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Design for Emotion: Can UK Secondary School Students be Taught How to Evoke an Emotional Response Through Product Design?

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ABSTRACT

This paper investigates whether secondary school students can be taught to design products which evoke a particular emotion in the user. A discussion on emotion is presented. Six emotions are identified for use in the study. To the authors' knowledge the concept of designing for emotion has not been researched or taught in the UK outside of higher education. Therefore, this study is the first to investigate designing for emotion within a secondary school environment and whilst the scale of this study is small, it provides some valuable insights for wider investigation. Eight male students aged 13-14 participated in the study. Pre and post questionnaires were completed and in addition, one semi-structured interview was conducted to enable both quantitative and qualitative data to be gathered. The findings are positive and suggest that designing for emotion increases student's ability to be creative and improves their consideration of the user. Evidence of their detailed design thinking and consideration of product features are presented. Prior personal experience of the emotions are reported, as are the session activities, as a source of student inspiration, with important findings favouring the use of mood boards. Limitations of the study are considered together with recommendations for further research.

KEYWORDS

design, emotion, product, creativity, education

Introduction

In 2002, Loughborough University held the third International Conference on "Design for Emotion", the first to be held within the UK. Industrial design students on the 2013 intake at Loughborough were required to write a short essay titled 'Is design for emotion new?'. This is where the topic interest has stemmed from. The university, at the time of writing, continues to highlight it as a key area of research and regard it as an area of design they specialise in (Loughborough University, 2020).

Research into this area has subsequently given emphasis to its importance and, as a result, universities now include it as an integral part of their undergraduate design courses. Testimony to its value is the research of McDonagh et al. (2004) who state, "we can no longer ignore the important role that emotions play in the generation, development, production, purchase, and final use of the products that we surround ourselves with" (p. xi).

Although designing for emotion has become a widely explored field of study in a variety of disciplines, there remains limited research regarding teaching this concept at secondary school level.

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Desmet and Hekkert (2009) highlight notable research in the field of 'Design and Emotion' from 1999–2009, with many findings focussing on student experience (pedagogy) in higher education. Whilst this research is useful in expanding understanding in the field, this paper seeks to focus attention on a stage before this (school experience).

Middleton (2005) argues that the development of the design and technology (D&T) curriculum has always been premised on the importance of designing and creative thinking. The author goes on to state, however, that there is "a great deal of uncertainty about methods for developing creative thinking abilities in design and technology students" (p. 61). This is highlighted by Nicholl and McLellan (2007, 2009; McLellan & Nicholl, 2011, 2013) whose research into D&T education suggests that current school practice and curriculum application is inadequate for fostering student creativity. Pressure to perform in the classroom has allowed little room for creative teaching or learning to occur; as a result, creativity is seen to be lacking in student work (McLellan & Nicholl, 2013; Nicholl & McLellan, 2008).

Therefore, research into new pedagogical approaches for D&T has been required and ultimately provided the motivation for this study. To the authors' knowledge, designing for emotion has not been researched or taught in UK secondary schools. As "experience or emotion driven design requires new tools and methods for designers" (McDonagh et al., 2004, p. xii), designing for emotion will provide new pedagogical methods for promoting student creativity in schools and is thus the chosen topic for this study.

Emotion

Creativity can be judged by the magnitude of the emotional response it evokes in the observer or user (Wilson, 2017). It is imperative, therefore, to understand what is meant by the term 'emotion'. Charles Darwin's (1872) book "The Expression of the Emotions in Man and Animals" has had a significant impact on emotion research. His theory of evolution was the first to highlight that emotion is influential to constructing social behaviours, like human communication (Ho & Siu, 2012). Since Darwin's book, there has been much debate on the topic of emotion and its definition. This debate was particularly widespread during the 20th century, when "controversy abound[ed] over the definition of emotion, the number of emotions that exist", their influences, origins and manifestations (LeDoux, 1995, p. 209). In an attempt to resolve this semantic debate, Kleinginna and Kleinginna (1981) compiled 92 definitions from a range of emotion literature. They were, however, only able to suggest that any definition should be broad enough to include any traditionally significant aspects of emotion. Due to its complexity and contention, some modern authors still perceive emotion to be a "notoriously difficult concept to define" (Jeffery, 2014, p. 126).

