The Haberdashers' Aske's Boys' School

Occasional Papers Series in Education

Occasional Paper Number One

An Evaluation of the Secondary School Physical Classroom Environment by Students and Teachers. Part 1: Classroom Colour

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March 2016

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Abstract

Students and teachers spend the majority of their time, whilst at any school, within classrooms and therefore these physical environments influence, directly or in-directly, the learning that occurs within their walls. The conclusions of Hattie & Yates (2014) show that the importance of the classroom environment is superseded by the quality of the teacher; an excellent teacher in a poor classroom will always produce better outcomes than a poor teacher in an excellent classroom. However, the classroom environment may restrict teaching or impede learning through causing frustration, stress and off-task behaviour. It is therefore important for educational leaders to develop classrooms which support excellent teaching and promote learning. The importance of the teacher in establishing, and maintaining, the classroom environment puts an emphasis on the question of what a teacher believes constitutes a good learning environment.

The responses from teachers regarding colour were similar irrespective of the subject they teach. The majority of teachers preferred a pale blue colour for their learning environment,

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which was also preferred by the majority of students. Both students and teachers believed that colour should differ between subject classrooms in order to provide identity within a classroom. The importance of natural light, reflectance and glare also influence the impact of colour on the learning environment.

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1. Introduction

The factors which influence school outcomes are both numerous and complex. In addition, the relationship between an individual factor and an outcome may not even be a linear one. Whilst this complexity makes factors more intriguing to those in school leadership, it may impede identification of aspects influencing school development and also make implementation of change even more. This research aims to investigate one of the key aspects of 'School Effectiveness' identified by Hattie (2008 & 2014), the 'class environment'.

Influence	Effect Size	Source of influence
Feedback to students	1.13	Teacher
Students' prior cognitive ability	1.04	Student
Instructional quality	1.00	Teacher
Students' disposition to learn	0.61	Student
Class environment	0.56	School
Challenge of targets	0.52	Teacher
Peer Tutoring	0.50	Teacher
Homework	0.43	Teacher
Teacher Style	0.42	Teacher
Questioning	0.41	Teacher
Testing	0.30	Teacher
Instructional media	0.30	Teacher
Affective attributes of students	0.24	Student
Physical attributes of students	0.21	Student
Audio-visual aids	0.16	Teacher
Individualisation	0.14	Teacher
Behavioural objectives	0.12	Teacher
Class Size	0.05	School

Figure 1: Table of school influence and effect (after Hattie 2008).
Effect size refers to standard deviation (0.5 is equivalent to an increase of one GCSE grade).

An evaluation of the learning environment can be split into two smaller questions. Firstly, what colour do students and teachers perceive contributes to a good classroom environment? Secondly, does the perceived choice of classroom colour differ between subject disciplines?

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2. Literature Review

The published literature related to classroom environments is limited and the empirical evidence base is small (Sutton Trust 2013 & 2015). The 2003 classroom design initiative imposed on the schools within the State of New York (Burke & Burke-Samide 2004) has meant that there is more literature available in American Journals; equally a learning environment initiative in Denmark, also in 2003, saw a growth in the literature published within that country. A recent growth in publications based on research in the Malaysian educational system (Ramil *et al* 2013) has provided conclusions regarding the physical classroom environments of that country. The focus on physical elements of the classroom has also led to an examination of architectural literature focussing on educational design.

The second element within the research question looks at the effect of physical variables on human behaviour and therefore the chosen literature has focussed on this. However, priority has been given to literature which has an educational basis for its research base. The context in which the impact is taking place is as important as the variable controlling the effect itself.

2.1 What is a classroom environment?

The term 'classroom environment' could be considered to be the physical classroom environment in which learning takes place. However, the term can also be used to infer the emotional and psychological atmosphere which exists within a classroom. The classroom must be a supportive and educationally 'safe' environment if learning is to take place (Smith 1996) and understanding is increased significantly within such an environment (James 2006). Behaviourist theories of learning (James 2006) place a great emphasis on the learning environment and the power of the classroom in shaping educational habits. Whilst most of

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the principles of Behaviourist theory are redundant, the role of the classroom environment should remain prevalent in schools.

The division between the physical environment and the emotional environment is not simple or discrete. Within the B.A.S.I.C.S. model of Accelerated Learning (Smith 2011); the 'Belonging' aspect can be based on the interaction between the teacher and the student, or it can be based on the interaction between students themselves; all of these are aspects of the 'emotional environment'. However, this aspect of the model can also be explained by the physical classroom environment. In many ways, the classroom influences the teacher-student and student-student interactions (Chapman *et al* 2011) and therefore there is a physical causation effect on the emotional environment. Equally by placing a student's work on the wall, not only is the teacher changing the physical environment for all students, but they are in fact also influencing the sense of belonging and aspiration of the students (Smith 2011). The esteem of a student is crucial in affecting outcomes (Terhart 2011; Hattie 2008) and therefore the influences on this esteem are the pivotal factors; it is disingenuous to believe that any one factor has sole control over outcome. However, in contrast Nufer (2007) and Fischer *et al* (2014) found that the students' work on walls, whilst important, was not as influential as other factors such as classroom décor.

The merger of the emotional and physical environments is supported by Bentley-Davies (2010) who identifies that the classroom is an extension of the teacher, to the point that the classroom is an indicator of the "subconscious attitudes of the owner of the room" (*ibid* p.45). This may be the reason that there is limited empirical research purely into the influence of the physical environment; it is too difficult to separate from the impact of the teacher or indeed the attitude and esteem of the student.

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Cooper (1944) believed that the impact of the physical environment was secondary only to the impact of the teacher which supports the later findings of Hattie (2008 & 2014). Even in classroom environments which should impede learning (i.e. those that are poor), a good teacher could overcome these obstacles and still add significant value (Cooper 1944). Therefore it is difficult to assess the extent, if at all, of any impact of the classroom environment. Whilst Copper's (1944) research is 72 years old, ironic in itself as the research discusses the fact classroom environments in 1944 hadn't changed in the previous 50 years and the negative impact this must have, the core principles are still true today and clearly the effect of the teacher is evident in the research of Hattie and Yates (2014), and also in the work of Terhart (2011), the Education Endowment Foundation (Sutton Trust 2013), Fischer *et al* (2014) and Barrett *et al* (2015).

2.2 Does a classroom environment influence learning?

The students in any given school spend the majority of their time within classrooms. Intuitively, teachers deduce that the classroom environment will have an impact on students socially, emotionally and educationally. In Denmark, the 2003 school initiative placed a demand for an 'enriched learning environment' (Daggett *et al* 2008); this initiative considered the classroom environment as important as the teacher, in shaping outcomes. However, there still appears to be a difference between what educators naturally believe and empirical evidence.

The central focus of schools must be learning (Dempster 2009), therefore the significance of the classroom environment derives from this concept. The use of a classroom to immerse the students in their learning is common in Primary schools and ensures 'knowledge' becomes stuck (MacBeath 2008). This principle is often lost with the student's transition to

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their Secondary school and with it departs an opportunity for embedding knowledge more easily.

The research by Hattie (2008 & 2014) is based upon 800 meta-analyses; a concept developed by Class in 1976 (Miller 2013). Whilst this analysis gives us a clear indication as to the positive impact of various variables, it also appears to be able to provide a quantifiable measurement of a factor which educationists believe impacts learning. However, Hattie (2008) does not give detailed information about the methods of calculation (Terhart 2011) and this makes the reliability of the calculation questionable. Whilst the concept and process seem sound, the arbitrary allocation of a figure and weighting to various factors seems to lack statistical grounding. Terhart (2011) calls into question not only the method of calculation but also the fact that Hattie (2008) focusses on purely quantifiable measures. As discussed, a classroom environment is more than just physical or quantifiable aspects; there are significant emotional variables; therefore to evaluate only these factors is somewhat artificial in the context that qualitative factors play an equally significant role in the learning environment. Admittedly Hattie and Yates (2014) attempt to address these criticisms in their revised research into educational effectiveness.

