play outlined in their first publication 'PoP: Towards a Pedagogy of Play' (Mardell et al., 2016) offer the key concept that play is not the same for everyone, what is playful for one is not playful for another, a concept that interestingly does not make any distinction in the age of the individual. Additionally, they provide three key conditions under which an activity is said to be playful, or rather, that need to be there in order for a researcher or observer to understand that 'play' is taking place. These three conditions are those of choice, wonder, and delight. Choice gives the participant some part in the decision of what should be undertaken or how it should be expressed. Wonder provides a playful provocation as a starting point for the concept, curiosity for how the project might unfold. Delight is trying to characterise the feeling of satisfaction, enjoyment and pride in what they are doing, as illustrated in figure 3.1.

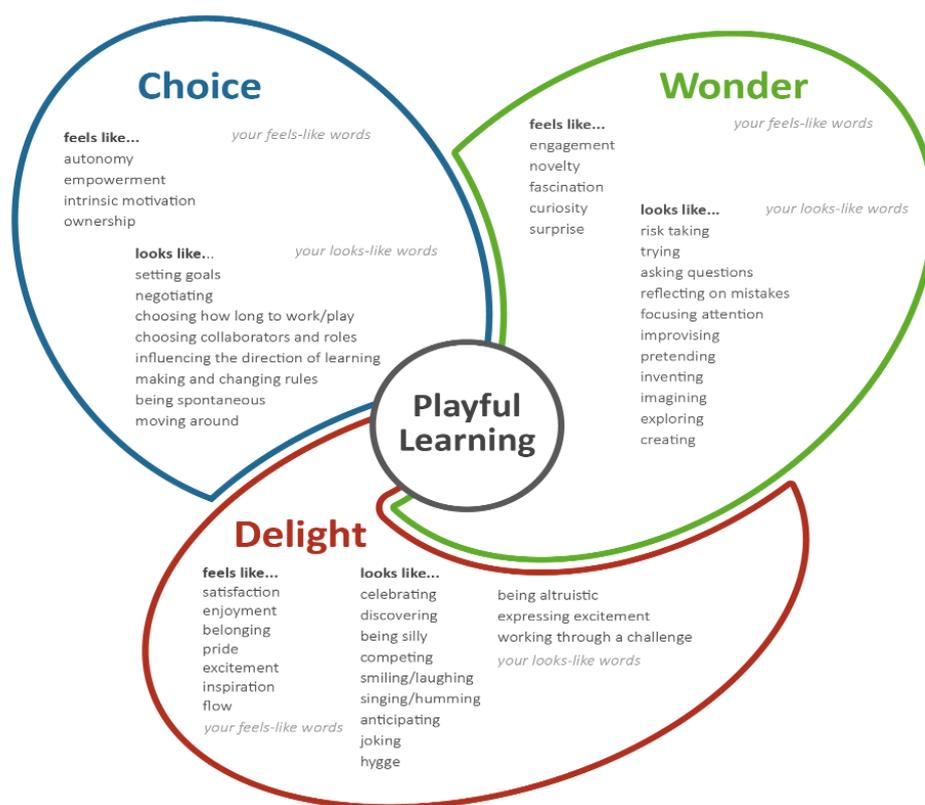


Figure 3.1- The Playful Learning Indicators- PoP (International School of Billund, 2017)

The same aspects are expressed differently by other researchers. Gray (2008; 2013), for example, defines play as ‘self-directed’ – an alternative to ‘choice’ – and an ‘active but non stressed frame of mind’ – a more detailed description for delight. Further alternative terminologies for ‘delight,’ such as ‘joy’ have also been proffered (Conklin, 2014; Gorden, 2014). The methodologies involved in a Montessori approach could also be termed a more ‘playful’ pedagogy (Walls, 2007), for example, the pupil directed learning focus correlates with the ‘choice’ indicator related to the PoP discussed earlier. Rathunde and Csikszentmihalyi (2005) explored this connection further when comparing pupil engagement in Montessori middle school in the US with a more traditional approach, concluding that when engaged in academic tasks, Montessori pupils reported greater flow and intrinsic motivation. Their research focused only on

intrinsic motivation and quality of experience, however, and did not evaluate attainment or explore other aspects of play, making their results of limited use when considering play and education.

3.7.3 Learning and Teaching through Play

The underlying concepts and descriptions of the conditions under which 'play' takes place that have arisen from research into Pedagogy of Play, as well as the planning and evaluation tool developed by the PoP team, based in the USA and working in Denmark, have potential applications in a UK secondary setting. The work undertaken by the PoP team is a synthesis and distillation of the theories of play based not only on the research that has already been cited here, but on the experiences of teachers and pupils at a working school. ISB, despite following the curriculum of Denmark and of the International Baccalaureate, follows the PoP principles in delivery, a very different pedagogical approach to the more academically specific model employed by England's National Curriculum. The need for more creative thinkers, economically (section 3.3), societally (section 3.5) and personally (section 3.6) and the link between creativity and play explored above however, make the notion of incorporating play into the teaching methodologies employed to deliver the national curriculum an intriguing one. The PoP principles of playful learning (International School of Billund & Project Zero Team, 2017) further state that learning does not have to be playful all of the time. This potentially makes the concept of playful learning more palatable to teachers who have curriculum delivery as their guiding principle.

3.8 Engaging Pupils Lessons through a Pedagogy of Play

This section examines strategies that can promote engagement in lessons for pupils and relates these strategies to the Pedagogy of Play model and principles in order to

establish how a Danish and American pedagogical approach could relate to methods already employed in a UK secondary setting.

3.8.1 Wonder and Delight in Learning

The need for lessons to be engaging is well established in the teaching profession for reasons of academic engagement and thereby attainment, behaviour management, and pupil and teacher enjoyment (Killen, 2015). From the teacher's perspective, the purpose behind this engagement is practical, the goal being to alleviate behaviour management issues and boost attainment (Capel, Leask, & Younie, 1995).

Some effort has been made to support teachers in the delivery of engaging lessons by producing strategies of 'active learning' in order to promote engagement from a pupil's perspective (Bellanca, 1997; Meyers & Jones, 1993; Silberman, 1996). Active learning strategies have been in use in UK secondary classrooms since their publication and many of the individual tasks and techniques are similar in nature to those employed in a playful PoP approach, although not all active learning tasks meet defined playful criteria. The terminology related to active learning is important for teachers who may be reluctant to use the terminology of play in their academic classrooms, as it provides them with a sense of familiarity and promotes confidence in the delivery of the approach.

While active learning has been used to support teachers in this delivery, the approach is not systematic, consisting of disparate tasks that can be used in any part of the lesson (Silberman, 1996). The PoP model uses the terminology of delight that also

encompasses the flow reported by Rathunde and Csikszentmihalyi (2005) in Montessori learning.

3.8.2 Choice and Agency in Learning

The 'engaging' activities advocated by the 'active learning' strategies cited above only target one, possibly two, elements of the Pedagogy of Play principles – those of delight and wonder – the fluid engagement that enjoyment and novelty provide. They do not address what is possibly the most important principle when looking at this age group – choice. While choice could arguably allow adolescents to engage in their learning more fully by giving them some responsibility for it, the reason behind the inclusion of 'choice' in the PoP principles goes much deeper.

Play for adolescents, as for children, provides a safe environment, either socially safe in terms of risk-taking behaviours supported by peers (Zill et al., 1997) or practically safe, to test out theories and practice strategies for dealing with upcoming situations (Meyers & Jones, 1993). For adults, there are play techniques such as role-play, employed by training organisations around the world to allow learning to be practised in a low-risk and learning focused environment (Mcloughlin, Mclarnon, & Stearman, 1988). The combination of concepts embodied in PoP further encourage adolescents to participate in critical thinking, something that is valued by workplaces and universities across the UK (Bean, 2011; Khoiriyah, Roberts, Jorm, & Vleuten, 2015; Meyers, 1986). By offering an opportunity for young people to make a choice about their learning, it provides a scaffolded environment where critically evaluated decisions about learning can be made. As teachers in England are limited by the standardised National Curriculum, there is no choice in terms of content – thus providing a challenge

in terms of boundaries that need to be taken into consideration when engaging in critical thinking exercises. The PoP model allows learners to take responsibility for their learning and again increases engagement by developing a sense of autonomy. The inclusion of choice as an indication of playful learning is of particular interest to young people in light of the above research, as it allows agency to be exercised in a safe and supervised environment.

Autonomy is a well-documented consideration for adult learning. The five andragogy principles as outlined by Knowles (1978) – self-concept, adult learner experience, readiness to learn, orientation to learning and intrinsic motivation to learn – suggest that adults learn best via tasks that are personal to them, a contextual knowledge gain that is relevant and applicable to them (Knowles, 1978). This links to the PoP principle of choice, allowing the learning to be personally applicable, the intrinsic motivation that is the key to successful learning as adults. Knowles also suggests that for adults to learn successfully, they need to learn from a place of safety, similar to the already explored safety that play affords children in learning. In schools, there is always the need to have safeguarding policies, but safety in learning takes this notion one step further. Safety in this context is the safety not to be ridiculed or to reveal differences in front of their peers. If it is possible to provide the learning space through play, with a concrete template that educators can follow to provide this space, then more classrooms have the potential to be more successful. The gap then in the research between adult and children's learning and play experiences may begin to be filled by PoP practices. If there are links with both play-based learning practices for children, and intrinsic motivational practices for learning with adults – then the PoP methodology

shows some potential to positively overcome the tension between learning success and thinking skills in adolescents.

3.9 Considerations Specific to Adolescents

In developing strategies for interventions to support adolescent learning, some care and attention needs to be given to the developmental needs specific to this age group. The time of adolescence is one of great change on a physical as well as developmental level. Much of the research falls into two broad categories, a neurological understanding of changes in adolescent development, and a psychological point of view from a more humanist and behaviourist perspective. This section explores these perspectives to examine the needs of adolescents when developing an educational programme.

Adolescence has long been recognised as a time of cognitive and literal separation from caregivers (Adams, 1973) although research into this independence also forms part of a debate on theories of agency: is it as a *separation from* parents or is it as a *motion toward* autonomy (Beyers, Goossens, Vansant, & Moors, 2003; Ryan & Lynch, 1989)? Irrespective of standpoint, it is clear that adolescents are engaged in a process of independent actions that stretch the boundaries of attachment to parents as they exercise their self-determination. The concept of agency is that of self-governance, of autonomy that is not always a motion away from authority (although this is one theory: see (Blos, 1985)), but rather a motion towards self-governance – an important distinction.

Kelley (2004) follows the motion to independence with an exploration of 'flow' as it pertains to adolescence. The positive psychology concept of flow (Csikszentmihalyi, 1992), elaborated further in a later publication (Nakamura & Csikszentmihalyi, 2014), develops the concept of natural process of thought that plays a key part in intrinsic motivation, mental wellbeing and self-actualisation. The tension between this process and cognitive thought as it relates to the increasing independence of adolescent experiences was explored by Kelly (2004) describing adolescent learnt overuse or misuse of the natural state of flow translating to worry, be self-conscious, or perfectionist, be judging or engage in fault-finding, becoming obsessive or angry in their thinking, or to be cynical in their thoughts. He describes that the processing power of flow thinking is also misused to generate artificial self-images or egos and connects their sense of self-worth to external factors such as possessions or looks. This argument speaks to the needs of adolescents for acceptance, promoting the needs of the individual as explored in a socially safe way that forms part of the playful standpoints of PoP.

Csikszentmihalyi (1999) focused primarily on ways that flow contributes to happiness and reports that the state of flow is intrinsically separate from everyday routines. He recognises, however, that a key element of happiness is derived from the sense of satisfaction in the ability to take responsibility for achievement. He provides key identifiers to support the identification of flow and thus, guidance in constructing supporting interventions to recognise and take responsibility for personal achievements. Key indicators of flow (Csikszentmihalyi, 1992) are the moment-by-moment understanding of what comes next, immediate feedback and the feeling that the work is of an appropriate challenge level. A sense of satisfaction as well as an

appropriate level of challenge can both be addressed by a process whereby adolescents have the opportunity to take responsibility for their own learning by exercising choice over their tasks. These indices of flow as related to adolescent educational needs provides direction for implementation of PoP principles in a UK secondary educational setting.

3.9.1 Neurological Considerations of Adolescents and Creativity

The neurological development of adolescents has been the subject of much research (Reyna, Chapman, Dougherty, & Confrey, 2012) and has provided clarity of understanding to key elements of adolescent behaviour supporting the development of the relationship between caregiving adults and adolescents. Some of the main understandings are built on hormonal changes, incomplete inhibitory systems, a heightened sensitivity to rewards (including the need for social acceptance) and a deep understanding that the brain has more plasticity at this stage of development (Griffin, 2017). This understanding is even appearing in popular literature, with accessible texts ‘demystifying’ the secrets of neurodevelopment for parental information (Reyna et al., 2012). Griffin (2017) and Reyna and colleagues (2012) amalgamate studies providing an understanding that the development of the brain during adolescence is both rapid and individual, with some clusters of similarity around different ages and genders. Griffin reports that the volume of grey matter increases during this time and the connections in the white matter change more during this period of development than at any time other than a baby’s first year.

Of key interest to this research is the link between brain plasticity and creativity as well as the decision-making process of this group and the different factors that come into

play. As explored previously when examining the neurological research on creativity, there are links between brain plasticity, as in the way the brain adapts to changes and makes connections, and creativity (Abraham et al., 2012; Fink, Benedek, Grabner, Staudt, & Neubauer, 2007; Gibson, Folley, & Park, 2009; Jung et al., 2013; Moore et al., 2009; Travis & Lagrosen, 2014). Having identified then, that adolescence is a time of significant changes in the brain (Griffin, 2017), it could be argued that this is a key time to develop creativity. As the thought process for this group is more dependent on their own perception of self-interest (Kelley, 2004), there is motivation to promote choice making rehearsal that also encourages flow, through satisfaction in achievement, by offering different difficulty levels. As adolescents usually spend a larger proportion of their time in educational settings than interacting with others at home, interventions in this arena are likely to have a greater impact than an individual approach.

The question of whether a creative child develops into a creative adult has been tackled by Torrance (1972) but his positive findings are largely anecdotal, exploring his perception of creativity as it relates to creative outputs or unusual job choices – honing in only on the ‘product’ exploration of the four P model of creativity (Rhodes, 1961). Torrance (1972) used his own judgement of creative adult lives to compare with previous pupil creativity scores, taken by his own measurement tool, and although he reported a correlation, the more everyday problem solving and practical application of creativity was largely ignored, leaving this question still open to some debate. While this matter may be somewhat resolved by implementing a more longitudinal approach to research, the measurement tools and a subjective evaluation of creativity in adulthood would need to be adopted, perhaps relying on Rhode’s (1961) four P

framework to assess that which renders an adult creative, or even a standardised measurement scale (discussed further in chapter 4) could be employed. Torrance's (1972) assertion that creativity was observable in adulthood after a high measure on his own scale was indicated in childhood, especially given that it was in objective support of his own measurement scale, may not have been as robust as it appears.

3.10 The Appetite for Educational Interventions

Interventions in educational settings, such as additional support or targeted sessions over and above timetabled classes, aimed at all ages are not uncommon and have many different intended outcomes and audiences. Some are aimed at improving educational outcomes (Gorard, Siddiqui, & See, 2015), some at improving mental health or behaviour (Rice & Meyer, 1994; Sugai & Horner, 2009) and still more at dealing with specific issues facing schools or individuals (Rice, Herman, & Petersen, 1993). Interventions such as these may take the form of individuals from outside of the school coming in and delivering a discrete, single or series of sessions, outside of the curriculum and exploring the impact of the sessions. In addition to these, there are academic targeted interventions that take place as part of everyday school procedures as a teacher led classroom intervention over and above the planned whole class teaching, either for individuals or small groups while the majority of learners progress differently (Garrett, Citkowicz, & Williams, 2019; Kajamaa, Kumpulainen, & Olkinuora, 2020; Zhai, Raver, & Li-Grining, 2011).

Many of these interventions form part of the normal school plans and one reason for this is because Ofsted – the inspection body for schools in England – specifically note that they do not expect the school to provide additional materials for any Ofsted

inspections. As nothing over and above normal practice is needed for the inspection process, many schools are making very high levels of interventions and record keeping part of their daily practice, primarily to have additional materials available for any 'no notice' inspections (The researcher was directly involved in staff meetings in at least four schools where these practices were upheld, and opinions shared by other teaching professionals (Doe, 2019).

As the complexities of the teaching role in school has increased with more demands on teacher time, both in terms of planning and implementing academic interventions for both struggling and high achieving pupils, in addition to the data management and report writing, teachers are increasingly time-poor (Bubb & Earley, 2004; Miryala & Chiluka, 2012). Non-contact teacher tasks are increasingly taking over teacher time (Galton, 2008; Manuel, Carter, & Dutton, 2018), even with the protected planning preparation and assessment (PPA) time that UK teachers are now granted on their timetabled hours (Capel & Blair, 2008). Many teachers are finding that more and more of their work is being taken home, leading to greater impact on their own lives and these increased stressors are leading to a reduction in the number of teachers remaining in the teaching profession after the first five years (Foster, 2018).

It is against this backdrop of time-poor teachers that additional and externally funded and implemented interventions take place, and even though teacher involvement may be low, any time that the pupils spend away from the taught classroom increases the likelihood that pupils may fall behind (Hancock, Lawrence, Shepherd, Mitrou, & Zubrick, 2017) and thus increases the chances that teachers will be required to provide additional academic support after the intervention. Many interventions, although they

are excellent in terms of pupil outcomes, struggle to sustain their impact due to lack of teacher and school support, frequently due to the additional time requirements on teachers or due to funding provision expiring (Bishop, 2011; Coffey & Horner, 2012; Pinkelman, McIntosh, Rasplica, Berg, & Strickland-Cohen, 2015).

Interventions based in a school setting have the potential to reach and influence the lives of many children with minimal disruption, as it is possible to retrain one secondary school teacher who then has influence over all the pupils in all their classes. This is a more viable way of implementing large scale interventions than with individual pupils, simply from a practical point of view. While these problems in terms of teacher workload have been identified however, it will be important to ensure that teacher buy-in and enthusiasm is high, any workload increase is minimal and the time that pupils need for any measurement or away from curriculum content is low. A minimal workload increase will enable teachers to engage more fully with the intervention, and a low time cost to pupils away from curriculum content will reduce anxiety from parents and teacher alike that learning may be adversely affected.

In order to minimise workload increase, it is important for any strategy or intervention aiming to promote creativity not to add to teacher time, and instead to replace existing tasks in a way that supports pupils' creativity while also meeting the school's inspection-driven extraneous expectations of documentation and procedure. In this context, one of the most important and oft-neglected focus of teacher training is lesson planning. Planning documentation is variable but is inevitably extraneous for a number of reasons; it is not a pupil-facing document but is vital for the teacher as a roadmap of the lesson (Skowron, 2001) and it is not specifically required by Ofsted for

inspections but schools often use them for internal monitoring to make them part of 'normal paperwork' (as described above). Replacing this typical documentation with something that is intrinsic to the lesson and gives the map to the pupils may help to support agency, free up teacher time to support less able pupils and allow pupils to manage their own experience of the lesson. It is also the case that targeting lesson plans also targets lesson delivery, while supporting the understanding that the teacher has influence over many pupils and interventions targeting teachers may therefore have a far wider impact than an individual pupil approach.

3.11 Conclusion

This chapter explored some of the diversity in creativity research, particularly structured around finding a working definition of creativity, the four C model (Kaufman & Beghetto, 2009) and the four P model (Rhodes, 1961) that remain prevalent in contemporary research. The literature discussed here demonstrates current understandings of creativity, with a narrowing focus on employment, business and problem-solving needs. Further exploration was given to the challenges in developing creativity within a UK education setting due to the historical legacy of western educational systems. In exploring methods of developing creativity, the medium of play was examined, including play with young children and how play changes as age progresses. The limited availability of data on how play changes during adolescence and beyond, and the implications for the role of play in educational settings means that this exploration is still in its infancy. Some practical and logistical considerations were also given to argue for the implementation of interventions in educational settings as the most effective medium for change to creativity development in this age group. The pitfalls of developing interventions that could place additional burdens on teacher

time, school reporting and workload were also discussed. This chapter has framed the three areas of psychological research into which this thesis seeks to make an original contribution to knowledge: creativity, play and learning.

This chapter also explored the historical context that has led to the current UK education system as well as the emerging need for change centred around creativity – particularly for secondary school pupils. In order to address this need, some exploration of the terms ‘creativity’ and ‘play’ – particularly as they pertain to adolescence – will be further defined in the forthcoming chapters describing the stand-alone studies, where additional exploration of more specific literature within the field will be undertaken. It is important here, however, not to ignore the impact that educational experiences have on young people. While the reductions in funding, value and timetable availability for ‘creative subjects’ such as art, drama and music may be providing more space for an increased focus on ‘fundamentals’ of teaching (Lee, 2017) and the increased standardisation of knowledge and learning may be driving more data driven teaching, the unintended consequences for learners may be a perceived devaluing of creativity and leading to a reduction in real world employability as the creative dividend is lost.

In exploring the economic, personal, social and individual dividends of creativity, this chapter has examined the needs for creativity, while the current challenges in developing this skill within educational system that still bears the legacy of its industrial past have also been reviewed. By utilising the Pedagogy of Play principles outlined in this chapter (further examined in chapters 5 and 6) during the teachers’ lesson planning phase, there is the potential to impact creative thinking skills in a measurable

and achievable way. This can be extrapolated due to the links between creativity and play explored in this chapter, and the inclusion play in a lesson by using three playful indicators of choice, wonder and delight, in learning. By targeting teachers' planning, the planned intervention studies inevitably also target lesson delivery and pedagogical standpoints and thereby values of teaching, and over time this approach can influence many more pupils than a pupil-targeted approach. As argued in this chapter and in the concluding chapter 7, developing young people's creativity may also help them to succeed in a rapidly changing employability climate by developing creative thinking skills that will equip them for success in the future.

In order to examine whether any intervention can be successful, chapter 4 reviews the current available methods of measuring creativity, seeking to establish an appropriate tool for research that will take place in schools with an adolescent population. The chapter addresses the key considerations for undertaking larger scale measuring during a school day with this population and examines the opportunities for doing so, concluding that an Italian tool (the Widening, Connecting, Reorganising (WCR) test) provides a viable option and then seeking to validate this tool in an English-speaking population. Specifically asking if the WCR test can be used to reliably measure creativity in an English-speaking population.

Once the measurement tool is established, chapter 5 describes the process of adapting the Pedagogy of Play for an English secondary classroom in more detail. As play has been established as key in developing creativity in this chapter, enhancing secondary pupil's access to play in the classroom is hypothesised to provide more opportunity for this skill to develop. This stand-alone study seeks to establish whether

the Pedagogy of Play is more effective than either Typical Teaching or a Student Focussed planning intervention in developing creativity.

Initial results from the investigation into play in chapter 5, leads to further refinement of the processes in chapter 6, along with the development of a hybrid teaching planning methodology. This hybrid model intended to incorporate positive enhancements in creativity with an accelerated attainment noted in chapter 5. This allowed for a full exploration of play as a means to enhance creativity in pupils in multiple subject areas as well as developing attainment goals over and above expectations. In addition, chapter 6 examines creativity in terms of creative subjects as well as creative teaching in core subject areas, exploring the possibilities of enhancing creativity while supporting accelerated learning outcomes.

The next chapter presents the tool validation study, which was designed to create a quick, efficient and reliable measure of creative thinking in adolescents. The aim of developing this measure was to provide a tool fit for purpose as a measurement scale in the classroom-based studies that form chapters 5 and 6 of this thesis.

4. Tool Validation Study (Study 1)

4.1 Introduction

This chapter first examines the existing options for a tool for measuring creative thinking suitable for adolescents that was easy to administer, non-disruptive and as objective as possible. It then expands on the theoretical backgrounds of the Widening, Connecting, Reorganising (WCR) test developed by Antonietti, Colombo and Pizzangrilli (2011) as described in detail in section 4.2.1 and identifies the reasons for using this tool as a measurement of creative thinking in this research and thus forms part of the process for gathering evidence for the intervention as an original contribution to knowledge.

4.2 Background

There are significant issues to consider when selecting a tool to measure 'creativity'. As identified by numerous authors (Auzmendi, Villa, & Abedi, 1996; Croyley, 2011; Feldhusen & Goh, 1995; Kim, 2006; Piffer, 2012; Runco, 1987; Runco, 1993; Simonton, 2000), the options are many and the reliability is often problematic (Croyley, 2000). The key issue seems to be that of the conceptual understanding of creativity, and in particular whether this is a sufficiently defined concept as to be able to test it. As discussed in section 3.1, for this research the adopted definition is the twofold combination of novelty and usefulness as outlined by Stein (1953b) and further clarified by Runco (2018). While the aforementioned authors agree that creativity is multidimensional and involves several thought processes and mental mechanisms, identifying distinct areas or types of thinking provides fuel for endless debate. This matter is outlined well by Batey (2012). As was discussed in the introduction, the

concept of principal interest in this research is creative thinking as it relates to problem solving.

Batey (2012) provides a new three-dimensional heuristics framework for categorising the types of creativity tests available. His model recognises that the type of creativity test that is employed depends on the historical background of the term as well as the purpose of the investigation taking place. The levels in Batey's model reproduced in figure 4.1 consider a three-dimensional axis when identifying the type of test to employ based upon the intended use of the data. First the population included in any research or intervention; is the goal to identify creativity in an individual, team, organisation or culture? Secondly, the various measurement approaches fall first on objective rating, and are predominantly numerical, as for example a number of responses to stimuli such as a Test of Alternative Uses (TAU) (Guilford, 1956) or the number of patents held by an individual or company. A self-rating test might explore an individual or team self-report of creativity while other ratings might depend on the products, for example an expert opinion on a product. The third axis for consideration, the facet, involves what aspect of creativity is being measured: the personality trait, the thinking process, the environmental press or the creative output or product.

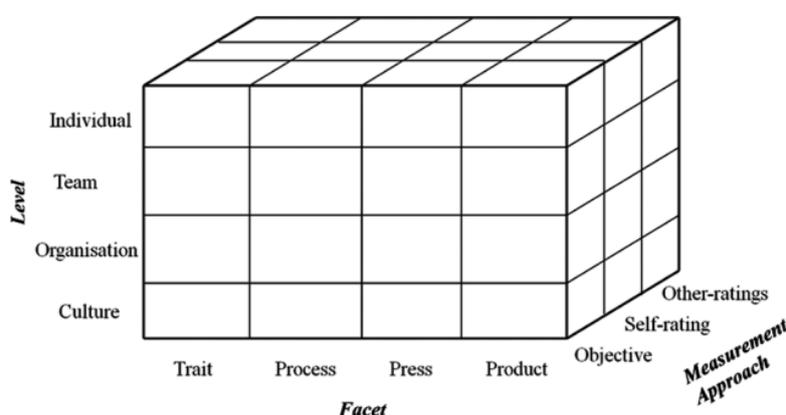


Figure 4.1- A graphical representation of a framework for creativity measurement. Reprinted from Batey (2012).

In addition to the type of test used, there are test administration constraints to consider. From a procedural viewpoint, many of the established tests, for example the Guilford TAU (Guilford & Hoepfner, 1971), involve face-to-face administration on an individual basis. Even when this can be modified to be administered online without negatively affecting its reliability (Hass, 2015), the participants could potentially be hindered by variability in typing speed or difficulties in generating ideas when faced with a blank page. Evidence exists, though, in support of the reliability of a 'multiple choice' approach to creativity testing (Auzmendi et al., 1996) based on the Torrance Test of Creative Thinking (TTCT) (Torrance & Goff, 1989). This test was validated with a Spanish population – although not online administered – and contains 60 multiple-choice questions, which are primarily image based. Although this provided an extensive analysis of creativity among participants aged between 13 and 20, the administration time for the test was well over an hour. This extensive timeframe calls into question the results at the end of the test, particularly in children with shorter attention spans, as long tests can induce fatigue.

However, the benefits of a Multiple-Choice Questionnaire (MCQ) element to a creativity test cannot be ignored. It makes administration simple and allows for statistical data to be quickly and easily examined, following the Cropley model (2000) where scoring is inverse to the population to identify novelty, so an answer arrived at by 10% of a sample population has a novelty or creativity score of 90%. The advantages of this is that it provides an objective element to the creativity test. The challenge of an MCQ is that while it can provide a starting point to explore the direction of an individual's thinking when compared to a sample of their peers, it is ultimately a restrictive method, focusing as it does on pre-defined constructed questions and

answer possibilities. Although this can seem to limit rather than measure the respondent's creativity, it does in fact provide an accurate categorisation of thinking styles within a sample. But considering the benefits and drawbacks outlined, it is important that a creativity test should not rely solely on MCQ style questions to allow for creative expression.

While the format of question, open-ended generation or MCQ, is part of the dialogue to be explored when examining creativity tests, the method of administration is also important. Face to face verbal tests (Guilford, 1967), pencil-and-paper tests (Torrance & Goff, 1989) and online administration both timed and untimed (Pásztor, Molnár, & Csapó, 2015) have all been considered and examined. Although older research identified no significant differences between verbal and pencil-and-paper tests (Vernon, 1971), one of the most frequently used tests is the TTCT (Torrance & Goff, 1989) as it contains a verbal response combined with figural responses. This has rarely been duplicated online, however, partially due to the challenges presented by the technological translation of figural responses, although a recent thesis has been utilising technology to remedy this (Guo, 2016). However, the technological requirements involved in Guo's methodology require a touch screen, something currently not universally available, especially in schools. Research also reveals no significant difference between pencil-and-paper tests and online tests (Hass, 2015; Lau & Cheung, 2010), thus suggesting that the medium of the test is not a determining factor. When looking at online-administered tests there is also an important issue to note around scoring. The more established tests, for example the Wallach-Kogan (1966) and the Guilford Test of Alternative Uses (Guilford, 1967) rely on subjective scoring procedures that have the potential for reliability problems – particularly with

interrater reliability, raising concerns over the validity of pre- versus post-intervention comparisons. While some external 'judgement' of the creative output is useful when explored with good interrater reliability, an enhancement that combines the numeric driven MCQ with a more subjective score although with rigid frameworks of analysis may be of most value.

A computerised version of the Wallach-Kogan test (1965), that also includes one subsection of the TAU, was developed in 2010 by Cheung and Lau in Hong Kong and normed in China. This took approximately an hour to administer and was scored electronically. While online multiple-choice tests are easy to administer, as discussed, they are prescriptive, providing no room for thinking outside the prescribed answers, regardless of how varied the options may be. The drawbacks of completely open-ended questions are that they have a significant impact on scoring time as well as introducing an element of opinion and thus subjectivity, even with good interrater reliability. The positives, however, are that they allow for the expression of greater creative freedom and this then allows for more thorough assessment of creativity. As there are drawbacks to both approaches for testing, a reasonable supposition is that a combination of these methods might provide the robust measurement tool needed. As outlined in chapter 3 and further explored here, it seems that this research requires an instrument that is quick to administer, to ensure minimal disruption to the school day, and offering a hybrid of the multiple-choice approach and the open-ended test items to ensure reliable repeated measures, while still allowing expression of open or 'elaborative' creativity. As it will be outlined in the following section, the Widening Connecting Reorganising test has been chosen, as it is theoretically sophisticated and practically effective.

4.2.1 Exploring the WCR test

The Widening, Connecting, Reorganising (WCR) test of creativity was developed in Italian by Antonietti, Colombo and Pizzangrilli (2011). It was intended as a tool to measure three components of creativity, namely ‘Widening’, ‘Connecting’ and ‘Reorganising’, identified in the proposal of a new model of creativity that drew together diverse theories from different psychological perspectives. The test was piloted on 160 lower higher school age pupils and 70 lower school age pupils in Italy.

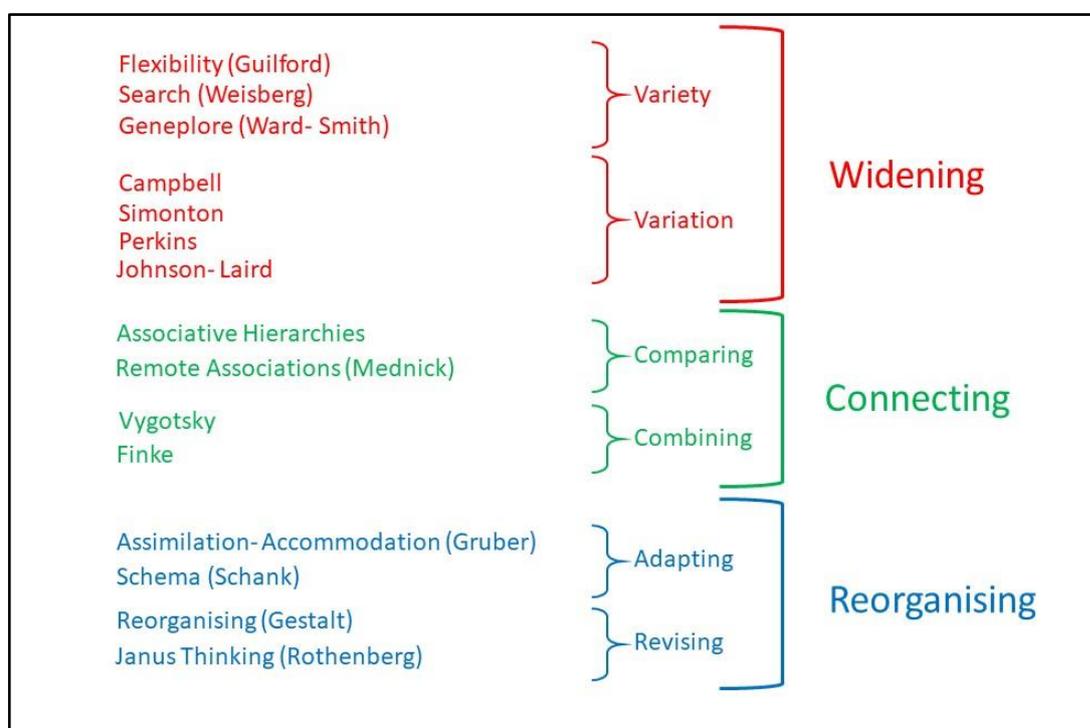


Figure 4.2- Theoretical underpinnings of the WCR- Adapted from slides from Antonietti, 2017.

The model categorises creative mental process into three distinct areas of creative thinking, the theoretical perspectives of which are modelled in figure 4.2. ‘Widening’ links the variety of thinking from the TAU and TTCT tests as well as the concept of variation presented by Campbell (1960), Simonton (1999a), Perkins (1981) and Johnson-Laird (1983). ‘Connecting’ correlated with the concepts of Associative Hierarchies and Remote Associations (Mednick, 1962) in relation to ‘comparing’, and

the 'combining' element of Vygotsky (1967) and Finke (1992). '*Reorganising*' links the terms of Assimilation-Accommodation (Gruber, 1980) and Schema (Schank, 1991), which refers to 'adapting', and Reorganizing (Perls, Hefferline, & Goodman, 1951) and Janus thinking as part of 'revising'. Although this is a significant breadth of theoretical material, the consideration of diverse key themes into the final test provides some indication of the scope of the field of creativity research.

The tool was later digitised and used to assess the creative thinking score of 1,119 Italian students between the ages of 6 and 17 (Pizzingrilli, Valenti, Cerioli, & Antonietti, 2015). It was further validated against the established TTCT (Antonietti, 2017; Torrance, 1962), and the results, reproduced here in table 4.1., although unpublished for reasons unknown, showed promising significant correlations. As the correlation between the WCR and the TTCT is significant, there is reasonable evidence to suggest that the WCR test could be a possibility for measurement of creative thinking in Italian.

The test consists of three sections, each one mapped to a different construct. The 'Widening' section consists of three single-answer multiple-choice questions, each drawn from a different medium (numerical, image and text). Participants select a single answer from a provided choice of four. The 'Connecting' section consists of two text-based multi-answer multiple choice questions- of interest here is the combination of different answers that each individual selects. The third question in this section is an image-based multi- answer multiple-choice question with additional rationale for choices requested. The final 'Reorganising' section consists of two multiple choice hypothetical situations, one 'what would happen if...', and finally, one image-based

sequential multiple-choice question 'what comes next' with a reason and a story to link the two images requested.

Table 4-1 Pearson's correlations between aspects of the Torrance Test of Creative Thinking (TTCT) and sections of the Widening, Connecting, Reorganising (WCR) test as reported by Antonietti, 2017.

TTCT	WCR		
	Widening	Connecting	Reorganising
Unusual Uses			
Fluidity	.63**	-.03	.02
Flexibility	.67**	-.05	.26*
Originality	.65**	-.06	.08
Figure Completion			
Flexibility	.31*	.02	.32*
Originality	.25.	.02	.31
*p<.05 **p<.001			

Note: Adapted from slides belonging to Antonietti shared via personal correspondence (2017)

4.2.2 The WCR Test Administration

The WCR test can be administered face-to-face on hard-copy physical pages as published in the original Italian test (Antonietti, Giorgetti, & Pizzingrilli, 2011), or administered online, which contains a combination of image and text-based options. It also has sections to allow for elaboration, while providing guidelines for scoring. It contains only nine questions and is quick to administer, allowing for typing time in the longer questions, taking, on average, 15 minutes to complete. These features make this measurement tool ideal for the current research.

4.2.3 Research Question and Hypothesis

Given the evidence of previous correlations with the TTCT, an established measure of creativity, and the additional online administration option available in Italian, the hypothesis is that the WCR test in English may be suitable for the needs of this research in providing a quick, easy to administer measurement of creativity for an adolescent population. Furthermore, it is predicted that once the necessary translations and cultural adaptations have been made, this tool will provide an additional option for researchers into creativity as a measurement tool in English.

Put succinctly, the research question is: Can the WCR test of creativity be a valid measure of creative thinking potential within an English-speaking population?

4.3 Method: Campus Recruitment

This section outlines the procedure undertaken in preparing translation of materials from Italian to English, and then validating the translated versions with an English-speaking population. To satisfy the demands of test validation, it is important to remark that the WCR test has already been demonstrated to assess the creativity construct that it purports to. Although the WCR has been validated with the TTCT as demonstrated by Table 4.1, this data was generated as part of an unpublished study. A concurrent validity test was therefore conducted between the WCR-E test – measuring creative thinking in English, and the TAU (1956) – measuring divergent thinking, a key component of creative thinking. The TAU was selected as it is the most frequently used instrument, and it was predicted that there would be a statistically significant correlation between the TAU and the WCR test – particularly with the ‘Widening’ section, based on the theoretical model previously outlined.

4.3.1 Participants: Campus Recruitment

69 undergraduate and postgraduate students at Edge Hill University took part in this study (8 males) aged between 18 and 58 with a mean age of 20.21. They completed a total of 240 tests overall and 52 participants completed more than one version of the test. All students were recruited through the psychology department student participation system (“SONA”) and the study received ethical approval from the departmental ethics committee (BM/12-2017/43). Information sheets were provided, and consent was collected as part of the online administration of the test. All data was anonymised at point of entry. Participants were compensated £3 per test according to departmental guidelines.

4.3.2 Materials and Measures: Campus Recruitment

This section outlines the procedures undertaken in preparation of the Widening, Connecting, Reorganising (WCR) test and the Guilford test used for this study. It identifies some challenges and outlines how the multiple versions of the test were adapted from the Italian version to better evaluate creative thinking in the English population.

4.3.2.1 The Original Italian Version

The WCR test consists of nine questions as described in section 4.1.2. The first three multiple-choice items provided no challenge in terms of translation as they were single word nouns, a numerical image-based task that required no translation and single word answers in response to a colour. Three versions of the test already existed in Italian validated with different age ranges, and there were additionally multiple

versions of the test for Primary ages as published in the handbook for teachers (Antonietti, et al., 2011).

It is worth noting some possible discrepancy in validation and norming in the Italian system when compared to the UK system. The age ranges of the Italian school system have some overlap with the UK system, meaning that the Italian 'junior' version as well as the 'senior' version can be used depending on the age of the participant. Concretely, in the Italian school system, the 'junior test' was for ages 8-12 years and the 'senior' for 12-18 years. The age range in the UK is set at from 11-16 meaning that both Italian versions of the test are age-appropriate, depending upon the year group involved. Direct translations from the different versions of the test were used translated to English, checked by a bilingual individual, and translated back, although some minor cultural adaptation was needful, to form the basis of the English test used in this study. In order to prevent the same participant from completing the same test more than once, six translated versions of the test were generated based on the original template. Although the key quasi-experimental studies that make up the remainder of the investigations for this thesis will have 11-16 year-old participants, the initial validation was conducted with university students for two key reasons. The first was practical, since research with adolescents comes with significant ethical concerns (discussed further in section 4.2.1) and recruiting pupils for this phase of the research would have jeopardised their inclusion in later studies, and second, that the level of language understanding would not be a factor in a university population, meaning that element of the translation would not be a significant problem at this stage (age-appropriate language is discussed further in section 5.2.6.).

4.3.2.2 Widening

The first section of the test measures the ‘Widening’ aspect of creativity. Widening refers to the variety of different functions or purposes for a given object. As an example, one method of assessing ‘Widening’ presents a simple line drawing, such as that in figure 4.3, where the participant is asked to identify what they see from a choice of four answers. In generating the English version of the test, it was possible to use the same images and provide a simple translation of the answers to ensure that these test items remained true to the validated Italian version. This figure came from the translation of the ‘Junior secondary’ version of the test that was included in the materials presented by Antonietti (2017) and provided by personal correspondence.

Four possible multiple-choice direct translated answers were provided with this image.