The cause of emotion also stimulates much debate; multiple theories exist but they can be seen to fall within two main perspectives, broadly referred to as evolutionary psychology and social constructivism. Those who support the idea that emotions have been socially constructed are "apt to connect affective dispositions with patterns of learned behaviour that reflect and perpetuate ideologies, moral codes and religious precepts" (Korsmeyer, 2011, p. 15). They argue emotions are the result of nurture not nature, and thus differ across cultures and throughout history (Prinz, 2004). In contrast, evolutionary psychologists argue that emotions are evolved products of natural selection and view emotions as relatively constant and uniform amongst different cultures (Korsmeyer, 2011). The evolutionary theory highlights the link between human and animal emotions and puts forward the notion that emotions play a part in species survival (Korsmeyer, 2011). The concept of the connection between the

body and emotion was the foundation of the work produced by James (1884). He suggested that emotions are the product of bodily change due to an environmental stimulus. Increased heart beats, breathing and muscle tension can all be associated with the emotion of fear (Prinz, 2004). The emotion prepares an organism to flee from threats; sending blood to the legs helps facilitate a flight response from any immediate danger (Campos et al., 2004). This theory has stemmed from Darwin's (1872) work on emotion expression in both animals and man. He suggested that the emotion process evolved to protect an organism, and the expression of emotion can be viewed as a significant communication tool.

How many emotions are there?

There is little agreement amongst researchers regarding how many emotions there are. Some emotions have been established as 'basic' and tend to be associated with the evolutionary theory of emotion. Basic emotions are described as "discrete physiological responses to fundamental life situations that have been useful in our ancestral environment" (Ekman & Cordaro, 2011, p. 369). Those emotions are considered to be basic in two ways: psychological and biological. These are universal, innate, and are not formed as part of another emotion (Evans, 2019; Prinz, 2004). Ekman and Friesen (1986) originally proposed that six emotions could be easily distinguished due to their unique, highly recognisable facial expressions. These are defined by Ekman and Cordaro (2011) and summarised below.

1. Anger - the response to interference with our pursuit of a goal we care about.
2. Fear - the response to danger both physical and psychological.
3. Surprise - the response to a sudden unforeseen event.
4. Sadness - the response to the loss of an object or person to which you are very attached.
5. Disgust - repulsion by the sight, smell, or taste of something.
6. Happiness - feelings that are enjoyed and sought by the person.

They have since been referred to as "The Big Six" and have become the most commonly accepted 'basic' emotions (Prinz, 2004). It is these emotions which were explored in this study.

Design for Emotion

The exploration of seminal literature offers an insight into the complex concept of both creativity and emotion. Notably the clear importance of creativity is highlighted, especially within a secondary educational setting. The significant absence of research regarding the impact of designing for emotion within this setting leads to the following questions:

1. Can secondary school students be taught to design for emotion?
2. Do secondary school students understand the importance of designing for emotion and its influence on creative thinking?
3. What pedagogical approaches are best to educate secondary school students to design for emotion?

Epistemological stance and theoretical perspective

The exploratory focus on human emotion within this study requires students to construct their own understanding of specific emotions. This focus aligns with constructionism which Crotty (1998)

identifies as "the view that all knowledge, and therefore all meaningful reality as such, is contingent upon human practices, being constructed in and out of interaction between human beings and their world, and developed and transmitted within an essentially social context" (p. 42). As the term suggests, within a constructionist view "meanings are constructed by human beings as they engage with the world they are interpreting" (p. 43). Therefore, the study does not consider the objective paradigm and aligns with the subjective approach.

When discussing theoretical perspectives Taber (2007) suggests that educational research commonly aligns with one of two approaches: Education Research Paradigm (ERP) 1 or ERP2.

ERP1 is considered as positivistic which describes "any approach that applies scientific method to the study of human action" (Schwandt, 2007, p. 233). This is based on a belief that observable phenomena can be reported on with "unambiguous truth" and "verified facts" (Taber, 2007, p. 37). Critics of this approach "would argue that the complexity of social phenomena (such as learners, lessons, classrooms, schools) makes it inappropriate to look for general laws that will apply across very different contexts" (p. 53). These critics are more likely to adopt an ERP2 stance which avoids the problem of trying to confirm "universal laws" and instead focus on an understanding that "allows insight into the hidden meaning behind human action" (Counsell, 2009, p. 316; Taber, 2013). Thus, ERP2 is considered interpretivist (the belief that all knowledge claims are interpretations) and idiographic (the exploration of unique individual cases) (Taber, 2013). This paradigm assumes that "the meaning of human action is inherent in that action, and that the task of the inquirer is to unearth that meaning" (Schwandt, 2007, p. 160).