The influence of the classroom environment is well supported by researchers. In fact educationalists have placed it second only to the teacher (Chapman *et al* 2011). However, the separation of teacher from the environment is not necessarily a reliable conclusion to draw. The teacher is often better considered as both an activator and a facilitator (Terhart 2011), and can have a direct influence on the outcomes achieved within a lesson, i.e. good teaching, or can have an indirect influence of education outcomes such learning environment, trust, safety (Smith 2011). A classroom reflects a teachers' attitude towards learning, education and pedagogy (Sommer 1977). This is an important concept when

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designing any investigation into the physical classroom environment. Either the element of 'teacher' has to be removed, such as with a Lens Model approach (Douglas & Gifford 2001), or the 'teacher' has to remain a constant Fischer *et al* (2014).

Norum (2004) asks two key questions: how we can improve the environment for learning and how do we know what works? This is not a new concept and, as early as 1955, the happiness of students was linked to environmental conditions (Unknown author, Journal of Education vol. 137, 1955). O'Hare stated that "properly designed classrooms not only accommodate active learning, but also encourage it" (O'Hare 1998 p.719). It is clear that the significance of the classroom environment cannot be underestimated (Chan & Petrie 1998). Vanhemert (2013) attributed the impact of classroom design as being up to 25%, either positive or negative, on a student's progress.

2.3 What effect does colour have on a classroom environment?

Every colour impacts the students' interpretation of the learning environment (Chapman *et al* 2011), and this interpretation can lead to positive or negative behavioural traits (Jalil *et al* 2013). Whilst the importance of students' work in developing aspiration and esteem (Smith 2011) has been discussed, some research has concluded that the colour of the classroom's walls is in fact significantly more important than displays and artwork (Nufer 2007). The impact of colour is supported by the findings of Simmons (1995) who made links between visual stimulation and stronger cognitive connections. However, the use of more than six colours within a classroom can over stimulate and have a negative impact on learning (Simmons 1995; Daggett *et al* 2008; Jalil *et al* 2013).

Red	Vitality, courage and self-confidence. This is the kind of colour that helps create energy. Motivational posters are best printed in bold red letters.

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Orange	Happiness, confidence and resourcefulness. Orange is the best emotional stimulant and strengthens our appetite for life. Greetings and 'smile' posters are best printed in orange.
Yellow	Wisdom, clarity and self-esteem. Yellow is related to the ability to perceive and understand. Problem solving activities are best printed in yellow.
Green	Balance, love and self-control. Green helps relax the muscles, the nerves and the mind. It helps to create a mood renewal, peace and harmony. Green is a good colour to use if you have a space dedicated to quiet work and introspection.
Blue	Knowledge, health and decisiveness. Blue is a mentally relaxing colour that has a pacifying effect on the nervous system and aids relaxation. This colour is ideal for worksheets as it helps calm hyperactive children. It is also an excellent choice for the colour of classroom walls.
Indigo	Imagination, dreaming and intuition. Indigo connects with the unconscious self and strengthens intuition, imagination and dreaming activities. Posters that are aspirational and goal-setting are best printed in this colour.
Violet	Beauty, creativity and inspiration. Violet purifies our thoughts and feelings, gives us inspiration and enhances artistic talent and creativity.

Figure 2: Impacts of colour on the classroom environment (Chapman *et al* 2011)

The concept of the impact of colour is supported by an understanding of the human psyche. Carl Jung hypothesised that humans are born with a predisposition towards certain colours (Engelbrecht 2003). It is understood that the effect of colour is due to the reflective nature of colour altering the amount of light which enters the eye. This in turn alters the alpha brain wave activity (Engelbrecht 2003). Therefore it is logical to infer that this experience is occurring within the classroom environment. This research is supported by the findings of Jalil *et al* (2013) who concluded that visual stimulation contributes to improvement of attention span and develops cognitive abilities. However, even within the study by Engelbrecht (2011), there is no evidence that the effect of colour is linked to the specific subject taught within an environment. One might deduce that certain subject disciplines desire different approaches and different outcomes. However, this deduction could also be more dependent on the individual teacher, rather than necessarily the subject. In fact, the effect of colour may be entirely personal (Jalil *et al* 2013) and linked to age, emotion, memories of the past, motivation and even culture (Jalil *et al* 2011 & 2013).

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Daggett *et al* (2008) concluded that classrooms should include a variety of colour based on age, gender, subject and activity. This was applied to individual subjects (Figure 3), however, the evidence for these conclusions was notably absent and it is difficult to understand the progression from generic understanding of the effects of colour, to specific effects in different subjects. Equally, it is unclear why the desired effect for two subjects is the same yet the colours are different. The lack of evidence for these conclusions means that it can only form the starting point for further research.

School Location	**Desired Effect**	**Colour**
Gymnasium	Activity	Red, red-orange, light orange, warm yellow, apricot, range, lime, medium green, no turquoise.
Hallway	Refresh	Green, blue, magenta, school colours
Cafeteria	Nutritious	Orange, red, green, lime, dark brown, no blue, no yellow-green, no magenta.
Auditorium	Dignity	Violet, black, dark green, navy, warm neutrals, purple, burgundy
Toilets	Comfort	White, blue
Counselling	Harmony	Green, lavender, peach, medium brown, yellow, no red, no bright yellow
Offices	Relax	Turquoise, blue, brown, green, magenta; sandstone, light gold, light green, cyan, black, no red, no blue
Entrances		School Colours
I.C.T	Encourage	Medium colours, provide visual relief, no bright colours.
Biology	Nature	Blue, green, teal, brown, beige
Chemistry	Logic	Blue, green, indigo
Physics	Energy	Blue, yellow, green, indigo
MFL	Friendship	Yellow
History	Age	Amber, blue, yellow, sea green
Mathematics	Logic	Indigo, blue
Drama	Passion	Orange, indigo, blue, violet, red, white
Art	Creative	Green, violet, red, peach, pink, light yellow
Politics	Order	Blue, green, indigo, silver, gold, mauve, violet, magenta
Economics	Wealth	Emerald green, amber, violet, gold

Figure 3: Dominant colour pallet for each school location (after Daggett *et al* 2008)

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Birren (1997) discusses the positive impact of colour on the attention span both within the US Navy and within business environments. This research concluded that whilst white and off-white environments decreased efficiency by 25%, the introduction of colour increased accuracy by 28%. However, this research is based on a rather limited study and there may be an age dependant variable with this impact, and therefore the conclusions are not necessarily directly applicable to a secondary school classroom environment. However, the research by Jalil *et al* (2013) showed that when given a choice of colours, the majority of respondents did not select white, although most selected a light shade of a particular colour.

Maknke (1996) makes age specific and even functional specific conclusions, but no subject specific conclusions are drawn within these age ranges.

Age Range	**Engelbrecht (2003)**	**Daggett *et al* (2008)**
Pre school	Warm, bright colour schemes that compliment nature.	Warm bright colours
Elementary school		Tints, pale shades and pastels
Middle School	Cool colours encourage concentration	Medium cool colours; e.g. greens, blues
Secondary school		Darker colours: burgundy, grey, navy, dark green
Hallways	Can have more colour range than in a classroom and can be used to give the school a distinctive personality	
Libraries	Pale light green creates an effect which enhances quietness and concentration.	Adolescents dislike large areas of primary colours.
Ceiling to furniture ratio	Maximum ratio of brightness difference of 3:1 between ceiling to furniture finish.	

Figure 4: Comparison of Engelbrecht's Guide to colour in Schools (2003) with Daggett *et al* (2008).

The research of Jalil *et al* (2013) supports the findings of Maknke (1996) and Daggett (2008). Kwalleck & Lewis (1990 after Jalil *et al* 2013) found that the colour red caused the most stimulation and led to the fewest errors. In addition, Kamarazzaman & Zawawi (2010 after

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Jalil *et al* 2013) concluded that the colour blue caused the highest performing environments, this is clearly in support of earlier findings, although the research of Jalil *et al* (2013) is based on a very narrow selection of colours and this significantly impacts the conclusions drawn.