- a) A flower
- b) A gear
- c) A dish on a crochet- hook doily
- d) A straw hat seen from above

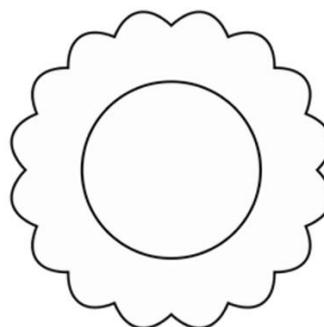


Figure 4.2- Example question translated from the Italian Widening section of the WCR test.

As an illustration of the changes that needed to be made to adapt the test to an English population, consider the option presented as ‘c’ in figure 4.3. Although a crochet lace doily is seen frequently in older houses in Italy, they are extremely uncommon in the UK at this present time and it is unlikely that this item will be within the frame of reference of 11-16-year-old pupils in mainstream UK education. To remain in keeping

with the decorative nature of the original Italian translation, this item was changed to 'a plate with a frill around it'.

An important consideration in translating the test is the phrasing of the instructional language. The original Italian 'Secondo te, che cosa potrebbe rappresentare questa figura?', translates as 'In your opinion, what would be able to represent this figure?'. A small syntax change renders 'In your opinion, what does this figure represent?'. The ethical guidelines set out by Ethical Research Involving Children (ERIC) (Graham, Powell, Taylor, Anderson, & Fitzgerald, 2013) for secondary education research best practice has a maximum reading age of 11 for all language chosen. For this reason, the instruction was changed to 'What do you think this image represents?' The word 'figure' has potential connotations of a human figure and so was replaced with 'image'. 'In your opinion' as a question opening was judged to be an academic barrier for this age group and therefore the language was adjusted to the more informal, 'What do you think' to help them feel more comfortable (a further breakdown of these questions and their linguistic and cultural translation and development can be found in appendix 1).

As a second example, another type of question relates to perception, such as the one presented in figure 4.4. Participants are asked to identify how many triangles there are. The image can be viewed in several ways- for example, a triangle can be identified in a single section:

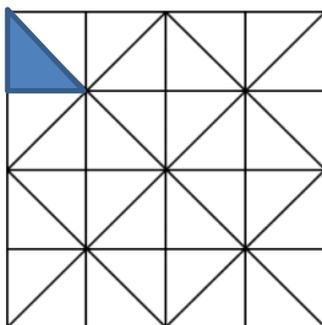


Figure 4.3 Perception test example from the WCR Widening section.

But it is also possible to identify triangles of multiple sizes and rotations within that same image as shown in figure 4.5.

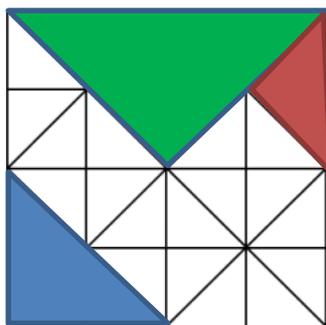


Figure 4.4- Perceptual possibilities for a single image of the WCR Widening section.

Thus, there are many possible answers with four presented as possible multiple-choice options. They are identified by counting all of the single small triangles as in figure 4.4 (32), then by adding to that the count of the blue triangle used in figure 4.5 (40). The next option is arrived at by calculating all the permutations of a single quarter of the figure (16 triangles) and multiplying it by the four sections providing the answer of 64. Finally, the triangles formed by connecting between the four sections need to be considered, such as the green triangle shown in figure 4.5. The multiple-choice options for the image in figure 4.4 are a) 32, b) 40, c) 64, d) more than 64. The ability to see multiple possible answers to a single question as documented in Guilford's

construct of divergent thinking. Although it would be possible for participants to select the largest and most unorthodox number as a matter of routine or to attempt to appear more unique, the inverse scoring applied simply means that by a majority of participants selecting it for any reason render is 'less creative' in that it attracts a lower score. The desire to appear unique is also evidence of a thought process around creativity and this is then reflected in the scoring of the individual within the sample group.

4.3.2.3 Connecting

The items on the 'Connecting' component of the WCR test had longer sentences, which required more thorough work on the translations. The test items were translated from Italian to English, then checked with a bilingual Italian/English speaker, then translated back again into English and checked once more. For example, the question '*Pensa al fiore. Quali delle parole riportate qui sotto ti fa venire in mente? Metti una crocetta di fianco alle tre parole il fiore ti fa venire in mente.*' This directly translates as '*Think about the flower. Which of the words given below do you come up with? Put a cross next to the three words the flower brings to mind.*' This was adapted for use in the final English version of the question to: 'Think of a flower. Which THREE things does a flower remind you of?' Given the high levels of computer literacy amongst young people (Poynton, 2005), the reference to making a cross was omitted as the method of presenting their answers would be self-evident given the medium of the test.

In Italy, 'abito fiore' or 'flower dress' is heavily drawn upon in fashion, but the term is unfamiliar to most people in the UK. For cultural reasons therefore, this was replaced

with a rhyming game that is found in children’s playgrounds across the UK: the plucking of individual petals from a bloom, and alternating ‘he loves me’, or ‘he loves me not’ for each petal. This retains the direct link to the flower as the object of the question while being a more culturally familiar construct. Table 4.2 presents the Italian test answers, their direct translation, and then final English answers for this test item. Due to the within-sample scoring method employed, there is no further adjustment needed. Further examples of items from the ‘Widening’ section of the test can be found in appendix 2.

Table 4.2- Example of translated answers for a ‘Connecting’ question from the WCR test.

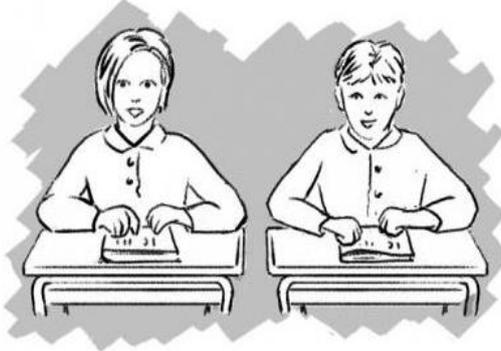
Italian Answers	English Translation	Final Selection
Petalo	Petal	Petals
Abito	Dress	‘He loves me, he loves me not’
Ape	Bee	Bees
Annaffiatoio	Watering can	Watering can
Profumo	Perfume	Good smells
Primavera	Spring	Spring
Festa	Party	Parties
Vaso	Glass	Vase
Prato	Lawn/ Meadow	Garden

4.3.2.4 Reorganising

The 'Reorganising' section of the WCR is both image and text based. It has questions with two-part answers, multiple-choice, and open-ended answers. Participants are presented with an image and then asked to select the image that could come next. The Italian instruction reads '*Observa questa scena in cui ci sono una mamma e il suo bambino intorno a un tavolo apparecchiato. Tra le quattrtro immagini scegli quell ache pensi sia piúaddata a continuare la stori. Metti na crocetta sul numero dell'immagine che hai scelto e scrivi sotto all'immagine perchél'hai scelta.*' In English this directly translates to 'Observe this scene in which there is a mother and her child around a set table. Among the images you choose what you think is more appropriate to continue the story. Put a cross on the number of the image you have chosen and write below the image why you have chosen it.' The instructional text in English was amended to read 'Look at this image. Which of the following images could come next in the story? Please give a reason for your answer'. This is shown in figure 4.6. It was believed that there would be too much text in the direct translation, and the language 'please give a reason for your answer' would be familiar to UK pupils as it is used in standardised tests at Key Stage Two from primary schooling.



Look at this image.



Which of the following images could come next in the story.
Please give a reason for your choice.



Please write a brief story linking the two images you have chosen.

110

Figure 4.5- An example from the Reorganising section of the WCR test

4.3.2.5 Guilford Test of Alternative Uses (TAU)

The Test of Alternative Uses (TAU) developed from Guilford's Structure of Intellect (1956) is almost synonymous with creativity and also forms part of a subsection of the Wallach- Kogan test (1965). Coded in various ways (for example, counting only for frequency, allowing for fluency, coded via latent semantic analysis tools, etc), it has been used in many studies to provide a measure of creativity, something explored and

summarised by Runco and Acar (2012). Despite the administrative and scoring drawbacks highlighted in 3.2, the status of TAU as an established tool make it ideal for use as a creativity benchmark for this English language validation of the WCR test. An oft used example of this test is 'Please list all the uses you can think of for a brick.' Items are then scored for each different answer, with an additional point for originality. In this example, an answer of 'build a house' would attract a single point, while 'break up and paint and use to make a mosaic' would gain two.

As there is little evidence that timed or untimed versions of this test deliver different results (Pásztor et al., 2015), this test was administered untimed. As the test is assessed for fluency by a number's count in this study, there was no cap to the number of answers that a participant could provide.

4.3.3 Procedure: Campus Recruitment

The test was administered on the university campus in a research laboratory. Demographic data consisting of age and gender was collected. Informed consent was obtained as part of administration of the test with withdrawal possible during the test by closing the browser window. Data was anonymised at point of entry with participants creating a personalised codename for their entry in case of later stage withdrawal. Debrief sheets with the researcher's contact details to allow for later withdrawal and/or project information were provided. The WCR test was administered first, followed by a single item TAU. Completion of both parts of the test took approximately 15 minutes although there was no time limitation placed on the test.

4.3.4 Data Analysis and Scoring: Campus Recruitment

There was some ambiguity around scoring the WCR test as there had been two methods advocated by Antonietti. One of these methods was published in his handbook for teachers (Antonietti, et al., 2011) and one described in detail via personal correspondence. The published paper (Antonietti, et al., 2011) also describes a scoring method that seemed to tally with that described in correspondence but contained less detail. While both methods follow broadly the same pattern and both address the standard definition of creativity described in 2.1 (Batey, 2012; Runco, & Jaeger, 2012), the most accessible scoring method was adopted in this study, despite some ambiguity in assigning middle scores (full description below).

In order to address the originality element of the definition of creativity, questions of a quantitative nature are assigned a creativity score out of four based on the popularity of the answer. The less common the answer, the higher the score. Each answer chosen by less than 10% of participants attracted a score of four, and the most common answer earned a score of one. This is the procedure published in the handbook for teachers (Antonietti, et al., 2011) and is demonstrated for hand scoring in table 4.3 (reproduced from that book with permission). In order to arrive at this method, the tests had to be normed within their population, something that was achieved for the handbook by Pizzingrilli (2015). The form, shown in table 4.3, was based on norming procedures undertaken for each sample; this method was explained via personal correspondence (Antonietti, 2017), and the same method was undertaken in each test for this study.

The norming procedure used a pattern of frequency versus design/logic. While answers chosen by less than 10% of the sample attracted a mark of 4, and the most popular item attracted a score of 1, attaching marks to other answers. If an item followed a matrix of the 'designed for' or primary purpose (e.g. a chair is designed for sitting on, a pen for writing with) frequency. If it was secondary purpose (for example building a den for a chair or as a projectile for a pen) and a low number of participants selected it (up to around 25% depending on the numbers that selected the most and least popular answer), it attracted a score of three: Low frequency but logical, similarly attracted a score of three. Secondary purpose and high frequency achieved a score of three, while a primary purpose and high frequency answer attracted a score of two. The use of secondary purposes offer choice in terms of usefulness addressing the other aspect of creativity's dual definition. The scores of one and four were attributed as explained above for scores of less than 10% (4 points) or greatest frequency (1 point).

Widening Test	7	score	8	score	9	score	Widening Total _____
	a	1	a	2	a	1	
	b	4	b	3	b	4	
	c	4	c	3	c	4	
	d	4	d	1	d	4	
Total _____		Total _____		Total _____			

Connecting Test	10	score	11	score	12	score	quant	Connecting Total _____
	a	1	a	3	a	2	1 2 3	
	b	2	b	4	b	2	1 2 3	
	c	4	c	4	c	1	1 2 3	
	d	4	d	1	d	4	1 2 3	
	e	4	e	4	e	4	1 2 3	
	f	2	f	4	f	2	1 2 3	
	g	3	g	4	g	4	1 2 3	
	h	4	h	3	h	4	1 2 3	
	i	4	i	3	i	4	1 2 3	
Total _____		Total _____		Total _____		_____		

Reorganizing test	16	score	17	score	18	score	quant	Reorganizing Total _____
	a	1	a	1	fig 1	1	1 2 3	
	b	4	b	2	fig 2	4	1 2 3	
	c	2	c	4	fig 3	4	1 2 3	
	d	4	d	3	fig 4	4	1 2 3	
	e	4	e	4				
	f	3	f	4				
Total _____		Total _____		Total _____		_____		

Total creativity score W+C+R=

Note: Adapted from 'Test per la scuola io penso creative' by A. Antonietti, M. Giorgetti and P. Pizzangrilli, 2011,

p.28

Table 4.3-Example Scoring form for Teachers for the WCR test.

The WCR test scoring paradigm used in this tool validation study ensures that both originality (offers of various secondary purposes) and frequency (number of participants selecting each answer) are taken into account. For example, when exploring the uses of a book, 'reading' is a primary purpose, but if it is chosen by less than 10% of the sample size, it attracts a score of four, regardless of whether the use is for an object's primary purpose or a secondary one. Should a response attract the highest frequency in this sample, it would receive a score of one. If it is in the middle, with around 25% frequency and a secondary use, it would score a three as it is both a conventional use and low frequency, whereas if it were chosen by 75% of the respondents it would be scored at two.

The open-ended items and thus subjective on the WCR test were scored out of three possible points. Logical answers or stories would attract a score of one, while imaginative ones would be scored as a three. Those which included either a conventional object with an imaginative reason, or a conventional reason for an unusual object would score a two. In addition, stories that were original or extensive but not particularly imaginative or creative attracted a score of two.

To ensure that the test scoring was reliable for the subjective element of the scoring, interrater reliability tests were conducted. Intraclass (ICC) estimates and their 95% confidence intervals were calculated based on a mean-rating ($k=3$), absolute-agreement, 2-way mixed-effects model. Calculations were completed for each of the five subjective items. The average interrater reliability of the items was .93, with the lowest of the five items scoring .84 and the highest .98. A total score for every

participant was calculated for each section of the WCR test (i.e., the Widening score, Connecting score and Reorganising score), as well as a combined score.

A separate score was calculated for the single Guilford Test of Alternative Uses item and the results examined. The TAU was scored to control for fluency and originality. Firstly, a simple count to assess for fluency score with one mark per unique item, and secondly, an originality score was awarded that was based on population sample answers. Originality scores were inversely proportional to the observed frequency in the population sample; for the item of pencil, an answer of "writing" selected by 100% of the population scored 0 and answers such as "rewinding old tapes" selected by 20% of the population were scored at 80%. This originality score was then divided by the fluency (to control for fluency bias) by providing an average originality for each answer. For example, in an scenario in which a participant provides nine unique answers, scoring nine for fluency, each answer additionally attracted a score for originality as described above (answer one scored 0 for originality as all participants used it, answer 2 scored 40 as 60% of participants used it and so on). The final originality answer, in this example 320, is divided by its fluency (9) to give an average originality score for each answer, in this example, 35.5.

4.4 Results: Campus Recruitment

The data was input into SPSS version 23 and descriptive statistics calculated. They revealed that the TAU had both the lowest mean value ($M=39.94$) and the highest standard deviation ($SD= 22.60$), indicating that the results may vary significantly between individuals.

Table 4-2 Mean and Standard Deviation of the WCR-E and TAU scores: Campus Recruitment

	TAU	W	C	R	WCR
Mean	39.94	50.84	71.89	62.56	61.76
SD	22.60	15.07	3.80	11.09	7.86
n	240	240	240	240	240

Once the data was input into SPSS version 23 a Pearson's correlation was run between the individual Guilford score for each test and the combined WCR test score results for the same participant and test. It showed no significant correlation between the TAU and any of the six versions of the WCR test, or for any section of test – Widening, Connecting or Reorganising, or the combined score – as seen in table 4.5.

Table 4.5- Pearson's Correlation Output Between the Campus Guilford Test of Alternative Uses and the Sectional WCR Test Scores.

		W	C	R	WCR
Guilford	Pearson Correlation	.051	.064	.114	.105
	Sig. (2-tailed)	.436	.320	.078	.105
	N	240	240	240	240

4.5 Interim Discussion: Campus Recruitment

The lack of a significant correlation between the TAU and the six versions of the Widening, Connecting, Reorganising test in English did not fit the hypothesis, and was surprising as some of the WCR questions were identical to the TAU items from different tests, although in multiple choice format. Upon reflection, the lack of correlation may have a threefold cause. First, test fatigue: the TAU test question was always at the end of the WCR test due to constraints in the BOS administration system (Jisc, 2014) and it also demanded the most written input from participants. Second, it was possible that the language of instruction was not as clear as it might be for the Guilford test, since 'List all the possible uses you can think of for XXX' occurring at the end of a test that had predominantly consisted of single-word answers may have been misleading for the participant, leading them to assume that they needed to provide only one answer since that had been the expectation thus far. This might translate to less incentive to persevere until they had run out of ideas for how to use the object. Finally, it was possible that a single Guilford object for each participant was unreliable or insufficient to establish a correlation. A correlation between a test with nine questions and three subsections and a single question test may be challenging, even though traditionally that is how the TAU is administered.

In addition, there was also some confusion around the scoring for the WCR test items as mentioned in 4.2.8. As there had been two documented methods of scoring, one to compare against the normed data for teachers' ease of use, and a second version used in the initial test validation (Antonietti, 2017), it was critical to examine the scoring method. The second method of scoring, that which was described in the published paper (Antonietti, et al., 2011) was to assign a value inversely to the percentage of

respondents who selected it. Thus, an answer selected by 10% of participants in the sample attracted a score of 90% while an answer selected by 70% of respondents attracted a score of 30%. While the first method was very clear with assigning the highest and lowest value answer, some ambiguity remained around a score of 2 or 3. This alternative method, while following the same principle, provided more variation in final scores as well as being a more mathematical and thus objective method of scoring the tests. Responses were thus rescored according to this alternative published method (Antonietti et al., 2011), but there was still no significant correlation between the translated WCR test and the TAU as shown in table 4.6. It is interesting here to note that, although not significant, the correlation between the ‘Connecting’ section and the Guilford test is higher than for the other sections.

Table 4-3- Pearson’s Correlation Between All Sections of the Campus WCR Test and the Guilford Test with Alternative Scoring

		W	C	R	WCR
Guilford	Pearson				
	Correlation	.006	.115	-.013	.007
	Sig. (2-tailed)	.924	.075	.845	.105
	N	240	240	240	240

4.6 Method: Social Media Recruitment

Given the potential confounds identified in the initial stage of the study, the point of validity had yet to be addressed and therefore the study was redesigned by adapting instructional text and changing test presentation to combat possible test fatigue.

4.6.1 Participants: Social Media Recruitment

This set of data was gathered during the summer, therefore the revised version of the Guilford and English WCR test was advertised on social media platforms (Facebook) and pinned to university online forums at Edge Hill, Cambridge and Hull universities. To run this new version of the study, an ethical amendment was sought and granted with focus on recruitment method and remuneration – there was no remuneration offered in this round of testing. Forty students or recent graduates participated in the study (32 females) with an average age of 27.8 years; there was also one participant who preferred not to specify gender aged 21).

4.6.2 Materials and Measures: Social Media Recruitment

Following the hypotheses outlined in Section 4.4 regarding the possible reasons for a lack of correlation between the two creativity tests in the previous study, the following changes were made:

- The number of TAU objects were increased to two to allow for greater subject variability.
- The TAU items were moved to the start of the testing session, before the WCR test to avoid test fatigue. This was arranged to split the typing demand questions up, the typing for the list requested by the TAU at the start and then typing the story needed for the final question at the end.
- The language of instruction for the Guilford items were modified by capitalizing one word: 'Please list ALL of the possible uses you can think of for XXX' to avoid risk of insufficient responses.
- The items from the multiple versions of the WCR test were collapsed to provide one direct translation test from a single Italian established version of the test so

that this version of the WCR-E test matched the Italian original most closely and therefore should present the largest change of correlation as the Italian WCR had.

4.6.3 Procedure: Social Media Recruitment

Participants were directed to an online link and informed consent was collected as part of the test. Demographic data was also collected at the start of the test, again comprising age and gender details. Two TAU items for alternative uses were administered first, followed by the nine items from the WCR test. The test took between 15 and 20 minutes to complete. Participation was not remunerated.

4.6.4 Data analysis and Scoring: Social Media Recruitment

Given the more objective focus, the scoring used the second method outlined in 3.4: scores were attributed inversely proportionally to the frequency of the choice of item recorded. The TAU was scored in the same way as the previous attempt but with two items included, the scores were averaged across both scores to provide a single TAU score for comparison with a single WCR score as an average of the three subsections of the WCR-E.

4.7 Results: Social Media Recruitment

The data was once again examined for descriptive statistics, which can be found in table 4.7, and once again the TAU test demonstrated a large standard deviation (14.53) with a small mean average (22.60).

Table 4-4 Mean and Standard Deviation for WCR-E and TAU measures of Creativity: Social Media Recruitment.

	TAU	W	C	R	WCR
Mean	22.60	48.29	75.78	71.87	65.31
SD	14.53	10.84	5.00	10.59	6.85
n	40	40	40	40	40

An initial Pearson's correlation was conducted and the English WCR test significantly positively correlated with the TAU, $r=.45$, $p=0.003$ as shown in table 4.8. Although the correlation was significant in all sections – “Widening” ($r=.333$, $p=.036$) and “Reorganising” ($r=.339$, $p=.032$), the correlation was particularly strong for the “Connecting” section ($r=.413$, $p=.008$).

Table 4-5- Pearson's Correlation Between All Sections of the Social Media WCR-E Test and the Guilford Test with Inversely Proportional Scoring.

		W	C	R	WCR
Guilford	Pearson				
	Correlation	.333*	.413**	.339*	.451**
	Sig. (2-tailed)	.036	.008	.032	.003
	N	40	40	40	40

* $p<.05$ ** $p<.01$

Following identification of 2 statistical outliers (3 standard deviations from the Mean), the data from these 2 individuals were removed and a further Pearson's correlation was conducted. The English WCR test significantly correlated with the TAU ($r=.52$, $p=0.001$) as shown in table 4.9. Although the correlation was not significant in all

sections – “Widening” ($r=.18$, $p=.281$) was no longer significant – it was more significant for the “Reorganising” ($r=.55$, $p=.000$), and “Connecting” sections ($r=.494$, $p=.001$).

Table.4-6- Pearson’s Correlation Between All Sections of the Facebook WCR Test and the Guilford Test with Statistically anomalous outliers removed.

		W	C	R	WCR
Guilford	Pearson				
	Correlation	.18	.55**	.494*	.52**
	Sig. (2-tailed)	.281	.000	.002	.001
	N	37	37	37	37

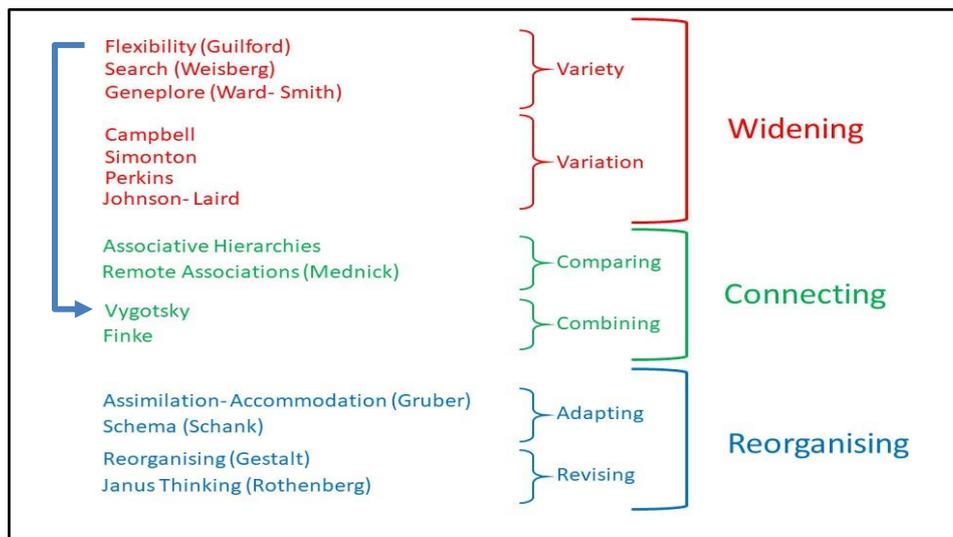
* $p<.05$ ** $p<.001$

4.8 Discussion

This study intended to establish validity for the English translated version (WCR-E) of the Italian WCR creativity test by correlating it with the commonly used Test of Alternative Uses (TAU). A strong correlation would allow this measurement tool to be used in the measurement of creativity in larger scale testing where time for administration is important as well as accuracy of results. The purpose of this in the context of the PhD was to establish a tool that could be used to measure creativity in a classroom environment, with minimal impact to teacher time or to pupil learning time. Overall, this validation study has revealed a significant positive correlation between creativity scores obtained with the newly developed English translation of the WCR test and the existing TAU. Despite early challenges, the significant positive correlation between the revised version of the WCR-E test and the TAU indicates that the expected connection between the two creativity measurements is present.

The further unpacking of the sectional WCR data highlights some interesting points. There was an unexpected, strong positive association between the TAU and the Connecting and Reorganising sections of the English WCR test. This potentially indicates that the process involved in the construct of divergent thinking as measured by the TAU and that the aspects of encompassed by the concept of 'Widening' is not as strong as previous research indicated (4.2.1). This might suggest that the divergent thinking process may be more strongly associated with the ability to combine knowledge of the properties of an object and the potential uses of those properties beyond those originally designed or intended. While this could be argued to reach the edges of convergent thinking – the logical or 'correct' conclusion of the combination of knowledge of various properties and potential uses, this is nonetheless generating an output that gives a novel and useful use of an object – and thus is demonstrating creativity. Another possibility here is that the connections between different sections differ by language, as the original was validated in Italian, and the best results were obtained in the version that was closest to the Italian version. This is another interesting area for further research. Pending further confirmatory research, in other languages as well as English, this might lead to a possible amendment of the model of theoretical perspectives offered by Antonietti previously in figure 4.2, which is displayed in figure 4.7.

Figure 4.7 Suggested Amendment to the Theoretical Underpinnings of the WCR.



The example of a pencil can be used to explore this perspective. The designed properties of a pencil involve mark-making. So, writing, drawing, sketching, scribbling, etc. are all extensions of the primary purpose of the object. However, a pencil has several other properties that can also be used in a variety of ways – it is hard, long, thin, has a point that is combustible, etc. From each of these, we can combine our knowledge of those properties to develop new uses for the object. The length of the pencil can lend itself to back scratching; the point may be used to reset an electrical device. It is possible then that this theoretical underpinning belongs rather with Finke (1992) and Vygotsky (1967) under the ‘combining’ and thus ‘Connecting’ process of creativity. This would confirm the assertion made by Ritter et al. (2012) that cognitive flexibility is similar in nature to the diversifying influence of divergent thinking; they postulate that schema challenges along with unexpected or novel experiences help to develop the ability to make diverse connections.

The significant positive correlation between the revised WCR-E test and the TAU test does go some way towards supporting the assertion that the WCR-E test is suitable

for use in measuring creativity, but there are some aspects that need further exploration. The TAU provides a separate basis for scoring creativity, coming from a single theoretical background. In contrast, the use of multiple thought processes in the construct of creativity is widely accepted by researchers (An et al., 2016; Benedek et al., 2016; Boden, 1994; Chang, Chen, Wu, Chang, & Wu, 2017; Cropley, 2011; Cropley, 1967; Cropley, 2000; Eysenck, 1993; Feldhusen & Goh, 1995; Guilford, 1967; Hardy, 1998; Kim, 2006; Ritter, & Dijksterhuis, 2014; Runco, 2003; Simonton, 1999a; Simonton, 2000). As multiple thought processes are employed, it is reasonable to suspect that the TAU maps onto multiple sections of creativity as well, as indicated by the WCR-E correlations.

In order for the WCR-E test to be validated as a tool to measure creativity, it is needful to evaluate its validity, reliability and objectivity. Limitations to the present study of creative thinking are not confined to the complex constructs and processes that are being assessed. The small sample size is another drawback, and the recruitment medium as well as the instant anonymisation does not lend itself to test-retest measures of reliability. But this does not mean that there is no merit in the WCR-E test, as the test-retest reliability is often offset by the practice effect (Lemay, Bédard, Rouleau, & Tremblay, 2004) and moreover, the current standard TAU also demonstrates problems in this area, since listing alternative uses for the same object twice is of limited use for retesting and the object choices themselves present problems – for instance, it may be easier to think of multiple uses for a brick, than for a ping pong ball.

Another key step in the validation process of a new tool deals with the collection of normative data. In this instance, the scoring procedure of the new tool is created from the test sample and so forms the normative data itself. This is a strength for a tool that is intended for use as a creative thinking measure, pre- and post- intervention in a teacher planning intervention, to encourage development of pupils' creative thinking using playful pedagogical approaches.

4.9 Conclusion

The positive statistical correlation between the English version of the Widening, Connecting, Reorganising test (WCR-E) and the Guilford Test of Alternative Uses (TAU) supports the notion that the construct of divergent thinking is certainly part of the spectrum of thought processes that contribute to the concept of creativity. That creativity constructs are measurable, and that there is some validity in tests doing so, continues to be a matter for great debate. This will continue to be the case as long as there are as many facets of creativity as there are uses for it.

The WCR test was selected due to its theoretical sophistication as well as the pragmatic need for a creative thinking test that could be administered quickly. The WCR-E test took each participant no more than 20 minutes to complete and this included the two questions from the Guilford test of Alternative Uses. This suggests that the test could be completed by pupils in around 15-20 minutes, making the administration time ideal; and the online data collection means no additional paperwork for participating teachers.

Functioning as a measurement of various aspects of creative thinking, the significant positive correlation in the second version of the WCR-E test suggests that it could be used as a wider-ranging, more objective alternative to the TAU. This provides some evidence that this measurement is a good fit for the tool needed for the large sample collection of data from schools in a fast and efficient way, to enable focus on the intervention as a method of developing creative thinking in adolescents. The establishment of the WCR-E tool as a valid method of collecting data in an English-speaking population is part of the original contribution to knowledge presented in this research.

The next chapter describes an intervention study that used the new WCR-E to measure adolescents' pre- and post- creative thinking.

5. Intervention Study (Study 2)

5.1 Introduction

This chapter describes an intervention study based upon Pedagogy of Play principles outlined in chapter 3. It first covers the theoretical background to the intervention and the development of the teacher training and testing protocols to evaluate its effectiveness. It also illustrates the development of a second planning-based methodology, Student Focused, that was intended as an alternative model to investigate the effectiveness of play as a medium as opposed to an additional focus on planning by the teacher. This chapter investigates whether these proposed training and testing processes and protocols were suitable for assessing creativity changes, as well as providing initial data for examination. The intention of this study was to explore whether a play-based planning methodology could enhance creativity development in adolescents more effectively than either typical teaching or an additional planning focused intervention. This study uses the WCR-E test that was validated in chapter 4, to assess the intervention that is described in the current chapter with an initial evaluation and further explored in chapter 6. The overarching aim of the thesis was to provide evidence for the use of play as an educational medium in order to enhance creativity. This research study was undertaken with a single school and department with the intention of obtaining feedback before undertaking a larger scale investigation.

5.2 Background

This study, which uses the WCR-E developed in chapter 4 as a key measurement of creativity, builds upon the premise established in chapter 3, and has several key

outcomes. As identified in the literature exploration (chapter 3), manipulation of the teachers' lesson planning methodology was targeted for intervention as it will replace current teaching practice and thereby limit this study's impact on teacher workload. Teachers themselves have been targeted due to the high impact that any intervention can have in comparison to individual pupil programmes. This research used existing PoP indices (Mardell et al., 2016) to inform development of a planning technique based upon a familiar lesson plan structure (discussed further in 5.3.2) to examine playful approaches to planning and what effect this may have on adolescent creative thinking. To evaluate this effectively, an additional lesson planning technique that is based on a student-centred approach (Tomlinson, 2017) and is pupil facing, thus increasing the importance of the document from a teacher point of view, was also developed (5.3.2). This was to control for any potential Hawthorne effect (Cook, 1962) of focusing on planning by teachers. These two methods were employed, along with typical teaching, to evaluate the effectiveness of planning interventions, play interventions and teacher training programmes, in order to provide evidence to optimise a larger scale experimental study (chapter 6). The literature (chapter 3) suggests several key features of effective interventions that the development of these two planning methods sought to address; little impact on teacher time, integral documentation, supported planning and a strong theoretical approach operationalised for practical use in the classroom. The process and background for developing these teacher lesson-planning interventions is discussed in 5.3.2. This chapter also discusses the challenges associated with conducting research in live school settings and with adolescents, and uses the initial literature exploration (chapter 3) to generate a hypothesis and research questions for this study.

5.2.1 School Recruitment

A key vulnerability of research conducted with adolescents has always been the difficulty of gaining access to them as research participants. 'Gatekeepers' exist in school settings in order to safeguard young people and many points of contact and consent are needed in order to work with adolescents safely and ethically. This project wrestles with this issue as it involves the use of school time and teacher workloads in addition to parental and individual consent. Although the manipulation of condition is through teacher planning, with the attendant need to recruit supportive teachers, the outcome is being measured in pupil psychometric testing, which requires parental understanding as well. Effectively, this creates a fourfold system of consent to gain access to each participant for the completion of this research: (1) a sympathetic Head Teacher role, then (2) class or subject teachers willing to participate and alter their planning style, and finally both (3) pupils and (4) parents who are willing to consent to taking part in the testing. As this is a complex issue, recruitment of schools was identified as a major risk factor when planning this research.

One key mitigation of this risk was the extensive personal network of the researcher who had significant prior experience in many schools. Finding schools with which to make initial contact was less of a challenge than recruiting a school willing to participate in a more in-depth study. After many meetings with various schools, one emerged as willing to make the necessary allowances for the research to continue beyond an initial intervention phase, along with having a department that suited the needs of the initial phase with willing teachers. From the outset, the Headteacher indicated that they would be very interested in taking the findings of the initial phase

forward to a wider trial. The maintenance of this good relationship was therefore of paramount importance to the research and significant care was taken to this end.

5.2.2 School Demographics

The school is situated in a market town in England with a population of over 20,000 according to the last census, which be conducted in 2011 (this data was obtained from the local authority website which will not be referenced in order to protect the anonymity of the participating school). It has a higher than average level of native UK population, with insignificant immigration. The population is also older than both the national average and the county average, with higher than average home ownership suggesting relative affluence. Despite this, the area has a large number of residents with either no qualifications or fewer than one GCSE at grade D. This may be due to the indicated high average age of the population, demonstrating limited access to education for historical reasons or changes in educational reporting policy (i.e. the implementation of GCSEs in 1988).

The town is served by four primary schools directly in the town, with an additional nine schools on the fringes of the town. It also hosts two secondary schools, a larger school serving approximately 1500 mixed gender pupils and currently rated 'Inadequate' by Ofsted and a smaller voluntary aided school serving 650 mixed gender pupils and rated 'Good' by Ofsted. It is the smaller of the two secondary schools that volunteered to take part in this research.

According to the school's Ofsted report (not referenced due to confidentiality for the participating school), the school is smaller than the average comprehensive school

and is voluntarily aided by the Archdiocese. The racial demographic of the school (and of the local area) is predominantly of White British heritage and there are very few pupils for whom English is a second language. The gender split is biased towards males and the number of pupils with additional or education needs are broadly within the national average. The school is in a high socio-economic area as evidenced by the low number of pupils supported by additional funding for school meals or other financial support.

5.2.3 Research Questions and Hypothesis

The research question in this initial intervention study was: Can a Pedagogy of Play (PoP) planning intervention enhance creative thinking in secondary education students, compared to an experimental control group with a Student Focused (SF) intervention and compared to a control group with Typical Teaching (TT), as measured by the WCR-E? A sub question also for evaluation was: are the teacher training materials, intervention programmes and testing procedures suitable for use in a secondary education context without undue strain on teacher workload or pupil learning?

The experimental hypothesis is that students who take part in the PoP intervention will show a significantly larger positive difference in pre- and post-intervention WCR-E scores, compared to students who take part in a SF intervention and students who do not take part in any intervention (TT). In addition, that the materials, procedures and processes were suitable for use in a secondary school environment.

5.3 Developing the Interventions

The link between creativity development and play outlined in 2.6 suggested the possibility that the introduction of play into lesson delivery may enhance the development of creativity. In order to control for the Hawthorne effect (Cook, 1962), a second intervention with a student-centred approach was also developed for inclusion. While the two interventions are outlined in detail below, there are several commonalities that had to be taken into consideration in their development and implementation: impact to teacher time, development of teacher training for continuing professional development, and adaptability for existing curriculum content.

The first of these concerns, the impact to teacher time, was addressed by using the approaches to replace current planning rather than as an addendum to existing protocols. Therefore it was important that the approaches met school requirements for internal monitoring, and to that end the PoP proforma, (a non-pupil facing document) was developed based upon an existing accepted model. The SF procedure was a pupil facing document which, although it had a greater impact to teacher time due to unfamiliarity, provided a necessary format from a pupil point of view making the document and therefore planning important in its own right.

From the point of view of adding value to teacher training, both of the methods were based on accepted and theoretically sound teaching practice and the training was able to build on existing knowledge. For the PoP approach an understanding of active learning approaches was used (Bellanca, 1997; Freeman et al., 2014; Silberman, 1996) and for the SF model the process of differentiation was expanded upon (VanTassel-Baska, 2012). This action of building upon existing accepted practice

means that teachers have a starting point for understanding and also feel that there is value in the methods from a training point of view.

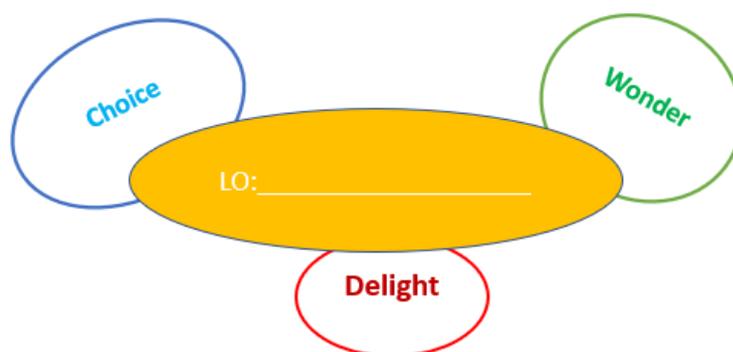
The final concern, that of the ability to adapt existing material is also connected to teacher time issues as many teachers re-use planning from one year to the next with only minimal changes on review (something that is supported and explained in the teacher interviews in chapter 6). This means that, from both a teacher engagement and time management point of view, asking a teacher to re- plan a unit of work without allowing them to incorporate previously used materials, means they must generate new materials, in addition to the time spent planning and getting to grips with a new technique. In both of the planning methodologies, while a few additional resources are required, most of the materials, for example worksheets and pupil tasks, can be repurposed in the new systems, adding to existing resources rather than rendering existing materials obsolete. Teachers invariably invest time generating their resources and enabling them to retain their value in a new methodology, means that teachers are able to use familiar resources in a new way.

5.3.1 Pedagogy of Play Intervention (PoP)

As discussed in chapter 3, the first intervention was based on the PoP approach which uses the focus of choice, wonder, and delight to identify playful learning opportunities, where lessons are planned to incorporate all three foci in each lesson at key points familiar to teachers. The various foci lend themselves to adoption as part of different aspects of the frequently adopted and taught structure of a UK lesson plan. This lesson plan structure is known as a four-part lesson plan and was first advocated by the Teacher Effectiveness Enhancement Programme (TEEP) in 2002 as part of their

'Accelerated Learning Cycle'. It was set up as a Continuing Professional Development (CPD) programme in 2010 through the Schools, Students and Teachers Network (SSAT) and the training funds come from the Education Endowment Foundation (EEF) to benefit the most disadvantaged students. Through this scheme, over 450 schools have undertaken this four-part lesson plan training to date, in addition to the model being used to demonstrate effective teaching practice in Initial Teacher Training (ITT) institutions across the UK. This is despite independent evidence to indicate that the programme makes no appreciable difference to exam results in English and Mathematics despite teacher and pupil enthusiasm for the programme (EEF, 2019). Regardless of efficacy, the four-part lesson plan has been in use across much of the UK since 2002 and remains prevalent. The adapted practical version of the planning sheet is shown in figure 5.1. It uses colour coding to link the concepts from the training materials (appendix 3) with the corresponding parts of the lesson.

PoP Planning Sheet



Starter:	
Teaching:	
Learning:	
AFL:	
Plenary:	

Figure 5.1- Pedagogy of Play (PoP) planning proforma, adapted from TEEP.

The 'wonder' element of the PoP methodology was mapped to the 'Starter' element of the four-part lesson plan, as both elements are seeking to provide a 'hook' to engage students. Often this is an application of the learning in the real world, but in the case of PoP, it should be approached with the intention to elicit wonder. Some examples of this could be to present a staged crime scene in a science lab with different experiments needed to identify clues; or a mathematical problem for hairdressers such as how much hair dye do you need to buy in order to dye the triangle area your client is requesting and how much money should you charge them. 'Delight' bridges both the 'Input' and 'Activity' sections of the lesson plan with the intention to keep interest while promoting a state of flow with the work. Teacher explanation should be interspersed with activity here in order to keep interest while maintaining guidance. In

addition, the 'choice' element should be utilised in the 'Activity' section with pupils having an opportunity to select how to demonstrate their knowledge – something that could be as simple as electing to complete the odd or even numbered problems in a text book, or more complex choices, such as writing the explanation of the experiment as a scientist back to NASA or as an alien back to high command. The 'what' of the learning is demonstrated in both cases but the 'how' is left more to the student, allowing them to take ownership of their learning. The reflective plenary remains the same but contains elements of flow and should be a natural progression of the lesson.