The research questions posed here refer to seeking an understanding of a human phenomenon, emotion, within a specified environment and thus aligns closely with an ERP2 focus. The epistemological stance that informs this study is one of constructionism embedded within an interpretivist theoretical perspective. Justifications for the methodological approach are presented in the paragraphs that follow.

Methodology

The interpretivist stance aligns with the use of action research for this study because it aims to gather an understanding of the students thought and learning process with teacher-researcher led participation (Cohen et al., 2017).

Action (what we do) and research (how we find out about what we are doing) combine the idea of taking purposeful action with educational intent (McNiff & Whitehead, 2010). By learning in and through action and reflection, personal and professional development can be made, which Koshy (2009) argues is the purpose of action research. This aligns with McNiff (2002) who proposes that self-reflection is central to action research and describes it as "a form of practice which involves data gathering, reflection on the action as it is presented through the data, generating evidence from the data, and making claims to knowledge based on conclusions drawn from validated evidence" (p. 16).

Action research is conducted by practitioners. This study is conducted by a teacher-researcher and therefore can also be referred to as practitioner-based and practitioner-led research (McNiff & Whitehead, 2010). Ferrance (2000) writes that "implicit in the term action research is the idea that teachers will begin a cycle of posing questions, gathering data, reflection, and deciding on a course of action" (p. 8). McNiff (2015) frames this into six key stages which are summarised below:

1. Observe - identifying an area to study and improve.
2. Reflect - gathering data about the current situation, reflecting and then re-planning.
3. Act – acting and observing the changes that have been made.
4. Evaluate - reflecting on what is happening and generating data.
5. Modify - Making changes in response to the evaluation.
6. Move in new directions - develop new practices in response to the findings.

Alongside these stages of the action-reflection cycle, the study adheres to the implications for social research set out by Blumer (1969) as a process of revision and adjustment. This enables the researcher to reflect, intervene and adjust the process in response to the needs of the participants. "The classroom and its many sub groups and sub cultures are arguably settings of continuous adaptation and re-adaptation" (Counsell, 2009, p. 318). Accordingly, between each intervention will be the opportunity to adjust the relevant subsequent session or activity as required.

The Study

The study was conducted at an independent school for boys in the UK during 2019/2020. The school was in a town setting and had approximately 900 pupils across an 11-18 age range.

Ethical approval was granted by the Faculty of Education Ethics Committee at the University of Cambridge. The aims of the research, study sessions, and data collection methods were discussed and agreed upon by the Headteacher and the Head of D&T at the study school. Information concerning the study was communicated through emails and school notices to the pupils and their parents/legal guardians. Teaching sessions took place weekly during one lunchtime break across a four-week period. Written consent was obtained from both the participants and their parents/legal guardians before the start of the research project. All parties were made aware of their right to withdraw from the study at any point and without needing to provide a reason to do so. Wiles (2012, p. 41), comments that "anonymity and confidentiality are key considerations in ethical research practice". As this research gathers data from young people and their emotions, the ethical considerations were particularly important. For this reason, two 'gatekeepers' were appointed for participants and their parents/legal guardians to contact independently of the researcher if necessary. In this instance these were the Headmaster and the Head of the D&T department. The identity of the school, participants, and their work, has been stored confidentially in line with the school's data protection policies and has been anonymised.

It should be noted at this point that this is a small-scale study, limited further by the COVID-19 outbreak. This impacted the length, structure, delivery, and data collection process of the study. At the start of the research project 14 year nine students (boys aged 13-14) agreed to participate. Six of the participants were removed from the school prior to UK schools being put into a lock-down state. As they were unable to complete all aspects of the study, the evidence gathered from these six students has not been included. Full data sets were gathered from the remaining eight participants. Despite this limitation, valuable opportunities remained to explore pedagogy and learning. What follows is an overview and justification of the data collection methods employed.

Data Collection and Analysis

Cohen, Manion and Morrison (2017) suggest that qualitative data focuses on the complexity of the

participants' worlds, to provide context-specific, rich, and subjective data. Qualitative data is integral to this study as it provides scope for the subjective interpretation of the participants' emotions, thoughts, and design ideas. This information will be supplemented with quantitative data to provide a numerical base from which clear comparisons can be made.