The conclusion of colour affecting learning seems to be reached far too easily and is without reliable evidence to support this conclusion. Whilst many educators and education academics believe that the effect of colour must surely impact learning, the direct cause-effect relationship is harder to evidence. However, the evidence of the effect of colour on human psychology is well documented. Therefore the link to an educational setting can be inferred even if not empirically tested. Grangaard (after Nufer 2007) observed an increase in the attention span of students once the white walls had been re-painted to a blue hue. Whilst Baytin *et al* (2005) concluded that the importance of wall colour was primarily focussed on the wall surrounding the board from which teachers used to deliver lessons. This supports the work of Engelbrecht (2003) and provides an interesting concept for primary research into the project. Whilst differences in colour have been identified as important factors, there has been further research into the variation in shade of one colour within a classroom. Nufer (2007) concluded that the wall to which the students face should be two shades darker than the other three walls. This is based upon physiological research of human anatomy and concentration. This provides indirect support to the conclusion that there is increased student attention with a reduction in glare from white paint (i.e. darker colours/shades). However, Sasson (2013) concludes that lighter colours are more preferable than darker colours. This contrast in analysis reduces the reliability of research in the area. Nevertheless, the concept is an intriguing one and lends itself to primary research.

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3. Research methodology

The research into this aspect of education is limited, and within this research there are a variety of approaches. Experiment has been utilised by Baytin *et al* (2005) and Fischer *et al* (2014). Douglas & Gifford (2001), Barrett *et al* (2013) and Ramli *et al* (2013 & 2014) have all utilised Survey methodologies.

3.1 Paradigm

In order to address the research question it was best to employ the principles of an *interpretivist* approach. The principles of Positivism influenced the design of the methodology, however, the design of the research had to allow repetition at different schools, both within the UK and internationally. The conclusions drawn, and generalisations made, for all research must be considered in each school's context. For these reasons the research focussed on context interpretation, meaning and elucidation (McNeill & Chapman 2005; Scott & Usher 1996). It is often impossible for research to be separated from historical and cultural contexts and therefore any research must embrace and explain it (Scott & Usher 1996). For the chosen research title, it was important to also understand participants' feelings and attitudes (McNeill & Chapman 2005), this is supported by Dorman's (2008) research which concluded that the school's setting highly influences individual responses to classroom environments. It was clear that only an Interpretivist approach will accommodate people's feelings and an assessment of context in which there are multiple interpretations.

3.2 Approach

An Experiment methodology would have produced quantitative data allowing bivariate analysis. However, this would have been difficult to analyse within the context of the School (Dey 1993) and it is also not Interpretivist in its approach. Observation and Survey

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methodologies addressed the limitations of Experimentation and allowed the context of the research to be established. In addition the use of Survey allows the research to be expanded spatially and temporally with relative ease. Nordi & Steward (2003; after Wilson & Fox 2009) utilised Classroom observation successfully to produce qualitative data which was triangulated using a Survey methodology of group interviews. Survey methodology has been successfully employed in comparable research by Barrett *et al* (2013). Regenhardt (2006) also used a Survey methodology which focussed on smaller groups of students, sampled by the subjects they had chosen to study. Ramli *et* al (2013) used a Questionnaire Survey based on the responses of 50 students and 10 teachers. In addition Douglas and Gifford (2001) also utilised an Observation method, which is based on the Brunswik Lens Model method (*ibid*) to inform their survey of 20 professors and 51 undergraduate students. This latter research was triangulated using interviews.

In order to establish the school context a Structured Non-participant observation (Bell 2010) method was employed. Following this Observation and Survey methodologies were employed in order to investigate the participants' perceptions of a classroom environment.

3.2.1 Description of the Observation methodology

Each classroom within the entire School was photographed from five perspectives (Figures 5-9).

Fig.5: Rear-left corner perspective

Fig.6: Rear-central perspective

Fig.7: Rear-right corner perspective

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Fig.8: Front-left corner perspective

Fig.9: Front-right corner perspective

In order to improve validity and reliability all sampled classrooms were photographed on the same day; within a 3 hour time frame (11:00-14:00). This reduced the influence of weather and time of day on natural illumination. The photographs were taken on a clear sunny day in June (time of greatest natural light in the UK); allowing the greatest natural illumination of a classroom.

The camera was set to the same exposure settings for each photograph and therefore allowed more reliable comparisons to be made between different classrooms. To further improve reliability, the camera was always at the same height; 180cm. Furthermore the Observation was only conducted from the photographs; this would allow repetition of the research at another school should the research be expanded spatially or temporally.

Using the photographs generated from this methodology an observation was conducted using a structured observation matrix (Appendix 1). This provided quantitative data regarding the context of classroom environments within the School. In addition to the photographs of each classroom, the observation methodology measured key variables of each classroom, which was recorded on the structured observation matrix (Appendix 1). The features of each classroom that were observed were:

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i. The level and aspect of each classroom

ii. Classroom dimensions

iii. Classroom orientation

iv. Quality of light

v. Quality of furniture

vi. Classroom decor

These variables established a context of the School's classrooms and allowed triangulation with the responses of the Survey questionnaire.

3.2.2 Approach to sampling for the Observation methodology

During a Pilot Survey 24 classrooms (20% of the total population) were observed using the described method. Following this Pilot, it was felt that the entire population of classrooms could be realistically observed; therefore negating the need for any sampling.

3.2.3 Description of Survey methodology

Using the photographs generated by the Observation methodology, a questionnaire was constructed (Appendix 2). This questionnaire was designed to address both of the sub-questions relating to classroom environments. Firstly, questions focussed on teacher and student participants' perceptions (research question one) and the final section evaluated whether these preferences changed dependent on subject disciplines (research question two). The fourth section of the questionnaire focussed on the specific variable of colour within a classroom environment. In order to isolate the variable of colour, all other variables were kept constant. This was achieved by taking a photograph of one classroom from one angle. The colour of main teaching wall was then digitally changed using computer software (Figures 10 and 11).

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Figure 10: Classroom Colour 1 – pale blue

Figure 11: Classroom Colour 9 – bright red

The use of digital alteration meant than there was not change to any other variable within the photograph. Participants were asked to select their preferred colour within the classroom. Once again participants were asked if their original choice of colour would change dependent upon the subject being taught in the classroom. If the participant indicated that their choice would change, they were asked to select a new colour for the indicated subject.

3.2.4 Approach to sampling for the Survey methodology

The School's population of 1400 students was too large for the total population to be measured, therefore a stratified sampling strategy was employed. Comparable studies have sample sizes of 60 (Baytin *et al* 2005), 60 (50 students and 10 teachers) (Ramli *et al* 2013), and 71 (51 students and 20 teachers) (Douglas and Gifford 2001). Therefore a similar number of participants were selected for this research: 40 students and 20 teachers.

It is imperative that each student must be socially competent and sufficiently mature (Cohen et al 2001) in order to be part of the research. For this reason Gillick Competence (Gillick v West Norfolk 1985) was used in determining the age and selection of students. Whilst the School contains students as young as 5 years old, it would have been inappropriate to use these students as respondents. Many of the Junior School would be deemed 'Gillick competent' but not all of the population. Therefore sampling may have selected students

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who are not ‘competent’. For this reason sampling of the population focussed on the Senior School (aged 11-18) all of whom are Gillick Competent.

The selection of the sample in this way should not prevent repetition in other organisations provided that sampling strategy is shaped by the local context of the School.

3.2.5 Validity and reliability of the Survey methodology

Validity is very difficult with attitude surveys (McNeil & Chapman 2005); the key question is determining that the subjects are telling the truth (Cohen *et al* 2001). The nature of research is not sensitive and therefore the likelihood of deception was minimised.