The purpose of using a familiar 'touchstone' or starting point to integrate a new methodology into an existing accepted framework was to support teachers in adapting existing planning. This layout was designed to highlighting how each section of existing planning might need to be altered to meet the needs of the new methodology. In addition, a familiar format was intended to encourage teachers to adopt the method and support the new strategy in order to minimize teacher stress and minimise additions to teacher workload while helping to allay fears that a play-based methodology was either unmanageable or would have a negative impact on student learning. The integration is also true to the theory behind the research, as it applies the PoP principles to the UK curriculum framework and expectations. The key indicators of the model – choice, wonder and delight – highlight some of the key purposes of the original TEEP model, while the shift in focus incorporating active learning techniques (Bellanca, 1997; Silberman, 1996) (chapter 3) is intended to allow the additional development of adolescents' creative thinking as a skill while maintaining the accelerated learning intended by the original TEEP model.

5.3.2 Student Focused Intervention (SF)

The Student Focused intervention was developed based upon an initial concept that emerged in Australia at the University of Virginia and was originally named 'Student Centred Learning – Planning for Student Success', as presented at the personalised Association for Supervision and Curriculum Development annual conference in 2017 (Tomlinson). This was developed in this study as an experimental control intervention to focus on teacher planning, in order to evaluate the effectiveness of play focussed planning, while controlling for any enhanced scrutiny of personal planning process and procedures that might occur as a result of participating in a planning focused intervention. The key focus in the present study is personalised learning, as opposed to differentiated learning. A brief look at adolescent development demonstrates the assertion of personal control as the brain matures (Casey, Jones, & Hare, 2008; Griffin, 2017; Reyna et al., 2012) and it is upon this premise that this Student Focused planning model was based. A heuristics type approach was selected, with individual small choices leading to an overall outcome greater than the sum of its parts. This was based on Simon's (1972) theory of bounded organisation where smaller choices enable complex decision making to occur until the intended outcome can be achieved – in this case understanding, practice and extension of the learning objective for the lesson. A flow diagram type planning procedure similar to the questions observable in teen magazines and online and therefore likely to be familiar in structure to the pupils (an example of which can be found in appendix 4) was selected as the vehicle. Figure 4.2 demonstrates the planning proforma used with each student following their own learning pathway through tasks designed by the teacher and all based upon the basic question 'Can I understand/demonstrate the learning objective?' as the starting point.

In addition to being based upon an understanding of the emergence of the adult personality and assertion of control during this phase of development, the model has an added benefit of including a focus emerging in schools of ‘taking responsibility for their own learning’ as a positive desire for students. This is part of the adoption of the ‘active learning’ pedagogy that began in 1991 (Bronwell & Eison). This began with a focus on learning styles that has since fallen out of favour, but the key principle of engaging the learner through participation remains a primary focus of teaching.

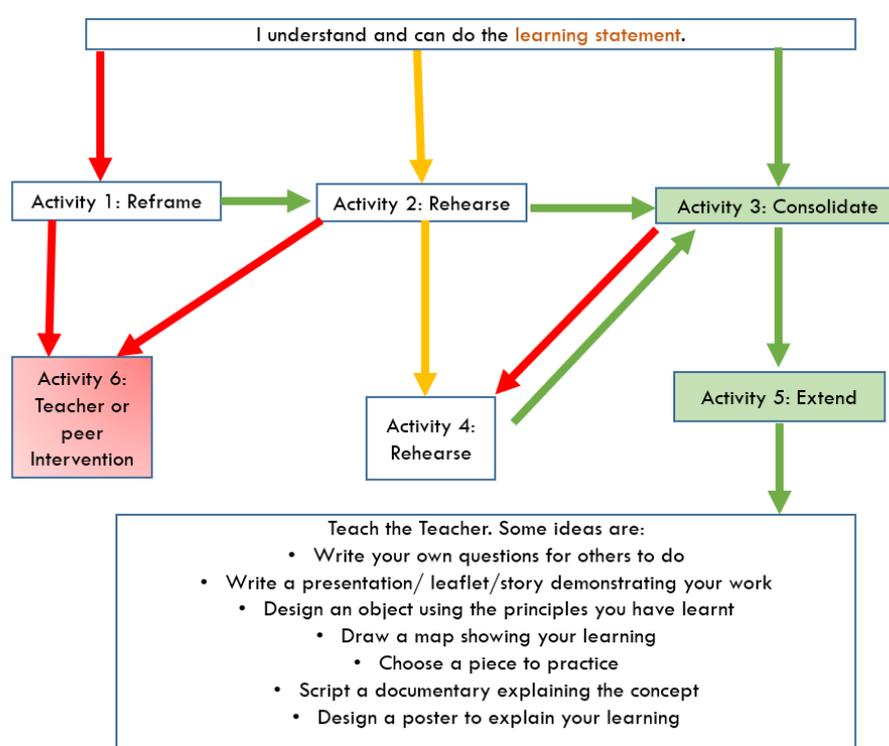


Figure 5.2- Student Focused (SF) Planning proforma.

5.3.3 Typical Teaching (TT)

In this research, an additional typical teaching (TT) group was used as a control group against which to compare the two developed interventions. This group covered the same topic as the two experimental groups and participated in the creativity testing, as well as submitting attainment grading at pre and post intervention points as part of normal school reporting procedures. There was no teacher training and no shift of

focus onto planning. The teacher had taught the same lesson content used intervention unit of work the previous year and the materials and methodologies remained unchanged.

5.4 Method

This section outlines the procedure undertaken in developing interventions and conducting teacher training in the new lesson planning and the effects on pupils' creative thinking testing in a single school and department. It describes the study design and testing procedure, as well as outlining the protocols for consent and intervention for the three conditions.

5.4.1 Participants

The department involved in this study consisted of three members of staff, all holding Qualified Teacher Status (QTS) and with a minimum of six years teaching experience for each staff member. They were all specifically trained in Religious Education as a subject specialism.

59 pupils (34 male) from a single year group (aged 12-13) in a UK secondary school were recruited along with their teachers. The teachers selected a single year group to participate in this study and distributed consent forms and information sheets for both parents and pupils during the lessons. Reading age on all documents was set at age 11 to facilitate understanding by all (Ogloff & Otto, 1991). Consent forms differed for parents, pupils, teachers and headteacher and are included in appendix 5. Data were anonymised four weeks after completion of data collection and once all participant data were matched at pre and post intervention time points. This timeframe was to allow for participants or parents to withdraw from the study should they wish to do so.

The researcher had no direct contact with pupils although they were offered the opportunity to ask questions about the nature of the research via email or through their teacher. There was no remuneration or incentive offered as part of this research either to the school, teachers, pupils or parents. The study received ethical approval from the Psychology Department Ethics Research Committee (BM/06/2018/46).

Class groups recruited were 'set' according to academic ability in Maths and English by the school and taught in streamlined academic groupings, with lower academic ability children taught in smaller groups. This meant that the groups were not equal sizes when they were recruited. Further attrition due to non-return of consent forms led to three unequal group sizes, with the smallest group consisting of only 10 individuals; the other groups were of 26 and 24 pupils. The school controlled these parameters, and the group of 26 (school designated high English ability) participated in the PoP experimental intervention, the group of 24 (school designated moderate high English ability) took part in the SF intervention and the group of 10 (school designated moderate low English ability) had no intervention but experienced typical teaching.

5.4.2 Materials and Measures

This section outlines the study design and materials used in the intervention as well as the testing methods. The measurement tools used were the validated WCR-E creativity test as outlined in chapter 4, and a school generated measure of attainment. These were based upon internal school assessments and generated by the class teachers specific to the subject areas that they teach.

5.4.2.1 Study Design

This study examined two experimental interventions, with one based on Pedagogy of Play (PoP) and one on a Student Focused (SF) planning approach, in addition to a control group (no intervention, but Typical Teaching (TT)). An English version of the Widening, Connecting, Reorganising (WCR-E) Creative Thinking test (Antonietti, Colombo, & Pizzigrilli, 2011) (chapter 4) was administered online via Qualtrics (Bosch, 2018) at pre and post intervention timepoints, illustrated in figure 4.3. Attainment grades were generated for each pupil at both time points by teachers as part of the normal school reporting processes. A teacher training intervention was administered to the teachers of the experimental groups, and teacher planning was supported for a unit of work lasting six weeks.

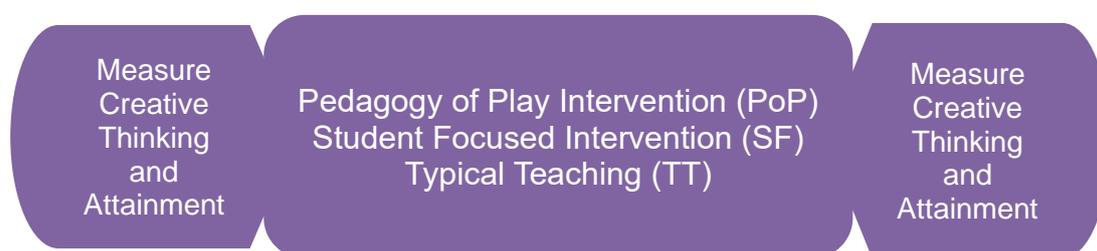


Figure 5.3. Graphic representation of the study design.

The two participating staff members (but not the Typical Teaching staff member) were interviewed using a semi-structured interview focusing on two key areas identified in the literature as crucial to the success of an intervention (teacher workload and training) as well as three areas of interest to the investigation (pupil engagement, teacher opinion of success and accuracy of implementation). Interview questions were as follows:

(Workload) How did you find taking part in the study in terms of workload?

(Pupil response) How did the pupils respond to the approach?

(Teacher opinion) How did you find delivering the lessons compared to your normal way of teaching?

(Training) How did you find the training element of the intervention?

(Pupil response) How were the pupils in terms of engagement?

(Quality control) How accurately do you think you taught the lessons compared to what you had planned?

Additional prompts were used as needed to allow teacher to elaborate and there was opportunity for open response at the end of the interview for teachers to share any additional information if they chose. This feedback from participating stakeholders was used to inform improvements for the next research phase in line with the methodological approaches of the action research spiral, in the larger scale intervention study.

5.4.3 Procedure

This study was conducted over 10 weeks with the intervention itself lasting six. Week one involved teacher meetings and distribution of consent forms, via the teachers, to the pupils to take home for parents as well as student consent forms that were completed in class. Teacher consent was obtained in week one and in week two they each took part in a separate training meeting lasting one hour, with no training for the designated Typical Teaching teacher. Materials used in this training can be found in appendix 3. Week two was also used to collect the consent forms back from pupils in lessons and to allow parents time to contact the school or researcher with any questions. At the start of week three each class was booked into a computer lab at

school and pupils worked independently to complete the WCR-E test online, following a link sent by the researcher to the teacher. The teachers began teaching their lessons at the end of week three and the six-week intervention took place through to week nine.

During week ten, teacher interviews were conducted, fitting in with the availability of the teachers. As schools break for at least a week every six to seven weeks in a cycle, there was an additional week between interventions ending and interviews being conducted.

5.4.4 Data Analysis and Scoring

The WCR data was coded and analysed as described in chapter 4.4 and pre and post data was compared. In addition, Cohen's *d* effect size was calculated. The students' attainment data was also compared pre and post intervention and comparisons made to expected trajectories for each student were based upon predicted outcomes nationally generated from primary Standard Assessment Tests (SATs).

The trajectory of attainment is calculated by the same formula across all schools in the UK and is predicated on even progress being made from starting point in year seven (age 11) to year nine (age 13). During the national curriculum update in 2014 discussed in chapter 3, the national curriculum levels were set in guidance documents and expressed by numbers (e.g. level 3, level 4, level 5), however since the devolution of the reporting system to schools and the advent of the change in GCSE grading from letters to numbers that started in 2017, many schools have opted to realign their lower school grading system to fit their own reporting. Despite changes in expressing the changes, the guiding principles remain the same, with grading used to monitor

attainment regularly. Each pupil had been expected to make one sublevel of progress (e.g., to move from a level 4a/1 to a level 4b/2) at three reporting points through the year. As schools changed reporting systems from three times a year to six, it becomes expected that pupils will make uneven progress, moving on in some subjects but not others at different points, but averaging three sublevels over an academic year.

The school in which this research was conducted used a numeric system combined with an indication of place within the band and were named according to school reporting procedures as: 'developing', 'securing' and 'extending'. Expected progress over the course of the year is therefore over one numeric value through three letter designated points. For example, over a single unit of work such as the one employed in this study, we might expect some, but not all, pupils to move from a 4d (developing) to a 4s (securing). It would be rare for more progress to be made, and it was actually expected for many pupils not to make such progress over a single six-week unit of work. To calculate the difference, each stage was allocated a scalar numeric value, for example level 4d, 4s, 4e became 4, 4.33, 4.66, to allow comparisons to be made, with the expectation that the average pupil would make between 0 and 0.3 points of progress. Pre and post scores were averaged and the difference between them used to identify average progress.

5.5 Results

This section reports the descriptive statistics and repeated measures ANOVA's that were conducted on the WCR-E results comparing the three different groups, PoP intervention, SF intervention and TT no intervention. It will also report the repeated measures ANOVA analysis conducted on the actual attainment of each group and

comparisons made with predicted attainment finally explore the interviews conducted with the experimental teachers.

5.5.1 WCR-E Test Results – Creative Thinking

The descriptive statistics for the three interventions are reported in table 5.1.

Table 5-1-Descriptive Statistics for WCR scores: Study 2.

Group	Pre-Intervention		Post-Intervention	
	M	SD	M	SD
TT	61.11	6.96	53.04	4.21
PoP	57.30	6.41	62.25	9.40
SF	61.61	6.70	55.56	6.42

Note: M and SD represent Mean and Standard deviation, respectively.

A one-way between subjects ANOVA was conducted to compare the initial pre intervention creativity results between the PoP group, SF group and the TT group. There was no significant effect of group on initial pre-test creativity scores ($F(1,55)=2.00, p=.15$), indicating that all three groups had a broadly similar creativity score before intervention.

It was also important to calculate the effect size to enable a good comparison sized between interventions. This was calculated using Cohen's d ($\frac{M_{post}-M_{pre}}{Pooled\ SD}$) to identify how effective each intervention was. The results revealed a very large positive effect for the PoP group= 1.86, a large negative effect for the SF group= -.92 and a very large negative effect for the TT group= -1.4. This indicated that both the TT group and the SF group had a significant decrease in creative thinking test scores in comparison

to the PoP group, where a significant increase was observed. It is also interesting to note that there was a decrease in the standard deviation of creativity scores at pre-test compared to post-test for both the SF group (-.03) – although only slightly in this case – and the TT group (-2.74) while the PoP group's increased (+3). This indicates a widening spread of creativity scores and a more diverse thinking pattern among the PoP intervention group, while the other two groups had a reduced spread of creative thinking scores.

A 2 x 3 mixed ANOVA was conducted to determine whether any change in creative thinking score (Dependent Variable) is the result of the interaction between type of planning intervention (PoP, SF or TT) and time (pre and post intervention). A main effect of time was observed ($F(1,55) = 6.19, p = .02, \eta_p^2 = .101$) indicating that creativity scores differed significantly at pre and post time points (see table 5.2). Of more interest was the significant group and time interaction, ($F(1,55) = 10.38, p < .001, \eta_p^2 = .274$) indicating that the changes in post intervention creativity measures varied significantly by group.

In order to understand the relationship between groups, the differences between pre and post creativity scores was calculated. Dunnett's T3 Post-hoc tests were used as the sample sizes of the groups were unequal. Results showed that the PoP group ($M = 12.48, SEM = 3.41, p = .004$) had significantly higher post creativity score compared with the TT group. In addition, when compared with the PoP group, a significant difference was observed in the SF group ($M = 1.48, SEM = 2.70, p = .001$). The difference between the TT group and the SF group was not significant ($M = 2.01, SEM = 3.12, p = .89$). This is illustrated in figure 5.4.

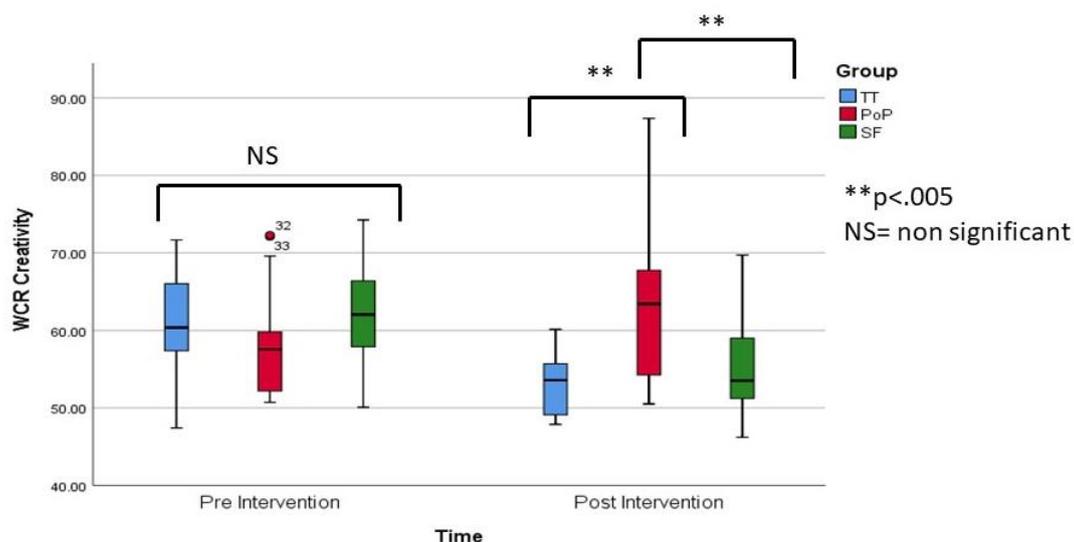


Figure 5.4- Pre and post intervention creativity scores by group, study 2.

5.5.2 Pupil Attainment

A 2 x 3 mixed ANOVA was conducted to determine whether any change in attainment (Dependent Variable) is the result of the interaction between type of planning intervention (TT, PoP or SF) and time. A main effect of time was observed ($F(1,55)=142.79, p<.001, \eta_p^2=.721$), indicating that higher creativity scores were found post-intervention. Of more interest was the significant group x time interaction ($F(1,55)=37.94, p<.001, \eta_p^2=.580$) indicating that the changes in post intervention creativity measures varied significantly by group.

The difference in attainment at pre and post time points was consistent with normal expectations, with an expected increase of .33 for each group (as outlined in 4.3.3), indicating that there was no detrimental effect to attainment in any group as a result of taking part in this study. Interestingly, both the TT (0.34) and PoP (0.24) groups made progress falling within expected parameters, while the SF group made significantly

greater than expected progress (0.99) albeit with a slightly wider SD, suggesting that pupils were making individualised and personal progress at their own pace.

Table 5-2- Descriptive Statistics for Academic Attainment Scores: Study 2

Group	Pre-Intervention		Post-Intervention	
	M	SD	M	SD
TT	1.76	.23	2.10	.16
PoP	2.49	.26	2.73	.28
SF	3.18	.35	4.17	.49

Note: M and SD represent Mean and Standard deviation, respectively.

5.5.3 Teacher Interviews

Following transcription, the interviews were reviewed using thematic analysis to identify areas of interest and the results are collated in thematic tables in tables 5.3 and 5.4.

Table 5-3 Student Focused Intervention Teacher Thematic table

Training	Pupil Engagement	Teacher Opinion	Impact to teacher time	Quality Control
- the training was very clear	- they really enjoyed it - they were more engaged	- it did help with planning - (good) challenge and stretch	- wasn't a great deal of work	- (the planning and teaching) it did match up - the lessons went to plan

- they were more on task	- the process isn't that hard
- they were always engaged	- it was all about the students
- (it was) at their individual level	- the outcomes were brilliant
- very engaging, very engaging	- made me reflect on my own planning
	- it worked really well
	- we loved it

Table 5-4 Pedagogy of Play Intervention Teacher Thematic map

Training	Pupil Engagement	Teacher Opinion	Impact to teacher time	Quality Control
<p>- I really did like... the examples</p> <p>- I loved that I had that print (the PoP principles)</p> <p>- I would find it useful if I could see a model of how it had been done</p>	<p>- the focus is all on them</p> <p>- I think they enjoyed it</p> <p>- It put the responsibility on them</p> <p>- they were able to interpret it more</p> <p>- THEY were responsible</p> <p>I don't think it made much (academic) difference</p>	<p>- my teaching style is quite similar</p> <p>- it was fun</p> <p>- It gave them an Ikea package</p> <p>- they think they are making the table but I gave them the materials</p> <p>- I would revisit it (the planning) after each lesson and adapt it slightly (the next lesson plan)</p> <p>It was a bit more chaotic</p>	<p>- wasn't much different to what I'd do anyway</p> <p>- I found it easy</p>	<p>- lessons can take their own journey</p> <p>- I used words like 'choice'</p> <p>- I do think I was sticking to my own plan</p>

Training	Pupil Engagement	Teacher Opinion	Impact to teacher time	Quality Control
	<p>My class can make the wrong choices sometimes but the majority of the time (with these lessons) made the right choices</p> <p>they (think) they are playing by their own rules</p> <p>they were engaged in the test (creativity assessment)</p>	<p>They were shouting out things but they were relevant</p> <p>this (topic) can be dry so to increase their engagement I believe it will... help them with their progress</p> <p>They (the students) wanted to know what the right answer was in the test (creativity assessment)</p> <p>I would like to do it (again) with an easier topic</p> <p>I would love to do it with a year 10 group.</p>		

The themes were gathered across the five key question areas. Both teachers identified training strengths through the training materials and appreciated uses of examples:

“I really did like, obviously when you talked me through, you gave me some examples and I thought that was great, it helped me to see where I wanted to go with it. I absolutely loved, as I said, I loved the fact that I had that print, (I’ve still got it on my wall actually) I had that on my wall, and I could refer back, to that to use the language, the ‘this should look like’, it’s worded something like that isn’t it? [to improve] maybe if I saw a model of how it’s been done, so, I’m kind of a visual learner, and I like to see it done and then do it, if that makes sense. And so perhaps, if I’d have seen it in place.”

PoP Participating teacher

“I think the training was very clear so I could see how things were meant to go. The process isn’t that hard really.”

SF Participating teacher

Both teachers commented that their workload had not differed widely from their previous practice:

“I don’t feel like it was that much different to what I’d do anyway, so I found that quite easy, just to be conscious of it.”

PoP Participating teacher

“In terms of workload it wasn’t a great deal of work, but it did actually really help with planning, so it made me as a teacher think of my planning

more thoroughly to extend the high ability students with like, challenge and stretch on that end and to have like scaffolded tasks for each of them because of the different pathways that my option took. So it was very similar so in terms of resources, not a lot of extra work, apart from a lot more thought for the teacher into the delivery of the lessons and then obviously sharing with them what the aims of each of the lesson are, which we did anyway because it took place over a six week programme with six different topics.”

SF Participating teacher

Themes emerging from the teacher opinion centred around pupil engagement and some belief that a key feature un this was the element of choice that enables pupils to take responsibility for their learning and feel an active engagement with it.

“I think they enjoyed it, I definitely think it was, putting the, putting the responsibility on them, that they’re deciding what they’re doing, that they’re deciding what’s going to happen in this lesson, whereas, just to flip it to like, other lessons I’ve done, like previously, with other year groups, and that class, where, you’re a teacher, it’s like, ‘do what I tell you to do’ whereas that was like, giving them, I like to think of it as like an Ikea package. You know, you’re giving them the flat pack, you’re telling them they have to make a table, and how they do it, they think well, THEY’RE making the table, well actually no, I’ve given you the materials, do you see what I mean.

It was a little bit more chaotic, because you were giving them that freedom. I don't think that's a bad thing, I'm a teacher who I believe who actually if they (the kids) are just sat there in silence then that's worse than them being a little bit noisy. They were shouting out things but, it's relevant... progress wise, the fact that they're engaged is brilliant, because I understand that that topic can be quite dry for a lot of pupils, so to give them the actual opportunity and to increase their engagement, I believe will help them, well, I hope it will, with their progress.

PoP Participating teacher

"They really enjoyed the topic itself and the research that went into it and those that were extended responded very well to the extension tasks that I'd set and their ability to choose their different, options almost. They were more engaged, because they were more on task, because of their ability to choose where they were in the options of tasks. ... mine was about the, student focused planning it was all about the students, so they always had something to do at their individual level so they were always engaged. And they really enjoyed the lessons. The lessons went to plan and the outcomes were brilliant."

SF Participating teacher

Another emerging theme was the practice of reflection on their own teaching:

"What I found whilst participating in this, I would plan the lessons then, however, after one lesson, I'd find myself revisiting it, to then adapt it

slightly, and I was very conscious of the fact that THEY were responsible.”

PoP Participating teacher

“As a teacher reflecting on my practice, the main strength of this research for me, was that it made me reflect on my own planning a lot more, because obviously, when you’re teaching, you have different strategies that you use, but when you are helping as part of this type of research, you do it, obviously more thoroughly and your lessons are better as a result. And it worked really well, so, we loved it!”

SF Participating teacher

Full transcripts of the interviews are found in appendix 6.

5.6 Discussion

The purpose of this phase of the research was to explore the processes and procedures of study 2, as well as to establish the effectiveness of the training. In addition, it yielded some primary findings to inform the larger scale intervention study.

5.6.1 Quantitative data

Exploring first the primary focus of this thesis, the development of creative thinking, these initial findings suggest that the Pedagogy of Play intervention had a significant impact on the creative thinking potential of pupils. Even though all three groups initially had similar scores in creativity, the PoP group demonstrated a significant increase in creative potential as seen by the comparative pre and post intervention effect size.

While it may be expected that over any time period a pupil's creative potential can expand, in this case, both of the other intervention groups actually showed some decrease in creativity scores. This observed change starts to provide evidence that creativity is linked to play. The increase in standard deviation for the PoP group also begins to indicate that the breadth of thinking styles within the classroom is also changing. This suggests that the PoP methodology might develop each pupil's thinking in an individualised way, allowing multiple styles to develop simultaneously.

Conversely, the decline in the overall creativity scores observed in both the TT and SF groups are accompanied by a narrowing of the standard deviation (albeit not dramatically in the SF group), indicating that the methodologies employed promote a similar thinking style amongst pupils. Although the reasons for this are not clear, knowledge-based competence is what is being tested in the majority of the national curriculum standardised grading; not only that, but the method of demonstrating their knowledge in the fastest and easiest to understand method could frequently be assessed as a 'higher' or 'better' attainment score due to ease of marking or a perceived benefit of demonstrating the ability to synthesize new knowledge in the 'best' way – or at least, the most easily recognisable way for the marker. While this is only a possibility, the 'funnelling' of thought process that seems to be tied to increased academic focus or attainment seems likely to lead to students leaving education with similar backgrounds and thought processes, much like the oft-satirized sausage in a factory. The much smaller diminution of standard deviation in the SF group (.3) could also indicate that these numbers might not only be caused by the playful pedagogical planning approach *per se*, but rather a confounding factor such as the increased

opportunity for pupil decision making utilised by both the SF group and PoP group, and missing from the more didactic teaching style of TT.

Academic attainment was included in the study not only to explore any link between play and attainment, but also to monitor that taking part in the research did not have any negative impact on academic achievement. Our initial results were somewhat unexpected, as the SF group (included in the study to control for the Hawthorne effect (Cook, 1962)) showed a very large positive effect on attainment. This result needs further exploration, and, while the reason behind this rise is unclear, the nature of the intervention suggests two possible explanations for the threefold increase in attainment observed in the SF group. The first is that there could be something about decision-making, either the process or the practicalities, that enables pupils to develop academically at an increased pace; linked to this could be the engagement with learning that may increase if agency is perceived as Knowles (1978) reports with adult learners. Secondly, it could be that pupils are able to make progress unrestrained by teacher expectations, that is, that it is possible that teachers teach to an expectation that is 'middle of the road', something that differentiation in the classroom seeks to address but may not always be successful (Van Tassel-Baska, 2012), in that particularly able pupils may be unable to express their full potential, which would be supported by the widening standard deviation in attainment in the SF group.

5.6.2 Qualitative discussion

A key feature of this methodology that provides vital data for consideration in the action research paradigm is the qualitative teacher stakeholder feedback. Information was sought on five key areas – training, teacher workload, teacher opinion, pupil response, training and quality control. Thematic analysis of the key areas revealed that the

training was felt to be fit for purpose although the inclusion of additional examples moving forward would support development by teachers. The interviews were examined according to the five areas and themes were identified. Although the high degree of specificity in the questions relating to the training and outcome made some of the responses less open to deeper interpretation, some key themes emerged. This section discusses the five areas and examine emerging themes as appropriate.

5.6.2.1 Training, impact to time and reliability of implementation

The teachers felt that the training offered was fit for purpose and equipped them well for planning and delivering the unit of work. The materials were trialled, with no amendments requested by teachers and their enthusiasm for the project appeared high. There was a request for further examples of the implementation to support visualisation of possible solutions. This was not possible in this instance as this was the first trail of the planning methodology however provides avenues for exploration at a later date.

Many educational interventions and innovations are implemented or conceptualized with little to no teacher buy in (Fink, 1999). Fink's research acknowledges this as 'the attrition of change' and reflects that this follows a predictable historical pattern: as the demands on teacher time are unreasonable or require a significant input over and above teachers' usual working practice, these innovations tend toward entropy. This project, however, intended to replace existing lesson planning methods by meeting school and inspection expectations in addition to furthering the development of creative thinking. In this case, both teachers felt that the workload change was negligible: 'The workload as I said, I don't feel like it was that much different to what

I'd do anyway, so I found that quite easy' (PoP Teacher). Teachers reported that workload remained largely unaffected by the planning techniques as it replaced work they were already doing rather than adding to it. Teachers appreciated the opportunity afforded them to reflect on their teaching and felt that it made them a stronger teacher. While this practice is advocated in all lesson planning approaches, the nature of the two planning modes here has it built into the process whereby the planning of the next session relies on the outcome of the previous.

Teachers both felt that they had delivered the units of work in accordance with the principle set out by the training and that the research was therefore reliably conducted. These elements of the interview gathered data on reliability of implementation to examine potential extraneous variables in the quantitative data set as well as for identifying improvements to the training in the next phase of this research. The nature of the responses made it unsuitable for deeper analysis.

5.6.2.2 Teacher opinion- theme: reflection

When examining the teacher responses to the project teachers a key theme of reflection emerged from both interviews. Reflective teaching practice has long been hailed as a key element of highly effective teachers (Booth, 2020; Geng, Smith, Black, Budd, & Disney, 2019; McCann, 2005). The literature revealed that teachers are under increasing pressure to move towards data driven teaching that, as discussed in chapter 3, reduces time for planning and preparation of which reflection is a key part. The Student focused teacher felt that participating in this project helped focus her planning, particularly for higher achieving pupils.

They also found that the project helped focus their planning: ‘...it did actually really help with planning, so it made me as a teacher think of my planning more thoroughly to extend the high ability students’ (SF Teacher). In addition, the Pedagogy of Play teacher felt that she was revisiting her planning more than she would have previously ‘I would revisit it (the planning) after each lesson and adapt it slightly (the next lesson plan)’. Both teachers were thus reporting that the ability to reflect on the planning process, had an impact to the teaching, supporting the literature around reflective teaching practice.

While the Hawthorne effect (Cook, 1962) may explain some of the focus on reflection, the planning methods rely on pupil decision making and self-reflection to support creativity as well as teacher reflective practice, and the mechanism for this is built into the planning framework in both cases. Although the fact that the teachers volunteered to take part in the project and knew that the focus was on creativity may also contribute to this rise by ensuring that the teachers were not only primed, but receptive to the idea of supporting the development of this skill, the front facing nature of the methodology supports student involvement in the process. In the student-focused method, the pupils decide on their ability in relation to the learning objective and then complete the appropriate task. This decision prompts self-reflection to support the making of that choice. The teacher uses the tasks that the pupils complete to ‘celebrate’ the planning for the next lesson in the unit of work. If more pupils’ complete higher-level tasks, the lesson plan for the next lesson must include more of them while still reducing workload by having the previous session’s higher level tasks now falling to lower level tasks in the next session. This means that the teacher reflection here is part of the pupil facing process and is therefore integral to the process and unlikely to

be skipped due to high time demand. The Pedagogy of Play methodology similarly uses pupil choice to support assessment and the teacher then uses the pupil decisions to support planning the next stage, once again building the process of reflective teaching into a pupil facing process that enables it to form a key part of the planning.

5.6.2.3 Pupil Engagement- theme: choice

In examining themes under the category of pupil engagement, a key emerging theme was that of choice. Teachers felt that the engagement was high and thematically suggested that the main reason for this might be the element of choice that pupils were able to make regarding the pathways through the lessons. They suggested that this allowed the pupils to take responsibility for their learning and thus were more invested in the outcome, discouraging passive learning.

In an educational system where pupil choice is often limited to subject option choices at age 13/14, the process of decision making that will impact learning is a novel experience for many pupils. As examined in chapter 3, the burden of responsibility for learning is frequently placed on the teacher, particularly with the reliance on data-driven teaching. The opportunity to make decisions that impact their own learning on a day-to-day basis has the potential to build responsible learners as well as allow pupils to practice decision making in a safe space. The element of choice is often neglected in current pedagogic practice, as the teacher makes the decisions for the whole class and pupils lack the opportunity to develop as individual learners. These opportunities have been touched on in previous research as the teacher-pupil relationship is identified as being a key element of educational success (Marsh, 2012). The opportunity to demonstrate trust in pupils by allowing them to make their own

decisions, this relationship can be enhanced. Pedagogical training and practice could further support this kind of relationship building by identifying more opportunities for teachers to demonstrate trust in their pupils (Sjöberg, 2014)

5.6.3 Limitations

It is important to note that in this first phase of the intervention study, only a single year group and department in a single school participated, which are limitations. Many interventions are advocated as being adopted as a whole school approach to firmly embed and have the greatest impact (Crevola & Hill, 1998; Rogers, 2007), and this aspect cannot be ignored when exploring a pedagogical standpoint. Many teaching models have been explored in other educational settings with alternative pedagogies as their guiding principle, for example Montessori Schools and those following a Reggio Emilia framework immerse their pupils in their pedagogies; although there is as yet little supporting evidence for the current method, it could be adopted in a similar way, and a consistent school-wide approach may have further beneficial impacts for learning and creativity.

5.7 Conclusion

While this study provides a glimpse at potential answers to the key hypotheses of the positive link between play and creativity, and illustrates that the implementation of the project is feasible with limited impact to teacher time and transparent training materials and experiences, it also illuminates further questions that need to be explored through research. Many unknowns remain: how related the 'sameness' or 'funneling' of thinking is to the curriculum, testing, or the expectations of the teachers in comparison to the experiences of the pupils. Further understanding of the relationship that learner

agency and decision-making, or even engagement, have with academic attainment is needed.

In exploring the procedural protocol for the larger research focus of this thesis, this study illuminates several changes that could be made in order to further understand some of the initial findings. Unexpected gains in academic attainment for the SF group could be explored further through academic self-efficacy (Boekaerts & Corno, 2005) measured at both pre and post time points, which may shed further light on the reasons for academic improvements or even to the underlying reasons behind the observed 'funneling' effect in thinking. In addition, it is theorised that it could be possible to combine elements of the PoP methodology with that of the SF protocol in order to maximise both creative potential as well as academic attainment.

Furthermore, this initial study focused only on a single department and year group, and it will be necessary to explore outcomes in other subject areas and age groups in order to evaluate the effectiveness of the new planning methods employed. In addition, it would be useful to explore a school-wide implementation of the techniques to gauge relative effectiveness for individuals as well as the transferability of the materials, training and protocols to other subject areas.

This initial research starts to develop our understanding about how teacher planning can affect how students learn and think. It demonstrates that it is not just the attitude that the teacher has to their students or to their job that can impact the student experience, but that the pedagogical standpoint from which planning is undertaken is of key importance. Initial results are encouraging in exploring the role of play in the

classroom and how it relates to creative thinking and attainment: it is a small piece of a jigsaw puzzle exploring the way that teachers model learning and the way that learning happens to promote thinking skills. These preliminary results already suggest that creative thinking, this important skill, can be 'taught' while teaching other things; it need not be treated as a separate subject and can be embedded in a secondary curriculum while supporting traditional knowledge acquisition. The next chapter explores these encouraging developments further and refines a hybrid intervention to promote both students' creative development as well as improved attainment.

6. Multiple Subject Area Study (Study 3)

This chapter builds upon the work of study 2 (Chapter 5), making changes to intervention and protocol based on the previous findings. The chapter explores the possibility of a hybrid intervention, a Personalised Playful Pedagogy (PPP) that can improve the academic output for pupils to harness the academic rigor of the student focused (SF) planning while simultaneously enhancing creativity development demonstrated by the pedagogy of play (PoP) group in chapter 5. It is a natural progression of the previous study where suggested changes are implemented from a strong theoretical background. It builds on the reflections of study 2 in order to develop a planning methodology that develops creativity as part of this research's original contribution to knowledge.

6.1 Introduction

The results from the study 2 (chapter 5) showed that while the intervention teachers were pleased by the adjustment to their workload and the play-based experimental intervention showed promise in terms of creativity gain, there was an unexpected gain in academic attainment in the Student Focused group. The correlating principles underlying the experimental Pedagogy of Play (PoP) and the experimental control Student Focused (SF) group, are choice and agency. The PoP group has this in the element of 'choice' with the other two elements being 'wonder' and 'delight' (chapter 3), and the SF group lessons are based on the pupils making a series of small, individual decisions based around the stated learning outcome. The differences in the guiding principles centre around wonder and delight with the PoP group employing these pillars, while the SF group uses only applied heuristics focusing on choice.

While the element of choice was very important for both the experimental teachers, with both teachers reporting higher levels of engagement from their pupils and attributing it to this element of their programmes, it was the difference in outcomes and guiding principles that was of interest in this study. While wonder and delight appear to be improving creativity, the key difference between the two methods in terms of pupil facing opportunities is the way that tasks are presented. The SF model allows pupils to see a linear progression of one task following another to lead to the outcome of understanding, while the PoP model also allows pupils to make choices but only in terms of assessment methods. This means that the majority of the teaching in the PoP lessons follows the same pattern as most Typical Teaching (TT) in terms of delivery methods with set teaching times and learning times, and then choice offered in assessment tasks. The SF model, while showing many more levels and layers of choice for pupils, does not have the same approach to extended focus on pupil flow. In order to try and harness the creative potential in the same way as the previous study demonstrated in the PoP group, as well as enhance the academic outcomes in the same way as the SF group had, a hybrid approach was trialled.

To enhance the element of choice, it was preferable to keep the wider choices from the SF model but combine that with the academic accountability inherent in the flow chart selection process presented to pupils in the SF group. In order to do this, a menu system used in education, similar to menus found in restaurants, was selected. Some restaurants have a grading type system to measure the spice of the meal to help diners select the appropriate heat level of their meal. A similar system was selected to help pupils gauge the challenge of the task. This enabled pupils to see the outcome and academic consequences of the choices they made and helped increase their

accountability. In addition, the principles of wonder and delight from the PoP programme were used as a planning aim for the teachers as they put together the 'menu' options. The hypothesis was that this hybrid approach, a Personalised Playful Pedagogy (PPP), would enable pupils to make gains in academic outcomes as well as creativity. This hybrid approach would be added to the PoP and SF methodologies employed in the previous study (chapter 5) as well as typical teaching, to evaluate comparative effectiveness. Additionally, based upon the findings in the previous study, it is hypothesised that academic self-efficacy may influence attainment as higher levels of pupil agency are evidenced in planning.

6.2 Developing the Intervention: Personalised Playful Pedagogy (PPP)

Using the same considerations from a teacher point of view outlined in 4.3, an additional planning approach was developed, drawing from the PoP methodology as well as the SF planning proforma. The aim being to combine the creativity enhancement demonstrated by the PoP method in chapter 5, with the attainment boost enjoyed by the SF approach. This system used a menu platform, a concept that is already in use in education and mirrors a menu that might be found in a restaurant. The existing process appears to have developed organically and simultaneously in many schools and is also used as a method for training teachers in lesson planning (Powell, 2016; Trefor-Jones, 2015). There are a number of approaches to this method of planning and it is often used as a structural scaffold for the lesson including a starter, main and dessert idea; the starter language matches the four-part lesson planning employed in many schools (chapter 5). In order to meet the needs of this project, the PPP menu needed to convey the level of challenge for each task to help pupils make decisions about the difficulty level of the work they select. It also helps teachers when

planning, as they are able to select different tasks at different challenge levels in the different tasks, helping teachers work to differentiate the tasks.

While many menu teacher-planning systems (Powell, 2016; Trefor-Jones, 2015) use the three-course framework, starter, main and dessert, to help structure the lessons, this terminology would not be an appropriate choice for this project as it primarily deals with the structure and order of the lesson. The use of structural terminology, particularly the use of the word 'dessert', has some connotations that are not helpful here, certainly around the idea of a sweet or reward at the end of the lesson. In addition to the idea of a sweet or fun activity at the end, it suggests that only that task is designed to be fun during the lesson, and potentially demarking the 'playful' experience of the lesson by limiting it to one aspect or task. The intention of this hybrid model is to combine the obvious challenge choices with the elements of fun and play involved in the PoP programme from the previous study.

The key concept for this methodology was to enable pupils to make task selections based upon the challenge level of the work. This builds upon the SF model from chapter 5, where pupils selected a green pathway that enabled them to access the most challenging aspects of the lesson. A different approach here allowed task selection from multiple options such as that of the PoP method, while incorporating a challenge levels indicator such as that used in the SF programme. A pictorial method of doing this was selected as pupils already encounter many numerical assessments during the course of their school day and a planning template with additional numbers would either provide additional challenges for teachers in attempting to map grades onto tasks, something that is not practical, or confusing for pupils. While any image

representing degrees of difficulty could be used, the shape selected for the menu challenge system was that of the chili, as shown in figure 6.1, primarily as it could be used in any subject specialism. Various additional possibilities arise, conceptually tied to the focus either of the unit of work or the subject. An image of a mountain, for example, may work with a geography unit or a test tube could be used in science. Key pedagogical principles will still apply when planning to this template and the imagery is important primarily as a way of presenting the choices to the pupils.