The use of questionnaires can be considered as a primary tool for gathering data and an integral component of research (Martin & Hanington, 2012). Two questionnaires were completed during the study: at the start and end. A combination of open and closed style questions were posed in conjunction with a Likert-scale style to provide both quantitative and qualitative data (Oppenheim, 2000). Closed questions provide clear data to direct questions that can be both quickly compared and analysed. Consequently, they restrict how articulate respondents can be and can cause less thought-through responses (Krosnick & Presser, 2010). Incorporating open-ended questions enables participants to write freely without limitation to explain and justify their responses. If, however, the questions are too open-ended they can cause the participants to go off-topic and therefore provide irrelevant and redundant information (Dohrenwend, 1965). A pilot questionnaire was conducted to mediate against these limitations and increase the reliability, validity and practicability of the study questionnaires (Oppenheim, 2000). These were conducted with one class of 12 year eight students at the end of a lesson, who were independent to that of the study and its participants.

Interviews are a widely used instrument for data collection and, as Martin and Hanington (2012) suggest, are a "fundamental research method" (p. 102). Hochschild (2009) noted that interviews can explore issues in detail, investigate people's thought processes, and identify how and why they make connections between ideas, values, events, behaviours, and more. This allowed the topics to be covered and provided the openness to change questions in order to follow up on answers given by the interviewees (Brinkmann & Kvale, 2018).

Quantitative data gathered from the questionnaires aimed to establish the change in the student's responses from the start to the end of the study. When presented with a range of responses, the median is defined as "the point dividing the distribution such that an equal number of scores fall above or below that point" (McCall,1970, p. 43). Due to the low number of participants an outlier will have a detrimental effect on the result if the arithmetic mean is calculated. As the median is intrinsically resilient to the influence of outliers in a distribution, it is the preferred method of establishing changes to the "central tendency" of the data (p. 49). For this study, the median was calculated from a distribution of scores that required students to circle a number on a Likert-scale between 1 (low) and 10 (high).

Teaching Session Activities

The study sessions were conducted weekly with each session lasting approximately 40 minutes. The order and structure of these are outlined in Table 1 below.

Session Title	Session Objectives	Overview of Session Activities
1. Thinking About Emotions	• Identify a representation of each emotion • Link a personal memory to each emotion	• Worksheet - students describe what makes them feel the emotion and what they understand it to be. • Worksheet – students sketch an image they believe represents each emotion. • Questionnaire one conducted
2. Experiencing Emotions	• To provide all students with a shared experience and understanding of each emotion. • To evoke all six emotions in the participants	• Students complete a range of exercises and tasks each with the intention of evoking one of the six basic emotions.
3. Mood Boards and Research	• To build up resources and knowledge in preparation for their final design task	• Students select one emotion to design for • Working individually, they examine the emotion and create a mood board
4. Final Design Task	• To assess if students can design for emotion.	• Students are given the design brief to design a light source which evokes their chosen emotion in the user • Questionnaire two • Semi-structured interviews

Table 1. *Teaching Session Activities*

'Thinking about emotions', the first study session, introduced the participants to the concept of the six universal basic emotions and required them to complete questionnaire one (see appendix 1). These questions were posed to establish student's prior knowledge and perceptions of designing for emotion. This data was used to help inform the structure and content of the study sessions. Students worked through two exercises both with the aim of questioning their understanding and recalling their experiences of these emotions. They started by describing an environment or situation in which they would/have felt the emotion. Once completed students sketched an image or object they thought reflected these emotions.

'Experiencing emotions', session two, aimed to give all students a shared experience of each emotion. This had two purposes, first to provide them with a talking point; an experience they could refer to, understand, and discuss with each other. Second, for each student to explore and experience the stimulants that can cause these changes. The session was split into six exercises, one for each emotion. After each one, the students were required to identify which of the six emotions they felt or associated the exercise with. The order of the exercises and their content are detailed as follows:

Anger. Participants were told there would be a design competition against a group of year eight students; the winners being awarded with sweets. This was, however, a fixed competition. The year eight pupils were told during the competition to distract the participants with the aim of disrupting their work. At the end of the exercise, they would be crowned the winners and asked to eat the sweets in front of the year nine students.

Disgust. Students watched a PowerPoint presentation slide show which contained images of vomit, insects, mouldy food, and dirty toilets. During this presentation, the author set off a 'fart bomb' into the classroom. This is a small package that when squeezed, bursts and releases a pungent rotten egg smell (a new classroom was used after this exercise).

Fear. Students were formed into two teams and told to select one person to represent the group in a 'what's in the bag' challenge. They were told that if the chosen pupil identified incorrectly the contents of the bag, their team would be put into a stress position. Pictures of creepy clowns, spiders, and dark cloaked figures were projected onto the board with sounds of creaking doors and sinister laughter played in the background. This was also a fixed exercise; the objects were switched after the student made their guess to ensure their answer was not correct and the 'fear' of being put into a stress position was made. It must be noted that the exercise finished after the incorrect answer was given and no student was put into a stress position.