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4.0 Analysis & Discussion

4.1 What effect does colour have on a classroom environment?

The preferred choice of colours was the same for students (35%) and teachers (43.8%); both opting for Classroom 1, which was digitally 'painted' a pale blue colour (Figure 13). Notably, a large proportion (20%) of student participants chose Classroom 9 (Figure 14) which was a bright red colour.

Q34	All %	Teacher %
1	35.0%	43.8%
2	15.0%	12.5%
3	2.5%	12.5%
4	2.5%	6.3%
5	5.0%	0.0%
6	0.0%	6.3%
7	7.5%	12.5%
8	12.5%	0.0%
9	20.0%	6.3%
10	0.0%	0.0%

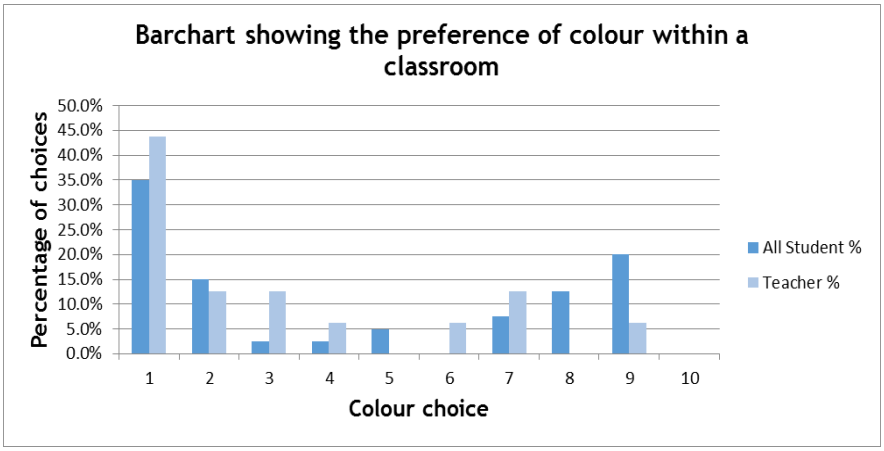

Figure 12: Table and Barchart showing percentage of student and teacher votes for each colour of classroom.

Figure 13: Classroom Colour 1 – pale blue

Figure 14: Classroom Colour 9 – bright red

The choice of preferred colour, pale blue, supports published theory in particular the research of Grangaard (after Nufer 2007) and Kamarazzaman & Zawawi (2010 after Jalil *et al* 2013) who observed a preference for a blue hue within a classroom environment. Respondents

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preferred a colour which also supports the conclusions of Birren (1997) and they certainly did not like white which supports the research conclusions of Jalil *et al* (2013).

There is empirical research showing that colour preference changes with age (Maknke 1996; Daggett *et al* 2008; Jalil *et al* 2013; Barrett *et al* 2015). Certain aspects of these conclusions are supported by this research (Figure 15). The U13 category has a greater range of colours selected, compared to the smaller range of colours selected by teachers (the oldest respondents).

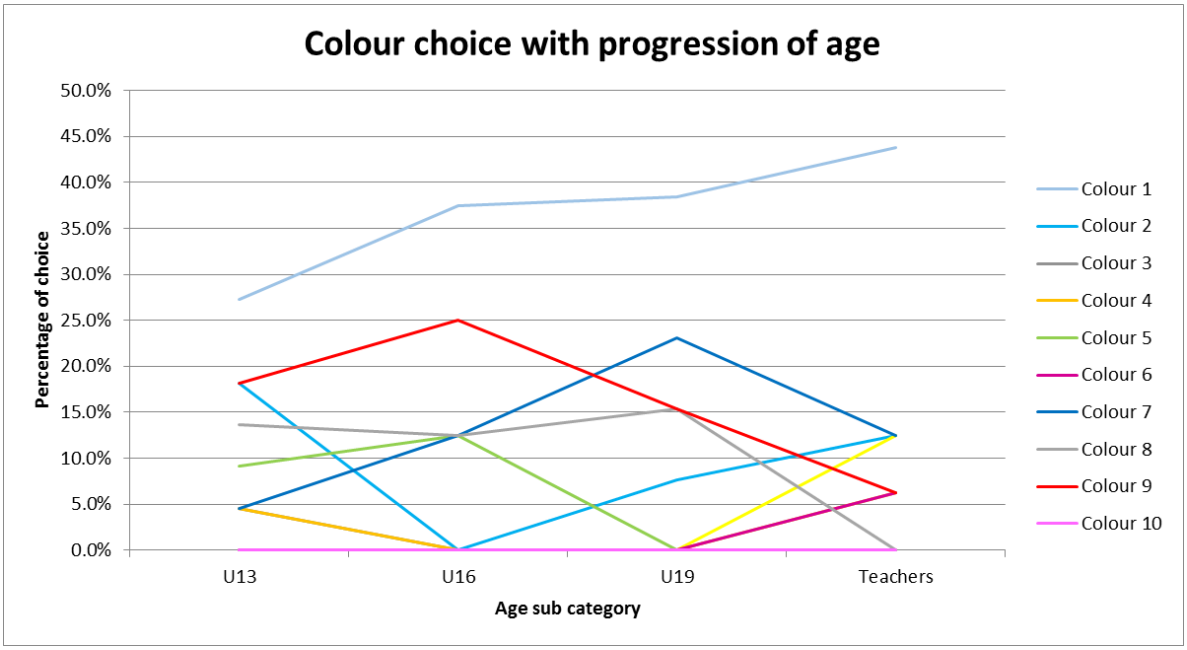

Figure 15: Line graph showing the changes to colour preference between the four age categories.

Published research shows that bolder, primary colours are preferred by younger participants and as participants get older there is an increasing preference for paler pastel colours (Daggett *et al* 2008; Jalil *et al* 2013; Barrett *et al* 2015). This is supported by Figure 15, which shows that bolder primary colours such as Classroom 9 (bright red) is dominant with younger students (U13) but then steadily declines in preference as students get older. In addition, the preferred colour (Classroom 1 - pale blue) steadily increases in popularity with

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age. This concurs with the conclusions of Barrett *et al (*2015). This is also evident by comparing Figures 16, 17 and 18, which show student and teacher participants' responses to the open question regarding colour in a classroom environment. There appears to be a trend in the preference from bolder, stronger colours at younger ages, to more pastel paler colours at older ages and for teachers.

Varied colours and brightness makes a good classroom environment.
lots of bright and colourful resources.
Bright vibrant colour.
Bright and colourful.
A classroom with plenty of colours is good.
Stronger colours.
I think the colour attracts children and plain white isn't interesting. I think the colour has to be bold but not dark.
I think bright, fluorescent coloured classrooms are too distracting but dull colours are too boring.
A bright colour is nice and would keep me lively.

Figure 16: Table showing a sample of U13 students' open question responses relating to choice of colour.

Light colours in general are preferential
Not too vibrant colours and not too dark either.
Not too dark colours.
A pale colour that doesn't distract from the teacher or board.
The colour would need to reflect light well making the classroom brighter.
A light grey, a dark grey, a white kind of colour, light grey around whiteboard, white on walls.
It can't be too bright otherwise it would distract learning.
A dark colour is too depressing.
Light colours.

Figure 17: Table showing a sample of U18 students' open question responses relating to choice of colour.

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A modern neutral colour for the feature wall would look good e.g. Grey
I prefer light colours, but I have no idea why!
Not too dark - pale and neutral colours are best
Light, pastel tones which enhance and do not detract from presentation/lesson delivery of the lesson. Colour needed but not too bold.
Calm neutral colours, pale & hence light enhancing. Blues for preference.
Pastel shades generally would be more conducive to learning I feel.
I don't want to teach in a room which is a colour I don't like (e.g. vibrant green)!
Calming light blue & in keeping with the school colours.
The colour should be light to avoid distraction - but not white or too close to white to reflect too much light.
I like a neutral colour as the background to the whiteboard, otherwise it would be too distracting.

Figure 18: Table showing a sample of teachers' open question responses relating to choice of colour.