From a planning perspective, the menu system is designed to present pupils with different options so that they can find a way of learning and expressing their learning in a way that interests them. This means that when planning these tasks, teachers are encouraged to think about things from a new perspective. This is not simply tweaking the existing lessons, but providing alternatives to meet with different outcomes and challenging pupils to work to their best. The use of challenge and choice language in the lesson as part of the teacher training is built upon teacher feedback from chapter 5, which highlighted that the pupils tended to select the more challenging tasks and responded well to the opportunities to make decisions about their learning. For some pupils this may be because it aligned with their goals to achieve, for others it may have introduced an element of competition into the lessons as they explored tasks with their classmates. The choice would be their own and the responsibility for success was then theirs as well. This was something of relevance to the method, that pupils should have

an enjoyable time while rehearsing choice making and taking responsibility for their learning.

MENU

opic or learning objective for the lesson.

Non Negotiable
No choice about this one I'm afraid!

Warm
A good way in to the work if you need a little boost!

Zesty
A reasonable start if you are struggling today

Medium
You should be able to have a good go at this at some point.

Hot Challenge
Really show us what you can do. This one is up to you!

Hot
An open ended task that can demonstrate the Non Negotiable, can be done from the start and is mostly up to the pupil.

Medium
These tasks should be what the majority of the pupils will follow. Slightly scaffolded and as independent or group as they can be.

Medium
These tasks should be what the majority of the pupils will follow. Slightly scaffolded and as independent or group as they can be.

Medium
These tasks should be what the majority of the pupils will follow. Slightly scaffolded and as independent or group as they can be.

Zesty
These tasks should be a bit more challenging but will be harder for those who struggle in the lesson.

Zesty
These tasks should be a bit more challenging but will be harder for those who struggle in the lesson.

Warm
A very structured task that enables the struggling student to made some headway. It could be a reframe task.

Figure 6.1 Personalised Playful Planning (PPP) proforma

6.2.3 Hypothesis and research questions

- Hypothesis one: Secondary students who take part in the novel PPP will show a larger positive difference between pre- and post-intervention WCR-E scores compared to students who take part in a comparative intervention (PoP, SF) or students do not take part in any intervention (TT).
- Hypothesis two: The novel PPP should also enhance self-efficacy and academic attainment scores compared to a playful intervention (PoP) and no intervention (TT), but should show comparable scores to the Student Focused intervention (SF).

6.3 Method

This section outlines the procedure undertaken in conducting a second phase of the intervention in a single school with multiple departments and age groups included. It describes the study design and testing procedure, as well as outlining the protocols for consent and intervention for six testing conditions (Pedagogy of Play intervention, and matched typical teaching group, Student Focused intervention and matched typical teaching group and finally Personalised Playful Planning and matched typical teaching group).

6.3.1 *Participants*

141 pupils (73 male) from two academic year groups (aged 11-13) in the same UK secondary school were recruited along with their teachers. Each participating experimental teacher identified one class they would like to work with and recruited another teacher within their department with the same year group and topic willing to act as a typical teaching group for each of the three experimental conditions. Consent forms and information sheets for both pupil and parents were handed out during

lessons. Reading age on all documents was set at age 11 to facilitate understanding by all (Ogloff & Otto, 1991). Data were anonymised four weeks after completion of data collection and once all participant data were matched at pre and post intervention time point and at pre and post attainment points. This timeframe was to allow for participants or parents to withdraw from the study should they wish to do so. The researcher had no direct contact with pupils although they were offered the opportunity to ask questions about the nature of the research via email or through their teacher, and there was no remuneration or incentive offered as part of this research either to the school, teachers, pupils or parents. The study received ethical approval from the Psychology Department Ethics Research Committee BM/06-2018/46a.

6.3.2 Materials and Measures

This section outlines the study design and materials used in the intervention as well as the testing methods.

6.3.2.1 Study Design

This study involved three experimental groups, with one based on Pedagogy of Play (PoP) and one on a Student Focused (SF) planning approach, as in the previous study. In addition to this a hybrid Personalised Playful Planning (PPP) intervention is added, and each of the three experimental groups has identified a control group (no intervention, but Typical Teaching (TT) that will have the same assessments taken at the same time points as the experimental groups. The WCR-E Creative Thinking test (Antonietti, Colombo, & Pizzingrilli, 2011) (chapter 4) was administered online via Qualtrics (Eileen Bosch, 2018) at pre and post intervention. Attainment grades were generated for each pupil at both time points by teachers as part of the normal school reporting processes. In addition to these measurements that were also used in the

previous study, a 13-item educational self-efficacy measurement was also used (Gaumer Erickson & Noonan, 2018). This was scored on a 5 point Likert scale (Joshi, Kale, Chandel, & Pal, 2015) ranging from 'very much like me' to 'not at all like me' and items such as 'If I practiced every day, I could learn just about any skill'. Scores were averaged across all items which generated an individual self-efficacy measure. A teacher training intervention was administered to the teachers of the experimental groups in the same way as the previous study and described in 5.1.6 with materials in appendix 3, and teacher planning was supported for a unit of work lasting six weeks.

In keeping with the mixed method approach of this research, semi-structured teacher interviews were again conducted over the five identified areas of teacher workload, and training methods, as well as pupil engagement, teacher opinion and consistency of delivery for quality control. These interviews were used to identify issues with the training, delivery and impact to teacher time, as well as a deeper thematic analysis of stakeholder teacher opinion. The thematic analysis is reported in section 6.4.6 and discussed in 6.5.5.

6.3.3 Quantitative Data Analysis

The data is analysed using two separate statistical processes. Firstly, three separate 2 x 6 repeated measures ANOVAs are computed in SPSS as reported in the same way the results in the previous study were (chapter 5). With pre and post measures compared in the WCR-E test, attainment test and the comparison with expected attainment, and the additional self-efficacy measure each as separate repeated measures ANOVA. Secondly a multi-level model was approached to explore the relationships between different variables. The multilevel model was also conducted in

SPSS and consisted of five sequential models to explain the data in the simplest way. This is explained in detail in section 5.4.9.

Before reporting the results, it is necessary to describe a key issue that arose during the period of the intervention that may have had an effect on all groups. Three weeks into the delivery of the intervention, the participating school was affected by an outbreak of the sickness bug Norovirus that led to attendance rates of only 25% and led to the closing of the school for three days while deep cleaning took place. There were staff members and pupils affected and teaching was collapsed for one week with non-subject specialist teachers taking classes of mixed subject and ability pupils. This led to an extension in the six-week delivery time and meant that the data collection points ran over eight or nine weeks instead to allow for full delivery of the planned lessons.

6.4 Results

This section reports the results for each of the three outcome variables, analysed first by three separate repeated measures ANOVAs to explore any changes in outcome on the three measurement scales: WCR-E, academic attainment and self-efficacy. The variables are reported as a mean difference in WCR-E score, attainment grade and academic self-efficacy with illustrative graphs as well as mixed ANOVA and post hoc tests to determine the nature of significant interactions.

In addition to ANOVA reporting, the differences in outcomes are assessed using multi-level modelling to assess whether variables in different levels can contribute to an

explanation in overall variance and attempt to establish more firmly a reason for observed differences in pre and post outcome variables.

6.4.1 Outliers

As a multi-level analysis was conducted on this data set, prior to analysis a Mahalanobis Difference calculation was performed on each group in order to identify outliers and they were removed from the data set. The Mahalanobis difference is a measure of the dissimilarity of a data point from the mean, and it is then used as a comparison with the chi squared to remove outlying data points, particularly in multi-level analysis (Leys, Klein, Dominicy, & Ley, 2018). Seven subjects were removed due to presenting a greater difference than that defined in a chi squared analysis in one or more outcome variable. This meant that the full data set was reduced from 141 to 135 complete data sets across all conditions (SF n.23, SF TT n.14, PoP n.25, PoP TT n.24, PPP n.26, PPP TT n.23)

6.4.2 WCR-E outcomes repeated measure ANOVA

Descriptive statistics were calculated on the full data set of 135 pupils and are presented in table 6.1. They indicate initially that all groups demonstrated an increase in creativity over the course of the intervention with the PoP group demonstrating a positive change of 4.92, compared to a smaller gain in the matched typical teaching group (1.1), The PPP group improved by 13.39 while the matched typical teaching group demonstrated a positive change of 6.44 and the SF group improved by 12.39 compared to the matched typical teaching group at 5.04. This demonstrates that all intervention groups demonstrated a larger positive increase than the matched typical teaching groups.

Table 6-1-descriptive statistics for WCR-E outcomes across groups

Group	Pre-Intervention		Post-Intervention	
	M	SD	M	SD
PoP	70.64	6.07	75.56	6.12
PoP TT	67.42	4.66	68.52	5.52
PPP	55.94	6.04	69.30	7.39
PPP TT	52.57	4.17	59.01	5.77
SF	56.31	7.03	68.70	6.39
SF TT	59.35	6.41	64.39	4.78

Note: M and SD represent Mean and Standard deviation, respectively.

To determine how these changes compared, effect sizes were calculated ($\frac{M_{post} - M_{pre}}{Pooled\ SD}$) and revealed a large positive effect for the PoP group = .81, while the PoP TT group showed a negligible positive effect = .21; the PPP group had a very large positive effect = 1.97 while the PPP TT group displayed a large positive effect = 1.27 and the SF group had a large positive effect = 1.84 in addition to SF TT group = .89. This indicated that although all groups showed a positive increase on creativity, the PPP intervention group had a larger effect than its matched control group, as did the SF group compared with the SF TT group. The largest effect size overall was displayed by the SF group within the subject area of Art, but all intervention groups displayed a larger effect size than their matched non-intervention counterparts.

A 2 x 6 repeated measure ANOVA was conducted to determine whether any change in WCR-E creative thinking score (Dependent Variable) is the result of the interaction between planning intervention (PoP, SF, PPP) and their control groups (PoP TT, SF TT, PPP TT) and time pre and post intervention. A main effect of time was observed ($F(1,129) = 111.94, p < .001, \eta_p^2 = .465$) indicating that higher creativity scores (see table 6.1) were found post-intervention. Of more interest was the significant interaction between the group and time, ($F(1,129) = 8.99, p < .001, \eta_p^2 = .259$) indicating that the changes in post intervention creativity measures varied significantly by group.

To better control for age and subject specialism, each experimental group was compared with a matched control group. Each matched control group was of the same academic ability as defined by the school, age as determined by the academic year (within 12 months) and subject area. Each group therefore is designated by the Intervention type (SF, PPP and PoP) and the matched control group for each intervention has a suffix of TT to designate Typical Teaching. As an example, the PPP group was situated within the Science department, and they were a high ability group as designated by the school, so they were matched by another high ability science group in the same academic year (PPP TT) who covered the same academic content over the same timeframe but followed a typical teaching planning methodology. In order to understand the relationship between groups, the differences between pre and post creativity scores was calculated. Dunnett's T3 Post-hoc tests were used as the sample sizes were unequal, showing that the positive gain difference between PoP group and the PoP TT group was significant ($M=5.15, SEM=1.28, p=.003$). The gain in the PPP group was also significantly higher than the PPP TT group ($M=6.83, SEM=$

1.15, $p < .001$) but the gain in the SF group compared to the SF TT group was non-significant ($M = .64$, $SEM = 1.75$, $p = 1$). This is illustrated in figure 6.6.

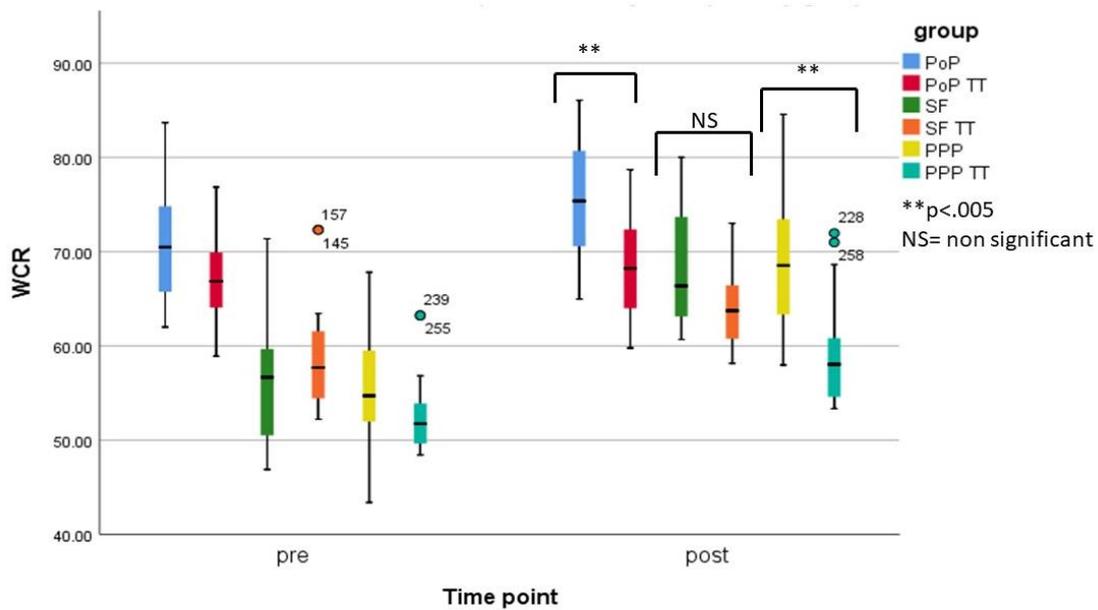


Figure 6.2- Box and whisker pots for all groups Pre and Post WCR-E results for all groups (study 3).

6.4.3 Attainment outcome results repeated measure ANOVA

A 2 x 6 repeated measure ANOVA was conducted to determine whether any change in academic attainment (Dependent Variable) is the result of the interaction between group planning intervention and time. A main effect of time was observed, ($F(1,129) = 316.95$, $p < .001$, $\eta_p^2 = .659$) indicating that higher attainment scores were found post-intervention. Of more interest was the significant group and time interaction ($F(1,129) = .20$, $p < .005$, $\eta_p^2 = .153$) indicating that the changes in post intervention attainment measures varied significantly by group.

The difference in pre and post time points was consistent with normal expectations in the PPP and SF groups, with an expected average increase of .33 for each group (as outlined in chapter 5), indicating that there was no detrimental effect to attainment in any group as a result of taking part in this study. A key issue resulting from the norovirus that closed the school here was the absence of one assessment point in the PoP group. This meant that the pre assessment data point was six weeks prior to the intervention and before a different unit of work, which means that expected progress over the larger time point for this group was between .33 and .66. The PoP TT group that had no intervention, but instead typical teaching, made almost expected progress on their own higher level, while the PoP intervention group made just slightly above expected progress (PoP= .67, PoP TT= .63). While both the SF groups made expected .33 progress, the groups varied significantly with the typical teaching group making almost double expected progress (SF= .39, SF TT= .63). The English subject area also demonstrated a more pronounced group difference (PPP = 0.57, PPP TT= .33), in this case with the intervention group making more progress than the matched typical teaching group.

In order to understand the relationship between matched control groups, the differences between pre and post attainment scores was calculated. Dunnet's T3 Post-hoc tests showed that the PoP group had significantly larger gain in attainment than the PoP TT group (, $M=.52$, $SEM=.09$, $p<.001$). The PPP group had a significant gain in attainment compared to the PPP TT group ($M=0.51$, $SEM= .102$, $p<.001$) and the SF TT group had significantly higher score with the SF group ($M=.48$, $SEM= .09$, $p<.001$). This indicates that the differences between all paired groups was significant.

Table 6-2- descriptive statistics of the Attainment outcome across groups

Group	Pre-Intervention		Post-Intervention	
	M	SD	M	SD
PoP	4.06	.32	4.73	.27
PoP TTT	3.56	.31	4.19	.54
PPP	2.68	.53	3.25	.53
PPP TT	1.29	.11	1.62	.11
SF	2.42	.67	2.81	.46
SF TT	1.83	.29	2.46	.30

Note: M and SD represent Mean and Standard deviation, respectively.

6.4.4 Self-Efficacy outcome repeated measure ANOVA

A 2 x 6 repeated measure ANOVA was conducted to determine whether any change in self-efficacy (Dependent Variable) is the result of the interaction between group planning intervention and time. As there was no main effect of time between the two measures, ($F(1,129)=2.35$, $p=.098$, $\eta_p^2= .021$) it indicated that the difference in pre and post self-efficacy measures was non-significant. There was however a significant group and time interaction ($F(1,129)=1.62$, $p=.003$, $\eta_p^2= .129$) indicating that although non-significant overall, the changes in post intervention self-efficacy measures did vary significantly by group.

In order to understand the relationship between matched control groups, the differences between pre and post self-efficacy scores was calculated. Once again Dunnet's T3 Post-hoc tests were selected as the group sizes were not equal. Results showed that although post intervention measures varied significantly by group, the groups matched by age and subject areas did not vary significantly. The difference between the PoP group and the POP TT group was non-significant ($M=-.37$, $SEM=.15$, $p=.18$), between the PPP group and PPP TT group was non-significant ($M=.03$, $SEM=.14$, $p=1$) and between the SF group and the SF TT group was also non-significant ($M=-.54$, $SEM=.18$, $p=.07$). The descriptive statistics for the self-efficacy measure pre and post intervention for all groups is shown in table 6.3.

Table 6.3- Descriptive statistics for Self-efficacy outcome across groups.

Group	Pre-Intervention		Post-Intervention	
	M	SD	M	SD
PoP	3.74	.54	3.93	.53
PoP TT	4.22	.51	4.21	.58
PPP	3.86	.47	4.18	.57
PPP TT	4.04	3.93	3.93	.65
SF	3.58	.62	3.57	.59
SF TT	4.13	.48	4.10	.51

Note: M and SD represent Mean and Standard deviation, respectively.

In order to investigate if there was a correlation between academic self-efficacy and attainment, the scores for the two measures were then correlated. There was a non significant Pearson's correlation at both pre ($r(130) = -.033, p = .702$) and post ($r(130) = .109, p = .209$) time points indicating that self-efficacy was unrelated to pupil academic outcome in this sample.

6.4.5 Multilevel Analysis

A three-level multilevel model was developed to explore the factors that affected student creativity gain at individual student, class group teacher and subject levels. Hierarchical analysis is useful in this case as the data presented in a nested structure, pupils beneath teachers, beneath subject levels. A multilevel model (MLM) is an appropriate statistical technique for this study. It allows each of the levels to be modelled and the best fit for the data established. Each of the levels in the hierarchy is analysed according to a sub-model, each one expressing relationships among variables at that level. Each level influences the one below but does not affect the higher levels. The hierarchy for this data set is illustrated in figure 5.3 with each subject area having two planning conditions nested under it, and each planning condition having pupil level data under it for each pupil at both pre and post intervention level.

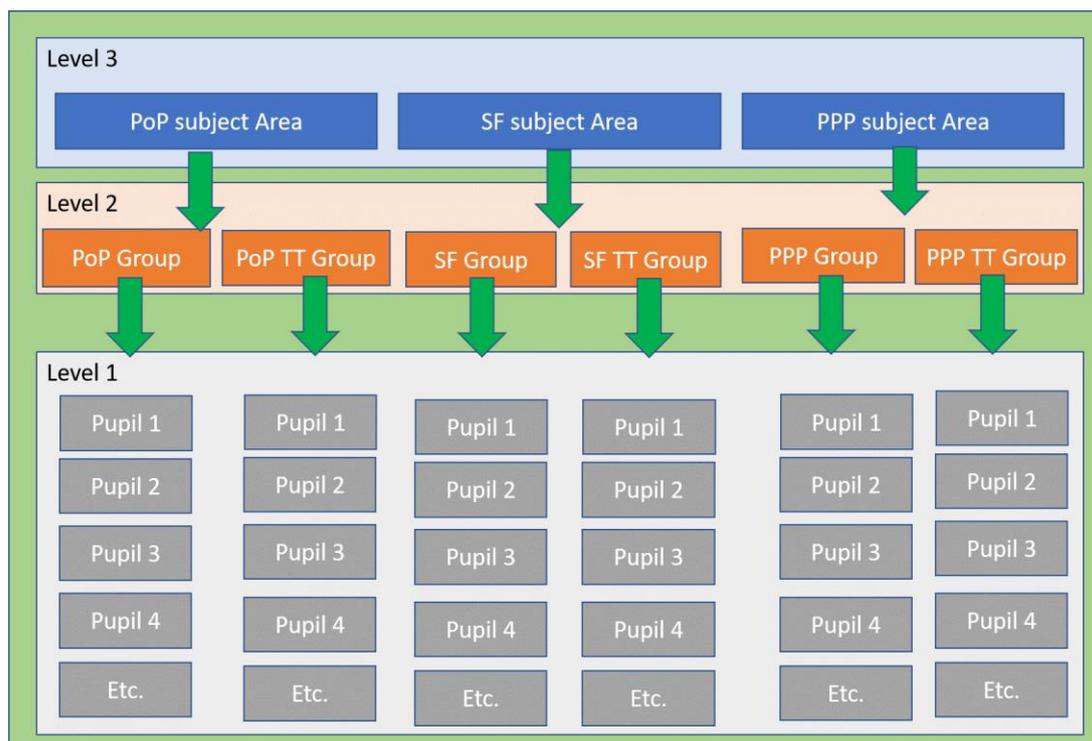


Figure 6.2- Incomplete table showing the three- level hierarchy of the nested data sets

There was no missing data in this data set as all pupils for whom consent was obtained, provided responses to all three outcome variables. The goal with this MLM analysis is to find the least complex model to best account for variation in creativity gain at the pupil level (level one) by adding predictors at the group level (level two) and at the subject specialism level (level three) Micceri (2007).

The MLM modelling procedure generally moves through three phases to ensure that each model can be assessed for best fit. The first model is a null model including only the student level key outcome variable of creativity gain, calculated as a difference between pre and post measurements and no predictor or independent variables at student, teacher or group planning method level. This null model, model one, is similar to a random-effect ANOVA model, providing the information of the variances within

and between pupils, teachers and group planning method for creativity gain (Ma & Klinger, 2000).

The second phase includes adding further variables, one level at a time, and adding to the complexity of the model by including the element of a random intercept as well as a fixed intercept for each model in order to establish if any further variance can be attributed to covariables at each level. In this analysis three models are explored in this phase with one variable added at each level; model two, a student level variable of standardised self-efficacy added at level one with both fixed and random intercepts to examine the effects of self-efficacy on creativity gain at an individual level; model three, a group level variable, of group standardised teacher effectiveness was added to examine the effects of teacher academic effectiveness on group creativity gain; and model four, a standardised group mean subject specific creativity gain was added as a level three covariable to examine the effect of subject specialism on creativity gain. This fourth model was created to examine what teacher characteristics and planning method variables influence the relationship between creativity gain at student level. A breakdown of each model and the covariables added at each stage can be found in table 6.4.

Table 6.4- Description of models involved in the MLM process for the study 3

Phase	Phase One	Phase Two			Phase Three
Model Number	1 (Null)	2	3	4	5
Level	Three levels	Three levels	Three levels	Three levels	Three levels
Covariates added	None	Self- efficacy	Teacher Academic effectiveness	Subject specialism	All relevant covariables
Level covariate added	NA	Level 1, pupil level	Level 2, group level	Level 3, Subject level	All relevant levels
Area explored	Fixed and random intercept	Fixed and random intercept	Fixed and random intercept	Fixed and random intercept	Random Slope added

The final phase of the multi-level analysis adds a random slope to the final model to evaluate how well a random slope model would fit the data set. Once all models are computed, the χ^2 values of the different models are compared and calculated alongside the degrees of freedoms for the models in order to establish if the change to the model has been significant. Raudenbush and Bryk (2002) provided the details about the statistical theory and methodological approach of MLM and the use of SPSS to complete the analysis was guided by Heck, Thomas and Tabata (2011) with the χ^2 analysis as described by Field (2009).

6.4.5.1 Model one: The null model

This model was defined simply by hierarchy with no covariates added.

Taking i as the pupil, j as the group planning and k as the subject specialism, the null model (model 1) is mathematically defined as:

$$\gamma_{ijk} = b_{0jk} + b_{0k} + b_1 + \varepsilon_{ijk}$$

where the creativity difference (γ) of pupil i in group j under subject specialism K is defined by the random intercept of the group under the subject area (b_{0jk}) separately the random intercept of the subject specialism (b_{0k}), a fixed slope (b_1) and the residual error of the individual pupil (ε_{ijk}). All models also contain a constant b_0 that will not form part of the equations for the sake of simplicity. The difference in creativity as calculated by subtracting the pre intervention WCR-E score from the postintervention WCR-E score specific for pupil i in group j under a subject specialism of k . This means

that the null model could be written out in full as the creativity difference pre and post intervention for a pupil (i) in a specific group (j) in a defined subject specialism (k) is calculated by determining the fixed intercept point that is an average of their group and subject specialism, calculating the variability in intercept at group and subject specialism level, determining the fixed slope and allowing for a variance of error specific to that pupil.

The null model was calculated in SPSS and the fixed intercept was reported as significant $F(1,133)=19.03, p<.005$. Table 6.5 shows the fixed intercept variance of the null model (model 1).

Table 6-5- Fixed intercept variance of the null model (model 1).

	Coefficient	SE	T-ratio	<i>p</i>
Fixed Intercept	7.32	1.68	4.36	0.004

A random intercept was then added at the two different levels and is reported as significant primarily at the subject specialism level. It is important to note that as SPSS runs the model using the mixed method syntax, it is essentially running the model as a two tailed test and reporting only the *p* value of a one tailed test, which means that the *p* values reported are roughly double that on the reported tables.

Table 6-6- Random intercept variation at three levels for the null model, (model 1).

	Variance	p^*	Wald Z	95% upper	95% lower
Pupil level variance (level one ε_{ijk})	2.70	.48	.69	0.16	45.46
Group level variance (Level two b_{0jk})	61.00	.00	6.86	45.84	81.16
Subject level variance (Level three b_{0k})	13.93	.15	1.45	3.61	53.72

**this is essentially a two tailed test and thus the p value here is two times this reported value.*

Reporting the significance of this test presents some difficulty due to the challenges of the p value, however relative significance can be determined. The most significant variation in intercept was residual, with some further variance explained at the group level – that is, the differences in teaching or planning style per group, and very little variance explained at subject level. Examining each model in comparison with this null model allows the significance of changes to be reported. This means that the group level is the most significant in explaining variations in WCR difference (61), supporting the hypothesis that it is difference in group teaching, likely influenced by the variation in planning and delivery methods that accounts for variation in WCR outcome. There were four degrees of freedom (df) for this model and it had a two log-likelihood (2-LL) of 944.96. Inter group correlations (ICC), the proportion of variance in the outcome variable that is explained by the grouping structure of the hierarchical model. It was calculated using this equation:

$$ICC = \frac{\sigma_{u3}^2}{\sigma_{u3}^2 + \sigma_{u2}^2 + \sigma_{u1}^2}$$

where σ_{u3}^2 is the variance of the level-3 residuals, σ_{u2}^2 is the variance of the level-2 residuals and σ_{u1}^2 is the variance of the level-1 residuals. The ICC calculation for the model 1, the null model, indicated that 3% of variation in the model occurred at individual pupil level, 80% at group level and 17% at subject specialism level.

6.4.5.2 Model two: Adding academic self-efficacy as a level one predictor variable.

Model two added an individual fixed effect of the grand mean centred change in self-efficacy as a level one (pupil level) predictor. This was to explore the relationship between academic self-efficacy changes and creativity changes in the same pupil, hypothesising that changes in self-efficacy may lead to greater creativity gains.

The level one, or pupil level model (model two) is defined as:

$$\gamma_{ijk} = b_{0jk} + b_{0k} + X_{ijk}ASE_{ijk}b_1 + \varepsilon_{ijk}$$

Where the additional level 1 predictor (Academic Self-Efficacy) is expressed as $X_{ijk}ASE_{ijk}$.

The fixed intercept of self-academic self-efficacy was not significant as shown in table 6.7 and the impact that it has on the overall random intercepts is negligible as shown in table 6.8.

Table 6-7- Fixed Intercepts of model two, adding pupil level academic self-efficacy as a fixed intercept predictor variable.

	Coefficient	SE	T-ratio	p
Residual pupil level				
creativity difference(ε_{ijk})	7.22	1.73	4.17	.005
Pupil level self-efficacy measure (ASE_{ijk})				
	.42	2.04	.20	.84

Table 6-8- Model two: Random intercept variance when self-efficacy is added in a multilevel model.

	Variance	p*	Wald Z	95% upper	95% lower
Pupil level variance					
(level one ε_{ijk})	2.71	0.49	0.69	0.16	45.71
Group level variance					
(Level two b_{0jk})	51.11	0.00	6.76	38.25	68.30
Subject level					
variance	15.12	0.14	1.48	4.02	56.95
(Level three b_{0k})					

*this is essentially a two tailed test and thus the p value here is two times this reported value.

There were 5 degrees of freedom for this model and a 2LL of 941.10. It was compared with model one and the difference calculated using this equation:

$$X^2 \text{ change} = \text{null model 2LL} - \text{model 1 2LL}$$

$$df \text{ change} = \text{null model df} - \text{model 1 df}$$

In this case $X^2 change = 944.96 - 946.62 = -1.66$ and $df change = 4 - 5 = -1$, this is not a significant change to the model as the X^2 significance value (.05 % of probability) with one degree of freedom is 3.84. This model was thus rejected, and pupil self-efficacy was removed from the model as a predictor variable.

6.4.5.3 Model three: Adding a fixed predictor of teacher academic effectiveness to the group level of the multi-level analysis

The next model included covariates of teacher effectiveness calculated as a group centred mean of average attainment for the group. The model is defined as

$$\gamma_{ijk} = b_{0jk} + b_{0k} + X_{jk}TE_{ijk}b_1 + \varepsilon_{ijk}$$

Where $X_{jk}TE_{ijk}$ is the predictor variable of teacher effectiveness for group j in subject specialism k . The covariate was added as both a fixed effect and as a random intercept to the level two hierarchy, this means that it will have an effect on the group level (two) and pupil level (one) but will not impact the subject specific level (three). The fixed effect yielded a non-significant result as shown in table 6.9.

Table 6-9 -Fixed effects of teacher academic effectiveness as part of model three of the multi-level analysis

	Coefficient	SE	T-ratio	p
Pupil level residual	7.11	1.71	4.15	.006
Group level teacher effectiveness	-6.78	14.95	-.45	.666

A non-significant result for teacher effectiveness at level two, group class teacher level was returned as a fixed intercept, $\gamma = -6.78$, $p = .66$, explaining no additional variance,

although when additional random intercepts are added this variance does become significant as seen in table 6.10, reported as such despite the issues with the p value as it is far below the significant value, ($\gamma = 60.15$, $p < 0.001$, 95% CI = [45.20, 80.04]). The ICC was then calculated indicating that at group level, 3% of variance is accounted for at an individual pupil level, 17% of variability is accounted for at the subject level, this is unchanged as the predictor variable was added at level two which can only influence level one and two variance. The variable of teacher effectiveness now accounts for 79% of variability in creativity gain outcome in the model, indicating that teacher effectiveness would be a relevant predictor of this data. Before this can be accepted however, the 2 LL must be compared with the null model to see if the data is a significantly better fit for this model, the intention still being to accept the simplest model that best fits the data.

Table 6-10 Estimates of random intercepts with teacher effectiveness as a covariate at group level (level 2).

	Variance	P^*	Wald Z	95% upper	95% lower
Pupil level variance (level one ε_{ijk})	2.70	.488	.694	.16	45.60
Group level variance (Level two b_{0jk})	60.15	.000	6.860	45.20	80.04
Subject level variance (Level three b_{0k})	13.39	.149	1.443	3.44	52.08

**this is essentially a two tailed test and thus the p value here is two times this reported value.*

The degrees of freedom for this model is 4 and the 2-LL 944.78. Using the χ^2 calculation from the null model returns a 1 degree of freedom change and a χ^2 chance

of .18, below the threshold for significance and so this model too is rejected, and teacher effectiveness was removed from the model.

6.4.5.4 Model four: Adding subject specific creativity gain as a predictor variable at level three (subject level)

At subject level, grand mean centred average of creativity measure of subject specialism specific creativity gains was added, which is a standardised average of WCR difference scores by matched groups (ie. PoP and PoP TT, etc) under specific subjects (see table 6.10) to account for variation in gains by subject specialism. The level three model is defined as

$$\gamma_{ijk} = b_{0jk} + b_{0k} + X_k SS_k b_1 + \varepsilon_{ijk}$$

Where X_k represents the added predictor variable of subject specific (SS) creativity gain for subject k . The purpose of this model is to evaluate the impact of subject specialism on creativity gain, that is, the possibility that a subject such as art, a subject specialism that purports to develop creativity purposefully, may have a different creativity gain intercept to a subject such as English.

The effect of adding this fixed intercept is non-significant at subject specialism level $\gamma = -.43$, $p = .08$ as shown in table 6.11.

Table 6-11 Fixed intercepts of subject specific gain at subject level (level 3).

	Coefficient	SE	T-ratio	p
Pupil level variance	7.37	1.10	6.73	0.00
Subject specific gain	-0.43	0.17	-2.52	0.08

A random intercept was then added at the subject level, and while the variability at the subject level is not significant, adding this variable has had an impact at group level which now does have significant variability.

Table 6-12 Estimates of random intercepts with subject specific creativity gain at a subject level (level 3).

	Variance	p^*	Wald Z	95% upper	95% lower
Pupil level variance (level one ε_{ijk})	2.71	0.49	0.69	0.16	45.96
Group level variance (Level two b_{0jk})	61.82	0.00	6.85	46.43	82.29
Subject level variance (Level three b_{0k})	0.09	0.39	0.86	0.01	0.85

**this is essentially a two tailed test and thus the p value here is two times this reported value.*

Table 6.12 shows the inclusion of a random intercept for this three-level model controlling for subject specific creativity gain demonstrating that this random intercept is significant at group level ($\gamma = 61.82$, $p < 0.001$, 95% CI = [46.34, 82.29]). ICC calculations reveal that adding subject specific gain as a means that 95% of the variation in creativity gain is explained at the group level. To evaluate this model, the χ^2 difference was calculated 941.47 with this model presenting a 2-LL of resulting in a change of 1 degree of freedom and 3.49 change in χ^2 , this is just below the threshold of significance for a χ^2 with one degree of freedom (3.84) and so this model is not significantly different to the null model. The near significance however suggested that adding slope variability may generate significant results.

6.4.5.5 Model five: Random slopes added to the subject level covariate of subject specialist creativity gain.

For this model, a random slope was added at level three that did not covary with other slopes. The mathematical model of this is defined as

$$\gamma_{ijk} = b_{0jk} + b_{10k} + X_k SS_k b_1 + \varepsilon_{ijk}$$

Where b1 represents the random slope. The fixed effects of this model are the same as the previous model as the random slopes for the different group are the only change. The results have now become significant at the random intercept and slope at group level.

Table 6-13 Random intercept and slope with subject specific creativity gain as a covariate.

	Variance	p*	Wald Z	95% upper	95% lower
Pupil variability ε_{ijk}	2.70	0.49	0.69	0.16	45.80
Group level variability b_{0jk}	61.82	0.00	6.85	46.43	82.29
Subject level Variability					
Variance of intercepts	51.32	.007	2.72	24.97	105.47
Covariance between intercepts and slopes	-1.05	.082	-1.73	-2.42	.13
Variance of slopes	.15	.63	.46	.00	9.32

*This is essentially a two tailed test and thus the p value here is two times this reported value.

In this model there is significance at group level ($\gamma = 61.82$, $p < 0.001$, 95% CI = [46.43, 82.29]) and at subject specialism ($\gamma = 51.32$, $p < 0.007$, 95% CI = [24.97, 105.47]) with variance of intercepts. The ICC calculation for this model reveals that the group level now accounts for 53% of the variability in creativity gain while the subject specialism intercept controlling for subject creativity gain accounts for 44% of the variance. The individual level accounted for 2% with the coefficient slope and intercept and random slope only accounted for less than 1% each.

To evaluate this model, the χ^2 difference was calculated with this model presenting a 2-LL of 936.91 and 7 degrees of freedom resulting in a change of 3 degrees of freedom and 8.03 change in χ^2 , the threshold for significance with 3 degrees of freedom is 7.81. This indicates that this model is a significantly better fit for the data than the null model and is accepted. This random intercepts and slope model indicates that subject specialism accounts for variation in pupil creativity gain with slightly more than half of the gain accounted for at the group level, likely attributable to teaching styles at a group level and possibly creativity of subject at a subject level.

6.4.6 Teacher Interviews

Following each of the intervention and data collections, an interview was conducted with each of the participating experimental group teachers in order to gather feedback on several key areas: the first was impact to teacher workload, teacher perception of pupil engagement, quality control (how well the planning was adhered to), and teacher opinion of the methodology. Once these had been transcribed, a thematic analysis was conducted to examine recurring themes in the teacher input and feed into the

action research spiral. The interview insights by category are displayed in tables 6.14 to 6.16.

Table 6-14 Student Focused Teacher Interview Thematic Table.

Training	Pupil Engagement	Teacher Opinion	Impact to teacher time	Quality Control
<ul style="list-style-type: none"> - that (the training) was really supportive - It would have been good to see the work someone else had done (example) 	<ul style="list-style-type: none"> - there was the odd one who was - they are a rowdier group - they should take more responsibility 	<ul style="list-style-type: none"> - I found it hard stepping back - I found it hard to trust them - I found... there were more mistakes - the outcome...was weaker - if they used it (clay) again it would be easier - there could have been a clearer way, maybe a three step (in relation to the flow diagram) - the two methods of teaching are completely different - some elements of it were good 	<ul style="list-style-type: none"> - I had to make a couple of worksheets and a video - a few hours work I think - all my planning is already done (I don't usually plan for each year) 	<ul style="list-style-type: none"> - I had to get more involved that you probably wanted me to - there has been quite a lot of disruption - This project has gone on longer than normal - They struggled with it (the planning) on the board - you don't have time (in the lesson) - I had to stop the lesson and.. I would resort to my normal way - I didn't always direct them to the board

Training	Pupil Engagement	Teacher Opinion	Impact to teacher time	Quality Control
		<ul style="list-style-type: none"> - the way I do it ...they are more successful straight away - if you see the same kids everyday I think you would notice it more (any difference in outcome) - In a subject where they had more lessons you would see a bigger difference - I think it was too hard in a practical subject - if you give them a little bit of freedom they think they have a lot - behaviour management gets harder - it was too chaotic for ...how I like things to run - it's too much work to change one whole project (planning done many years ago) - if it works (old way) why change it? 		

Table 6-15 Pedagogy Of Play Teacher Interview Thematic Table.

Training	Pupil Engagement	Teacher Opinion	Impact to teacher time	Quality Control
<p>- the information you gave me and the conversations we had were fantastic</p> <p>- I knew exactly what I was doing</p> <p>- That was fine</p>	<p>- In terms of the enjoyment of the lesson well absolutely</p> <p>- they lapped it up</p> <p>- there was a choice of what they were going to do with the information</p> <p>- they give a little bit of themselves with enthusiasm</p>	<p>- I enjoyed it</p> <p>- trying to be as crazy as possible</p> <p>- it was an enjoyable process to rethink things</p> <p>- It was good and an interesting experience</p>	<p>- It was more work than I was expecting</p> <p>- I found the ideas week by week were coming more quickly</p>	<p>- I approached it all guns blazing</p> <p>- at the beginning I stuck absolutely strictly to it</p> <p>- as I got more familiar with the process...I may have deviated slightly</p>
Training	Pupil Engagement	Teacher Opinion	Impact to teacher time	Quality Control
	<p>- they were definitely more motivated</p> <p>- (choice) helped hugely</p> <p>- They were looking forward to giving (their homework) to me</p>	<p>- It allowed me to get to know some of the pupils a little better</p> <p>- I REALLY enjoyed delivering the lessons</p> <p>- I was looking forward to delivering them</p>		

Training	Pupil Engagement	Teacher Opinion	Impact to teacher time	Quality Control
	<ul style="list-style-type: none"> - they were really keen to get things in on time - it made a huge difference with their engagement and their enjoyment and with the teaching and with every aspect of it really 	<ul style="list-style-type: none"> - I knew I was going to enjoy it - The whole experience of teaching it was enjoyable - It was really easy to build challenge into the lesson - pace would have been a challenge... with a lower ability group - I will be using lots and lots of them again - I will be doing my absolute best to carry on as far as possible - This would be quite a nice way to differentiate the tasks without them even realising - It might be the perfect methodology (differentiation) 		

Table 6-16 Personalised Playful Pedagogy Teacher Interview Thematic Table.