Surprise. A combination of videos containing a 'jack in the box' and its variants were watched by the participants.

Sadness. Instrumental, soft piano music was played throughout the exercise. Students were subjected to silent meditation for two minutes. They were then asked to recall memories of pets dying, being called hurtful names by friends, and to imagine watching a sentimental item being destroyed.

Happiness. Modern pop music was played in time with disco lights. Students were given a variety of confectionary items and carbonated drinks.

In the third study session, 'mood boards and research', the students self-allocated an emotion to focus on. This was aided by the author to ensure all the emotions would be designed for. Once chosen, the participants created a mood board of images and colours relating to their emotion. An example mood board for "sadness" is shown in Figure 1.

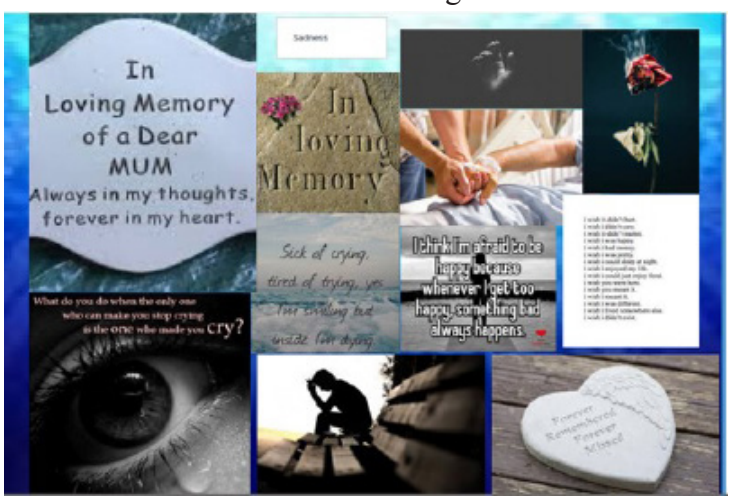

Fig.1 *Participant mood board – sadness*

In the last session, 'final design task', students were given the design brief 'to design a light source that when interacted with causes the user to feel your specified emotion'. A light source (lamp) was selected as it is a product that all participants have experience with. As there is a wide variety of existing designs this would combat the influence of the path of least resistance; when existing knowledge influences students' ideas (Ward, 1995). The session ended with the completion of questionnaire two (see appendix 2). These questions were asked so student insights into both the study and its activities could be obtained. Certain questions were repeated from the first questionnaire, so that direct comparisons could be made. Following this session, schools in the UK were placed in lockdown. Nonetheless three students were able to remotely take part in a semi-structured group interview which concluded the research.

Limitations and suggestions for further research

More research is required in the field of designing for emotion, particularly within a range of school contexts. Unfortunately, the outbreak of COVID-19 meant that only data from eight of the initial 14 participants was used to inform the study. As this research project was conducted in one single-sex independent secondary school, it has been subject to a constricted demographic and thus has only provided an indication into the wider topic area. A larger sample size would confirm the results of this initial study. Research with mixed gender groups and single-sex girls is also suggested and encouraged. Further credibility would be given to the findings of this study if data from other schools could be analysed and compared. As this is a fertile area, an additional study with more mature students would also be informative.

The study could be considered ambitious with its aim of analysing the results of all six basic emotions within the allotted time frame; concentrating on three emotions which students deemed to be easy, medium, and hard in terms of difficulty would have narrowed the research focus. From the results of this study these would be, Happiness (easy), Disgust or Fear (medium), and Sadness (hard)(see Figure 5). This refinement would allow for a greater number of direct participant comparisons to be made and for the teacher researcher to prescribe tasks appropriate to student ability.

Results and Discussion

Question 1: Can secondary school students be taught to design for emotion?

To structure the content of the study sessions, an understanding of what the participants believe an emotion to be must first be established. The first question in questionnaire one aimed to achieve this. Responses were compared to the definition of emotion as outlined by Campos, Keltner and Tapias (2004) in the literature review, "a short-lived, biologically based pattern of perception, experience, physiology, and communication that occurs in response to specific physical and social challenges and opportunities" (p. 714). Each answer related to the definition, suggesting students had a reasonable understanding of what an emotion is prior to the study.