The definitive nature of the question relating to colour, whilst providing clear quantitative data, may be improved by asking participants to rank the classroom colours, rather than choosing one. This is a topic of potential future research. Colour preference is also individual (Engelbrecht 2003) and therefore is may not be possible to have all participants agree on one preferred colour. It would be more informative for a highly rated colour to be used rather than one definitive colour which might polarise opinion.

It is clear from this research that paler colours should be selected within the classroom environment and pale blue should dominate classroom environments.

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Similar learning environments have attempted to embed the principles of a dominant colour on the main teaching wall. However, these environments have not always selected colours which are preferred by students and teachers (Figure 19)

Figure 19: Bright pink dominant teaching wall installed in a London Independent School.

The learning environment show in Figure 19 employs the concept of the teaching wall being a darker colour, however, the choice of colour was disliked by participants and was perceived to create a stressful learning environment.

4.2 Should colour differ between subjects?

Students were asked if their choice of classroom colour would change dependent on the subject being taught in the classroom. The data from this question (Figure 20) was irrespective of which colour they initially chose. It was purely designed to test if colour should change between subjects.

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Q35 - Humanity		Q36 - Mathematics		Q37 - MFL		Q38 - English	
Yes	No	Yes	No	Yes	No	Yes	No
52.5%	47.5%	50.0%	50.0%	32.5%	67.5%	30.0%	70.0%

Figure 20: Table the responses to the question whether a participant's choice of colour would change dependent on the subject being taught in the classroom.

Participants indicated that their choice of colour would change for a Humanity subject. The responses for Mathematics were even with half of the participants indicating they would change their colour choice, and half saying they would not. For both Modern Foreign Languages and English students would remain with their original choice.

The results for the choice of colours for each subject should be interpreted in comparison with student participants' overall choices (Figure 12); allowing a difference in choices to be identified.

Students continued to prefer Classroom 1 (Figure 22), which has a pale blue colour on the main teaching wall. However, the preference for this colour has declined compared to the overall percentage, showing that for a Humanity subject some students would prefer to be taught in a different coloured classroom. Almost 20% of students chose Classroom 2 a bright blue (Figure 23) for their choice of classroom colour for a Humanity subject. This is an increase compared to the overall colour choice selection.

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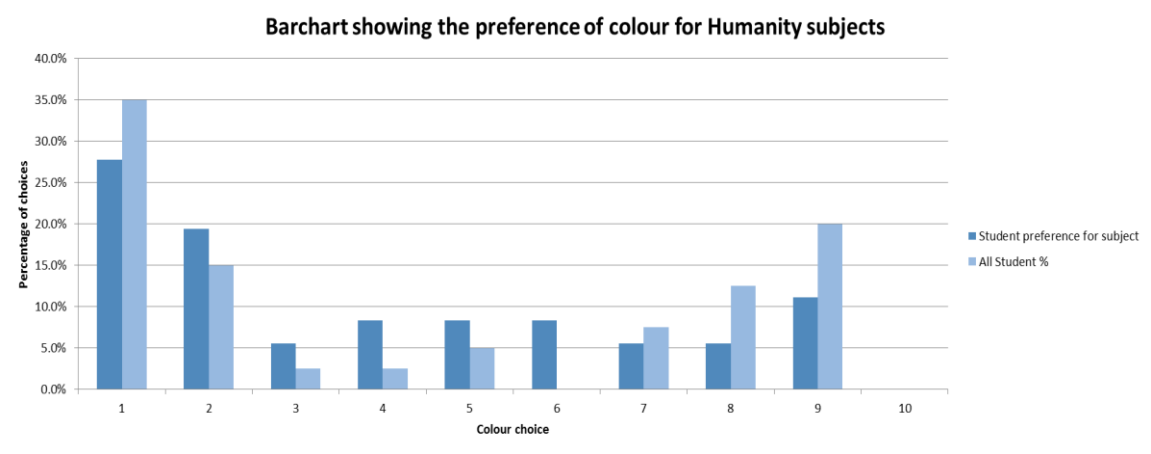

Figure 21: Bar chart showing the percentage of participants choosing each classroom for Humanity subjects (Geography, History & Religious Studies).

Figure 22: Classroom colour 1 – pale blue

Figure 23: Classroom colour 2 – bright blue

For Mathematics, students indicated the strength of their preference for Classroom 1, a pale blue, as shown in Figure 24. This preference increased from the original choices, indicating more students changed their preference to Classroom 1. There was also an increase in the preference for Classroom 8 (Figure 26), a pale grey colour.

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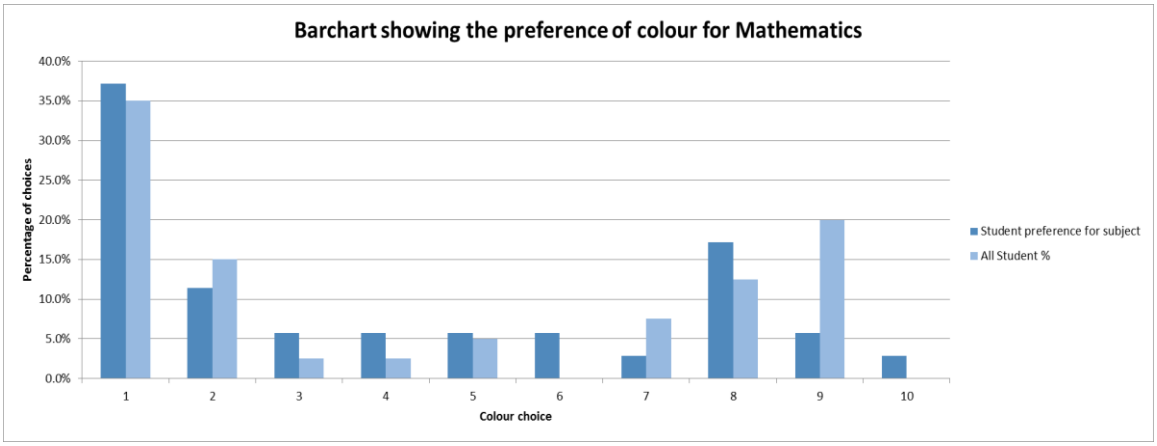

Figure 24: Bar chart showing the percentage of participants choosing each classroom for Mathematics.

Figure 25: Classroom colour 1 – pale blue

Figure 26: Classroom colour 8 – grey

The preference for Modern Foreign Languages remained highest for Classroom 1, pale blue, although this did decrease by 5% from the original choices (Figure 27). There was an increase of 5% in the preference for Classroom 2 – bright blue (Figure 29).

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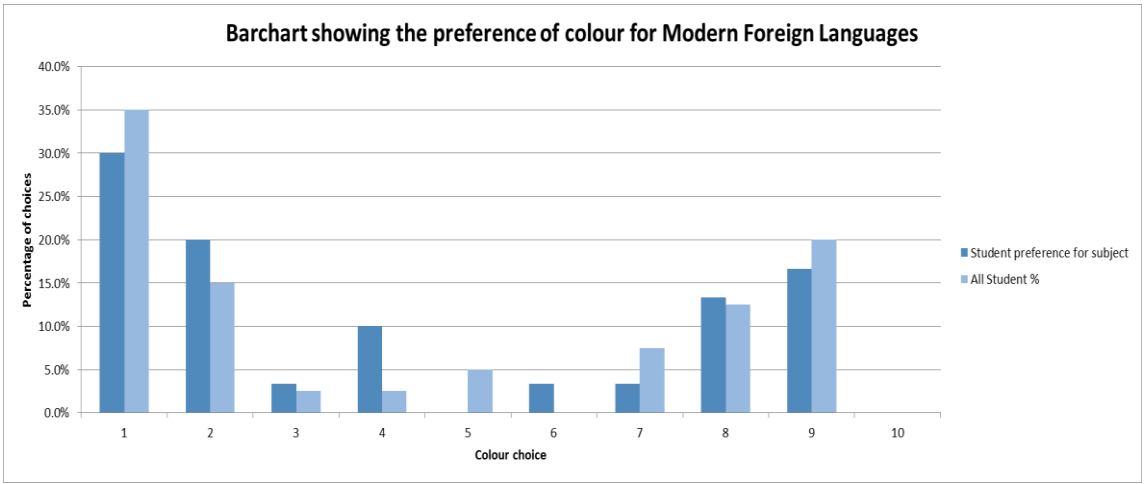

Figure 27: Bar chart showing the percentage of participants choosing each classroom for Modern Foreign Language subjects.