Training	Pupil Engagement	Teacher Opinion	Impact to teacher time	Quality Control
<ul style="list-style-type: none"> - It was really clear - like how the work you do goes in front of the kids 	<ul style="list-style-type: none"> - the children responded really well - they liked that control - most of them were aiming high - they want to impress the teacher - They want to show off a little bit - gave them more motivation - they liked having a part in the development of the lesson - they engaged with it more - They really liked having that autonomy 	<ul style="list-style-type: none"> - they became saturated (with the planning sheet) - they naturally do challenge themselves - it's healthier than when it's posed to them that they HAVE to - It was interesting - It made me think about how I design all my lessons 	<ul style="list-style-type: none"> - I didn't feel it added any extra workload - it doesn't take long (using the proforma) 	<ul style="list-style-type: none"> - There were points when it wasn't possible - we had to drop everything and do an assessment - when it was just content teaching, yeah (stuck to the plan) - there were times when I had to deviate a bit

One of the themes that emerged this time was that all teacher felt that there had been an addition to their workload:

“it, was more work than I was expecting, I’ll be honest, because I approached it obviously, kind of, all guns blazing, cos I thought, well, if I’m going to take part in this, I’m going to do it as well as I possibly can, so it was a case of trying to design a number of activities each time, that were all fun for them to do, and all interesting and all, obviously, still valid, and obviously for each one, it needed a slightly different way of assessing each one it was a little bit more work, but once I started getting going on it, I found that the ideas week by week were coming a lot more quickly, and almost instantly I was thinking of four different alternatives maybe for pieces of work which erm, all obviously end up with the same, outcome”

PoP Teacher

“I didn’t feel like it added any extra workload, because I was just doing all of that anyway so that replaced what we would have done. The only thing that sometimes, not exactly added, but was sort of, a factor to think about, was oh yeah, I’m going to have to put that into the proforma, I’m going to have to make sure that goes in and, I mean it doesn’t take long, only like 5 or 10 minutes, but sometimes I found myself think that oh, I’ve got year seven in 10 minutes and I haven’t put it in that, [planning sheet].”

PPP teacher

“it was a few hours worth of work I think”

SF teacher

A theme of engagement emerged from the both the PPP intervention and the PoP intervention where play and personalisation combine. This was not the same focus as the SF teacher experienced.

“T: in terms of their enjoyment of the lesson, oh, well absolutely, I mean, I mean I don’t know if you want to know about individual things that we did?”

R: Yeah

T: Well, for example there was, quite a, well, pretty boring lesson, on, erm, on, distillation, and because of our, well, safety, and lack of equipment and, those sorts of issues, we normally just have a distillation set up and they come over and have a look at it, and then they go back and they draw a diagram, and they write about distillation and all that sort of thing. We don’t have the facilities for everyone to do it and it would be chaos with glassware everywhere with 13 year olds! So, but this time instead, I got one of the, sort of, pieces of equipment, and I made an alien crash site, was one of the activities, and they had to identify the piece of equipment. And it was recovered from an alien crash site and the every now and again, there would be a transmission from HQ and they would decode the information, and get a bit more information about what the equipment did, and they did it that way. That was one of the kind of, fun activities that we did, and they, sort of, lapped it up, obviously, some of them more than others, you know, getting into the spirit of things! But with those sorts of activities, and then obviously there was a choice of what they were going to do with the information. Some of them were writing reports back to NASA, and some of them were writing reports to, back to the aliens about what life was like

on earth, so. There were those sorts of activities. I mean they absolutely loved it, and you could tell, I mean, what are we doing today was sort of increasing week on week as they came into the room, which was really pleasing to see. And its actually allowed me form really er, get to know some of the pupils a bit better. Just as, throughout the activities, they give a little bit more of themselves with their enthusiasm, you learn peoples likes and dislikes, you know, outside the classroom a bit more.”

Excerpt from interview with PoP teacher

“at first the children responded really well because of the visual, because of like that menu, and they liked being able to choose and they liked that kind of, I dunno, they liked that bit of control, that bit of agency over the lesson. Over time as I was giving them it, it was getting a bit like, oh, this again, or kind of like, it wasn't the activities that they didn't enjoy, it was just once they were seeing that same map over and over they were getting a bit like, a bit like, ohhh, we've seen this before (disappointed tone), so what I started doing then was not giving it them on paper, I started just projecting it on the screen and then they could just look at in from there, so that worked for a while, and then in the end I was teaching in that style but not displaying that anymore because I didn't want them to become too saturated or desensitised BUT they really liked that they could choose the difficulty level and most of them were aiming high. That was what was really nice, because it's a mixed ability group, but they are generally high ability, even although they're mixed, erm, there's like, some higher and some a little bit lower, but only a few were going for the top, the hot challenge, most were aiming for

the, like, none were staying for like, the weaker activities, most were aiming higher, but I noticed that only a couple were going for the very top activity, so I don't know if that was cos I was making it too hard or, I don't know, I'm not really sure why..... They are a good class in general, and they respond really well to anything that, that's why I chose them as well, because I knew that they would go with it. I think that they liked having a part of the development of the lesson, rather than just being teacher led, and you just have to do what I say. I think that they liked, being able to choose, and kind of stretch themselves, when they were ready and not have to, yeah I think that they engaged with that side of it more."

PPP teacher

The experiences of the SF teacher were a little more mixed:

"the group that did your way [the SF intervention] is a rowdier group so it was harder, so it was harder, it's harder, because I've not taught them before you see, this is my first year of, of teaching that class. I think if I'd have known what they were like before, I would be able to answer that."

SF teacher

Focusing on consistency of delivery, there were more deviations than reported in chapter 5, but emerging themes of curriculum needs and attainment focus were the given reasons for changes as well as disruption due to school calendars.

"at the beginning I stuck absolutely strictly to it, maybe towards the end I was, erm, not quite adhering to the rules exactly, but was definitely well

within the spirit of the activities, in terms of giving them fun activities, choice and choosing their own learning path, to go through the lesson which would obviously, still, as I said earlier, still reach the same learning outcomes at the end. Yeah, so I , I must admit as I, as I got more familiar with the process, maybe I didn't refer to it quite as much. I might have deviated slightly, but as I say it was still well within the spirit of the activities”

PoP teacher

“There were points at which it wasn't possible, like when we would have, like sometimes an interim spelling punctuation and grammar test, so we just had to drop everything and do that and the assessment and the lessons leading up to that, sometimes it didn't work well with that, so erm, preparatory lessons, but generally, when it was just content teaching, yeah, there were times when we had to like, deviate a little bit.”

PPP teacher

“they, struggled with ‘don't ask me check on the board’ sort of what you should be doing and where you are, they struggled to understand that at first, there could have been a clearer sort of, maybe a three step, they struggled with where they were and sort of where do I go now, and of course you did have to step in because well... the, the, yeah, the clay I think was the bit where we really,... because we ended up just scrunching it up and starting again. And then of course I would, you know if it happened three or four times in one 50 min lesson, you know you're stuck so you know, you can't, you can't afford to do that, you can't have so much waste and then of

course I would stop the lesson and then it was, ok right everybody stop, this is what we're doing this is where, and I would resort back to my normal way....[a different section of the unit of work was better because] we did some drawing of the cupcake shape. The ellipse and the cylinder shape and that was when I did have that worksheet and I would say, right, just stop there and I want you to just sketch on the side and I want you to just practice them. I didn't always direct them to the board, but I would say to just practice how you would get that ellipse in and that 3d shape and use this worksheet to help you. So then they'd go back, look at that and then come back to their drawing and you could see an improvement in their drawing."

SF teacher

The principle of choice remained a positive focus of teacher opinion and this element was applauded by both the PoP and the PPP teachers:

"I enjoyed it, it was erm, it reminded me in a way of my NQT (Newly Qualified Teacher) years, sort of trying to be as crazy as possible, and actually I enjoyed the process of going over the lessons I'd maybe, used, quite a few times, erm, you know in the past few years, and reworking them and working out ways to access the material. SO it was an enjoyable experience to rethink things and I came out with some really good activities that I've actually shared with the department. I *really* did enjoy delivering the lessons, because I planned them, well, obviously I plan all of my lessons, but, because I planned these ones so, well, not minute by minute,

because well, I don't you know, I don't plan like that, but in terms of that I knew there were some nice, beefy activities to go through the lesson, and I was looking forward to delivering them, I knew they were going to enjoy it and obviously as a teacher if you know that the pupils are going to enjoy that lesson, you know, there's not a chance of you, you know, walking in to the classroom with a slightly, you know, oh dear, kind of a, kind of mindset! So I knew I was going to enjoy it, I knew they were going to enjoy it, I knew the material, you know, obviously, I didn't need to refer to anything because I had planned it I mean, I had spent so much time planning it, I knew what was going to happen all throughout the lesson obviously. Erm, and the whole experience of teaching it was enjoyable too, so I mean, I was looking forward to teaching the lesson."

PoP teacher

"I think when you present something to them in that way, of its kind of, it's your choice, they naturally do, like to challenge themselves, they do want to show off a little bit, they want to impress the teacher, and that's healthier than when its posed to them as in you HAVE to do this and then they go, ahhh, I don't want to do that. SO I think that they liked the way that was posed to them as kind of, you can climb your way up and then this is kind of like, the challenge and you could hear them say, Ohh where are you up to and which one have you gone for and , Miss, I've done the hot challenge and just reframing it in that way, I think gave them more, kind of like motivation, rather than, feeling like, oh we've GOT to do this. they would talk to each other, what are you going to choose, and even when I was

turned my back for a minute, like to do the register or something, I would hear like, these little mini conversations that would go, well I'm going to choose that one, or, well, I'm going to do that one first, and then I'll do the next one and I'd like I think they really like having that autonomy."

PPP teacher

Themes of time pressures and concern over ability to trust pupils to manage their own learning were themes that were evident in the SF teacher interview:

"I found it hard stepping back. I mean I probably do more, I interfere more with what they're doing and support them more as I'm walking round the classroom. And I found that hard initially to step back and say 'go back and have a go at this activity from the board' and I also found it hard to trust them to pick where they felt they fitted in on the flow chart. And, sort of, because generally we'd always do the same thing all together, so I, I found that hard. I found that once I'd gotten over that and I just let them get on, and make their own decisions and choices, it was Ok, but I found that the quality of work, or the mistakes, there were more often than not more mistakes, especially with the clay because it's the sort of thing they'd not done before, and normally when I teach that, I teach it more of a step by step, everybody stop, do this, now everybody start again. And I'd say there was a difference in the outcome, I think it was weaker, erm, I think it's too, ...If I was to carry on and do another clay project with them, I think I would probably have seen a difference, they'd have learnt their lessons and would perform probably better in the next project."

SF teacher

In open questions at the end, further insight was offered in terms of length of task time and supporting students in making choices about the most challenging work as well as time pressures for timetable restricted subject areas. These themes allow deeper discussion for the future directions of this research pursuit:

“With a lower ability class, I think I would have found it more challenging, because I find with a lower ability class, lots and lots of smaller activities to keep the lesson moving, keep their, maintain their interest, works better than, big sort of 20-25 minute tasks if you like, although 20 minutes is as far as I'd go, but, designing a he number of smaller tasks, would have obviously taken a lot more time for them to play their own route... There's always been a problem, in teaching with differentiation, and differentiation ISNT making 10 worksheets that are all slightly different, and it isn't giving more work to people who finish early. This would be quite a nice way to differentiate tasks without them really even realising there was a higher and lower, just allowing them to choose the activities that they want and, with a middle set, class, a middle ability class, I think it would really lend itself. It might be the perfect teaching methodology and would allow, if you can think of two activities that are, er, just different ways of getting to the same outcome, like I said, but, not even an easier and a hard version. Just two different ways for them to reach the same outcome, will, er, will really help with the middle ability classes.... You know what its like when, how frustrating or amusing it can be as a teacher when, you say something five or six times, and they just don't get it. And then their friend says 'diddelelde' and they go like, oh yeah, I get it now. I think, well, just for having a choice

of different activities, even if I haven't consciously made one easier and one harder, one of them will be the one that they think will get them to the end point so, I think with middle ability it would be the best thing that I'd like to move forward with."

PoP teacher

"only a few were going for the top, the hot challenge, most were aiming for the, like, none were staying for like, the weaker activities, most were aiming higher, but I noticed that only a couple were going for the very top activity, so I don't know if that was cos I was making it too hard or, I don't know, I'm not really sure why."

PPP teacher

"I'd pick a subject that has more lessons. I think it was too hard, and I think in a practical subject like mine and you've got, you have to keep on top of them and if not they get giddy and silly, and I think that's harder to control and they, I think, when you give them a little bit of freedom, they think they've got loads of freedom, so your behaviour management gets harder. So they think, oh I can just get up and get this worksheet so I will take the long way round or, erm, so, I think that makes it harder. Erm, I think putting the ownership on them is better, I mean, that's good, and they should take more responsibility, but er, I think that would work better in a subject that wasn't. I think, well, it can be quite chaotic in here and I think that, for me, and how I like things to run, I found that hard."

SF teacher

6.5 Discussion

The purpose of this study was to further explore the relationship between play as a learning medium that could be influence through planning, and creativity development in pupils, It intended to investigate the effectiveness of three different planning methods to evaluate relative effectiveness in developing creativity, attainment and self-efficacy in pupils. The prediction based upon the previous study (chapter 5) was that a Pedagogy of Play planning method would enhance creativity to a larger degree than a Student Focused planning method while the Student focused method allowed for enhanced attainment. The hypothesis was that including a method that combined these, the Personalised Playful Planning, would allow both creativity and attainment to flourish over that of Typical Teaching. A multi-level approach to the analysis allowed many variables to be taken into consideration including teacher effectiveness and subject specific creativity gains. This section unpacks meaning from the two types of statistical analysis undertaken and combine it with the reported teacher interviews to evaluate the key elements of this study. It explores the meaning of the results in combination and makes links to further literature in understanding the implications.

The design of this study was intended to control for subject specialism, topic content and age by pairing each intervention group with a matched typical teaching (TT) group in order to manage some of the natural variation in teaching type, subject appeal and attainment. As such, each pair is discussed separately to allow comparisons with the three measures to be made and then the relative effectiveness of the different interventions explored.

6.5.1 *The PoP Pairing*

This paired set of classes were from a year eight group (aged 12-13), in a high academic ability streaming with a science subject specialism. The intervention teacher was very enthusiastic about the project although there was a small issue as the previous data point for academic data collection had been disrupted in the science specialism due to a Norovirus outbreak, the learning had been completed but the assessment point had not.

Pre intervention results indicated that this subject specialism has the highest creativity points initially, as assessed by the WCR-E, collectively the subject area had a baseline creativity score of 69.03 in comparison to the SF groups in the subject area of art (57.83) or the PPP groups in the subject area of English (54.25). The reason for this is unclear although the academic ability of this group was higher in mathematic skills than any of the other groups due to the setting protocol of the school and the way the class lists are managed, something that was out of the control of the researcher. Studies have suggested that IQ and creativity are not linked except in specific cases concerning high ability females and with mitigating factors suspected to be motivational in nature (Welter, Jaarsveld, Leeuwen, & Lachmann, 2016). It may therefore that be a confounding factor is responsible for this higher baseline.

The extent to which academic ability influenced the creativity score is unclear, as the attainment scores included in the research was subject specific, it is possible that evaluating an average attainment score for each pupil from across the subject areas may provide further data for examination. The effects of the Norovirus closing the school were felt most keenly in the attainment data from this group. The method

employed by the school for this group however is the same as the one employed in this research, wherein the attainment gain over two units of work is calculated as being between .33 and .66 gain (PoP= .67, PoP TT= .63. These data suggest that a standard trajectory has been maintained for both groups with the attainment gain for both groups is in line with expectations. It also supports the findings of the study 2 (chapter5) where this planning methodology, employed by the PoP intervention group, maintained but did not exceed attainment expectations.

From the point of view of this research, setting out to support curriculum development, this is a positive step towards a solution to enhancing creativity development. The tantalising increase in subject attainment levels offered by the SF group in study 2 however, provided some suggestion that lesson planning may also be able to enhance the expected attainment trajectory on an individual pupil basis.

With regards then to creativity enhancement, it was not only the case that this subject specialism had the highest starting point but within this specialism, the intervention group also had a large positive effect size when compared to the matched typical teaching group (.85). The negligible effect size of the PoP TT group (.19), suggests that the playful approach to planning has had some impact on creativity development. This is also in line with the higher gain in creativity seen in the study 2 PoP group with a focus on play as a pedagogical approach to planning. These two separate results start to build further evidence that play is linked to the development of creativity in this population. It also suggests that it is possible to influence the development of creativity to some extent by manipulation of teacher planning methodologies to include play without an adverse effect on attainment.

An additional element, not investigated by this research but reported inadvertently in the transcribed interviews (appendix 6), is the teacher attitude to the intervention. In the case of the PoP intervention teacher, his attitude can be reported as supportive. He suggested he approached the project “all guns blazing” and that he enjoyed teaching his lessons that way, and this attitude, helpful though it is as a researcher, from an analysis point of view, adds a further layer of complexity to the evaluation. Although from a quality control point of view all teachers report predominantly following the planning approach, their own enthusiasm for the lessons may have been reflected in the outcomes of the pupils. While teacher effectiveness is evaluated in the MLM and found not to be significant, neither teacher attitude, personal creativity nor the value that the teacher places on creativity in their pupils was included in this research. Teachers often report that their mood is reflected in the attitude of their pupils, something well-articulated by Ginott (1972, p.13) as he states that “It’s my personal approach that creates the climate”. The extent to which this is true of creativity development is unclear, adding a further dimension for consideration. This may also be the cause of the trend in the data recorded in model two of the MLM analysis which, although not significantly different to the null model to adopt, was none the less a model that did explain the data significantly demonstrated a trend in the data toward the possible inclusion of teacher academic effectiveness in teaching, accounting for 79% of variance at group level. The need to adopt the simplest model led to the exclusion of this model in this PhD, however the trend towards significance is one that may be worthy of further research.

The self-efficacy changes reported in all these pairings and across all groups was not significant. Academic self-efficacy was added to the measurement portfolio to explore the relationship between self-efficacy, creativity and attainment. There is little research in this area for this age group and what research has been done has focused upon whether self-efficacy is related to attainment, concluding that those with higher self-efficacy do better academically (Bassi, Steca, Fave, & Caprara, 2006). The rate of change in self-efficacy is not as well established. One study found that a problem-solving web-based programme had only slight increases in college students but that research was carried out with sustained weekly participation over the course of one full semester (Crippen & Earl, 2007). The intervention design for this research was only over the course of a six-week unit of work, suggesting that it may take more sustained intervention to impact self-efficacy or academic self-belief.

6.5.2 The PPP Pairing

The subject area for these two groups was also a core curriculum subject, meaning the contact that they had with their teacher was governed by the same timetabling structure – 5 x 50min lessons per week. The confounds in this group arise from the age group, since this subject area selected a year seven cohort (age 11 and 12) while the other two subject areas elected to work with were year 8 (age 12-13). In addition to the age difference, this group was not academically streamlined; part of the school approach to transition between primary and secondary school and the well-researched dip in attainment and other measures (Riglin, Frederickson, Shelton, & Rice, 2013) is to teach several core subject areas in mixed ability groups to allow the same group of pupils to remain together for longer periods. These two factors add another layer of variability to the research outcomes.

The PPP was developed as a response to the increased creativity in the PoP group in addition to the increased attainment of the SF group, shown in the exploration study (chapter 5). The hybrid approach was based on the key pillar of choice from the PoP intervention and the outcome focused nature of the choices used in the flow chart process of the SF model. In terms of the creativity attainment of this subject area, it is important to note that extremely large positive creativity gain was demonstrated by both groups. The PPP intervention group had a very large positive effect of 2.33 while the PPP TT group displayed a large positive effect of 1.12. The reason for these extremely large effect sizes in this subject area are unclear, although they may be connected with the variability in age or group academic make up providing a collective diversity of experience and thought processes leading to greater creativity as has been seen in previous research (Nemeth & Nemeth-Brown, 2003). Although both effect sizes are large, comparatively, the intervention group was double that of the matched control group supporting the theory that planning with the elements of choice in this way is a key consideration when endeavouring to enhance creativity in this age group.

The attainment gains in the two groups varied widely (PPP = 0.57, PPP TT= .33). The typical teaching developed exactly expected outcome gain at .33 while the intervention group was much higher. The increased attainment in the intervention group when compared with the typical teaching group, suggests that the second aim of the PPP model has also been successful. The creativity gain was almost double that of the typical teaching group and the attainment gain was also higher, although not by the multiple of three demonstrated in the SF model as part of the experimental group (chapter 5). Results here suggest that the dual aims of the PPP model in combining

creativity enhancements with academic attainment enhancements has at least been partially effective.

In terms of the pupil response to this model, the teacher in this group reported that pupils were consistently aiming high and selecting challenging tasks although she noted that there were relatively few pupils aiming for the very hardest of tasks. The PPP model has been designed to illustrate the challenge level of the tasks that the pupils could choose, as opposed to the free choice with no challenge level used in the PoP method. Pupils were able to discern how difficult the task was by the heat rating of the task and select that which they felt was most appropriate for their ability. This did lead, as reported in the interview (appendix 6), to some friendly competition between pupils and most pupils choosing moderately high tasks. The PoP group however had no indication of the relative challenge of the tasks and so their choice was based solely on their connection with the activity. This may have led to enhanced flow and engagement with the task (Hardy, 1998; Nakamura & Csikszentmihalyi, 2014). While the difference in attainment between the intervention and typical teaching groups for the PoP groups was negligible (5.5. 1) the wider gap reported by the PPP intervention and typical teaching groups may be connected with the development of challenge. A reported lack of engagement with the most challenging tasks however may be connected with the self-efficacy problem discussed previously and presents possibilities for further study.

6.5.3 The SF Pairing

The SF subject area was art. This means that additional factors at play here in terms of intervention time. Both English and Maths (the PoP and PPP group pairings) are

core subjects the consequence of which is that while the time period that elapsed was the same for all three interventions and units of work, the contact hours for the different classes differed significantly. Both the PPP and PoP teachers saw the pupils for 5 x 50 min lessons per week while the SF teacher, although a creative subject and therefore having an additional confounding factor in that direction, only sees pupils for 1 x 50 min lesson per week. In addition, this subject experiences reduced timetable time over the year as pupils move between specialisms (Music, Art and Technologies).

This disparity in teaching hours not only has an impact on the results of this study but also produces some interesting systemic challenges for creativity development. The first is that the differences in contact time may create a perceived weighting in pupil's minds as to the relative importance of these subjects and therefore their value. Secondly, there is the difference in the quality of the relationship that develops between pupils and their teacher over the course of their lessons. The length of time spent with an individual and frequency of meetings has a positive impact on relationship quality (Duslak & Geier, 2018) and the strength of that relationship may have a bearing on the strength of the attainment or creativity development for the pupils.

SF groups also experienced a gain in creativity overall, with large effect sizes reported by both groups, 2.06 for the intervention group and .87 for the typical teaching group. As this is a more creative subject, there is a possibility that the subject space on their timetables in which the test was undertaken, primed the pupils to respond more creatively to the material leading to larger effect sizes. The attainment in this group however did not follow the pattern of study 2 (chapter 5) with the intervention group

making just over expected progress while the typical teaching group made almost double. This may be partially due to the teacher's discomfort in employing the alternative delivery style leading to reluctance to step in and support individual pupils in developing the more practical skills, or it may be that the skill acquisition element of this type of lesson does not lend itself to the step by step small decision process defined in this planning approach.

For the SF group following a more creative curriculum in the subject specialism of Art, the element of individual teacher style and experiences is controlled for as the same teacher delivered both lessons. This teacher experienced some challenges in changing her teaching style between delivery methods. Hinted at in the interviews however is some additional reluctance to change anything about teaching style. This is evident in the constant repetition of how "hard" the project was for her as well as the articulation of the minimal revision of planning that takes place regularly (appendix 6). Some confounding of the outcome may thus be explained not only by the strength of the relationship that this teacher has been able to build with their pupils in the reduced timetable time, but also with the lower enthusiasm levels for the project.

6.5.4 The MLM

The analysis thus far discussed has focused on the primary research question exploring the impact of the intervention on creativity development in this population analysed using simple repeated measure ANOVA, but in order to explore the rich complexity of the data more fully, an additional multilevel analysis was undertaken. This analysis determined a significant effect of subject specialism on the creativity outcome of the individual. While this could be attributed to the inclusion of a creative

subject such as art, the likelihood is that this is reflected in the extremely high creativity gain effect sizes demonstrated by the PPP subject area that may be further confounded by age and academic variance in the group, as discussed previously. In addition, the SF groups that also both showed large gains in creativity was located in the subject specialism of art which may also increase the likelihood of creativity gain as a confounding variable.

Adding variables in terms of random intercepts for self-efficacy supported the results of the ANOVA, suggesting that this intervention period may simply be too short to allow a measurable increase of self-efficacy. The research that has been done in this area suggests that feedback, even in the form of self-explanation, can support the development of academic self-belief (Crippen & Earl, 2007). The period of intervention falls between two directly sequential attainment measures for these pupils and thus they have had no concrete feedback on their attainment levels between the two measurement points. Any confirmation of their ability is thus absent between these points and may explain the lack of significance in this result.

The key finding of the MLM is confirmatory of the ANOVA; that the main significance in creativity gain was accounted for by group variance. Despite the confounding variables reported above and mapped in figure 6.4, 53% of the variance in creativity can be explained at the group level, this supports the effect sizes reported in the ANOVA and further confirms the possibility that manipulation of the teacher planning at this level may be used to enhance creativity development.

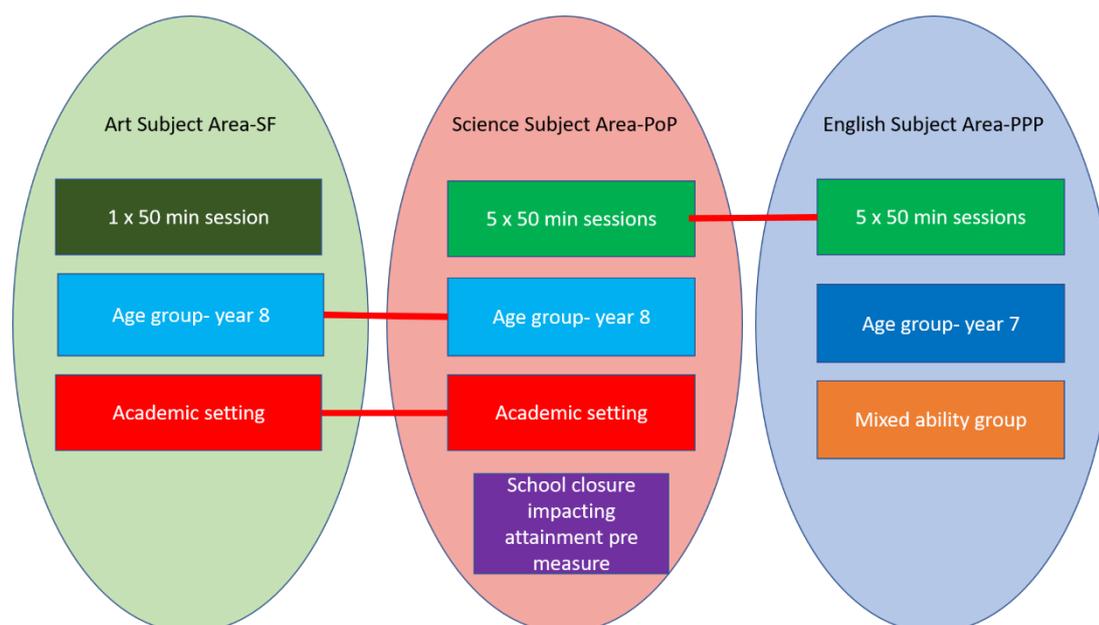


Figure 6.3 Confounding variables for this research due to situation variances.

6.5.5 Teacher interviews

Semi structured interviews allowed for data to be gathered on five key areas identified in the literature. Questions explored the quality of the training, impact to teacher time and reliability of delivery, in addition teacher opinion of the methodology was sought and questions around pupil engagement were used to identify efficacy.

6.5.5.1 Time, reliability, and training

In contrast to the previous study (Chapter 5), teachers reported that this took more time than they would usually have dedicated to their planning. There are a number of possible reasons for this, and they differ from teacher to teacher. For the PoP teacher showed immense dedication to the program and replanned his unit of work, constantly updating it and providing more opportunities for the pupils to make choices. He describes this as 'all guns blazing'. This means that he was planning more tasks over

and above what he had done before and starting with a blank slate. For the SF teacher, the level of discomfort in doing something so different to her usual practice, contributed to her feeling of additional workload. She described having to make additional videos and resources, but when challenged admitted that they had been part of the plan for the unit of work, even before the project was identified. The SF teacher's planning strategy was to set the work years in advance and re-use schemes of work every year for each year group and changing the work for this unit felt like a burden to her compared to a typical unit of work under that practice. The PPP teacher found it more challenging to decide how much additional time was being used as everything was taking the same length of time to prepare although she felt that the proforma was sometimes an afterthought as she had prepared the work and then needed to amend the pupil facing document.

The impact of the new pedagogy on teacher time is a challenge to identify. It has long been established that learning takes time and is variable by individuals (Bloom, 1974). It is further clear that change to existing practice involves learning something new. Taking these two perspectives together it is reasonable conjecture that changing the process of planning lessons would take longer than planning lessons following an individual's typical methodology. Whether the increase to the length of time taken to plan lessons would persist if this became usual practice would be an avenue for further investigation.

The teachers reported some variability in the implementation of the initiatives which may also have implications for the validity of the study. The PoP teacher reported greatest fidelity to the program, the PPP teacher reported that she was mostly faithful

to the intentions while needing to make certain allowances for school-based testing procedures, and the SF teacher reported personal difficulties with the methodology and that she found it very hard to step back and trust pupils to make the correct decisions. This also speaks to the commitment of the teachers to the project, something that will be discussed in the next section.

All of the teachers once again reported that they were happy with the quality and content of the training provided in this project regardless of the planning condition they were working with, with once again small comments made on the benefits of having examples to work with, also adds to the feedback from the previous study (Chapter 5) and provides future directions for this research.

6.5.5.2 Teacher opinion- theme: enthusiasm and teacher role models

The thematic analysis of the interviews leads to the identification of two themes and supporting mechanisms which may impact the development of creativity in addition to the planning approaches that were the focus of the study. Firstly, the enthusiasm and commitment of the member of staff representing a personal difference in adult leadership in the classroom. Secondly, the contact hours that member of staff has available to build a relationship with their pupils. Both have an impact on the quality of the professional working relationship between teacher and pupil in the classroom.

The teachers demonstrated differing levels of enthusiasm for the project. The SF teacher was a somewhat reluctant volunteer ('it's too much work to change one whole project' and 'I don't plan every lesson from scratch') while the PPP ('It made me think about how I designed my lessons') and PoP ('All guns blazing') teachers were both

enthusiastic in their approaches. Enthusiasm for teaching has been linked with effective teaching practice (Bloom, 1974; Kunter et al., 2008) and this also may have had an impact on the outcomes. The relationship between teacher and pupil does seem to form a key element of pupil engagement with learning (Cornelius-White, 2007; Marsh, 2012), and reason would suggest that the role of the teacher modelling creativity and commitment to its development may also have an impact. Teacher role modelling has already been linked to better outcomes in terms of positivity, personality and academic attainment (Marsh, 2012; Ulug, Ozden, & Eryilmaz, 2011), it may follow logically then that the teacher as a role model also has an impact on creativity development in pupils. If this is the case, then the factors identified through the interview transcripts of unequal teacher time with pupils to develop a good relationship as well as the teacher's enthusiasm may contribute to the factors confounding this research.

6.5.5.3 Pupil engagement- Theme: Choice

Once again a key theme in terms of pupil engagement that emerged through the interviews was that of choice.. All of the teachers reported choice as a key element that appealed to the pupils in their subjects. Even the SF teacher, despite indicating that pupils found it 'hard' to rely only on the board for instruction, confirmed that there was a positive purpose and outcome of allowing pupils to make their own choices and have some responsibility for their learning. Teaching tends to follow a process of demonstration and practice that allows the learner to develop their skills in a safe and supported way, but the skill of decision making is unaddressed. As adults, decisions are every day occurrences but the rigidly defined world of the school pupil, leaves little possibly of rehearsing choice making in way that matters – in that it impacts in the

activity they are doing and their learning – but is neither immaterial (like a choice of lunch meal) nor of catastrophic consequence (like a risky adult financial decision). Some of the key data reported by the interview process is that these three interventions allowed pupils to demonstrate agency. Placing this decision-making process at the heart of their learning may increase decision making practice opportunity as well as developing a sense of responsibility for their own learning in addition to enhancing creativity.

6.5.6 Theoretical principles

The development of PPP came about in response to the desire to combine creativity development with attainment enhancement and was embarked upon by including the guiding pedagogical principles of choice and wonder from the initial PoP methodology in the teacher training for this model. It used these two elements as an informing principle when selecting tasks for inclusion and particularly using the hook, or starter point of the lesson as a source of wonder. The delight was derived from a sense of flow that would be enhanced by the awareness of the level of challenge for each task (Csikszentmihalyi, 1992), it also combined a measure of performance from the initial SF model by allowing the pupil to evaluate their progress based on the challenge level of the tasks they selected. The key element combined from the SF and the PoP methods in designing the PPP programme was that of choice, identified from the teacher interviews as the element which engaged pupils in all of the intervention classes.

The need for pupils to develop agency was discussed in chapter 3 and the PPP model makes this the most overt pupil facing aspect of this method. While this was done from

a desire of boosting creativity, the unintended benefit of increasing engagement and choice rehearsal may have benefits that reach beyond either creativity development or attainment enhancement. Agency has been linked to intrinsic motivation and school adjustment in early adolescence (Walls, & Little, 2005). Developing this attribute at the point of adolescence may be beneficial for individuals as it is during this time that the sense of self expressed as *motion toward* autonomy (Beyers et al., 2003; Ryan & Lynch, 1989) is most keenly developed. The reason for the increased pupil engagement may then be the affinity to towards any mechanism whereby the opportunity to express their autonomy is permitted.

In exploring some of the confounding variables in this study, the relationship between academically streamed class groupings and mixed ability groups has emerged. Creativity has been cited as one of the key competencies prized by businesses in the 21st Century (Forrester Consulting, 2014), and one of the ways in which a team demonstrates creativity is the interplay between the complex, multilevel web of individual thinking styles that make up the cohesive group competencies and decision making (Ahmed, Hasnain, & Venkatesan, 2012; Armstrong & Cools, 2009; Ilgen, Hollenbeck, Johnson, & Jundt, 2005; Leonard, Beauvais, & Scholl, 2005). As the interplay between different thinking styles is important, it follows that a wide spread of represented thinking styles within a team is desirable for a high performing organisation. If this diversity of thinking styles is a desirable outcome and traditional teaching models seem to affect a reduction in this diversity, then the current educational model is not best preparing pupils for success outside the classroom.

A good example of how this diversity has been useful has been the UK response to the COVID crisis. During a daily news briefing in the UK, Matt Hancock, health secretary, praised the team responsible for ramping up PPE procurement in the UK, and in particular he noted that this programme was only possible as members had different experiences, thinking styles and expertise (Donati, 2020). In this unprecedented global crisis with constantly changing needs and capabilities, it is not possible to manage things in the way they have always been managed, and different solutions to novel problems must be found. This is the breeding ground of creative problem solving and diversity of thinking is the key, yet the observation of a narrowing of diversity in standard teaching methods indicates that thinking diversity in future generations may be at risk.

6.6 Conclusion

The results of study 3 did offer some support to study 2 as reported in chapter 5. The PoP intervention group demonstrated the largest effect size in creativity gain, with only standard attainment gains (once the effect of the school closure on the pre intervention attainment measure had been controlled for), just as it had in the previous study. With regards to the comparative results of study 2, the SF group offered some significant variation. Both groups showed large effect sizes in creativity gains, possibly as a result of the creative subject area, while the attainment gains were more varied, suggesting perhaps that this model does not lend itself to supporting delivery of practical subjects or that pupils needed more contact time to acclimatise to the methodology.

Where this study reveals a larger measure of success was in the evaluation of the PPP model. The aim of this model was to develop creativity while enhancing attainment and the results demonstrate that this has been the case. The creativity gain effect size was 2.33, the largest creativity gain of all of the groups, even outstripping the PoP group that had performed well in terms of creativity gain in both studies. This gain is large enough to support the hypothesis that the PPP planning methodology supports the development of creativity in pupils. Attainment growth was also supported by this intervention allowing pupils to support their academic attainment while developing creativity. While not demonstrating three times the attainment growth of the SF model in study 2 (chapter 5), the PPP group was demonstrating almost double predicted attainment growth. These two elements combined provide evidence to support this model as a compromise between attainment growth and creativity development that was the purpose of the PPP programme.

As indicated in the previous study, this research would be further supported by undertaking a longitudinal study that examines other methods of determining teacher effectiveness and potentially quantifying the quality of the relationship between teacher and pupil to examine the impact this has on learning. A longitudinal study would provide more robust data but would have a drawback of further impact to teaching time which must be considered as any research in real world settings has potential ethical repercussions beyond those of conducted in a more controlled setting. Questions also remain as to whether this is a sustainable change and if (or how quickly) thinking patterns would revert if TT is resumed, which could be tackled by implementing longitudinal studies. This approach would also strengthen the

robustness of the data, particularly if multiple tests were administered pre and post intervention at various time intervals.

7. Reflections and Conclusions

7.1 Introduction

This chapter summarises this research project and draws together the areas of contribution to knowledge, how they related to the research aims, and allows for discussion of the project as a whole. It also explores the limitations and their implications for the research outcomes and offers some ideas and questions that could be developed in future research. It examines the contributions in order of chronological sequence rather than import, but is clear on the key findings and most important practical offering for this research: the new pedagogic planning methodologies.

7.2 Research Summary

The intention of this project was to explore the development of creativity and the links to play, particularly in an adolescent population. A fundamental purpose for pursuing this research was enabling development of key employability skills in school aged pupils in order to enhance opportunity after leaving compulsory education. To achieve this, a thorough investigation into the nature, definitions and characteristics of creativity from the perspectives of development, education and employability was undertaken. This highlighted the dearth of appropriate English language creativity measuring tools. During the first stage of the project, an Italian creativity scale was translated and adapted for a UK population providing a useful opportunity for future research projects due to two key features: having a fast completion time and minimal disruption to participants in terms of testing allowing any intervention to be more accurately measured. During the second stage of the project, two lesson-planning based strategies were developed from different theoretical backgrounds, which were

evaluated for effectiveness using this new tool as well as attainment measures enabling the refinement of ideas into a new planning framework in the third stage, which further evaluation revealed provided a synthesis of the desirable outcomes from both previous strategies.

This project has developed an objective and theoretically sound creativity measure that could be used in classroom environments. Furthermore, it developed a pedagogical approach that could enhance creativity in pupils while having a minimal effect on teacher workload, and then evaluate teacher planning approaches to examine comparative effectiveness. In addition to the practical outputs of the validated WCR-E test of creativity, as well as the three additional pedagogical approaches to lesson planning and teacher training that this research has contributed, this thesis also provides several theoretical contributions to understanding of the links between creativity and play as well as key indicators to support learning.

7.3 Reflections on Methods and Limitations

The second and third studies of this PhD broadly followed an experimental methodology with pre and post measures used to evaluate the effectiveness of intervention strategies. While this is a sound theoretical model to follow in terms of evaluation, the population and research setting of a school present several challenges in this approach. Participating pupils cannot be defined randomly as the school infrastructure and timetabling are part of the remit and functioning of the educational setting. An additional limitation in terms of generalisability is the use of ages 11-14 in this study. An age group selected by the teachers due to the reduced exam pressures

on this cohort at secondary school in terms of external examinations. As such, further research is needed into the applicability for this model for older adolescents.

7.3.1 Practical concerns of real-world educational research.

The challenges of conducting real world research in this type of setting cannot be underestimated. The first challenge is recruitment within the context of a secondary school for an independent study of this nature. The pressures on schools are considerable and identifying a school willing to participate can be a major difficulty. Once the head teacher and senior management team have been 'sold' on the concept, teachers need to be recruited to implement the strategies. Informed pupil consent involves a further two layers of obtaining consent from the pupil themselves and from their parent. The latter can be problematic in a secondary school, where parental involvement is often at a minimum.

In addition to challenges of recruitment as described, there are additional factors that occur in the school setting that make data collection challenging. One problem is computer access for taking the assessment. Typically set up as individual information technology labs with computers, secondary school timetables use this resource to its fullest. From a practical point of view, providing laptops for pupils to take the creativity assessment may have been more helpful for the school. In addition to this, events such as school trips and as happened in this PhD, a serious outbreak of Norovirus closing the school, disrupt learning time in a way that teachers get used to and absorb as part of the learning environment, but from an experimental perspective, cause problems of data collection or limiting intervention time.

On a more individual level, pupil absence due to illness or medical appointments for example, that occur during that particular lesson mean a missed data set that cannot be collected at a later time without removing that pupil from another lesson and causing further disruption and thus making the data set more prone to attrition. The significant challenges posed by the need and method of consent collection from parents, in terms of sending letters home with pupils to give to parents a chain of two, repeated on the return to school is not efficient. This is the method employed due to the confidentiality needs of the researcher not having access to the contact details of the parents. The level of success in overcoming all these obstacles is due in no small measure to the level of commitment of the head teacher kindly donating administration time to posting out the consent forms through the school mail merge system. This was only possible due to the high level of engagement that the head teacher had with the project. Even with this consideration, 27 pupils were excluded from the research prior to data collection due to lack of parental consent.

Although the practical challenges inherent with conducting research in this real-world setting are significant, the benefits of the data gathered in this way over truly experimental and lab-based conditions are multiple. While lab-based research, potentially more reliable in terms of controlling for extraneous measures, could identify processes and methods to enhance creativity in adolescents, this type of research, although only quasi-experimental, is also dealing with the practical implementation of a systematic approach that seeks to have the greatest impact for young people. For this to be achievable, it must be conducted with support and knowledge transfer from practicing teachers in the settings for which it is designed. This type of research can lead to practical and systematic teacher led approaches that support educators in

enhancing their teaching and the development of creativity in their own classroom. The contribution of practicing teachers also lends credence to the research as their experience may encourage implementation for their colleagues in the profession with more ease than an untested theoretical framework.