The students were asked what they considered to be the most common six emotions. The question was asked in both questionnaire one and two so that a comparison could be made. The results are shown in Figure 2. All eight participants completed both questionnaires and thus formed the sample size for the figures that follow.

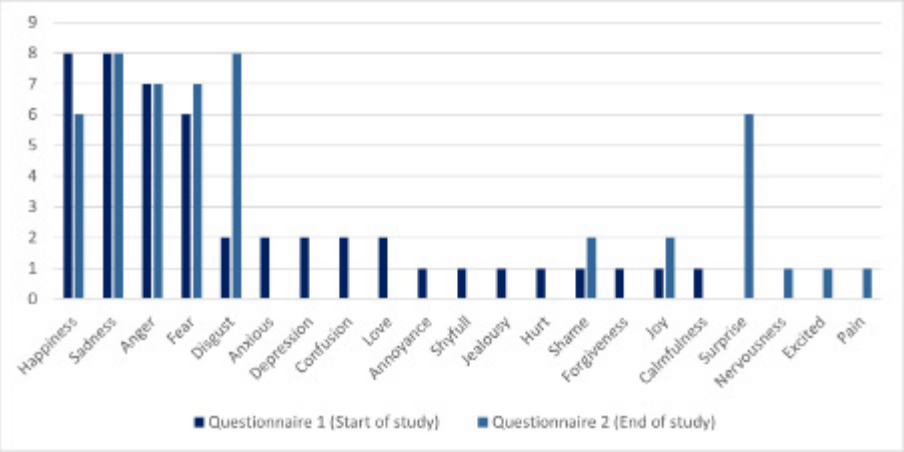

Fig.2 *What are the most common six emotions? - Student responses.*

The result shows that there was initial common knowledge and agreement amongst the participants for several emotions: happiness, sadness, anger, and fear. At the end of the study, this understanding expanded to include both disgust and surprise. This development is further highlighted by the decrease in the variety of mentioned emotions in the two questionnaires from 17 to 11. When asked what design features would affect the emotions of the user, there was a significant increase in both the number and variety of answers provided at the end of the study. The results are shown in Figure 3.

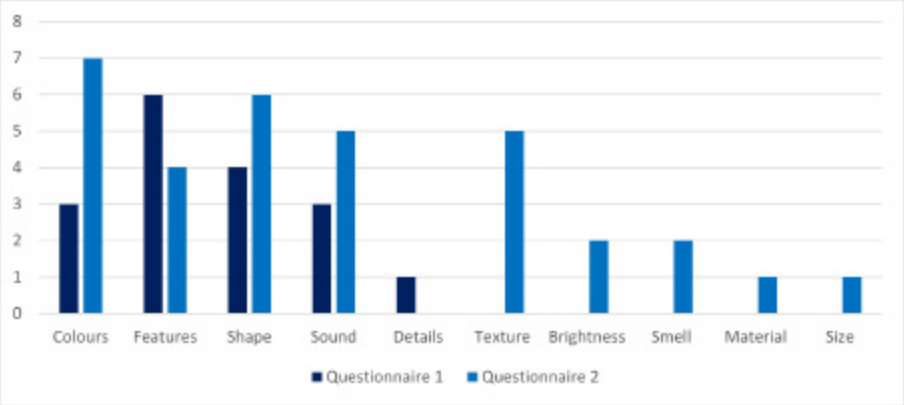

Fig.3 *What design features would affect the user's emotions.*

This important result suggests an increased development in the student's design thinking as well as an increase in their use of detail.

To ascertain if the study had affected the student's creativity, they were asked how confident they felt about designing for a specific emotion. This question was repeated in both questionnaires at the beginning and end of the study. The results are shown in Figure 4.

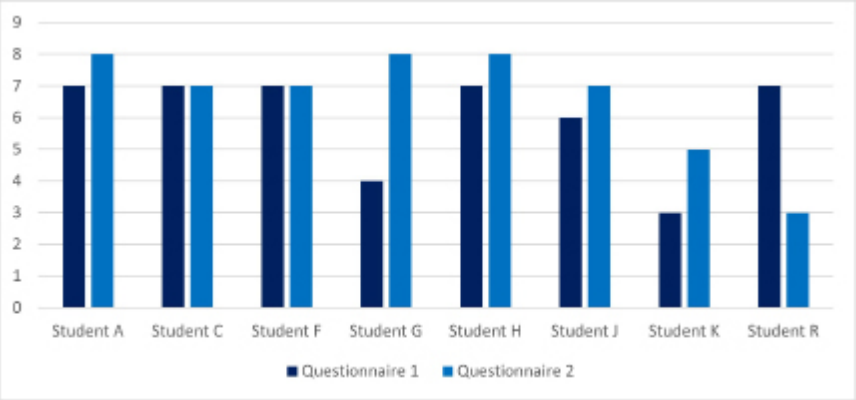

Fig.4 *Student's confidence in designing for a specific emotion.*

The results are mixed with positive and negative changes with some being unaffected. Importantly, however, the median shows an increase from 6.7 to 7.17 indicating that an increase in confidence and creativity had been demonstrated.