Figure 28: Classroom colour 1 – pale blue

Figure 29: Classroom colour 2 – bright blue.

Student preference for Classroom 1 – pale blue, increased by 10% from the original choices when asked to indicate colour preference for English being taught in the classroom (Figure 30). There was also a significant increase in the preference for Classroom 2 – bright blue.

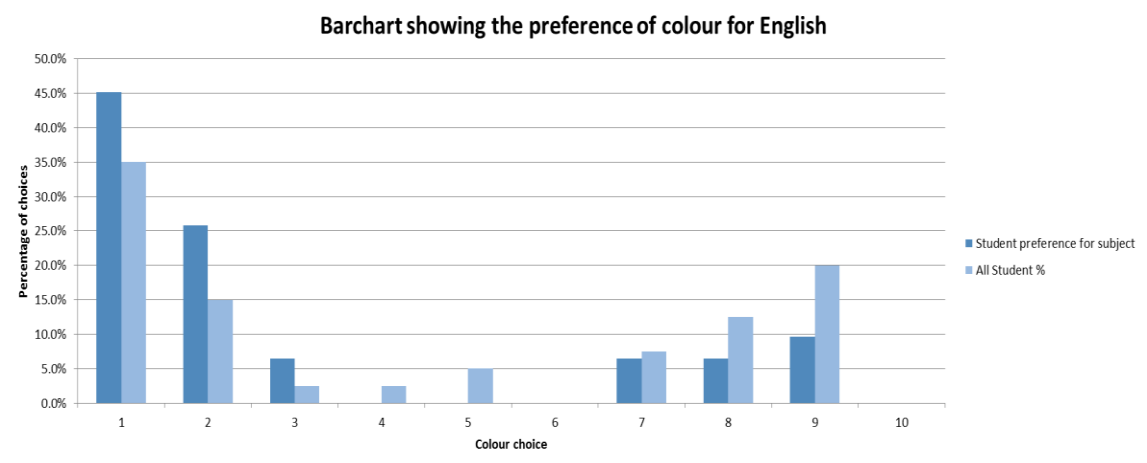

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Figure 30: Bar chart showing the percentage of participants choosing each classroom for English.

Figure 31: Classroom colour 1 – pale blue

Figure 32: Classroom colour 2 – bright blue

It is clear from the Survey methodology that students approve of the concept of a different colour in a classroom. It is also clear that the majority of students prefer pale blue (Classroom 1) irrespective of the subject being taught in the room. This concurs with the teacher participants' preferences, although does create a dilemma about how every classroom should be pale blue and also be different from other subjects.

There are a large percentage of students who did change their preference based on the subject being taught within the classroom, whilst the majority remained with Classroom 1 (pale blue) there was a degree of movement and difference between subjects. Both students' (Figures 16 and 17) and teachers' (Figure 18) responses to the open question indicate a desire for identity within the classroom and subject. The conclusions of Engelbrecht (2003), *Daggett et al* (2008), and Chapman *et al* (2011) indicate that colour should change between subjects, which was not directly supported by the conclusions of this research, there are indications that these conclusions are valid.

One method of forming this identity is through the use of contrasting colours; however, this improvement in one aspect of the classroom environment may have a detrimental impact on

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other aspects, as shown by the students' preferences. It may be plausible to allow classroom environments to be made individual through displays and decorations.

It is clear that both teachers and students like pale, pastel colours, and the number of colours within a classroom should be limited. This supports the conclusions of Chan (1980), Nufer (2007) and Sasson (2013), who concluded there should be a maximum of six colours within a classroom. Policy formation on classroom environments should restrict the number of colours within the classrooms, particularly relating to furniture, and soft furnishings such as carpets and blinds.

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6. Conclusions

The outcomes of the Survey methodology have supported many of the conclusions of published literature. The key principles of colour within a good classroom environment can also be outlined based upon this research and the findings of comparable research. These features can be modelled to provide a basis for future classroom development as well as the refurbishment of existing classrooms.

6.1 What makes a good classroom environment regarding colour?

Two key principles can be derived from this research. Firstly that a classroom should be painted predominantly white in order to aid light reflectance within the room, although consideration of glare regarding paint finish is needed. The main teaching wall should contain a colour around the whiteboard. Both students and teachers expressed a preference to a colour within a classroom around the whiteboards in order to raise concentration and give character to the classroom. This supports the conclusions of Baytin *et al* (2005) and Barrett *et al* (2015), which stipulated the need for colour on the main teaching wall.

The second principle which can be derived from this research is that the main colour of the teaching wall should be pale blue. This was overwhelmingly the preference for teachers and students for all classrooms. This choice of colour supports the conclusions drawn by Grangaard (after Nufer 2007), Kamarazzaman & Zawawi (2010 after Jalil *et al* 2013), Birren (1997), and Jalil *et al* (2013). Therefore, the standard teaching wall colour should be pale blue. Deviation should be permitted from this colour, if the subject decides there is a higher priority of identification, stimulation, or desired outcome within that particular subject.

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6. Bibliography

1. Arnold A, Britton-Simmons M, Williams R, Brewbaker S, Ranson S, Tomasik B & Protor K; 1993; *Designing classrooms with students in mind*; The English Journal Vol. 82 (2); pp 81-83

2. Ball S; 1998; *Big Policies/Small World: An introduction to international perspectives in education policy*; Comparative Education; 34 (2); pp 119-130.

3. Barrett P, Zhang Y, Davies F & Barrett L; 2015; *Clever Classrooms – Summary report of the HEAD Project*; University of Salford, Manchester

4. Barrett P, Zhang Y, Moffat S, Kobbacy K; 2012; *A holistic, multi-level analysis identifying the impact of classroom design on pupils' learning*; Building and Environment 59; pp 678-689.

5. Baytin C, Kiran A & Tunbis M; 2005; *Colour preference in Architectural Design Studios*; Architectural Science Review; 48(4); pp 317-328

6. Bell J; 2005; *Approaches to Research*, Chapter 1 in 'Doing your research project' (4th Ed.); Maidenhead: Open University Press; pp 7-27.

7. Bell J; 2010; *Designing & Administering Questionnaires*, Chapter 8: in 'Doing your research project' (5th Ed.); Maidenhead: Open University Press; pp 140-150.

8. Bell J; 2010; *Observation*, Chapter 11: in 'Doing your research project' (5th Ed.); Maidenhead: Open University Press; pp 191-205.

9. Bell J; 2010; *Planning & Conducting Interviews*, Chapter 9: in 'Doing your research project' (5th Ed.); Maidenhead: Open University Press; pp 160-176.

10. Bell L & Stevenson H; 2006; *Citizenship and Social Justice Developing Education Policy in Multi-Ethnic Schools;* in Bell L '*Education Policy: Process, Themes, and Impact';* London: Routledge; pp 138-159.

11. Benne K & Chin R; 1985; 2.2 General strategies for effecting change in human systems; from Benne K & Chin R; *The planning of change*; New York, Rinehart and Wintson; pp22-45

12. Bentley-Davies C; 2010; *How to be an Amazing Teacher*; Crown House Publishing Ltd, UK.

13. Bezjak B, Cerne B, Kalcic I & Medved S; 2003; *Optimizing the form of school buildings by using the requirements for daylight illumination;* Architectural Science Review; 46 (3) pp305-311

14. Birren F; 1997; *The Power of Color [sic]*; Carol Publishing Group, New Jersey.

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15. Breakspear S; 2012; *The Policy Impact of PISA: An Exploration of the Normative Effects of International Benchmarking in School System Performance;* OECD Education Working Papers; 71; OECD Publishing.