7.3.2 Validating the creativity measurement tool (WCR-E)

The validation of this creative thinking measurement tool presented some challenges, in the end necessitating the repeating of the study. While the tool was already validated as a measure of creativity through a large-scale correlative study in Italy and thus had a robust theoretical history as a measure of creativity, there remained some concern that the translated English version might not assess the same construct. The translation itself provided little concern, translating, checking and retranslating is a typically employed method (Behling & Law, 2000) made easier due to the typically concrete nature of the content, primarily referring to objects. Some accommodation was made for cultural differences as described in chapter 4, but the translation process was unproblematic. The platform used to run the test proved unsuitable by virtue of the way it presented the test items. Initially presented on the Bristol Online Surveys (BOS) platform (Now Online Surveys) (2014), the platform had several limitations in terms of presenting images and texts together that presented problems for a key question where participants are asked to select an image that could continue a scenario. The presentation of the question asked them to select the next image and then provide a reason for their answer without being able to review the images in sequence. An additional limitation was in another image selection question where they were required to select three images that could complete a larger situational image with reasons for their choices. The platform could only accept the image selections as one image file with the reasons for choices on a separate page, making providing

reasons challenging. These limitations were removed with the purchase of a licence for Qualtrics (Bosch, 2018), an alternative platform that did not have these restrictions.

7.3.3 Validation study limitations

The limitations of the platforms were not the only challenge faced in the validation process; the initial recruitment provided results that were not sufficient to suggest that the translated creativity measurement tool was achieving its aims. There are several reasons for this; firstly, the order presentation in the validation always had the Test of Alternative Uses (TAU) at the end of the WCR-E test (reported and discussed in 3.4), secondly, the lack of instructional clarity (3.4) combined with a limitation of the test platform meant that often data sets were incomplete due to the platform being unable to stipulate that three answers needed to be selected before the question was complete, and finally, TAU being only single item (designed that way for brevity) may not give reliable data. To manage these issues the instructional language was changed (chapter 4) as well as the platform (as described above), and the TAU broadened which allowed the second data set to provide the needed evidence to enable use.

Upon reflection of this procedure, much research naivety is identifiable, and this study could provide stronger evidence if several changes were made to the testing protocol. There are two key changes that would enable more robust data; firstly, that the TAU items and the WCR-E items would be administered in random order for each individual participant which would eliminate the issues around test fatigue (4.4), and secondly, that the recruitment of more participants for a larger sample size. The size of the data set was governed by the timescale of the research and the challenges around the first

data collection. The evolution of this early career research would provide a more secure data set for analysis.

7.3.4 Intervention study limitations

While the intervention development and testing had the advantage of being designed by a slightly more practiced researcher, further limitations exist of the intervention studies that were the product of the research setting beyond the practical considerations already explored. The project funding limitation of three years combined with the challenges of school recruitment resulted in a significant limitation in respect of dataset size. Recruiting schools proved even more problematic than first identified and only a single school was secured. This results in some potential demographic based limitations to generalisability. While the protocol did encompass multiple subject areas, the inclusion of other schools with other demographics in terms of location, size, Ofsted grading etc, would have provided more variables to the data set and enabled further exploration of the transferability of the Personalised Playful Planning (PPP) system. Similarly, inclusion of more subject areas, for example inclusion of all Baccalaureate subjects would also have provided further information about how the system could be implemented. It would also enhance the catalogue of exemplar material that would provide a practical handbook to guide existing practitioners in adapting the PPP system to their own classroom. The production of this practical guide with exemplars may be a further direction of this research and increase the impact of the findings.

7.4 Theoretical contributions and implications

This research has provided further evidence to support several theoretical links that were identified in the literature. The links are threefold and are explored separately as each provides interesting discourse and potential for further research.

7.4.1 Links between play and creativity development

While the literature did present some understanding of the nature of creativity and its relationship with play, the links were either dated, such as the initial understanding of Piaget (1932), explored as a facet of child development (Hoffmann & Russ, 2012; Russ, 1998; Russ, 2003), or too broad in scope to provide specific guidance (Tsai, 2012). This research provides evidence that play as a learning medium can be used to enhance creativity in early adolescence, as it was by manipulating the planning in light of the theoretical indicators of play (choice, wonder and delight), that these gains in the WCR-E test were seen. This link is important, particularly for this age group, as it is often at this point that the concept of play begins to change. The reason for this is unclear, whether this is due to adult supposition or a natural response to transitioning to high school and wanting to fit in with older pupils or an entirely unrelated reason. This link between play and creativity starts to open further areas for investigation. Providing opportunities for play in this population, even outside of the classroom, perhaps in investing in outdoor play equipment not typically seen in secondary schools or encouraging playful pursuits in after school settings may also have a benefit in creativity development for example.

Conceptually, the link between creativity and play would appear to have merit, although as this research has progressed, it appears that for strong academic development and motivation the key factors potentially differ slightly from the three

indicators laid out by the original Pedagogy of Play (Mardell et al., 2016) for this older age group, and instead focus more heavily on engagement and the promotion of flow as well as the key focus of agency. The PoP methodology employed in this intervention, while theoretically based upon Mardell et al., was operationalised to support academic learning. The first study demonstrated that this worked well with no detrimental effect to attainment experienced by the playful intervention group. It may be that to further enhance academic development, elements of playful learning should be incorporated with other methods to make the most attractive prospect for pupils and teachers while adding value for head teachers and data driven teaching. A Personalised Playful Pedagogy was developed for this purpose and has proven successful, provides a starting point for future exploration.

7.4.2 The language of creativity

Drawing on the theoretical differences in the placement of flexibility of thinking in the original Italian model (widening) to the findings of the English validation (connecting), it is possible to suggest differences in these populations may impact the understanding of the construct of creativity. There is already evidence to suggest that bilingual individuals have a tendency to demonstrate more creative traits than monolinguals (Hommel, Colzato, Fischer, & Christoffels, 2011; Leikin & Tovli, 2014). Although sample size is a limitation of the present study, as discussed, there is sufficient evidence to suggest that further exploration is needed. The implications of links between the creativity construct and elements of culture or language adds further credence to the notion of creativity gains from increased diversity in working teams. Diversity in teams has already been linked to increased creativity (Leung et al., 2008; Nemeth & Nemeth-Brown, 2003; Shin et al., 2012), and this understanding could add another dimension to the understanding of the creative make up of teams. Diversity of

experience may support the creativity of teams, but it may be possible that the linguistic background of team members, beyond bilingual advantages, may also contribute to a highly creative team.

7.4.3 The teacher as a creative role model

It has long been recognised that the role of the teacher extends far beyond that of instructor, with the professional relationship between pupil and teacher (Marsh, 2012), teacher personality (Hakim, 2015; Kim., Dar-Nimrod, & MacCann, 2018) and teacher role-modelling (Paredes, 2014) all playing their role in teacher effectiveness. During this research a predictor variable of the subject specialism as a contributor to creativity was explored, and the extraneous variable of the role of the teacher (as individual educator) in this process was included (chapter 6). It was demonstrated that the development of creativity is not restricted to the more traditionally accepted creative subject areas such as art, although some contribution in this area is being made. Thus, it may be that teacher pedagogical perspectives of creativity in terms of its value also plays a role in the development of this skill. If this is the case, then the implications for teacher education practices may have greater impact in developing 21st Century employability skills than previously suspected.

A political shift for UK teacher training provision to be primarily hosted within schools risks reducing the time spent on supporting teachers in the refinement of their own personal pedagogical standpoint (Carter, 2015; Hobson, 2002; Hobson, 2003). In fact, in the 2014 report on initial teacher training (ITT) provision, 56% of headteachers reported that recruiting newly qualified teachers (NQTs) was challenging with key skills missing in behaviour management (74%), pedagogical understanding and child

development (56%) (Carter, 2015). While no distinction here is made between candidates from higher education institution (HEI) led training programmes and those led by schools, the report makes key recommendations that HEI institutions should remain a key part of the teacher training partnership to deliver, amongst other things, training on research-based teaching as well as key training on pedagogical understanding. The end of the 20th and start of the 21st Century has been an increasingly turbulent time for ITT with changing policy and needs as well as indication that school-based training at this stage is more cost effective (Allen, Belfield, Greaves, Sharp, & Walker, 2014). The suggestion that the pedagogical standpoint of the teacher as illustrated by their planning and delivery supports skill development in pupils' places greater importance than ever on the pedagogical development of teachers, how this may be achieved is also an area for future consideration.

7.5 Practical contributions and implications

In addition to developing theoretical understandings of creativity and play, this research has made some practical contributions to the fields of education and creativity research. These practical contributions are discussed, and the implications highlighted for consideration in education and future research.

7.5.1 Creativity Measures

While the heart of this research has been to explore creativity development and enhancement amongst compulsory school age pupils in the United Kingdom, one of the contributions to knowledge is a unique measurement system for use in English facilitating: a) large scale data capture; b) population normed results allowing for comparison; c) a high level of between tester correlation; and d) minimal disruption in terms of administration time for the participants, making it ideal for use in schools and

other high density population studies. Its use in the two studies contained in this thesis (chapters 5 and 6) suggest that the tool has merit for data capture in this type of setting and population although atomization of the coding and data presentation would be of more benefit long term, representing as it does, a significant time drain for researchers.

7.5.2 Pedagogical Planning Approaches

The most significant and practical contribution of this research has been the development and evaluation three different novel planning methods (SF, PoP and PPP) with a common thread of agency or choice opportunity for the individual pupil. In interview, teachers have all agreed that agency was a key beneficial element for this age group. The psychological and neurological research also appear to support this theory as to the neurological, developmental and social needs of the adolescent (Casey et al., 2008; Marni, Molinari, & Passini, 2018; Reyna et al., 2012; Ryan & Lynch, 1989).

Learning is the acquisition of new knowledge and typically goes through several phases labelled variously as acquisition, consolidation and internalisation (Jarvis, Holford, & Griffin, 2003; Tenison, Fincham, & Anderson, 2016). In order to access the higher levels of internalisation and cognitive application whether to a new schema or to an understanding of how new information connects with existing knowledge, giving space for a pupil to rehearse or practice the new learning is the heart of the process of teaching, whether the rehearsal is physical or cognitive. The planning methods developed in this research all provided a safe space for pupils to rehearse decision-making in a safe environment where there was a tangible outcome for the decision, certainly in terms of the task that the pupil would undertake, and potentially for their

academic outcome. In the first study, choice was presented as either a flow diagram allowing pupils to make step by step decisions that lead to a more or less challenging task and ability to demonstrate outcome, or as a series of connected but separate tasks that enabled pupils to have more freedom in their choices without a step by step measure of their achievement (chapter 5).

In the second, larger scale intervention study (chapter 6) an additional planning condition was added to allow pupils to have a greater range of choices and thereby further develop their creativity while still providing an indication of challenge of each task thus providing guidance for academic accountability. These methods had a measurable effect on pupil creativity gain with some of the effect possibly attributable to the increased focus that each teacher was using in planning for the lesson. The hybrid Playful Pupil Pedagogy produced a more modest improvement in academic attainment, although still above the expected gain, while also demonstrating a significant gain in creativity although the teacher reported a lack of pupils aiming for the highest challenge, an area that will need further investigation.

The key contribution made by this PhD is the addition to pedagogical planning presented by the three planning approaches, in particular the positive outcomes associated with the PPP approach. Teacher planning is an area with many different methods advocated, researched and anecdotal as well as those adopted as best practice (EEF, 2019; Powell, 2016; Tomlinson, 2017). The purposes of planning are many and primarily provide a road map of sorts to teachers in order to track learning, ensure understanding, demonstrate differentiation and manage pace and challenge. Typically, these documents are not shared with pupils and indeed in the PoP

methodology this is also the case. The two planning proformas that allow pupils to make informed decisions about the challenge of their learning (SF and PPP) both require the teacher to share that planning with the pupils. This has several effects, firstly the documents are not being filled out to be stored or shared only with managers and inspectors. On a psychological level this means that time and energy must be spent planning every lesson as each of the plans are transparent to the pupils, preventing the complacency of recycling previous schemes of work without amendment or 'winging it'. This increases teacher engagement with the lessons and with that group of pupils. It also has the effect of increasing teacher workload slightly – something reported in all the teacher interviews. The development of a teacher driven handbook with lesson examples and identified templates would go some way to offsetting this and would provide a useful forum for teacher stakeholder input and be an impactful direction for future work in this area.

Teachers have some time for planning and assessment built into their timetable, an attempt to address problem of work life balance implemented by government (Galton, 2008), but data driven teaching compels much of this time to be spend in assessment and grading in order to evidence progress. Planning is often done infrequently, as typified by the SF teacher interview in the second study (chapter 6 appendix 6). Historic lesson plans are frequently reused as the topic is covered year after year, indeed, as noted by the PoP teacher in the second study (chapter 5, appendix 7), when re-planning his unit of work with a playful approach, he reported feeling like was back in his NQT year with all the teaching and planning experiences new and exciting. Many of the units of work are planned as a new teacher and gradually it is possible, in experienced and older teachers such as the SF teacher in the second study, for

planning to become less important as a tool. In these cases, either training, or a pupil facing planning process that encourages constant revision may be of benefit. Revision of these planning approaches and incorporating the novel methodologies advocated by this PhD, also supports teachers in recognising and valuing creative thinking in the classroom.

This research has developed three separate planning approaches, built on sound theoretical frameworks and existing accepted teaching practice. The planning protocols meet the needs of any internal monitoring procedure as well as the secondary school inspection framework in England, with a pupil facing document advocated to encourage teachers to prioritise time for planning lessons. The approach to teacher training in building upon existing knowledge to support professional development as well as provide a touchstone of familiarity, supported teacher buy in for this project and demonstrated researcher respect for teacher time cost and workload. As demonstrated in teacher interviews, this approach has been successful and teacher responses to training and materials were positive.

The main practical contribution to knowledge of this PhD is the development of the PPP proforma to the teaching profession. This proforma provides a systematic approach to planning that has several potential benefits for teachers and pupils alike. Firstly, it encourages frequent revision as it is not always necessary to re-plan the entirety of the lesson, rather switching individual tasks can refresh the teacher's thinking and thereby engagement with the lesson. It is also pupil facing and thus something that is required for every lesson encouraging constant updating and not simply something that can be ignored from a paperwork perspective. Secondly, it

provides opportunity for decision-making rehearsal for pupils while increasing their sense of responsibility for their own learning. Finally, it not only theoretically sound, but there is evidence that it has the potential to enhance learning outcomes for pupils in addition to the creative benefits, encouraging teachers in implementation as it allays concerns that teaching outcomes may be negatively affected by using a novel planning approach.

7.6 Future Directions

This research has made theoretical and practical contributions to the academic community. This section will summarise the potential future directions these contributions could take in terms of additional exploration.

There are three key contributions made to theoretical future directions made by this thesis. Firstly, research into the role of play for adolescents should continue, perhaps by including an exploration of free time play as a method of creativity enhancement in this age group. Secondly, the concept of creative linguistics suggests that future research into the creative constructs in different linguistic and cultural populations would be valuable, particularly with respect to comparative studies between populations. And thirdly, this PhD opens the way for further exploration of the lesson-planning models as a way of influencing the development of other non-academic skills through teacher planning and delivery methodology. If it can be demonstrated with creativity, then possibilities arise for other non-curricular employability skills, such as organisation or metacognitive skills.

The practical contributions also lend themselves to future research. The use of the WCR-E test of creativity suggests further correlational data collection in other populations and also other languages in furtherance of the understanding of the linguistic relationship of the Test of Alternative Uses (TAU) and the creativity construct. In addition, the WCR-E test should be developed further in terms of technology to provide an autonomous scoring system to enable easy use in research. The further development of this tool has significant application as the translating procedure from a cultural point of view can be followed to develop this for other languages. In addition, it is a tool that provides quick completion times for participants, minimises the impact that testing has in any intervention allowing for further large-scale research into creativity to be conducted in time sensitive settings such as those of education.

The contributions made in terms of pedagogical approaches have implications far beyond the English secondary school system. This approach has potential applications in both primary and higher educational settings as creativity becomes more valuable to society and its development gains traction in political agendas. The evaluation of these in various settings and with various applications has global potential, and the basis upon which both the teacher training and pedagogical approaches sit in terms of building upon existing established knowledge and demonstrating respect for teacher time and workload are applicable in any educational setting.

The findings reported in this thesis regarding the PPP model suggests two directions for future work. The first in relation to other educational settings in terms of application of PPP methods in a variety of schools with alternate demographics, which may then lead to the second; the creation of a practical handbook for practitioners in particular

working with practicing teachers to develop a range of materials to facilitate ease of delivery and further reduction to workloads. It is also likely that the proforma will need to be supplemented with alternative layouts and options to fit with subject areas and topics to prevent oversaturation for pupils. As previously mentioned, the whole school approach is also an area for investigation to examine the effect consistency has on developing this skill. As well a whole school approach, a longer-term study is also suggested to examine the durability of any impact to creativity development, of special interest if typical teaching was resumed.

7.7 Conclusion

During the course of this research, just prior to completion of the thesis, the Covid-19 crisis caused the UK to enter a lockdown state and schools to close. As the dust settles and further research is conducted into the long-term implications for pupils' academic and mental health, the country seems likely to enter a significant period of recession. This makes jobs scarcer, candidates more numerous and typically overqualified for those jobs that are available and thus, employability skills and in particular, adaptability, are even more pertinent than in typical times as these skills may be what separates successful candidates from unsuccessful ones.

Adaptability is driven by creativity and by the ability to see solutions in unconventional places making this skill something demonstrated by teachers, policy makers, parents working from home and a myriad of others striving to meet the challenges presented by an unprecedented global situation. It also has the potential to be a key skill for development in the workforce of tomorrow as they will grapple with future problems

such as climate change, an aging population, international tensions and global stressors that are not yet on the radar of the population.

This PhD has developed a systematic approach to develop creativity in future generations that has implications for supporting employability, and thereby economic growth. It has provided a mechanism for teacher empowerment enabling teachers to support pupils in decision making, providing valuable support to the development of independence in this adolescent population as they transition into adulthood. It has demonstrated that it is possible to influence creativity development in adolescents through teacher planning, and that the positive effect is measurable through the newly developed WCR-E creativity test. It shows that creativity can be enhanced using methods that promote an increase in attainment with only small increases in teacher workload, making the project sustainable. It has demonstrated that using a technology enabled WCR-E measure of creativity, large data sets can be gathered quickly and effectively without undue disruption to learning and timetable implications for pupils, something that also has implications for data capture in business settings, as well as any setting where time is a factor in designing a study.

The research contained in this thesis makes original contributions to knowledge from both a theoretical and practical perspective. It raises the possibility of using lesson planning as a vehicle to engender skill development and change in classrooms, by prompting focus on planning from a playful standpoint. It provides a new tool for assessment of creative potential in the UK and highlights the role of play, and of agency, in the development of creativity in an adolescent population. It supports the development of creativity in this population as a key 21st Century employability skill

and provides an empowering, personalised framework, whereby a systematic approach to planning, can encourage teachers and pupils together, to succeed.

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Appendices

Appendix 1: Cultural and linguistic development of the WCR-E

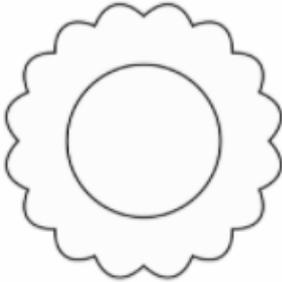
Italian - direct	English - used
<p>Q1. Image Ice cream</p> <ul style="list-style-type: none"> • A triangle and a half circle • An ice cream • A pointy bucket/ bag with a handle • A birds beak 	<p>Image- Ice cream</p> <ul style="list-style-type: none"> • A triangle and a semi-circle • An ice cream • A pointy bag with a handle • A bird with a beak
<p>Q2. Image grid 4 x 4</p> <ul style="list-style-type: none"> • 16 • 17 • 25 • More than 25 	<p>Q2. Image grid 4 x 4</p> <ul style="list-style-type: none"> • 16 • 17 • 25 <p>More than 25</p>
<p>Q3. Choose for yourself how a pencil can be used.</p> <ul style="list-style-type: none"> • As a bookmark • To write • To scratch your back • To tie long hair 	<p>Q3.A pencil can be used for...</p> <ul style="list-style-type: none"> • Drawing a picture • Writing with • As a back scratcher • To pin back long hair
<p>Q4. Think of the colour blue. Which of these things enter the window of your mind?</p> <ul style="list-style-type: none"> • Sea • Sky • Bottle of water • Smurfs • EU flag • Police Cars • Pilots uniform • Merlin the Wizard • Gentian flower 	<p>Q4. Think of the colour blue. Which of these things defines yellow for you?</p> <ul style="list-style-type: none"> • The ocean • The sky • Bottled water • Smurfs • The EU flag • Planet earth • Swimming pools • Moon • Sadness
<p>Q5. Think of a bike. Which object enters the window of your mind.</p> <ul style="list-style-type: none"> • Pedal • Trip • Radius (circle? Spoke? gear?) • Sun • Post (seat post? chain?) • Race (meeting, club?) • Friends • Wheel • Music 	<p>Think of a bike. Which of the words below does a bike remind you of?</p> <ul style="list-style-type: none"> • Pedals • Transport • Gear • Energy • Chain • Race • Friends • Wheel • Children
Q6. Direct image translation	Q6 Direct image translation

<p>Q7. What would happen if the rain was red?</p> <ul style="list-style-type: none"> • I would stain my clothes • The blood would make less impression • Umbrellas would all be coloured red • I would exchange rain on the grass for wild strawberries • The puddles would be red • The bulls would be angry whenever it rained 	<p>Q7. What would happen if the rain was red?</p> <ul style="list-style-type: none"> • I would ruin my clothes • Blood would make less of an impact when it was seen • All umbrellas would be red • Rain on the grass would look like wild strawberries • All the puddles would be red • All the drinking water would be red
<p>Q8. What would happen if the sun was black and emitted black light?</p> <ul style="list-style-type: none"> • We would all have eyes like a cat's to see in the dark • I would be afraid because it would be always dark • We never get tanned • I would not see anything anymore • The sea would look like oil • There would be no difference in the day and the night 	<p>Q8. What would happen if the sun was black and emitted black light?</p> <ul style="list-style-type: none"> • We would all have eyes like a cat's to see in the dark • Lots of people would be afraid all the time because it would always be dark • No one would ever have a tan • No one would be able to see very much • The sea would look like oil • There would be no difference between day and night
<p>Q9 Image direct copy</p>	<p>Q9. Image Direct copy</p>

Appendix 2: Six Versions of the WCR-E test

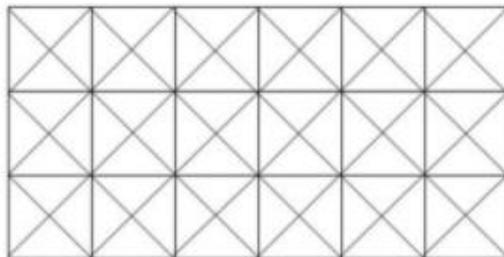
WCR-E 1

Q1. What do you think this image represents? (Please choose one).



- A flower
- A mirror with a frame around it
- A circle with a frill shape around it
- a gear

Q2. How many triangles can you see in this image? (Please



choose one).

- 72
- 108
- 144
- More than 144

Q3. In your opinion, a desk can be used for...

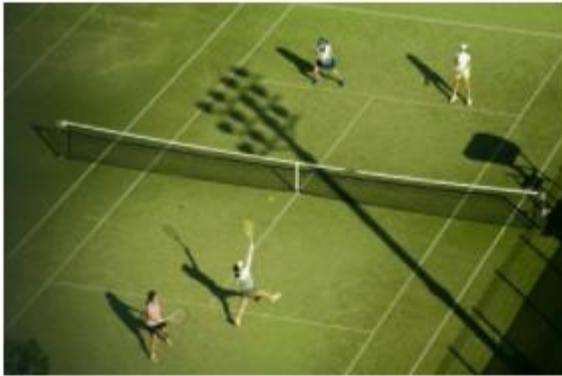
- writing on
- climbing on to reach an object placed on a tall shelf
- a book shop. filling it with displays of books
- as a shelter in case of earthquake, crouching underneath it

Q4. Think of a rucksack. Which THREE of the following things does a rucksack remind you of?

- | | |
|---------------------------------------|----------------------------------|
| <input type="checkbox"/> school | <input type="checkbox"/> hiking |
| <input type="checkbox"/> books | <input type="checkbox"/> camping |
| <input type="checkbox"/> compartments | <input type="checkbox"/> summer |
| <input type="checkbox"/> colours | <input type="checkbox"/> friends |
| <input type="checkbox"/> homework | |

Q5. Think about red. Which THREE of the words below defines 'red' for you?

- | | |
|---|---------------------------------------|
| <input type="checkbox"/> robin | <input type="checkbox"/> fire |
| <input type="checkbox"/> fire engine | <input type="checkbox"/> Santa Clause |
| <input type="checkbox"/> sunset | <input type="checkbox"/> a poppy |
| <input type="checkbox"/> Little Red Riding Hood | <input type="checkbox"/> blood |
| <input type="checkbox"/> The Red Cross | |



Q6.

Which of the following options should be added to the picture?
Please choose three and give reasons for your choices.

<input type="checkbox"/> 	<input type="checkbox"/> 	<input type="checkbox"/> 	<input type="checkbox"/> 
<input type="checkbox"/> 	<input type="checkbox"/> 	<input type="checkbox"/> 	<input type="checkbox"/> 
<input type="checkbox"/> 	<input type="checkbox"/> 		

Q7. What would happen if we could only see in black and white?

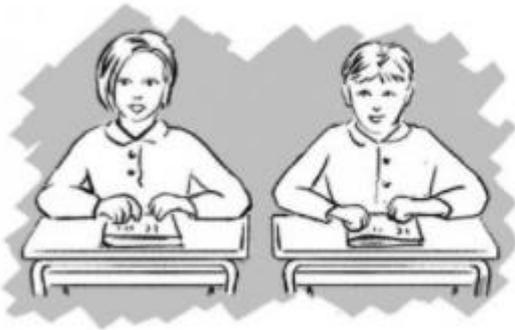
- We would not be able to see other colours.
- You would not be able to tell football teams apart.
- Everything would be much sadder
- We would not have to worry about our clothes matching.
- Painters would only have two colours on their palettes.
- Life would seem like an old movie.

Q8. What if all our money was made of chocolate?

- It would melt in the sun.
- It would be too tempting to eat it.
- It would feel like Christmas all year.
- It would be worthless.
- It could melt easily to make chocolate bars.
- Doing business would be a lot sweeter.

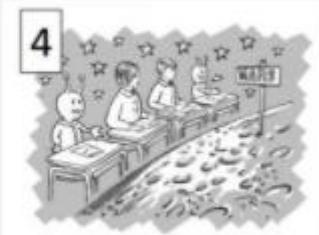
Q9.

Look at this image.



Which of the following images could come next in the story.
Please give a reason for your choice.

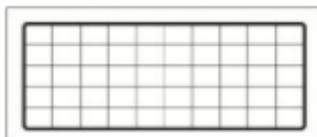
Which of the following images could come next in the story.
Please give a reason for your choice.

<p><input type="radio"/> 1</p> 	<p><input type="radio"/> 3</p> 
<p><input type="radio"/> 2</p> 	<p><input type="radio"/> 4</p> 

Q10. Please write a brief story linking the two images you have chosen.

WCR-E 2

Q1. What do you think this image represents? (Please choose one).



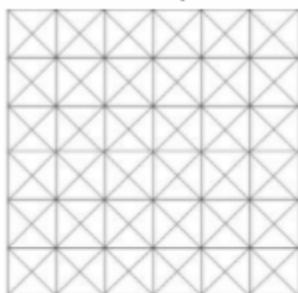
A rectangle with lots of small squares inside

A chocolate bar

A BBQ grill

a calender

Q2. How many triangles can you see in this image? (Please choose one).



144

216

288

More than 288

Q3. In your opinion, a piece of paper can be used for ...

writing on

building a fan

putting under a wobbly table leg

making a paper airplane

Q4. Think of a mobile phone. Which THREE of the options listed below does a mobile phone remind you of?

keeping in touch

text messages

books

being connected

touch screen

chargers

energy

social media

entertainment

Q5. Think about black. Which THREE of the words below defines 'black' for you?

coal

elegance

night

blackberry

panther

dirty

funerals

shoe polish

pitch



Q6.

Which of the following options should be added to the picture?
Please choose three and give reasons for your choices.

<input type="checkbox"/> 	<input type="checkbox"/> 		
<input type="checkbox"/> 	<input type="checkbox"/> 	<input type="checkbox"/> 	<input type="checkbox"/> 
<input type="checkbox"/> 	<input type="checkbox"/> 	<input type="checkbox"/> 	<input type="checkbox"/> 

Q7. What would happen if we were all awake at night and slept during the day?

Electricity bills would be more expensive.

People would use camera flashes more.

No one would get enough vitamin D.

Everyone would be on night shift.

No one would buy sunglasses.

We would all be living like vampires.

Q8. What if everyone was able to walk on water?

It would be possible to take walking holidays to America.

Bridges would not be needed.

You might be at more risk of being eaten by a shark.

More people would question Christianity.

Fishing would be easier.

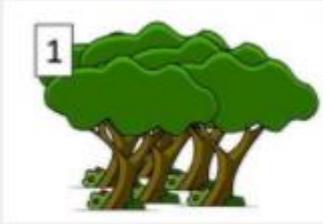
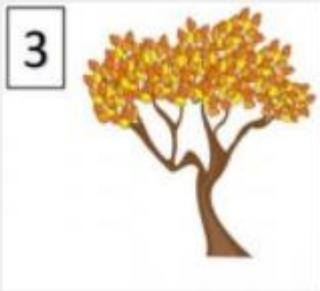
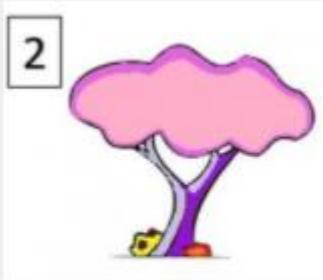
It would be harder to wash clothes.

Q9.

Look at this image.



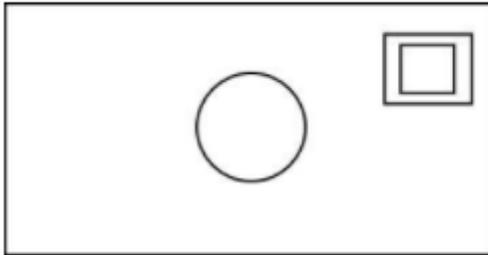
Which of the following images could come next in the story.
Please give a reason for your choice.

<p><input type="radio"/> </p>	<p><input type="radio"/> </p>
<p><input type="radio"/> </p>	<p><input type="radio"/> </p>

Q10. Please write a brief story linking the two images you have chosen.

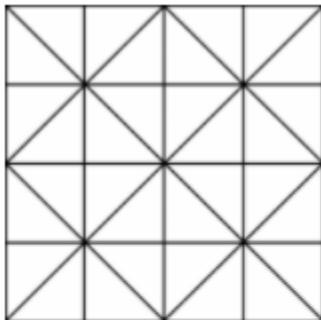
WCR-E 3

Q1. What do you think this image represents? (Please choose one).



- a camera
- a circle and some rectangles inside a bigger rectangle
- an envelope with a stamp and postmark
- a drawer front with a sticker in the corner

Q2. How many triangles can you see in this image? (Please choose one).



- 32
- 40
- 48
- more than 48

Q3. In your opinion, a book can be used for...

reading

writing in

an umbrella

a building block

Q4. Think of a bicycle. Which THREE of the following things does a bicycle remind you of?

pedals

chain

gears

transport

energy

friends

race

children

wheel

Q5. Think about yellow. Which THREE of the words below defines 'yellow' for you?

sun

hope

daffodil

lemon

banana

ribbon

chick

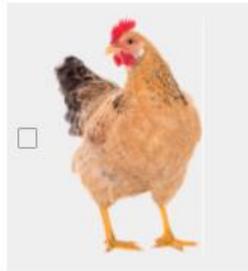
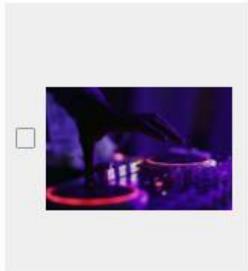
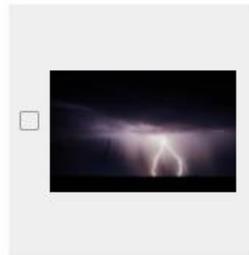
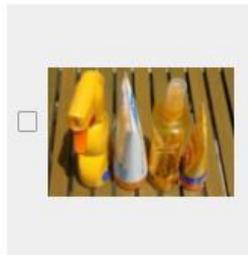
a bee

sunflower



Q6.

Which of the following options should be added to the picture?
Please choose three and give reasons for your choices.



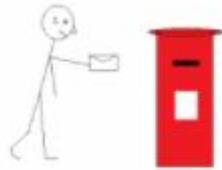
Q7. What would happen if the dinosaurs had not died out?

- A type of super intelligent technological dinosaurs would be the dominant species.
- Humans would not have evolved.
- Restaurants would have to serve very rare steak.
- Mammals would live in an underground subculture.
- Dominant dinosaurs would keep other types as pets.
- All cars would have to be huge to fit a dino- driver.

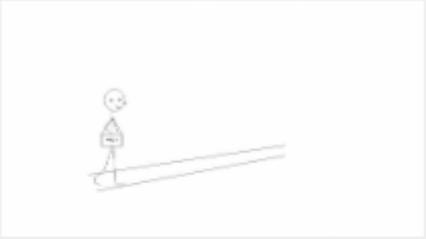
Q8. What would happen if it was always summer globally and seasons didn't exist?

- There would only be one collection of clothing released every year.
- There would be more cases of skins burns and allergies.
- Fireplaces and radiators would disappear in houses.
- We would be at risk of drought.
- Ski slopes would have only artificial snow.
- Polar animals would soon be extinct.

Q9. Look at this image.



Which of the following images could come next in the story.
Please give a reason for your choice.

<input type="radio"/> 	<input type="radio"/> 
<input type="radio"/> 	<input type="radio"/> 

Q10. Please write a brief story linking the two images you have chosen.

WCR-E 4

Q1. What do you think this image represents? (Please choose one).



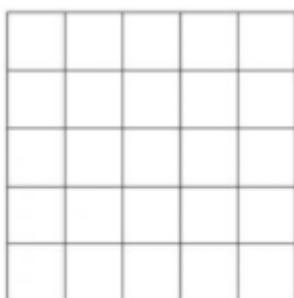
A rocket

A pencil

A rectangle with a triangle on top

A tower

Q2. How many squares can you see in this image? (Please choose one).



30

31

41

More than 41

Q3. In your opinion, a paperclip can be used for...

- holding papers together
- opening out and pressing a reset button on a phone or router
- connecting many together in a chain
- sculpture material

Q4. Think of a flower. Which THREE of the following things does a flower remind you of?

- | | |
|---|----------------------------------|
| <input type="checkbox"/> petals | <input type="checkbox"/> spring |
| <input type="checkbox"/> he loves me, he loves me not | <input type="checkbox"/> parties |
| <input type="checkbox"/> bees | <input type="checkbox"/> meadows |
| <input type="checkbox"/> watering can | <input type="checkbox"/> gardens |
| <input type="checkbox"/> good smells | |

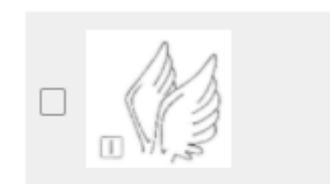
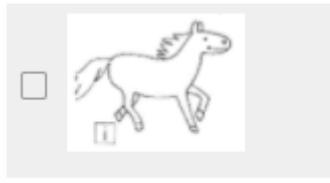
Q5. Think about green. Which THREE of the words below defines 'green' for you?

- | | |
|--|---|
| <input type="checkbox"/> grass | <input type="checkbox"/> aliens |
| <input type="checkbox"/> Christmas Trees | <input type="checkbox"/> sustainability |
| <input type="checkbox"/> hedges | <input type="checkbox"/> jealousy |
| <input type="checkbox"/> pears | <input type="checkbox"/> mold |
| <input type="checkbox"/> recycling | |



Q6.

Which of the following options should be added to the picture?
Please choose three and give reasons for your choices.



Q7. What would happen if everyone looked at the world through yellow tinted glasses?

- Everything would appear yellow.
- They would not be able to tell the difference between olive oil and vinegar.
- Grey days would seem like sunny days.
- They would think that people with white hair were blond.
- They would not be able to tell if fruit was ripe or unripe.
- They would often have a headache.

Q8. What would happen if the sun was black and emitted black light?

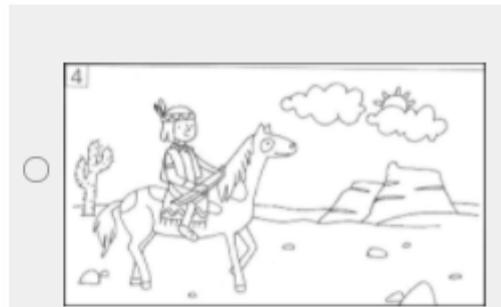
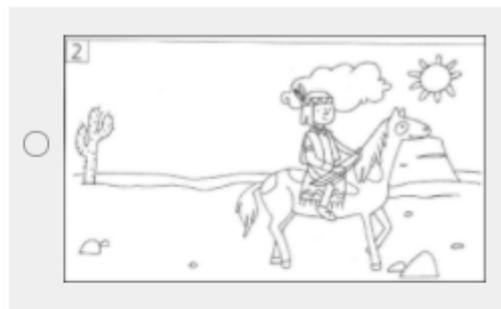
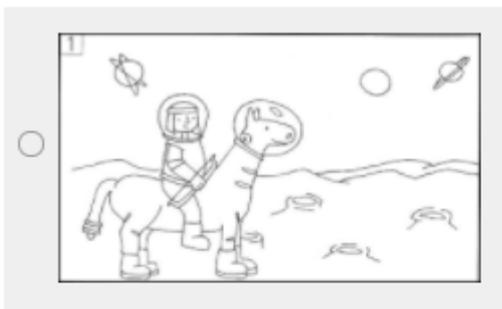
- We would all have eyes like a cat's to see in the dark.
- Lots of people would be afraid all the time because it would always be dark.
- No one would ever have a tan.
- No one would be able to see very much.
- The sea would look like oil.
- There would be no difference between day and night.

Q9.

Look at this image.



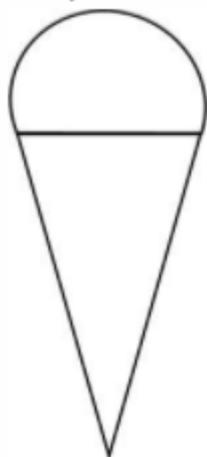
Which of the following images could come next in the story.
Please give a reason for your choice.



Q10. Please write a brief story linking the two images you have chosen.

WCR-E 5

Q1. What do you think this image represents? (Please choose one).



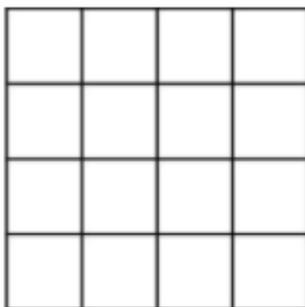
An ice cream

A triangle and a part of a circle

A bird with a beak

A pointy bag with a handle

Q2. How many squares can you see in this image? (Please choose one).



16

20

22

More than 22

Q3. In your opinion, a pencil can be used for...

drawing a picture

to scratch your back

writing with

using to pin back long hair

Q4. Think of a chair. Which THREE of the following things does a chair remind you of?

school

lion taming

relaxing

wheels

soft

lifting onto a desk

office

uncomfortable

reaching up

Q5. Think about blue. Which THREE of the words below defines 'blue' for you?

ocean

Smurfs

earth

The EU flag

sky

sadness

bottled water

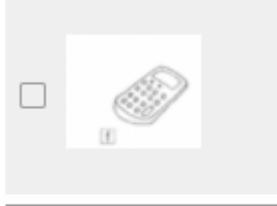
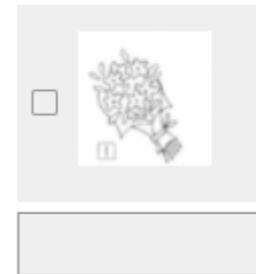
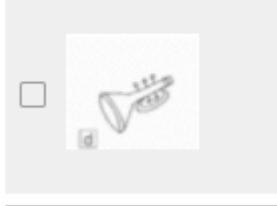
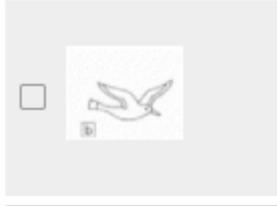
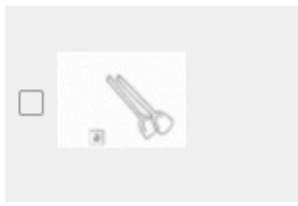
the moon

swimming pools



Q6.

Which of the following options should be added to the picture?
Please choose THREE and give reasons for your choices.



Q7. What would happen if the rain was red?

- I would ruin my clothes.
- Blood would make less of an impression when seen.
- All umbrellas would be red.
- All the puddles would be red.
- Rain on the grass would look like wild strawberries.
- Drinking water would be red.

Q8. What would happen if everyone could read minds?

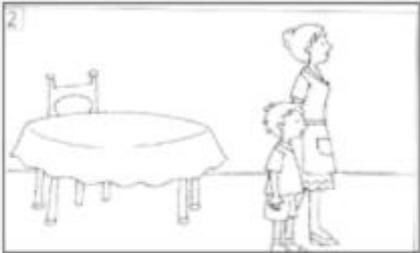
- A thought could get you into trouble.
- No one would talk anymore.
- The inside of your head would be a very noisy place.
- There would be no secrets.
- There would be no need for the internet.
- People would understand each other more.

Q9.

Look at this image.



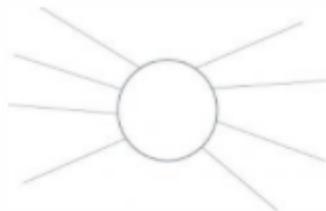
Which of the following images could come next in the story.
Please give a reason for your choice.