To ascertain if some emotions are more straightforward to design for than others, two questions were posed to the participants. They were asked to identify which emotions, if any, they found easy and difficult to design for. These were open-ended questions and consequently caused some pupils to provide more than one answer. The frequency of responses relating to the emotions has been listed below in Figure 5.

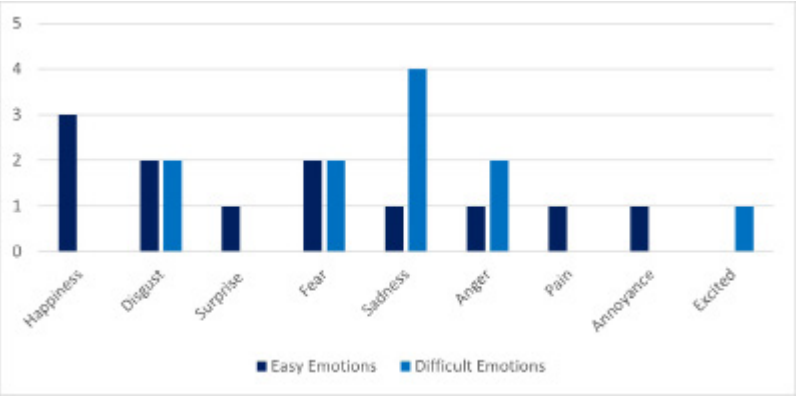

Fig.5 *Difficulty of emotions to design for: student responses.*

Happiness and sadness were identified as the easiest and most difficult to design for, respectively. This result will inform student learning by scaffolding the emotions to students in relation to their ability and confidence. As an example of an emotion which is difficult to design for, Figure 6 shows a sketch of a lamp intended to provoke anger in the user.

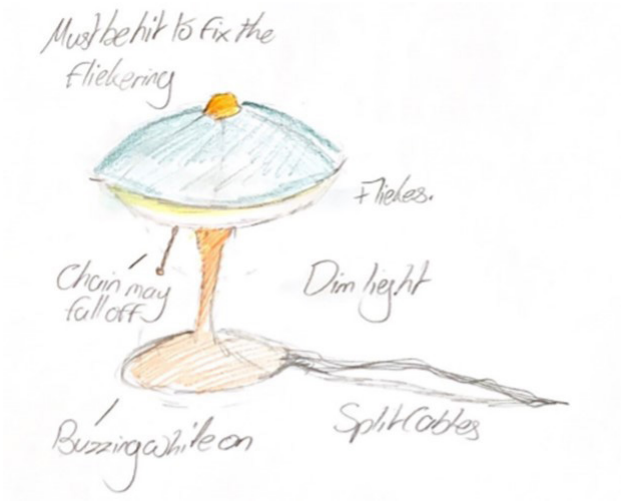

Fig.6 *A student's "anger" light.*

Question 2: Do secondary school students understand the importance of designing for emotion and its influence on creative thinking?

At the start and end of the study students were asked if it was possible for a product to be designed to evoke a particular emotion. All students agreed that this could be achieved. In addition, they were asked how important it was for a designer to consider the emotions provoked in a user when they interact with a product. The results are shown in Figure 7.