16. Burke K & Burke-Samide B; 2004; *Required changes in the Classroom Environment: it's a matter of design;* The Clearing House Vo. 77 (6); pp.236-239

17. Chan T; 1980; *Physical environment and middle grade achievement*; Educational Resources Information Center *[sic]*; Greenville County District, South Carolina

18. Chan TK & Petrie GF; 1998; *The Brain learns better in well-designed school environments*; ASCD Conference, California

19. Chapman S, Garnett S, Jervis A; 2011; *Improving Classroom* Performance; Crown House Publishing; pp.42-59

20. Cohen L, Manion L & Morrison K; 2001; *Chapter 2: Planning Educational and Social Research,* in 'Research Methods in Education'; London: Routledge pp 49-91.

21. Cohen L, Manion L & Morrison K; 2001; *Chapter 32: Planning Educational Research,* in 'Research Methods in Education'; London: Routledge pp 49-91.

22. Cooper D; 1944; *Improving the Design of the General Classroom in the Elementary School*; The Elementary School Journal Vol. 44(8); The University of Chicago Press; pp 465-471

23. Creemers B & Kryriakides L; 2012; *Chapter 2: Establishing links between effectiveness research & school improvement,* in 'Improving Quality in Education'; Routledge; pp 19-49.

24. Daggett W, Coble J & Gertel S; 2008; *Color [sic] in an Optimum Learning Environment*; International Center [sic] for Leadership in Education; pp 1-9

25. Dempster N; 2009; What do we know about leadership?; Chapter 2 in MacBeath J & Dempster N (eds); *Connecting Leadership & Learning: Principles for Practice*; London, Routledge; pp 20-31

26. Dey I; 1993; Chapter 3: *What is qualitative analysis?* in Qualitative Data Analysis: A user-friendly guide for Social Scientists; London: Routledge; pp 30-54.

27. Dorman J; 2008; *Detriments of classroom environment in Queensland secondary schools: a multilevel reanalysis*; Educational Research & Evaluation: International Journal on Theory & Practice 14(5); pp 429-444

28. Douglas D & Gifford R; 2001; *Evaluation of the physical classroom by students and professors: a lens model approach*; Educational Research; 43 (3); pp 295-309

A Haberdashers' Aske's Occasional Paper. All rights reserved.

29. Engelbrecht K; 2003; *The Impact of Colour on Learning*; Perkins & Will, Chicago, Illinois;

30. Espey M; 2008; *Does space matter? Classroom design and team-based learning*; Review of Agricultural Economics Vol. 30 (4); pp 764-775

31. Fischer A, Godwin K & Seltman H; 2014; *Visual Environment, Attention, Allocation and learning in Young Children: When too much of a good thing may be bad*; Psychological Science Vol. 25 (7); pp 1362-1370

32. Fullan M & Sharratt L; 2009; *Sustaining Leadership in Complex Times: an Individual and system solution;* Ch. 11 in Fullan M: The Challenge of Change, Start School Improvement Now!; Thousand Oaks: Corwin; pp 157-178.

33. Gorad S; 2010; *Serious doubts about school effectiveness*; British Educational Research Journal; 36 (5); pp 745-766.

34. Gronn P; 2010; Leadership: Its Genealogy, Configuration and Trajectory; Journal of Educational Administration and History; 42 (3); pp 405-435.

35. Hartas D; 2010; *The Epistemological Context of Qualitative and Quantitative Research;* in Hartas D: 'Educational Research and Inquiry: Qualitative and Quantitative Approaches'; London: Continuum; pp 33-53.

36. Hattie J; 2008; *Visible Learning: A Synthesis of Over 800 Meta-Analyses Relating to Achievement*; Routledge.

37. Hattie J & Yates G; 2014; *Visible Learning and the Science of How We Learn;* Routledge.

38. Jalil N, Yunus R & Said N; 2011; *Environmental colour impact upon Human Behaviour: a review*; Procedia – Social and Behavioural Sciences 35; pp 54-62

39. Jalil N, Yunus R & Said N; 2013; *Student's colour perception and preference: An empirical analysis of its relationship;* Procedia – Social and Behavioural Sciences 41; pp 575-582

40. James M; 2006; Assessment and Learning; London: SAGE; pp 47-60

41. James M, McCormick R; 2009; Teachers learning how to learn; Teaching & Teacher Education Vol. 25; pp 973-982.

42. Jones P; 1998; *Globalisation and Internationalism: Democratic prospects for world education;* Comparative Education; 34 (2); pp 143-155.

43. Leithwood K, Anderson S, Mascall B, Strauss T; 2010; *School Leaders' influences on Student Learning: The Four Paths;* in Bush T, Bell L & Middlewood D (Eds):

A Haberdashers' Aske's Occasional Paper. All rights reserved.

The Principles of Educational Leadership and Management (2nd ed); London: Sage Publication Ltd; pp13-30.

44. Lippman P; 2010; *Evidence-based design of Elementary & Secondary Schools*; Wiley, USA; pp 10-25

45. MacBeath J; 2008; What do we know about learning?; Chapter 1 in Frost D., Swaffield, S. and Waterhouse, F.(eds.) *Connecting Leadership and Learning: Principles of Practice;* London: Routledge pp4-19

46. MacBeath J & Mortimore P; 2001; *School effectiveness & improvement, the story so far,* in 'Improving School Effectiveness'; London: Open University Press; pp 1-21

47. MacGilchrist B, Myers K, Reed J; 2004; The Intelligent School: Chapter 4 – Learning about Learning; London: SAGE; pp 48-70.

48. Maknke F; 1996; *Color [sic], Environment, & Human Response*; Wiley & Sons Inc., Canada

49. McIntyre D & MacLeod G; 1993; *The Characteristics and use of systematic classroom observation,* Chapter 2 in 'Controversies in Classroom Research'; Buckingham: Open University Press; pp 10-24.

50. McNeill P & Chapman S; 2005; *Research methods in Sociology;* Ch. 1 in 'Research Methods'; London: Routledge; pp 1 -29.

51. Norum J; 2004; *Transforming the Physical Environment for Learning;* Change Vol. 36 (5); Taylor & Francis Ltd; pp 62-66

52. Nufer E; 2007; *Aspects of an Ideal Classroom*; California State University.

53. O'Hare M; 1998; *Classroom Design for Discussion Based Teaching*; Journal of Policy Analysis and Management Vol. 17 (4); pp 706-720

54. Perkins D; 2003; From Lordship to Leadership; Chapter 5 in Perkins D *King Arthur's Round Table: how collaborative conversations create smart organisations*; Hoboken, N.J.: Wiley; pp 89-117, 255-257.

55. Pring R; 2000; *Ethical Dimensions to Educational Research;* Ch. 7 in 'Philosophy of Educational research'; London: Continuum; pp 142-157

56. Ramli N, Ahmad S, Masri M; 2013; *Improving the Classroom Physical Environment: classroom users perception*; Procedia – Social and Behavioural Sciences 101; pp 221-229

57. Ramli N, Ahmad S, Taib M & Masri M; 2014; *Principals' perceptions on classroom physical environment*; Procedia – Social and Behavioural Sciences 153; pp 266-273

A Haberdashers' Aske's Occasional Paper. All rights reserved.

58. Regenhardt B; 2006; *School, Pupil's well-being and Achievement Scores – A psychological perspective on some of the factors that affect some pupils' performance in school;* Lunds Universitet – Department of Psychology.

59. Reynolds D; 2000; *School Effectiveness: The International Dimension;* Ch. 8 in 'The International Handbook of School Effectiveness Research'; Reynolds & Teddie; Falmer Press, New York; pp 232-256.

60. Robson C; 2011; *Surveys and Questionnaires,* Chapter 8 in 'Real World Research'; London: Blackwell; pp 227-268.

61. Roskos K & Newman B; 2011; *Classroom environment: first, last and always;* The Reading Teacher; Vol. 65 (2); pp 110-114.