<input type="radio"/> 	<input type="radio"/> 
<input type="radio"/> 	<input type="radio"/> 

Q10. Please write a brief story linking the two images you have chosen.

WCR-E 6

Q1. What do you think this image represents? (Please choose one).



A circle with eight lines

A shining sun

A spider

A bow

Q2. How many squares can you see in this image? (Please choose one).



64

76

105

More than 105

Q3. In your opinion, a rubber can be used for...

erasing pencil lines

a building block

writing on

a missile

Q4. Think of a train. Which THREE of the following things does a train remind you of?

tracks

transport

carriages

holidays

stations

journeys

The Railway Children

Paddington Bear

clickity clack

Q5. Think about grey. Which THREE of the words below defines 'grey' for you?

pencil

mixture of black and white

clouds

shading

boring

gloomy

elephant

old

rain



Q6.

Which of the following options should be added to the picture?
Please choose three and give reasons for your choices.

<input type="checkbox"/> 	<input type="checkbox"/> 	<input type="checkbox"/> 	<input type="checkbox"/> 
<input type="checkbox"/> 	<input type="checkbox"/> 	<input type="checkbox"/> 	<input type="checkbox"/> 
<input type="checkbox"/> 	<input type="checkbox"/> 		

Q7. What would happen if there was no such thing as time?

No one would be able to make arrangements to meet.

No one would have to learn history.

Everything would seem to happen at once.

No one would grow old or be born.

Everything would be still forever.

Everything would move so fast no one would notice it.

Q8. What would happen if writing had never been invented?

Story tellers would be our historians.

News would travel slowly.

Computers would never have been invented.

Lots of knowledge would be lost when anyone died.

No one could communicate over long distances.

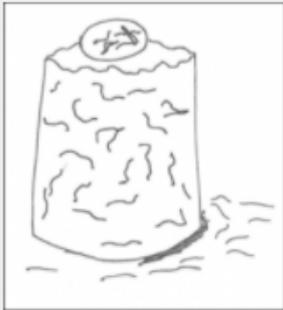
No one could ever owe money.

Q9.

Look at this image.



Which of the following images could come next in the story.
Please give a reason for your choice.

<input type="radio"/> 	<input type="radio"/> 
<input type="radio"/> 	<input type="radio"/> 

Q10. Please write a brief story linking the two images you have chosen.

Appendix 3: Training materials, PoP, SF and PPP methods

PoP Teacher Training Presentation

Pedagogy of Play



Why do we have to learn this?

Specification

Why did you want to learn this?

I didn't but...

PoP Instigating Principles

Play with an educational purpose

Learners leading their own learning

Experiencing choice, wonder, and delight

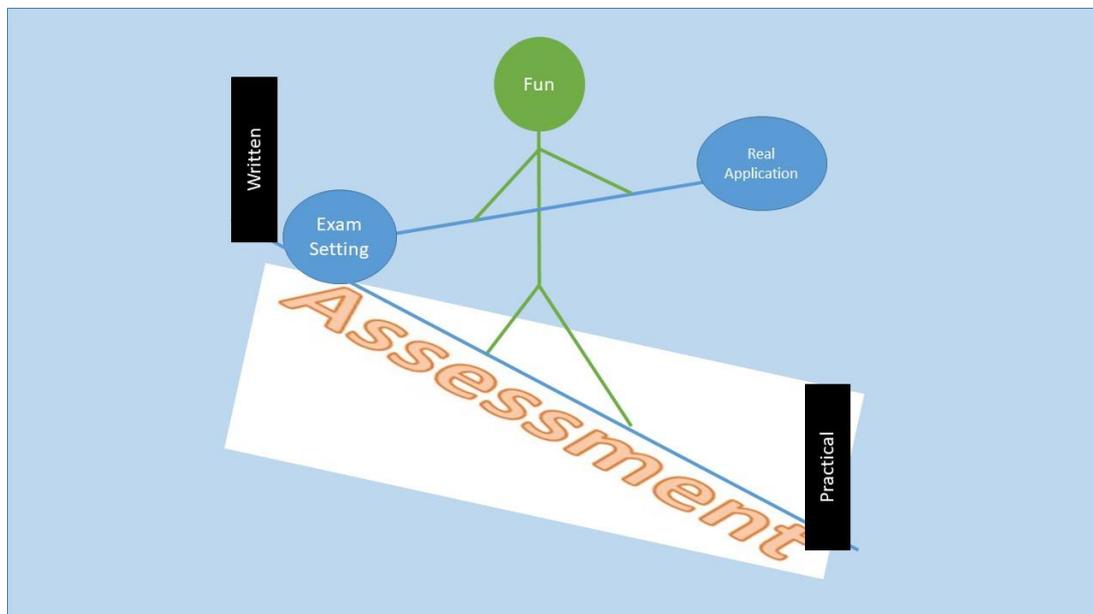
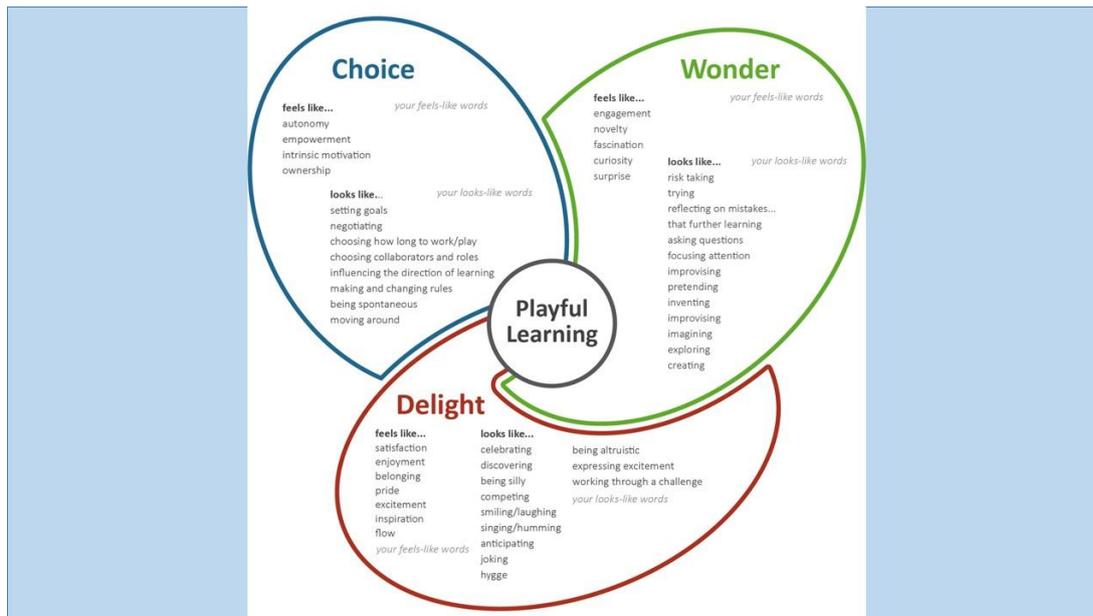
Connecting life inside and outside the classroom

Learners reflecting on playful experiences

Cultivating a culture of playful learning for adults

Fostering trust and welcoming negotiation

Collectively studying the paradoxes between play and school

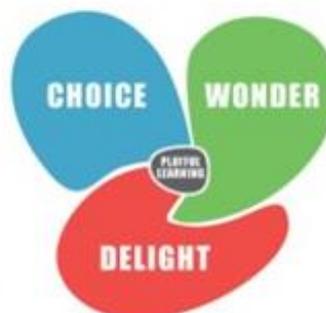


Playful Learning Planner

Identify an experience in which you would like to incorporate playful learning (you might think of a particular class, a theme, a unit of learning, a staff meeting, or something else):

How might you structure the experience to encourage...

Choice: *a feeling of empowerment, autonomy, ownership, and intrinsic motivation.* Can be promoted by helping learners: participate in setting goals, challenges, and purposes; making and changing rules; negotiating; having and sharing ideas; being spontaneous; choosing how long to work/play; choosing collaborators and roles; and moving around.

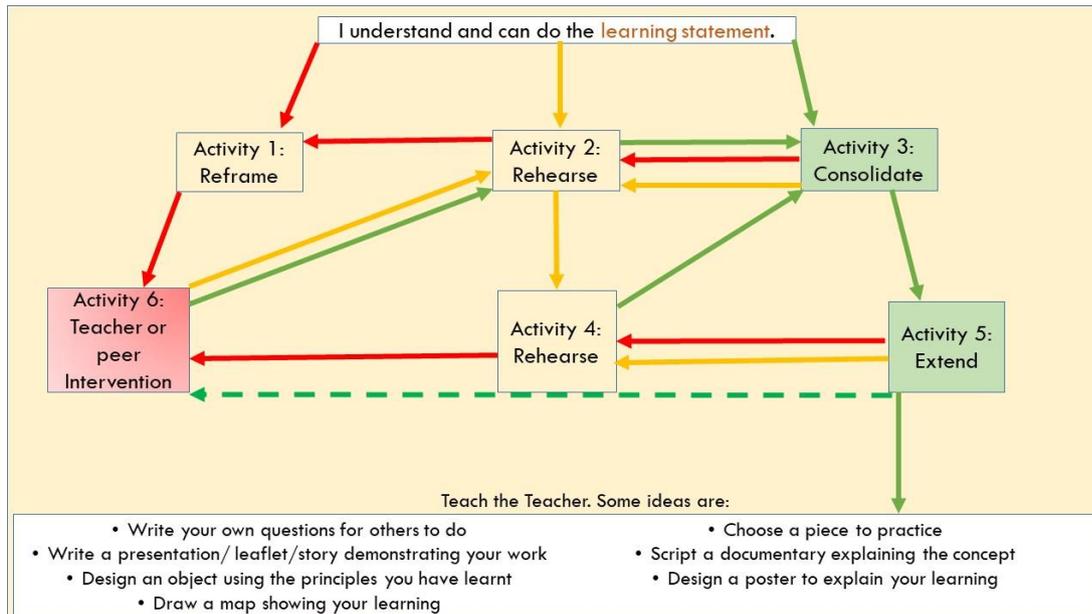


Wonder: *a feeling of curiosity, surprise, engagement, fascination, novelty, and challenge.* Can be promoted by supporting learners in improvising, exploring, learning from mistakes, creating, inventing, pretending, imagining, and taking risks.

Delight: *a feeling of enjoyment, excitement, satisfaction, inspiration, pride, and belonging.* Can be promoted by creating a sense of anticipation, providing time to explore, teachers showing excitement, highlighting learners' discoveries, and providing aesthetically engaging materials, stories, and ideas.

Created by the Pedagogy of Play project, International School of Billund and Project Zero @ Harvard Graduate School of Education.
For more information see: www.isbillund.com or <http://www.pz.harvard.edu/projects/pedagogy-of-play>

SF Teacher Training



Personalised Playful Planning



Why do we have to learn this?

Specification

Why did you want to learn this?

I didn't but...

PoP Instigating Principles

Play with an educational purpose

Learners leading their own learning

Experiencing choice, wonder, and delight

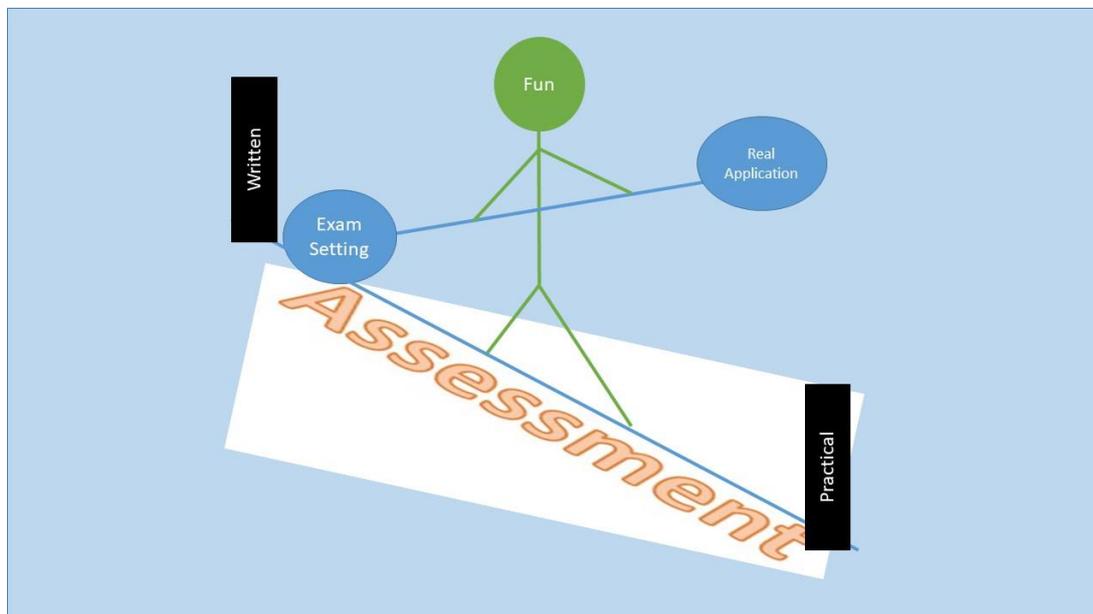
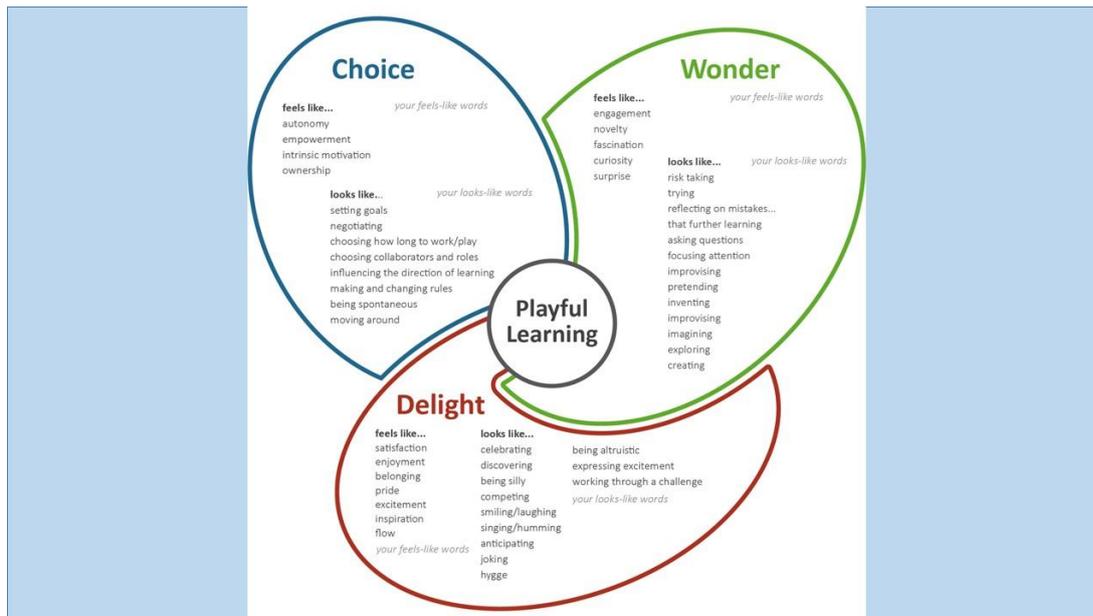
Connecting life inside and outside the classroom

Learners reflecting on playful experiences

Cultivating a culture of playful learning for adults

Fostering trust and welcoming negotiation

Collectively studying the paradoxes between play and school



Differentiation

MENU
Topic or learning objective for the lesson.

Non Negotiable
No choice about this one I'm afraid!

Warm
A good way in to the work if you need a little boost!

Zesty
A reasonable start if you are struggling today

Medium
You should be able to have a good go at this at some point.

Hot Challenge
Really show us what you can do. This one is up to you!

Non Negotiable
This is the outline of what you are expected to do/ demonstrate today, regardless of how.

Hot
An open ended task that can demonstrate the Non Negotiable, can be done from the start and is mostly up to the pupil.

Medium
These tasks should be what the majority of the pupils will follow. Slightly scaffolded and as independent or group as they can be.

Medium
These tasks should be what the majority of the pupils will follow. Slightly scaffolded and as independent or group as they can be.

Zesty
These tasks should be a bit more challenging but will be harder for those who struggle in the lesson.

Medium
These tasks should be what the majority of the pupils will follow. Slightly scaffolded and as independent or group as they can be.

Warm
A very structured task that enables the struggling student to made some headway. It could be a reframe task.

Zesty
These tasks should be a bit more challenging but will be harder for those who struggle in the lesson.

MENU

Topic or learning objective for the lesson.

Non Negotiable
No choice about this one I'm afraid!

Warm
A good way in to the work if you need a little boost!

Zesty
A reasonable start if you are struggling today

Medium
You should be able to have a good go at this at some point.

Hot Challenge
Really show us what you can do. This one is up to you!

Non Negotiable

Hot

Medium

Medium

Medium

Zesty

Zesty

Medium

Hot

Warm

Zesty

Warm

Appendix 4: Example Flow Chart Quiz



Appendix 5: Ethics forms

Head Teacher Information Sheet

Creative Thinking Skills

You are being invited to allow your school to take part in a research study. This information sheet outlines how the research will be conducted so that you can make an informed decision about taking part.

What is the purpose of the study?

This research is investigating links between teacher methodologies in the classroom and creative thinking skills in their pupils. Creative thinking and problem solving are becoming more desirable in an employment sector with a very changeable set of requirements. We would like to explore ways of enhancing creative thinking and attainment by investigating two different planning techniques and collecting information about the creative thinking skills of your pupils.

Who is conducting this research?

The research is being conducted in the Department of Psychology at Edge Hill University by Bridget Mawtus as part of her PhD. Bridget has been a secondary school teacher in the UK for 10 years prior to starting this research. The research is being conducted under the supervision of Dr Sara Rodriguez-Cuadrado, Dr Karen Ludke and Prof. Rod Nicolson.

Does my school have to take part?

No. Your participation is entirely voluntary. If you choose not to take part, it will not affect you, in any way. If you do choose to be part of the research, you can still withdraw at any point during the study without any problems by contacting the researcher. Even if you do choose to take part, you will still be free to withdraw at any time up to two weeks after my last contact with you, without giving a reason and without any problems or receiving any further communication from us. This may be done by contacting us using the details below.

What will my staff and pupils be asked to do?

There are differing levels of participation in this research to allow as many people to participate as possible. This information sheet outlines a high involvement in the research participation. It is very important to stress that there is no change to curriculum content for any participating staff. As head teacher your role will be to provide access to your staff:

- In the first instance the first place you will be asked to **allow the researcher to speak briefly** to staff to give information to teachers considering taking part.
- If there is interest in participation, you will then be asked to **allow the researcher to speak at assemblies to the school**, to give information and seek consent from both parents (via letter) and pupils.
- Participating **staff would then be asked either to teach a unit of work that they have planned** with no changes, with the addition of asking pupils to complete a **10 minute online task** at the start of the unit and again at the end, designed to assess their creative thinking potential and explore any natural changes during the course of the unit.
- You will then be offered **staff training** session on one of the different planning techniques. This could be part of INSET training provision for the year and has no cost attached to it, this training could take place at your school, in which case you will be asked to provide space and a convenient time, INSET day, twilight training sessions or another mutually convenient time. Alternatively, we can arrange space at Edge Hill for this training should that be more desirable. Each training session will last between one and two hours, depending on your time allocation. All staff will be eligible for the training, regardless of whether they participate in the research or not.
- Your staff will be asked to **plan a unit of work using the planning techniques** and delivery methods explored during the training and to share this planning with the researcher.
- This unit would be delivered following the same procedure as the previous unit. Including a **10 minute computer task for pupils** at the start and the end of the unit.

- This full process would be repeated with a **second planning methodology**. It would involve a second training session, again available to all staff, regardless of participation. Another unit of work planned and delivered with computerised tasks at the start and end.
- At some point during the year, we might also like your **pupils to complete a single 10 minute** online questionnaire to explore the choices that they made during their free time activities.
- We would also ask you to allow participating staff to **share attainment data** with the researcher to explore any connections between attainment and creative thinking. Data will be anonymised as soon as data collection is complete.
- At the end of the unit of work and at a convenient time, any participating staff, will then be asked to take part in **individual interviews with the researcher**, to share their experiences of the technique and to assess if there is any practical merit to using it. These techniques are designed to save teacher time and workload, and as such their experiences of using them are invaluable.
- One member of staff will be asked to become a **named contact for pupils** or parents in the unlikely event that they experience any emotional problems with the research during the study.

Will school and staff details, interviews and outcomes be kept confidential?

Yes. All the information about participants in this study will be kept confidential and data will be anonymously and securely stored within electronic data files. These files will be stored for at least 10 years in line with the Data Protection Act (2018) and Edge Hill University data policy. All personal information will be held according to the new General Data Protection Regulation (2018) and no identifying information will be shared with anyone else. Once the last part of the study is complete, all of the names will be deleted from the data and a number will be assigned to each record, staff, school and pupil. Data for each individual student, staff or school will not be released to anyone, however other researchers who might need the whole set of data, with no names or identification of individuals, might use it for other research in the future. Edge Hill University will record and process this information about the collection of data and

this information may be used in other academic forums (e.g., academic journals, at conferences, or in teaching).

What are the risks?

This research has been reviewed and approved by the ethics committee of the Department of Psychology at Edge Hill University. There is not expected to be any risk to your school, pupils, staff or yourself as a result of taking part in this research. If anyone, teachers, the researchers or anyone connected with this work, becomes concerned that pupil education is being affected, the research will stop, and lessons will return to normal.

Contact

If you require any further information or have any questions about this study, please do not hesitate to contact us using the details below:

Bridget Mawtus, Department of
Psychology, Edge Hill University,
Ormskirk, L39 4QP. Email:
mawtusb@edgehill.ac.uk

Dr Sara Rodriguez-Cuadrado
Email: sara.rodriquezcuadrado@uam.es

Dr Karen Ludke, Department of English,
Edge Hill University, Ormskirk, L39 4QP.
Email: Ludkek@edgehill.ac.uk

Prof. Rod Nicolson, Department of
Psychology, Edge Hill University,
Ormskirk, L39 4QP.
Email: Rod.Nicolson@edgehill.ac.uk

Head Teacher Consent Sheet

Research Title: **Creative thinking in Adolescents**

This research is being carried out to investigate the links between creative thinking skills and teacher planning in secondary schools. If you are happy for your data to be collected as part of this research, please read and complete the form below. Your data are anonymous and confidential, and neither you, nor you school, staff or pupils will be identifiable at any time.

Names of Research Team:

Bridget Mawtus, Email: mawtusb@edgehill.ac.uk

Dr Sara Rodriguez-Cuadrado, Email: sara.rodriguezcuadrado@uam.es

Dr Karen Ludke, Email: Ludkek@edgehill.ac.uk

Prof. Rod Nicolson, Email: Rod.Nicolson@edgehill.ac.uk

Please tick all boxes to agree to the statements. By ticking the boxes you are agreeing to take part in the study.

1. I have read and understood the information sheet for this research and understand what is expected of me and my school.
2. I understand that I am free to stop taking part at any time and I can remove our data from the study up until 4 weeks after last data collection point.
3. I agree that I have been given the chance to ask questions about the research and if I did ask any questions, they have been answered and I am happy to carry on.

Data Protection Act

I understand that the information collected about my school and staff while taking part in this study will be stored on computer for 10 years and that any files containing information about my school, staff or pupils will be made anonymous so no identification is possible.

I agree to Edge Hill University recording and processing this information and that this information may be presented in other academic ways (e.g., academic journals, at conferences, or in teaching). I understand that information will be used for these purposes and may also be used to conduct additional research projects during the next the ten years. I only agree as long as the University follows the rules of the Data Protection Act and the General Dara Protection Guidelines (2018).

I confirm that I am willing to take part in this research.

Name _____

School _____ **Date** _____

Teacher Information Sheet: Creative Thinking Skills in Adolescents (Experimental Groups)

Creative Thinking Skills

You are being invited to take part in a research study. This information sheet outlines how the research will be conducted so that you can make an informed decision about taking part.

What is the purpose of the study?

This research is investigating links between teacher methodologies in the classroom, and creative thinking skills in their pupils. Creative thinking and problem solving are becoming more desirable in an employment sector with a very changeable set of requirements. We would like to explore ways of enhancing creative thinking by investigating three different planning techniques and collecting information about the creative thinking skills of your pupils.

Who is conducting this research?

The research is being conducted in the Department of Psychology at Edge Hill University by Bridget Mawtus as part of her PhD. Bridget has been a secondary school teacher in UK for 10 years prior to starting this research. The research is being conducted under the supervision of Dr Sara Rodriguez-Cuadrado, Dr Karen Ludke and Prof. Rod Nicolson.

Do I have to take part?

No. Your participation is entirely voluntary. If you choose not to take part, it will not affect you in any way. If you do choose to be part of the research, you can still withdraw at any point during the study without any problems by contacting the researcher. Even if you do choose to take part, you will still be free to withdraw at any time up to two weeks after my last contact with you, without giving a reason and without any problems or receiving any further communication from the researcher. This may be done by contacting us using the details below.

What will I be asked to do?

You will be asked to attend a short training session on one of three planning methods. The training should take no more than an hour and a half and will take place at your school or at the University if you prefer. During the training session you will be asked to work with the researcher to plan a single unit of work using the technique, without making any changes to the curriculum content. At the start of the unit of work, you will ask your pupils will complete a 10 minute computer based task to measure their creative thinking as a baseline. After this you will deliver the planned unit of work. At the end of the unit, your pupils will complete a second version of the measurement scale to assess if there has been any change. In addition

to this you will be asked to share your assessment data for that unit of work, predicted and actual, to explore any effects on attainment. At the end of the unit of work and at a convenient time, you will then be asked to take part in an interview with the researcher, to share your experiences of the technique and to assess if there is any practical merit to using it. All of these planning techniques are designed to save teacher time and workload, and as such, your experiences of using them are invaluable. One member of staff will be asked to become a named contact for pupils or parents in the unlikely event that they experience any emotional problems with the research during the study.

Will my details, interviews and outcomes be kept confidential?

Yes. All the information about participants in this study will be kept confidential and data will be anonymously and securely stored within electronic data files. These files will be stored for at least 10 years in line with the Data Protection Act (2018) and Edge Hill University data policy. All personal information will be held according to the new General Data Protection Regulation (2018) and no identifying information will be shared with anyone else. Once the last part of the study is complete, all of the names will be deleted from the data and a number assigned to each record. Data for each individual will not be released to anyone, however other researchers who might need the whole set of data, with no names or identification of individuals, might use it for other research in the future. Edge Hill University will record and process this information about the collection of data and this information may be used in other academic forums (e.g., academic journals, at conferences, or in teaching).

What are the risks?

This research has been reviewed and approved by the ethics committee of the Department of Psychology at Edge Hill University. There is not expected to be any risk to your pupils or to their education as a result of taking part in this research.

Contact

If you require any further information or have any questions about this study, please do not hesitate to contact us using the details below:

Bridget Mawtus, Email: mawtusb@edgehill.ac.uk

Dr Sara Rodriguez-Cuadrado, Email: sara.rodriguezcuadrado@uam.es

Dr Karen Ludke, , Email: Ludkek@edgehill.ac.uk

Prof. Rod Nicolson, Email: Rod.Nicolson@edgehill.ac.uk

Teacher Information Sheet: Creative Thinking Skills in Adolescents (Control)

Creative Thinking Skills

You are being invited to take part in a research study. This information sheet outlines how the research will be conducted so that you can make an informed decision about taking part.

What is the purpose of the study?

This research is investigating links between teacher methodologies in the classroom, and creative thinking skills in their pupils. Creative thinking and problem solving are becoming more desirable in an employment sector with a very changeable set of requirements. We would like to explore ways of enhancing creative thinking by investigating two different planning techniques and collecting information about the creative thinking skills of your pupils.

Who is conducting this research?

The research is being conducted in the Department of Psychology at Edge Hill University by Bridget Mawtus as part of her PhD. Bridget has been a secondary school teacher in UK for 10 years prior to starting this research. The research is being conducted under the supervision of Dr Sara Rodriguez-Cuadrado, Dr Karen Ludke and Prof. Rod Nicolson.

Do I have to take part?

No. Your participation is entirely voluntary. If you choose not to take part, it will not affect you in any way. If you do choose to be part of the research, you can still withdraw at any point during the study without any problems by contacting the researcher. Even if you do choose to take part, you will still be free to withdraw at any time up to two weeks after my last contact with you, without giving a reason and without any problems or receiving any further communication from the researcher. This may be done by contacting us using the details below.

What will I be asked to do?

There are differing levels of participation in this research to allow as many people to participate as possible. This information sheet is for the least involved level of participation. There will be a short information session to explain how the research works. You will be asked to teach a unit of work as you always have, but to allow your pupils to complete a 10 minute computerised task before the unit starts, and again after you have completed the unit. In addition to this, you will be asked to share your assessment data, predicted and actual, to explore any connections between attainment and creative thinking skills. One member of staff will be asked to become

a named contact for pupils or parents in the unlikely event that they experience any emotional problems with the research during the study.

Will my details, interviews and outcomes be kept confidential?

Yes. All the information about participants in this study will be kept confidential and data will be anonymously and securely stored within electronic data files. These files will be stored for at least 10 years in line with the Data Protection Act (2018) and Edge Hill University data policy. All personal information will be held according to the new General Data Protection Regulation (2018) and no identifying information will be shared with anyone else. Once the last part of the study is complete, all of the names will be deleted from the data and a number assigned to each record. Data for each individual will not be released to anyone, however other researchers who might need the whole set of data, with no names or identification of individuals, might use it for other research in the future. Edge Hill University will record and process this information about the collection of data and this information may be used in other academic forums (e.g., academic journals, at conferences, or in teaching).

What are the risks?

This research has been reviewed and approved by the ethics committee of the Department of Psychology at Edge Hill University. There is not expected to be any risk to your pupils or to their education as a result of taking part in this research.

Contact

If you require any further information or have any questions about this study, please do not hesitate to contact us using the details below:

Bridget Mawtus, Email: mawtusb@edgehill.ac.uk

Dr Sara Rodriguez-Cuadrado, Email: sara.rodriquezcuadrado@uam.es

Dr Karen Ludke, Email: Ludkek@edgehill.ac.uk

Prof. Rod Nicolson, Email: Rod.Nicolson@edgehill.ac.uk

Teacher Consent Sheet

Research Title: Creative thinking in Adolescents

This research is being carried out to investigate the links between creative thinking skills and teacher planning in secondary schools. If you are happy for your data to be collected as part of this research, please read and complete the form below. Your data are anonymous and confidential, and you will not be identifiable at any time.

Names of Research Team:

Bridget Mawtus, Email: mawtusb@edgehill.ac.uk

Dr Sara Rodriguez-Cuadrado Email: sara.rodriguezcuadrado@uam.es

Dr Karen Ludke, Email: Ludkek@edgehill.ac.uk

Prof. Rod Nicolson, Email: Rod.Nicolson@edgehill.ac.uk

Please tick all boxes to agree to the statements. By ticking the boxes you are agreeing to take part in the study.

1. I have read and understood the information sheet for this research and understand what is expected of me.
2. I understand that I am free to stop taking part at any time and I can remove my data from the study up until 4 weeks after last data collection point.
3. I agree that I have been given the chance to ask questions about the research and if I did ask any questions, they have been answered and I am happy to carry on.

Data Protection Act

I understand that the information collected about me while I take part in this study will be stored on computer for 10 years and that any files containing information about me will be made anonymous, so my name is not attached to it.

I agree to Edge Hill University recording and processing this information and that this information may be presented in other academic ways (e.g., academic journals, at conferences, or in teaching). I understand that information will be used for these purposes and may also be used to conduct additional research projects during the next the ten years. I only agree as long as the University follows the rules of the Data Protection Act and the General Data Protection Guidelines (2018).

I confirm that I am willing to take part in this research.

Name _____ **Date** _____

School _____

Pupil Information Sheet: Creative Thinking Skills in Adolescents

Creative Thinking Skills

You are being invited to take part in a research study. This information sheet explains why the research is being done and what will happen. Please ask us anything that is not clear or if you would like more information. You can do this by using the contact information at the bottom of this sheet.

Why are we doing this research?

We would like to find out if the way that your teachers plan your lessons, can change the way that you use thinking skills to solve problems. The research is only working with teachers to look at how they plan their lessons, there will be no change to the content of the curriculum that you study at school. Creative thinking is a very important skill in life and when you start to work, so we would like to learn a little more about what can make teenagers better at it to help prepare them for the future.

Who is doing this research?

The research is being carried out in the Department of Psychology at Edge Hill University by Bridget Mawtus as part of her PhD. Bridget has been a secondary school teacher in UK for 10 years prior to starting this research. The research is being conducted under the supervision of Dr Sara Rodriguez-Cuadrado, Dr Karen Ludke and Prof. Rod Nicolson.

Do I have to take part?

No. It is up to you if you want to take part or not. If you choose not to take part, it will not affect you in any way. If you do choose to be part of the research, you can still take your information out at any time during the study without any problems by contacting the researcher, or asking your parent or teacher to do so for you. Even if you change your mind after the tasks are finished, you can still decide to take your information out of the research. You will not have to have any more contact with the researcher or give any reason for changing your mind. If you want to change your mind, you just need to contact the researcher with your name and your school, so that we can find your

information to take it out. You need to do this within two weeks of the last tasks done in school; after that, we will not be able to take out your information.

What will I be asked to do?

You will be asked to complete a task on a computer, it should take no more than ten minutes at the start of a unit of work that your teacher has planned with the researcher. You will be asked to answer a number of questions on the computer; some multiple choice and a few that ask you to write a little more. Then you will complete the unit of work that the teachers have planned, just as normal. At the end of the unit they will complete a similar task with slightly different questions. As there may be more than one teacher participating in the research, you may need to do a version of the task a few times over the course of the year. This will be planned with the school to cause as little disruption as possible. The tasks are designed to explore your creative thinking skills. There are no right or wrong answers and there is no pressure to answer in any way. No one can find out your results or get any information about you. The next section will tell you more about how we will keep your details safe.

Can anyone get my information?

No. All the information about the people who take part in this research will be kept confidential. This means that only the researcher will be able to look at it. Any information about you, like your name and your school will only be kept for two weeks after we have finished collecting information. This is why you have two weeks to change your mind. After two weeks each person who took part will have their name deleted from the one computer that had that information stored on it. After two weeks we will not know which data is yours, so we can't take it out. We will keep the information about how you did on the tasks with your number on password protected computers at the university. These files will be stored for at least 10 years in line with the Data Protection Act (2018) and Edge Hill University data policy. All personal information will be held according to the new General Data Protection Regulation (2018) and no personal information will be shared with anyone else. No one will be allowed to see any one person's information, or even information from any one school. Sometimes another researcher might need to use all of the information about

everyone, with no way to identify schools or pupils, to do some other research. Edge Hill University will keep this information about all the information and it might be used in other ways, like at conferences, during teaching or published in an academic journal.

Are there any risks to me if I take part?

This research has been checked by a group of experts at the university who make sure that it is safe. The ethics committee have agreed that this research can take place. As there is no change to your curriculum, there is almost no risk the research will be harmful to your or to your education if you choose to take part, however your teachers and the researchers will be monitoring your lessons very closely to make sure that it stays that way. If anyone, teachers, the researchers or anyone connected with this work, becomes concerned that pupil education is being affected, the research will stop, and lessons will return to normal.

Contact

If you want any more information about what is going on or what we are trying to find out, please let me know using these details:

Bridget Mawtus, Department of Psychology, Edge Hill University, Ormskirk, L39 4QP. Email: mawtusb@edgehill.ac.uk

Dr Karen Ludke, Department of English, Edge Hill University, Ormskirk, L39 4QP. Email: Ludkek@edgehill.ac.uk

Prof. Rod Nicolson, Department of Psychology, Edge Hill University, Ormskirk, L39 4QP. Email: Rod.Nicolson@edgehill.ac.uk

If you feel at any time during the research that you would like to talk to someone about how you are feeling, then please speak to Mr Denton at school and he can support you there.

Pupil Consent Sheet

Research Title: Creative thinking in Adolescents

This research is being carried out to investigate the links between creative thinking skills and teacher planning in secondary schools. If you are happy for your data to be collected as part of this research, please read and complete the form below. Your data are anonymous and confidential, and you will not be identifiable at any time.

Names of Research Team:

Bridget Mawtus, Email: mawtusb@edgehill.ac.uk

Dr Karen Ludke Email: Ludkek@edgehill.ac.uk

Prof. Rod Nicolson Email: Rod.Nicolson@edgehill.ac.uk

Please tick all boxes to agree to the statements. By ticking the boxes you are agreeing to take part in the study.

1. I have read and understood the information sheet for this research and understand what is expected of me.
2. I understand that I am free to stop taking part at any time and I can remove my data from the study up until 2 weeks after I finish the last computerized task.
3. I agree that I have been given the chance to ask questions about the research and if I did ask any questions, they have been answered and I am happy to carry on.

Data Protection Act

I understand that the information collected about me while I take part in this study will be stored on computer at least 10 years and that any files containing information about me will be made anonymous so my name is not attached to them.

I agree to Edge Hill University recording and processing this information and that this information may be presented in other academic ways (e.g., academic journals, at conferences, or in teaching). I understand that information will be used for these purposes and may also be used to conduct additional research projects during the ten years. I only agree as long as the University follows the rules of the Data Protection Act and the General Data Protection Regulations (2018).

I confirm that I am willing to take part in this research.

Name _____ School _____ Date _____

Parent Information Sheet: Creative Thinking Skills in Adolescents

Creative Thinking Skills

Your child is being invited to take part in a research study. This information sheet explains why the research is being done and what will it involve. Please ask us anything that is not clear or if you would like more information.

What is the purpose of the study?

This research project is investigating if the way that children are taught at secondary school can change the way that they think and problem solve. The research is only looking at working with teachers to explore how they plan their lessons, there will be no change to the content of the curriculum that you child studies at school.

Who is conducting this research?

The research is being conducted in the Department of Psychology at Edge Hill University by Bridget Mawtus as part of her PhD. Bridget has been a secondary school teacher in UK for 10 years prior to starting this research. The research is being conducted under the supervision of Dr Sara Rodriguez-Cuadrado, Dr Karen Ludke and Prof. Rod Nicolson.

Does my child have to take part?

No. Your child's participation is entirely voluntary. If or your child choose not to take part, it will not affect you or them, in any way. If your child does choose to be part of the research, they can still withdraw at any point during the study without any problems by contacting the researcher. Also, if your child does choose to take part you, or they, will still be free to withdraw at any time up to two weeks after the last task, without giving a reason and without any problems or receiving any further contact from the research team. This may be done by contacting us using the details below with your child's name and school. This will allow us to identify your data to remove it.

What will my child be asked to do?

Your child will be invited to complete a computerised task, it should take no more than ten minutes at the start of a unit of work that their teacher has planned with the researcher. They will be offered a series of simple tasks that have to do with creative thinking. They will then complete the unit of work that the teachers have planned. At the end of the unit they will complete a similar task with slightly different questions. As there may be more than one teacher participating in the research, your child may take part in a version of the task up to six times over the course of the year. This will be planned with the school to cause as little disruption as possible. The tasks are designed to measure their creative thinking potential. There are no right or wrong answers and there is no pressure to answer in any way and only the researcher will have access to their personal results in order to analyse the data, no one at school will be able to see individual results. The study is only investigating how teacher planning can influence creative thinking.

Will my child's details and assessment results be kept confidential?

Yes. All the information about participants in this study will be kept confidential and data will be anonymously and securely stored within electronic data files. These files will be stored for at least 10 years in line with the Data Protection Act (2018) and Edge Hill University data policy. All personal information will be held according to the new General Data Protection Regulation (2018) and no identifying information will be shared with anyone else. Once the last part of the study is complete, all of the names will be deleted from the data and a number will be assigned to each record. The names will only be stored in connection with the record on a single researcher's computer, and only kept for two weeks after the last part of the study is finished in case anyone wants to remove their data from the research. After that point, it will be assigned a number and it will not be possible to identify anybody's data in order to remove it. Data for each individual will not be released to anyone, however other researchers who might need the whole set of data, with no names or identification of individuals, might use it for other research in the future. Edge Hill University will record and process this information about the collection of

data and this information may be used in other academic forums (e.g., academic journals, at conferences, or in teaching).

What are the risks?

This research has been reviewed and approved by the ethics committee of the Department of Psychology at Edge Hill University. There is not expected to be any risk to your child or to their education as a result of taking part in this research. If anyone- teachers, the researchers or anyone connected with this work- becomes concerned that pupil education is being affected, the research will stop, and lessons will return to normal.

Contact

If you require any further information or have any questions about this study, please do not hesitate to contact us using the details below:

Bridget Mawtus, Department of Psychology, Edge Hill University, Ormskirk, L39 4QP. Email: mawtusb@edgehill.ac.uk

Dr Karen Ludke, Department of English, Edge Hill University, Ormskirk, L39 4QP. Email: Ludkek@edgehill.ac.uk

Prof. Rod Nicolson, Department of Psychology, Edge Hill University, Ormskirk, L39 4QP. Email: Rod.Nicolson@edgehill.ac.uk

If your child becomes distressed as a result of taking part or would like someone to talk to at school, your named contact is Mr. Denton and he will be able to guide them through any issues arising from any of the tasks.

Parent Consent Sheet

Research Title: Creative thinking in Adolescents

This research is being carried out to investigate the links between creative thinking skills and teacher planning in secondary schools. If you are happy for your child's data to be collected as part of this research, please read and complete the form below. Their data are anonymous and confidential, and neither they, nor you will be identifiable at any time.

Names of Research Team:

Bridget Mawtus, Email: mawtusb@edgehill.ac.uk

Dr Karen Ludke, Email: Ludkek@edgehill.ac.uk

Prof. Rod Nicolson, Email: Rod.Nicolson@edgehill.ac.uk

Please tick all boxes to agree to the statements. By ticking the boxes you are agreeing to take part in the study.

1. I have read and understood the information sheet for this research and understand what is expected of my child.
2. I understand that I am free to stop taking part at any time and I am can remove my child's data from the study up until 2 weeks after the last computer task.
3. I agree that I have been given the chance to ask questions about the research and if I did ask any questions, they have been answered and I am happy for my child to carry on.

Data Protection Act

I understand that the information collected about my child while they take part in this study will be stored on computer for 10 years and that any files containing information about them will be made anonymous, so their name is not attached to it. I agree to Edge Hill University recording and processing this information and that this information may be presented in other academic ways (e.g., academic journals, at conferences, or in teaching). I understand that information will be used for these purposes and may also be used to conduct additional research projects during the next the ten years. I only agree as long as the University follows the rules of the Data Protection Act and the General Data Protection Regulations.

I confirm that I am willing for my child to take part in this research.

Name _____ Parent or Guardian of _____

School _____ Date _____

Appendix 6: Study 2 Teacher Interview Transcription

R= Researcher

T=Teacher

SF Teacher Interview

T: God, let me get, let me get my memory back to the lessons!

R: It's not so much the lessons first of all, it's about how you found taking part in the research as all, was it a difficult thing? Was it a huge amount of extra workload, that sort of thing, can you just let me know how that process went for you?

T: Erm, it was very similar to what we had already done. The topics we were doing was Jesus in Art and the strategies used were quite similar to what we already did and tweaked in some ways so in terms of workload it wasn't a great deal of work, but it did actually really help with planning, so it made me as a teacher think of my planning more thoroughly to extend the high ability students with like, challenge and stretch on that end and to have like scaffolded tasks for each of them because of the different path ways that my option took. So it was very similar so in terms of resources, not a lot of extra work, apart from a lot more thought for the teacher into the delivery of the lessons and then obviously sharing with them what the aims of each of the lesson are, which we did anyway because it took place over a six week program with six different topics.

R: And can you remember how the students interacted with the work? Where they exhibiting the same sort of behaviour that you were used to seeing with

previous topics, did they find it challenging to follow a different way of doing things or ...?

T: Em, it was quite discrete in the way in which it was delivered to them so they wouldn't have seen much difference as they have never studied that topic before. They really enjoyed the topic itself and the research that went into it and those that were extended, em, responded very well to the extension tasks that I'd set. Em, and their ability to choose their different, options almost.

R: Ok, did you find teaching and delivering the lessons any more challenging, or not, than you typically had been in the past.

T: No, No, I think the training was very clear so I could see how things were meant to go. The process isn't that hard really.

R: So no big problems, no big changes?

T: No,

R: Excellent, and did you find that there was a difference in, were the students engaged in what was going on, even the ones that- well you talked about the ones that were stretching and that they felt able to do that- but what about the ones that would maybe be struggling a little bit more with the work, were they...?

T: Erm, they were more, engaged, because they were more on task, because of their ability to choose where they were in the options of tasks. So if they, because mine was about the, erm student focused planning it was all about the students, so they always had something to do at their individual level so they were always engaged. And they really enjoyed the lessons.

R: And from a bit more of a procedural sort of standpoint, when you've planned your lessons, do you think that you... delivered them in the way that you had meant to, or do you feel that you perhaps either went back to the way you have delivered them in the past, or if there was a change. This is more for, like, quality control, I'm trying to find out if what you planned to do, using the planning tool, is actually what played out in the classroom, did it sort of match up?

T: Yes it did, it did match up, some lessons they did more than what was planned, and you know as normal lessons will go, maybe some lessons they did less than what was planned, but overall, each lesson, we achieved what we wanted to achieve from that lesson time, bearing in mind that we have 30 minutes for a lesson,

T: Yeah, absolutely, so the lessons went to plan and the outcomes were brilliant, and this data, sorry, is their Jesus and Art assessment, and I can show you some books as well, if you want some examples of ...

R: Yeah, that looks good, that would be awesome.

R: Yeah, and that's really all the questions that I have...

T: Erm, when they had to go and research different artists, like Rembrandt and Michelangelo, now that is on the GCSE specification,

R: And they were doing that in year eight?

T: And we pulled that right down into year eight in this planning as part of that stretch and challenge task so when these students come back at GCSE to look at Rembrandt and people like Michelangelo, they have already touched

on this and have already researched so the stretch and challenge tasks were brilliant, and it was a very engaging, very engaging... And sorry, what I meant to say was as a teacher reflecting on my practice, the main strength of this research for me, was that it made me reflect on my own planning a lot more, because obviously, when you're teaching, you have different strategies that you use, but when you are helping as part of this type of research, you do it, obviously more thoroughly and your lessons are better as a result. And it worked really well, so, we loved it!

R: Fantastic, thank you!

PoP Teacher Interview

R: Erm, so thank you very much for taking part in this research. It was very kind of you. I just wonder if you could let me know, kind of, how the process was, in terms of workload, in terms of, anything additional that you had to do to be part of the research, how have you found that?

T: Erm, So I think my teaching style is quite similar to what I was asked to do, however, I found that I was quite conscious if it, so, I had it on my wall, you know, the little three part thing, and I'd refer to that even in the lesson, as I was planning my lesson, and I'd ensure the focus was all on them. All on them all the time, having the, it was like, fun wasn't it, it was like PoP? Pop wasn't it?

R: Yes, it was Pedagogy of Play.

T: Yes and erm, and the workload as I said, I don't feel like it was that much different to what I'd do anyway, so I found that quite easy, just to be conscious of it. To be conscious of it when I was planning. Erm...

R: Yes, Ok fantastic, thank you.

R: When you were delivering- this is sort of a procedural question- when you were delivering the lesson, having planned the lesson according to the three circles, the choice, wonder and delight, you have already said you would refer to the three circles during the lesson, but do you feel that what you delivered was true to what you were planning in terms of. It's about quality control, did you do what you thought you were going to do?

T: Yeah, I mean, obviously you know that lessons can take their own, heh, can take their own journey and go in a different direction. That's why I had it on my desk, when I was teaching that class, To ensure that, I even used words such as 'choice', you know, 'I'm giving you the choice here' you know ' you can make the decision for yourself' which gives them that illusion of, well, of choice I suppose. But then again, I do, yeah, I mean I was, I do think I was sticking to my own plan, yeah, as much as I could, definitely.

R: That was great, Thank you. When you were teaching it, how do you think the kids responded to it, how did they find it?

T: Erm, I think they enjoyed it, I definitely think it was, putting the, putting the responsibility on them, that they're deciding what they're doing, that they're deciding what's going to happen in this lesson, whereas, just to flip it to like, other lessons I've done, like previously, with other year groups, and that class, where, you're a teacher, it's like, 'do what I tell you to do' whereas that was like, giving them, I like to think of it as like an Ikea package.

R: Ok?

T: You know, you're giving them the flat pack, you're telling them they have to make a table, and how they do it, they think well, THEY're making the table, well actually no, I've given you the materials, do you see what I mean.

R: That's a lovely analogy.

R: Have you taught that unit before?

T: Yes.

R: How did you find that it compared to when you taught it previously?

T: Erm, so, I, I think previously, it's been a bit more, like, blocky, like de- de - de-de-de-de-de we do this, whereas, I feel like, this time, it has taken a different route. Ok, it has taken a different rout, because they've been able to interoperate it more. I mean obviously, it was Jesus in Art wasn't it. Erm, and it's allowed them to, to mould the lesson to... What I usually do, every weekend, I plan my lesson then. Whereas what I found whilst participating in this, I would plan the lessons then, however, after one lesson, I'd find myself revisiting it, to then adapt it slightly, and I was very conscious of the fact that THEY were responsible, if that makes sense.

R: Do you think that academically they were more engaged with what was going on, or do you think that their academic work was suffering in terms of having that element of choice?

T: If I'm going to be completely honest, I don't know whether it made that much difference really, I think. I can see how with other classes and with individual pupils, that having that choice, CAN go the wrong way, go down the wrong path. However, I would say, that for my class, who – lovely class- can make

the wrong choices sometimes, the majority of the time, made the right choices and did know as a young person what to do and where they would like to go. So if they've got the drive within them, I think that's a big factor. So if they want to follow the rules. However, it's not really giving them the rules is it? cos it's allowing them to choose the rules. It's very often, if you give them the... if you put the onus on them they think that, that that, they're playing by their own rules, and I love that illusion. I love that. But they're not!

R: When you were teaching the unit and you gave them the opportunity to make their own rules and to make their own choices, how did you find being in the classroom as a teacher at that point, because it changes your role a little bit, I mean you're obviously still the teacher and you are still there to manage things but. Did you notice things about, say, noise levels or chaos or whatever else in the classroom and how did you find that, how did you manage that?

T: Erm, I'm gonna be honest, I mean it was a little bit more chaotic, because you were giving them that freedom. I don't think that's a bad thing, I'm a teacher who I believe who actually if they (the kids) are just sat there in silence then that's worse than them being a little bit noisy. They were shouting out things but, it's relevant, erm, so that's you know, OK. Behaviourally it's not great that they're shouting out, however, progress wise, the fact that they're engaged is brilliant, because I understand that that topic can be quite dry for a lot of pupils, so to give them the actual, opportunity and, to increase their engagement, I believe will help them, well, I hope it will, with their progress. Basically if you are interested in something then you are more likely to do it. So if, you feel like you've come up with that decision, you're more likely to be supportive of our own decision as to a member of, a person of authority, telling

you what to do. There are some pupils who would just be like, nerp, no. But if they've had that opportunity, to voice their opinion, and to go along with that, happy days.

R: Is there anything that you would change, either about the materials that you were using, or about the training session that we had before hand or, anything that you think might be adapted, or might be done better having had the experience of using it?

T: Done better. Or what I en... can I say what I enjoyed?

R: Both yes please.

T: Is that, is that Ok?

R: Yeah yeah.

T: I really did like, obviously when you talked me through, you gave me some examples and I thought that was great, it helped me to see where I wanted to go with it. I absolutely loved, as I said, I loved the fact that I had that print, (I've still got it on my wall actually) I had that on my wall, and I could refer back, to that to use the language, the 'this should look like', its worded something like that isn't it? The 'this should look like'. I suppose if it were to be any better, it could... I potentially could have gone out and done a little bit more research? but I don't know if that would defeat the object, I'm not quite sure. But that's it really, I did find it quite useful, maybe if I saw a model of how its been done, so, I'm kind of a visual learner, and I like to see it done and then do it, if that makes sense. And so perhaps, if I'd have seen in it place.

R: Sort of, in action?

T: Yeah, cos I was a bit conscious sometimes, not knowing what THE OTHER TEACHER's was and knowing that another teacher's was just their normal style, me thinking, am I just being my normal, am I just being my normal self. Or, cause, I'm similar to that anyway, I'm similar to the chaotic, and not knowing what THE OTHER TEACHER's was, I was thinking. I hope I'm not accidentally doing what she should be doing do you see what I mean? I think it was just the uncertainty, but I understand there's obviously a reason why I couldn't see what THE OTHER TEACHER was doing. But, would that have ruined the experiment if I'd have, known?

R: Yeah, a little bit,

T: Would it?

T: Yeah, so obviously that's not something that you can do.

R: You can have a conversation about it now and talk about what you have done in the past.

R: Erm, I mean, what about the process of the, I mean, I know its awkward taking students down to do the tests and it's a faff and it takes time, but what about the process of the, sort of managing and being there, in terms of having the students take part in that online test.

T: When we were actually there?

R: Yeah.

T: Erm, so, some of them were asking me. So, what do I do here miss, obviously, I cannot be involved in that and I said, I can't be involved, I said. Whatever you think, do whatever you think. There's not really a right or wrong answer, it's your opinion, er, I did try to make sure that they were doing it by themselves, they, well, they were engaged cos it was something quite different, they were quite excited that they were part of something new, and that, and when they came back (after the holiday) they were like, Miss are we still doing that thing that you can't tell us about? They loved it, erm, I think, I'd love to find out how they did in that as well. Which would be great, erm, they just, I mean they just go along with it and they just did it. Some of them it took them longer than others, because I could see, obviously that they were thinking about it a little bit more. There was one, it sticks out in my head, there was one with squares, and it said, how many triangles are in here, that, that caught a few of them out. They were like, what, what, and I think, that was the second test when they had completed it, I don't know if this is ok, but we spoke to a few of them after they had completed it and they were like, oh yeah, cos you can do that!!! So I think they were engaged and they did enjoy that.

R: Excellent. That's great, so if I asked you, for example, if I asked you if you would mind doing another unit of work, would you, have a problem with it, if there's anything you'd change about how it worked or...?

T: Er, if I did it again, obviously this is nothing that you can control. I'd like it to be with a topic that is a little more easy to do that with, cos I think with some modules, with some topics, it might be slightly more challenging, not impossible, but slightly more challenging. I'd love to try it, and I will, and I probably am, subconsciously, with perhaps a different year group, with, maybe

like a GCSE class? To see how that would go because really, I mean, to put it bluntly, they're the results, that they are stuck with for life, aren't they. I'd like to. Have you, are you, are you doing anything with GCSE groups or?

R: I'm doing it with whoever will work with me. I mean. I need to try and repeat this to gather more data.

T: Yeah, I think would be interesting, maybe not year 11, maybe year 10, a year 10 group would be great. You might come up with a bit, I mean sometimes they're a bit funny about doing it with GCSE groups, but if what you're experimenting with is effective, I would be more more than happy do that again with another group.

Appendix 7: Study 3 Teacher Interview Transcriptions

R= Researcher

T= Teacher

SF Teacher Interview

R: Thank you very much for taking part in my research. Now that the last set of data is collected the hard part is over, I promise. First of all, I just wondered how you found it, being involved in it?

T: For, for the lesson?

(affirmative noise)

T: I found it hard stepping back. I mean I probably do more, I interfere more with what they're doing and support them more as I'm walking round the classroom. And I found that hard initially to step back and say 'go back and have a go at this activity from the board' and I also found it hard to trust them to pick where they felt they fitted in on the flow chart. And, sort of, because generally we'd always do the same thing all together, so I, I found that hard. I found that once I'd gotten over that and I just let them get on, and make their own decisions and choices, it was Ok, but I found that the quality of work, or the mistakes, there were more often than not more mistakes, especially with the clay because it's the sort of thing they'd not done before, and normally when I teach that, I teach it more of a step by step, everybody stop, do this, now everybody start again. And I'd say there was a difference in the outcome, I think it was weaker, erm, I think its too, ...If I was to carry on and do another clay project with them, I think I would probably have seen a difference, they'd

have learnt their lessons and would perform probably better in the next project, but we did find that we were having to start again with a lot of them and especially in the clay element, get more involved than you probably wanted me to.

R: Ok

T: So erm, that was what I found really.

R: Ok, and in terms of your workload, when you were planning the lessons and delivering the lessons, I know you said you felt uncomfortable with sort of, taking a step back in the lessons, but in terms of addition to your workload, how was that for you?

T: Erm, so I did a couple of worksheets and I had to make a couple of videos, so that was extra, so preparation was more than during the lesson, in the lesson it was more standing back and letting them get on with it I suppose, so yeah, and we planned the slides together didn't we of what, so what did that take, about an hour that we did, and then videos probably an hour to do a couple of those, and then worksheet, it was a how to draw worksheet wasn't it? So yeah, it was a few hours worth of work I think, I mean I only get one lesson a week and then we missed out on some lesson so there has been quite a lot of disruption, and then we obviously did a Christmas card thing which took some time away, so, and it was planning the computer and trying to get in for the testing,

R: Yes, I know that was a difficulty.

T: So yeah, this projects gone on longer than normal, so, yeah.

R: Ok, so, erm, in terms of how well you stuck to it, this is sort of for my own quality control purposes, so I have now got to go and write about how it went, so you said you felt like you stepped in more than you felt I would have wanted you to, so particularly with the sort of, clay thing.

T: Yeah,

R: But in terms of presenting the stuff to them on the board and erm, following that through, do you think you did that pretty consistently or,...

T: Erm, they, struggled with 'don't ask me check on the board' sort of what you should be doing and where you are, they struggled to understand that at first, there could have been a clearer sort of, maybe a three step, they struggled with where they were and sort of where do I go now, and of course you did have to step in because well... the, the, yeah, the clay I think was the bit where we really,... because we ended up just scrunching it up and starting again. And then of course I would, you know if it happened three or four times in one 50 min lesson, you know you're stuck so you know, you can't, you can't afford to do that, you cant have so much waste and then of course I would stop the lesson and then it was, ok right everybody stop, this is what we're doing this is where, and I would resort back to my normal way.

R: Ok

T: Which did actually suit the subject better. In terms of time, resources, cost, that kind of thing. Erm, so, yeah, that was the hardest bit.

R: So in terms of the clay, what you're talking about there. Are you talking about skills acquisition, a new skill

T: It was a new skill yeah

R: That they were using and then, no absolutely you did the right thing, my question, sort of leaving that to one side. Because that's a different thing really, sort of demonstrating and needing to be part of what was going on. When you look at the sort of earlier phases that went along side that, the sort of, drawing than the learning that went with that.

T: Yes, that was better, they did so we did some drawing f the cupcake shape. The ellipse and the cylinder shape and that was when I did have that worksheet and I would say, right, just stop there and I want you to just sketch on the side and I want you to just practice them. I didn't always direct them to the board, but I would say to just practice how you would get that ellipse in and that 3d shape and use this worksheet to help you. So then they'd go back, look at that and then come back to their drawing and you could see an improvement in their drawing.

R: Ok, so that's really good. Do you think that having that additional preparation time for you helped you deliver the lesson in a way that... What I'm trying to get at is that the additional workload and time went into YOUR time, so it was your additional planning time, I'm trying to see if that additional time, regardless of what it was spent doing, then had a reflection on the delivery of the lesson. Or the, not necessarily the outcome, because their outcome for you is their, the, what they've produced, its more their learning, the process of their learning.

T: Erm, it's hard to say isn't it, because say, with that, I'm thinking of a drawing they did with that oil pastel quite early on, and I just said right off you go you're

drawing a cake and what I would normally do it break it down and say, right we're drawing this shape, let's look at this curve. And we would do more on let's look at it as a shape, and they would all look at it in that way and get to that stage, and then 'right, now we're all going to add colour' and I would do a second demonstration. Erm, so, I would just, I just, I would just. I just. The two methods of teaching are completely different. So I think in a sense, I mean, there were some elements of it that were good and you could see them making their own progress with it by themselves which I suppose is more independent. And then the way I do it, I think they're more successful straight away as opposed to learning independently.

R: Ok, are there any pupils that you can think of that had a better outcome following their own pathway and their own learning or do you think that it, it didn't work for anybody?

T: Um, I think that I've not been doing it for long enough and it, I think if you see the same class all day every day, like a primary teacher, I think you would notice it more. I think its not long enough and every lesson is rushed because it's a practical lesson and its 50 minutes, by the time you've got stuff out, show them, I mean the making stuff is like 20- 30 minutes, and then you're tidying away and then I think in a subject where they had more lessons you'd see a bigger, a bigger difference really.

R: OK. My next question is about student engagement, how they were engaged with their own learning, that independent bit and the ability to make their own choices. Because you were teaching two different classes with the

two different methods right, so did you notice any difference in terms of engagement with the process of learning between the two groups?

T: That's another really hard question because the group that did your way is a rowdier group so it was harder, so it was harder, it's harder, because I've not taught them before you see, this is my first year of, of teaching that class. I think if I'd have know what they were like before, I would be able to answer that. I mean, you would have like the odd one who would be like, oh yeah, and if I come along with the worksheet and ask them to go and practice they would say, no well I just want to get this done. But then you have some that like it don't you, I mean. This is going back quite a way.

R: And in terms of taking part I the research, I know that there was some difficulties getting hold of the computers and things, but this is about, how the process was for you, also for my quality control. SO if I was to do this project again with another teacher in another school, what can I learn from your experience of taking part in this research.

T: I, I would, I'd pick a subject that has more lessons. I think it was too hard, and I think in a practical subject like mine and you've got, you have to keep on top of them and if not they get giddy and silly, and I think that's harder to control and they, I think, when you give them a little bit of freedom, they think they've got loads of freedom, so your behaviour management gets harder. So they think, oh I can just get up and get this worksheet so I will take the long way round or, erm, so, I think that makes it harder. Erm, I think putting the ownness on them is better, I mean, that's good, and they should take more responsibility, but er, I think that would work better in a subject that wasn't. I

think, well, it can be quite chaotic in here and I think that, for me, and how I like things to run, I found that hard.

R: Ok. In terms of the training and the experience that you had with me at the beginning about how the project worked and how the panning worked, is there any feedback that you can give me on how that process was and

T: Yeah, and that was really supportive, I mean, when you sat with me and went through the slides, that was really helpful, erm,

R: Ok

T: And that's, yeah, that's all we needed really wasn't it?

R: Yeah

T: I think it would have been good to see, to actually physically see the work that someone else had done, to, to , to understand the process, but ...yeah

R: Ok. I know we talked briefly about workload and you talked about making the extra videos and making the worksheet, that was on top of what you had already planned for that lesson anyway, because I know that when we were planning you said that you were planning on making one of the videos anyway as part of your planning for that work,

T: Yeah, yeah, so,

R: That would cross over for the other lessons as well, so I was wondering what you had done over and above the planning, that was just for this student focused style of teaching, the worksheet and...

T: Yeah, so the worksheet, and the slides on the powerpoint.

R: But the other videos was stuff that you...

T: Stuff that I wanted to do already.

R: Ok, cause that's what I'm looking at really, the difference between your current planning methodology and then the stuff, the stuff on top. That's great, thanks, it's just really...

T: Yeah, you see, all my planning, its all done really, so when I come to teach, like tomorrow's lessons, I don't have to do any planning because it's already there. I mean, if my class was much lower ability or much more talented, then obviously yes I would, but actually, its all done for all our projects.

R: How, how long ago was that done?

T: Well, it is ongoing, so we do add to it and we do add things or take away things say if there's a new initiative in school about grading or whatever the terminology we use, then we'll go through it but often that's just, you know, a 10 minute check, I mean I could be sitting here doing this now saying I'll do this and this for tomorrow. Yes, I can do that or... so it is ongoing and we do add different stuff

R: Ok, but is that something that you've planned or is it sort of a departmental planning process?

T: So, yeah its most of mine and Helen's quite new so she's added bits since shes been here as well, so she's seen like an artists she likes and she'll add that in and...

R: Mmmhmm, but the planning you hve done, stuff you are using, I mean, its stuff that you've been using for a while? I mean, I'm not, suggesting

T: Well it is, but it's constantly updated so its

R: Of course it's updated, that's not what I was suggesting, I mean that's

T: Introducing the subjects...

R: Yeah, but at some point you had to have sat down and gone right, what are we going to teach them, and I'm just trying to get an idea of..., cause I used to do the same thing with music, it's not like

T: No, it's like, say for example, we do an insects project and you see above the door there's those felt pieces (Mmmhmm) but, you might not want to do felt if you're a painter so Helen last year did painting matchboxes instead, so project title and generally the artist research would stay similar, so like, like this year for example for the cupcakes I made a crossword, so that was, and I've done a couple of extra homework sheets, so what I'm saying I think is that I don't plan every lesson from scratch,

R: No

T: Like, you've got your theme, you've got your project, and then you add to it, or depending on who's teaching it, you add your element in. depending on your skill, like mine and Helen's skills basically,

R: Erm, yeah, no its exactly the same way that I used to teach music. I'm not suggesting that you planned it 40 years ago and it stays the same, I'm just saying that at some point you will have sat down with the curriculum and gone,

right we're going to do a project on insects in year seven and I was kind of wondering when that thought process had happened for you in terms of your planning?

T: Hu, that's quite, quite a while

R: Quite a while ago, that's you kept the same

T: Yeah, its too much work to change one whole project and of course everything is like, so its on the website or the head has a copy of our roadmap and if you change one whole project every document, several documents have to be changed or new ones uploaded, so we do stick within the theme. I mean, yeah, we do, I mean we do change,

R: I'm not in any way suggesting that you don't I was just wondering about the process that's all, because my project in n teacher planning and how teachers plan and how things are put together, that's all,

T: No, we do, yeah, I mean it works, and if it works, why change it? And they're good projects and they hit all the skills and I think, well, yeah

R: Well, that's great, well thank you very much, that was great.

...

R: Oh, just, when you are grading their work, when you are generating the data collect marks, are you judging the execution of the skill, so like the final finished product, or are you looking at acquisition and technical ability of the skills, so, if they've done really well un until a point and then it all goes hideously wrong at the end do they still,

T: No its just everything, no that's fine, I mean, marking the cupcake drawing, you lay them all out and you do put them in order of the strongest to the lowest and it is in that was the final outcome, whereas the clay I 've marked as like, mid and end, I marked like an interim, yeah, like, so I was saying, for example, if you can use bits of coil, that's a higher grade than if its just a pinch pot, so there is skill, there's a harder skill set in there, so of course if they've tried to use that you do consider, you do take that into consideration, oh well they've used a coil, which is harder, so I give them credit for that but then , if t was poorly executed, its hard, it's a hard judgement to make.

R: It always is with practical subjects, I remember the same thing marking compositions, but I just kind of wanted to see,

T: You just take it as you naturally do it, its hard to answer

R: That's brill, no that's great.

PPP Teacher interview

R: Thank you very much for being part of my research for a start, I know its kind of a bit more stuff to be doing and be part of and be aware of, but I just kind of wanted to find out how it went?

T: Erm, so at first the children responded really well because of the visual, because of like that menu, and they liked being able to choose and they liked that kind of, I dunno, they liked that bit of control, that bit of agency over the lesson. Over time as I was giving them it, it was getting a bit like, oh, this again, or kind of like, it wasn't the activities that they didn't enjoy, it was just once they

were seeing that same map over and over they were getting a bit like, a bit like, ohhh, we've seen this before (disappointed tone), so what I started doing then was not giving it them on paper, I started just projecting it on the screen and then they could just look at it from there, so that worked for a while, and then in the end I was teaching in that style but not displaying that anymore because I didn't want them to become too saturated or desensitised BUT they really liked that they could choose the difficulty level and most of them were aiming high. That was what was really nice, because it's a mixed ability group, but they are generally high ability, even although they're mixed, erm, there's like, some higher and some a little bit lower, but only a few were going for the top, the hot challenge, most were aiming for the, like, none were staying for like, the weaker activities, most were aiming higher, but I noticed that only a couple were going for the very top activity, so I don't know if that was cos I was making it too hard or, I don't know, I'm not really sure why.

R: No that's an interesting one, I wonder whether, ...I'll have to have a look at that. Erm, and in terms of your workload, this is always the slightly scary question, how was that in terms of what you would normally do for planning, versus the way that you were teaching this unit of work?

T: It's a bit of a strange year because, being my first year here, but also we're completely overhauling key stage three at the moment but this year is really heavy on planning, we're just planning as we go throughout the year so that next year it will all be in place, so most of my time in PPA is planning rather than marking so I didn't feel like it added any extra workload, because I was just doing all of that anyway so that replaced what we would have done. The only thing that sometimes, not exactly added, but was sort of, a factor to think

about, was oh yeah, I'm going to have to put that into the proforma, I'm going to have to make sure that goes in and, I mean it doesn't take long, only like 5 or 10 minutes, but sometimes I found myself think that oh, I've got year seven in 10 minutes and I haven't put it in that,

R: That planning sheet? Yeah, erm, were you surprised that they were going, or that most of them were going for the top end, or well the moderately top end of the thing or was that, would it be what you would expect from them?

T: No, I wasn't surprised because I think when you present something to them in that way, of its kind of, its your choice, they naturally do, like to challenge themselves, they do want to show off a little bit, they want to impress the teacher, and that's healthier than when its posed to them as in you HAVE to do this and then they go, ahhh, I don't want to do that. SO I think that they liked the way that was posed to them as kind of, you can climb your way up and then this is kind of like, the challenge and you could hear them say, Ohh were are you up to and which one have you gone for and , Miss, I've done the hot challenge and just reframing it in that way, I think gave them more, kind of like motivation, rather than, feeling like, oh we've GOT to do this.

R: And you've been teaching this class since the begging of the year right, so they're YOUR class, you know them well?

T: Yeah,

R: Well, as well as you can, you see them a few times a week! Did they, did they feel more engaged with, this sort of plan, when they were able to take

control compared with the way that you may have taught them previously? Or was it much of a muchness for them and just how they are?

T: They are a good class in general, and they respond really well to anything that, that's why I chose them as well, because I knew that they would go with it. I think that they liked having a part of the development of the lesson, rather than just being teacher led, and you just have to do what I say. I think that they liked, being able to choose, and kind of stretch themselves, when they were ready and not have to, yeah I think that they engaged with that side of it more.
Yeah

R: Great. What about the training. Did you find that you had everything that you needed and that you understood the principles and processes involved?

T: Yeah, no that was good, the sheet is really clear and I liked how the work that you do on that goes in from of the kids, so you don't have like, hidden files of paperwork everywhere.

R: Fantastic, and from a quality control point of view, from my side, do you think that you kind of, stuck to the way that, obviously, you say that you didn't give them the piece of paper which is absolutely fine, but that method of teaching where they have the choice, do you think you stuck to that all the way through or were there, points at which it wasn't possible to do that.

T: There were points at which it wasn't possible, like when we would have, like sometimes an interim spelling punctuation and grammar test, so we just had to drop everything and do that and the assessment and the lessons leading up to that, sometimes it didn't work well with that, so erm, preparatory lessons,

but generally, when it was just content teaching, yeah, there were times when we had to like, deviate a little bit but,

R: And, did you enjoy teaching it that way?

T: Yeah, it was interesting. It made me think about the way I design my lessons,

R: Fantastic, well, this is very easy and that's it, that's all I needed to know from you, so thank you.

T: Yeah, so like, they would talk to each other, what are you going to choose, and even when I was turned my back for a minute, like to do the register or something, I would hear like, these little mini conversations that would go, well I'm going to choose that one, or, well, I'm going to do that one first, and then I'll do the next one and I'd like I think they really like having that autonomy,

R: Yeah, I think it's really important for them kind of have those kind of decision making opportunities, in a place where it's not like, a big deal, if you make a mistake and you make the wrong decision, it's not, like catastrophic, it's not like choosing the wrong mortgage product or like oh you know. It's not something that is going to have a major impact on their lives, and school really is about training. It's a safe place to practice stuff, isn't it, so, yeah, that's why it is the way that it is. SO thank you so so much.

PoP Teacher Interview

R: So first of all, thank you very much for being part of my study.

T: My pleasure.

R: I appreciate it. You were working with the Pedagogy of Play materials and I just wanted to know how you found the process of planning with a different planning methodology,

T: Ah, I enjoyed it, it was erm, it reminded me in a way of my NQT years, sort of trying to be as crazy as possible, and actually I enjoyed the process of going over the lessons I'd maybe, used, quite a few times, erm, you know in the past few years, and reworking them and working out ways to access the material. SO it was an enjoyable experience to rethink things and I came out with some really good activities that I've actually shared with the department, so yeah, I enjoyed it.

R: Fantastic. Did you find that it significantly, or in any way increased your workload, over and above what you were already doing, more work than you were expecting?

T: It it it, was more work than I was expecting, I'll be honest, because I approached it obviously, kind of, all guns blazing, cos I thought, well, if I'm going to take part in this, I'm going to do it as well as I possibly can, so it was a case of trying to design a number of activities each time, that were all fun for them to do, and all interesting and all, obviously, still valid, and obviously for each one, it needed a slightly different way of assessing each one it was a little bit more work, but once I started getting going on it, I found that the ideas week

by week were coming a lot more quickly, and almost instantly I was thinking of four different alternatives maybe for pieces of work which erm, all obviously end up with the same, outcome if you like, erm, but just different ways of reaching there so, yeah, it was good, it was, and interesting experience.

R: Fantastic

T: Yeah

R: Erm, from a quality control point of view, from my, sort of, side, did you stick to the planning, to the methodology all the way through the unit of work or were there points at which you, deviated. Its only so that I can, sort of...

T: I, ah, I think, at the beginning I stuck absolutely strictly to it, maybe towards the end I was, erm, not quite adhering to the rules exactly, but was definitely well within the spirit of the activities, in terms of giving them fun activities, choice and choosing their own learning path, to go through the lesson which would obviously, still, as I said earlier, sill reach the same learning outcomes at the end. Yeah, so I , I must admit as I, as I got more familiar with the process, maybe I didn't refer to it quite as much. I might have deviated slightly, but as I say it was still well within the spirit of the activities, so...

R: Fantastic, when you were delivering the material and teaching the lesson, did you notice any, changes, any changes in terms of either engagement or attainment, with the pupils, or would you say, did they respond in pretty much the same way as they have for previous units of work?

T: The, starting with the second part, it was difficult for me to determine quite a big change, because I hadn't taught them for that long before and I didn't

teach them in the previous year, so I think the information for yourself would be more. Well, there was one initial assessment that we did, but it was looking at data maybe from the previous year maybe compared to this year, erm, but, erm, in terms of their enjoyment of the lesson, oh, well absolutely, I mean, I mean I don't know if you want to know about individual things that we did?

R: Yeah

T: Well, for example there was, quite a, well, pretty boring lesson, on, erm, on, distillation, and because of our, well, safety, and lack of equipment and, those sorts of issues, we normally just have a distillation set up and they come over and have a look at it, and then they go back and they draw a diagram, and they write about distillation and all that sort of thing. We don't have the facilities for everyone to do it and it would be chaos with glassware everywhere with 13 year olds! So, but this time instead, I got one of the, sort of, pieces of equipment, and I made an alien crash site, was one of the activities, and they had to identify the piece of equipment. And it was recovered from an alien crash site and the every now and again, there would be a transmission from HQ and they would decode the information, and get a bit more information about what the equipment did, and they did it that way. That was one of the kind of, fun activities that we did, and they, sort of, lapped it up, obviously, some of them more than others, you know, getting into the spirit of things! But with those sorts of activities, and then obviously there was a choice of what they were going to do with the information. Some of them were writing reports back to NASA, and some of them were writing reports to, back to the aliens about what life was like on earth, so. There were those sorts of activities. I mean they absolutely loved it, and you could tell, I mean, what are we doing

today was sort of increasing week on week as they came into the room, which was really pleasing to see. And its actually allowed me form really er, get to know some of the pupils a bit better. Just as, throughout the activities, they give a little bit more of themselves with their enthusiasm, you learn peoples likes and dislikes, you know, outside the classroom a bit more. SO yeah, they were definitely more motivated, but the attainment and data side of things, I would have to look at the year seven data in a bit more detail because we started so close to the beginning of the year.

R: Yeah, well, don't worry, I mean, I'll deal with that bit, that's not, a problem. Er, my next question is about how you found the experience, of teaching like that. And you've kind of, already touched on it a little bit, how you were able to build better relationships with the pupils but because you had spent a little bit more time on the planning and on the working on it that you have already mentioned that you had increased your workload a little bit, were you happy enough, I mean, did you enjoy delivering the lessons?

T: I *really* did enjoy delivering the lessons, because I planned them , well, obviously I plan all of my lessons, but, because I planned these ones so, well, not minute by minute, because well, I don't you know, I don't plan like that, but in terms of that I knew there were some nice, beefy activities to go through the lesson, and I was looking forward to delivering them, I knew they were going to enjoy it and obviously as a teacher if you know that the pupils are going to enjoy that lesson, you know, there's not a chance of you, you know, walking in to the classroom with a slightly, you know, oh dear, kind of a, kind of mindset! So I knew I was going to enjoy it, I knew they were going to enjoy it, I knew the material, you know, obviously, I didn't need to refer to anything because I

had planned it I mean, I had spent so much time planning it, I knew what was going to happen all throughout the lesson obviously. Erm, and the whole experience of teaching it was enjoyable too, so I mean, I was looking forward to teaching the lesson.

R: Erm, fab, I have, I have two, brief questions about pace and challenge of the lesson, that is, that's the do you think the planning, because pace and challenge are always key things for engagement and for focus for the secondary pupils and I also know that its something that Ofsted are kind of looking at when they come into lessons. DO you think that the planning methodology, the theory behind what we were trying to do here, would lend itself to developing pace and challenge within in the lesson or...

T: Challenge definitely, challenge definitely, it was very easy to build in challenge with the activities. Pace, yeah don't get me wrong, the lessons didn't drag, but I found with the, it was big chunks, rather than lots of small chunks. With a lower ability class, I think I would have found it more challenging, because I find with a lower ability class, lots and lots of smaller activities to keep the lesson moving, keep their, maintain their interest, works better than, big sort of 20-25 minute tasks if you like, although 20 minutes is as far as I'd go, but, designing a he number of smaller tasks, would have obviously taken a lot more time for them to play their own route, so I think, challenge definitely, pace maybe not quite so much, and I think pace would have been a challenge doing the pedagogy of play with a lower ability group.

R: Fantastic, thank you very much, erm, in terms of the training that we went through at the beginning. How did you find that? Did it answer all of your questions, or did you still have more,

T: No, no, it was, the information that you gave me and the conversation that we had were fantastic. I knew exactly what I was doing, and I knew obviously that you told me that I could get in contact with you if there was ever any problems, so no, that was fine.

R: Ok. Erm, there was another question but I can't remember it!

T: Was it about the IT side of things?

R: Yeah, well, the testing process was kind of part of the study, it wouldn't be how we'd move forward with this to try and roll it out. We wouldn't expect every teacher to do the testing before and after, that's to make sure that our process is working properly. Were there any issues with the testing and the IT stuff?

T: Only with our end, that I found that er, not the first time, I might have used a different one but, the URL you gave was really really long, that's not your fault, but it was really really long, so getting them to type that in would have been a nightmare, so I used, you know one of those website shorteners?

R: Yeah

T: You know the bit.ly. And the one obviously the one that I chose the first time round was fine, the second one didn't get through our school filter. So it was like, oh no, oh no. So instead, quick solution, we er, got a shared document file, so they copied and pasted the link in. That was the only issue, that was our end, not your end but maybe just one for the future. If you could, if you

could shorten it at all, cos you know, imagine the kids doing question marks and dots and forward slash pains, you know... (laughter) it was, but no no, it was fine

R: (laughter), ok, yeah

T: Yeah, and we erm, we managed to get, er, it took about 20 minutes, so, the first time we did it cos there was no issues with the website shortening link, we got my class, and the control class done within one single lesson, so we just swapped over within a one hour lesson, halfway through. The second one took a bit longer because of that issue, but no, it was fine. And they enjoyed doing that. The only, the only thig I'd say is, and this is for the teachers, not for yourself, is that I had to keep reminding them, don't, don't be asking the person next to you what do you think, it doesn't matter. You know, I said, there's no right or wrong, just, you know, d what you will, but a lot of them, maybe again, being top set pupils, were very concerned, and you know, looking for the right answer, which is always I guess an issue, you have with this kind of psychometric test.

R: Absolutely, well, that's great. Well, I really appreciate the time that you've put into doing this. Are there any elements of this that you would like forward-oh, and I remembered what my other question was as well!- are there any elements of this that you would move forward with? That you'd pick up and kind of run with in your other lessons?

T: Yes, so, well first of all, the activities as I said, I've shared across the department, which is great. Its always nice to share stuff and I'll definitely be using lots and lots of them again, and yeah, I will be doing my absolute best

to carry on as much as possible, with time allowing, to er, at least the choice of activities idea, because I think. There's always been a problem, in teaching with differentiation, and differentiation ISNT making 10 worksheets that are all slightly different, and it isn't giving more work to people who finish early. This would be quite a nice way to differentiate tasks without them really even realising there was a higher and lower, just allowing them to choose the activities that they want and, with a middle set, class, a middle ability class, I think it would really lend itself. It might be the perfect teaching methodology and would allow, if you can think of two activities that are, er, just different ways of getting to the same outcome, like I said, but, not even an easier and a hard version. Just two different ways for them to reach the same outcome, will, er, will really help with the middle ability classes. Cos you know what its, cos you've taught yourself haven't you?

R: Yes,

T: You know what its like when, how frustrating or amusing it can be as a teacher when, you say something five or six times, and they just don't get it. And then their friend says 'diddlelele' and they go like, oh yeah, I get it now. I think, well, just for having a choice of different activities, even if I haven't consciously made one easier and one harder, one of them will be the one that they think will get them to the end point so, I think with middle ability it would be the best thing that Id like to move forward with.

R: And that is, actually the, my last question. Was about choice. Because what I am trying to explore, is how important you think that element of choice is to the pupils, both, sort of, academically and sort of, for themselves, how much

do you think of the idea of being able to choose what they were doing, even if, it's a tiny choice, erm, helped with the engagement, is kind of where I'm at.

T: Erm, I think it helped hugely, erm, they, I found, like, homeworks. Some of the elements of choice were based around homeworks, as well, and I found that they were all coming in on time, and they were all looking forward to giving them to me in a way so, erm, for example, one of the ones we did was, on, healthy diet. It was a simple choice. It was you can either be a pirate writing to the captain telling him what food you were going to need on a journey and what deficiency diseases were, or you were, again, going back to space, its one of my things, they were, er, you were going up to the international space station and you had to very carefully choose the foods that you'd require, for a, for a two week stay. So, they were both broadly very similar, all you had to write about were the food groups and why you need each one, and those sorts of things, but just simply providing that choice for the homeworks, they all came in on time and, it was just the fact that, you know, the pirate one was done on old scrumpled paper and the NASA one was all official with headings and like, all weird code that I'd made up and just simply that they were looking forward to, and look what I've done Sir, and look what I've done, and, you know, they were all, er, yeah, really, really keen to get things in on time. So I think it made a huge difference with their engagement and their enjoyment and with the teaching and, with every aspect of it really and...

R: Well fantastic, and thank you very much for your time with todays interview, I really appreciate it.

T: My Pleasure,

R: And thank you for being part of the study.

T: I thoroughly enjoyed it.