62. Rosenfield P, Lambert N & Black A; 1985; *Desk Arrangement Effects on Pupils' Classroom Behaviour*; Journal of Educational Psychology Vol. 77 (1); pp 1010-108.

63. Scott D & Usher R; 1996; *A critique of neglected epistemological assumptions of educational research;* Ch. 2 in 'Understanding Educational Research' London: Routledge; pp 18-32.

64. Simmons S; 1995; *Drawing as thinking*; Think Magazine; pp 23-29

65. Simms S & Coly D; 2011; *The relationship between wall reflectance and daylight factor in real rooms*; Architectural Science Review 34 (4); pp 329-324

66. Smith, A; 1996; *Accelerated Learning in the Classroom*; Network Educational Press.

67. Smith, A; 2011; *High Performers: The Secrets of Successful Schools;* Crown House Publishing Ltd, UK.

68. Sommer R; 1977; *Classroom Layout*; Theory into Practice Vol. 16(3); pp 174-175

69. Stutchbury K & Fox A; 2009; *Ethics in Educational Research: introducing a methodological tool for effective ethical analysis;* The Cambridge Journal of Education; 39(4) pp. 489-504

70. Sutton Trust; 2013; *Education Endowment Foundation Teaching & Learning Toolkit.*

71. Sutton Trust; 2015; *Education Endowment Foundation Teaching & Learning Toolkit*

72. Taysum A & Iqbal M; 2012; *What counts as worthwhile policy analysis?;* Italian Journal of the Sociology of Education; 10 (1); pp 11 – 28.

73. Terhart E; 2011; *Has John Hattie really found the holy grail of research on teaching? An extended review of Visible Learning;* Journal of Curriculum Studies; pp.425-438

A Haberdashers' Aske's Occasional Paper. All rights reserved.

74. Thomas G; 2009; *The Design Frame;* Ch. 6 in 'How to Do Your Research Project'; London: Sage; pp 99-145.

75. Thomas, G; 2009; Your Introduction: starting points; Chapter 1 in Thomas G: *How to do a research project: a guide for students in education & applied sciences*; Thousand Oakes, Calif.: SAGE; pp 1-22

76. Unknown; 1955; *More light on the Modern Classroom*; The Journal of Education Vol. 137 (8); pp 11

77. Weinstein C; 1977; *Modifying student* behaviour in an open classroom through changes in the Physical Design; American Educational Research Journal Vol 14 (3); pp 249-262

78. Weinstein C; 1979; *The Physical Environment of the School: A review of the research*; Review of Educational Research Vol. 49 (4); American Educational Research Association; pp 557-610

79. Wilson E & Fox A; 2009; *Collecting Data;* Ch5 in School Based Research; London; Sage; pp 85-91

Websites & Podcasts

1. Fullan M; 2009 http://www.youtube.com/watch?v=ZqUfrd2SBlandfeature=related

Watched January 2015

2. Fedder S; 2010;

Classroom use of colour to motivate, organise and boost memory

www.voices.yahoo.com/classroom-colour-motivate-organize-boost-6822558.html

Read November 2013

3. Heppell S; 2013

Sensory Perceptions in the Classroom: Sound, Light & Colour;

www.greenhearted.org/sensory-perceptions-in-the-classroom.html

Read February 2014

4. Jana R; 2013

Classroom design can affect students' progress

www.smartplanet.com/blog/bulletin/classroom-design-can-affect-students-progress-study-shows

Read December 2013

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5. Miller G; 2013
Understanding John Hattie's Visible Learning Research in the context of Carol Dweck's Growth Mind-set;
Educational Consultant published online.
Read November 2013

6. Sara H; 2013;
The Effects of Wall Colour on Learning
www.ehow.com/info-7874935_effects-classrook-wall-colour-learning,html
Read November 2013

7. Sasson D; 2013;
Colors [sic] and learning;
www.suite101.com/a/colors-and-learning-a-19816
Read February 2014

8. United Kingdom House of Lords Decisions: Gillick v West Norfolk & Wisbech Area Health Authority (1985)
http://www.bailii.org/uk/cases/UKHL/1985/7.html
Read June 2014

9. www.learningandthinking.co.uk
Read February 2014

10. Vanhemert K; 2013;
Classroom design affects student learning
www.fastcodesign.com/1671627/study-shows-how-classroom-design-affects-student-learning/
Read December 2013

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Appendix 1: Learning Environment Observational Grid Matrix

Physical Characteristics						
1. Height of classroom	Below Ground	Ground Floor	First Floor	Second Floor	Third Floor	Fourth Floor
2. Aspect	N	E	S	W		
3. Number of different aspects	Zero (No Windows)	1	2	3		
4. Classroom Dimensions	Length (m)		Width (m)		Height (m)	
5. Total Area of Windows (m^2)						
6. Ratio of window area to classroom volume						
7. Light meter reading (lux)	Reading:		Daylight Reading:		Difference:	
8. View from window	Nature		Playing Fields		Built Environment	
Orientation of classroom						
9. Taught off longest wall?	Yes	No				
10. Learning Wall is 90° to natural light source (window)?	Yes	No				
11. Orientation of pupil desks	Individual	Rows	Horseshoe	Small Groups	Circular	Other
12. Position of Teacher's desk	No desk	Front left	Front centre	Front right	Side	Rear
Quality of light	Very poor	Poor	Neutral	Good	Very good	
13. Quality of natural light	1	2	3	4	5	
14. Quality of artificial light	1	2	3	4	5	
15. Quality of wall reflectiveness	1	2	3	4	5	
16. Quality of furniture reflectiveness	1	2	3	4	5	
Classroom Furniture	Very poor	Poor	Neutral	Good	Very good	
17. Quality of furniture	1	2	3	4	5	
18. Does all the furniture match?	Yes	No				
Classroom Décor	Very poor	Poor	Neutral	Good	Very good	
19. Quality of wall paintwork	1	2	3	4	5	
20. Number of display boards	Zero / 1	2 / 3	4 / 5	6 / 7	8 / 9	10 / 10+
21. Is student work on display?	Yes	No				
22. Is subject material displayed?	Yes	No				
23. Are generic skills displayed e.g. spelling, command words	Yes	No				
24. Quality of displays	1	2	3	4	5	
25. Is the Learning wall populated?	Yes	No				
26. Quality of Learning Wall displays	1	2	3	4	5	None
27. Quality of floor coverings	1	2	3	4	5	
28. Quality of ceiling	1	2	3	4	5	
29. Is material stored on classroom surfaces?	Yes	No				
30. Quality of classroom tidiness	1	2	3	4	5	
Comments						

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Appendix 2: Survey Questionnaire

Colour Preference within a Classroom Environment

Q34: Each of the classrooms shown below has a different dominant colour. Which or the classrooms shown below would you prefer to be teach/be taught in?

1

2

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Q35 (Students only):

Would your original choice of dominant colour (insert answer to Q34) change if you were being taught a Humanity (Geography, History, Religious Studies) in this classroom?

YES / NO

(If Yes) Please select the dominant colour you would prefer to be taught a Humanity Subject.

1

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Q36 (Students only):

Would your original choice of dominant colour (insert answer to Q34) change if you were being taught Mathematics in this classroom?

YES / NO

(If Yes) Please select the dominant colour you would prefer to be taught Mathematics.

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Q37 (Students only):

Would your original choice of dominant colour (insert answer to Q34) change if you were being taught a Language subject (Arabic, French, German, Greek, Italian, Latin, Mandarin, Russian, Spanish etc.) in this classroom?

YES / NO

(If Yes) Please select the dominant colour you would prefer to be taught a Language subject

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Q38 (Students only):

Would your original choice of dominant colour (insert answer to Q34) change if you were being taught English in this classroom?

YES / NO

(If Yes) Please select the dominant colour you would prefer to be taught English.

1

2

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