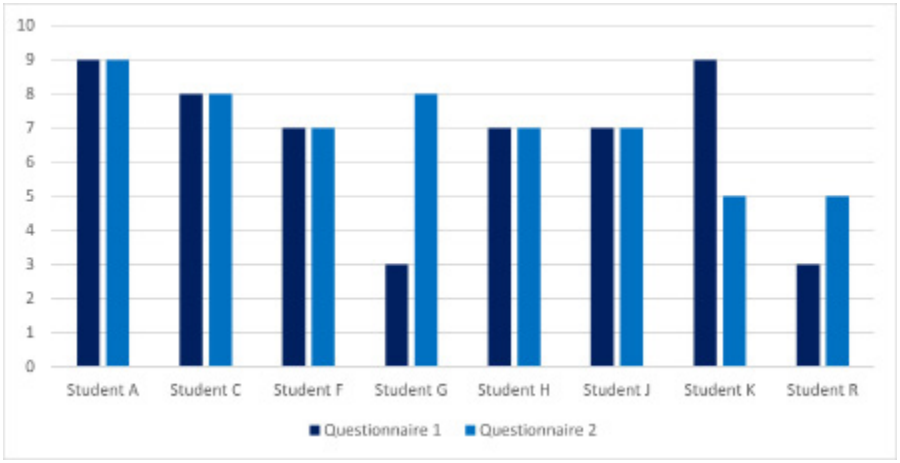

Fig.7 *Importance of considering the emotions of a user.*

In this case, the medians were the same for the beginning and end of the study at 7.17. This indicates that all students thought designing for emotion is an important topic and the study did not change this view. All students (including those interviewed) agreed the topic of design for emotion should be taught in schools and found the study to be of educational benefit.

Do you think students should be educated on designing for emotion? Why?	
Student F	"Then they will understand the purpose of designing a product and design something meaningful rather than a meaningless product."
Student G	"I think it's important because it drastically changes the way you design and think."
Student R	"It makes you think more about different bits of a design and how it can affect the user."

Table 2. *Should students be educated on designing for emotion – questionnaire responses.*

Students were asked to evaluate how creative they considered themselves to be on a scale of 1(not very) to 10 (very) at the start and end of the study. The results are shown in Figure 8.

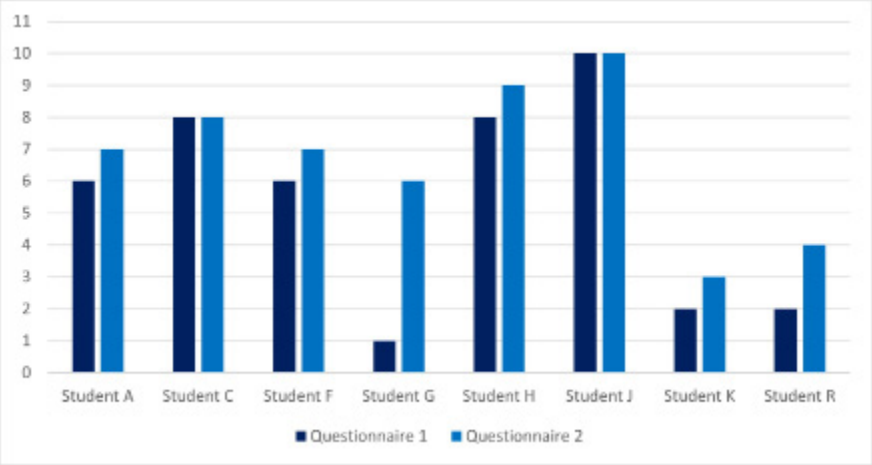

Fig 8. *Student self-evaluation of creative ability.*

The median between the start and end of the study increased from 6 to 7 respectively, suggesting that being taught how to design for emotion has increased the students' confidence to be, and think creatively. This question was explored in the interview where the result was further confirmed.

> "Yeah. It gives you another point to be creative with. Cause when you're just making a product and not considering emotions, you're just making the product, but your heart, when you're designing for emotion, you're having to consider the thing and then be creative around that. So, you're having to be more creative and think of more ideas." – Student J

Question 3: What pedagogical approaches are best to educate secondary school students to design for emotion?

When asked if the study had been enjoyable, seven out of eight agreed it had. Importantly, all students agreed that the study had changed their thought process and the way they would approach designing a product.

Has the study changed the way you think during the design process? Why?	
Student C	"It makes you think more about what effect it will have on the user's mood"
Student G	"It taught me how a product/design can demonstrate emotion"
Student R	"It has made me appreciate things like colour and how they can impact on the user"

Table 3. *Changes to student thinking during the design process – questionnaire responses.*

This was further investigated with the three interviewed students. Their comments are presented below in response to the same question. All students commented that their views on the subject had changed, and they now considered broader aspects of design. Some suggested they would now try to include designing for emotion in their work.

> "Yeah. For example, before when we, um, for example before in DT we ended up making the, uh, desk tidy or the automata (school DT projects), then I wouldn't take into a person's emotion into the, I wouldn't have thought about it, but now we did the research, I would have added that to the, thing." – Student C

> "Ah bit yeah. So, it gives you, it gives you a bit of a different kind of perspective to look at designing from." – Student J

> "Yeah, would've taken emotion to consideration into our design and stuff. Yeah." – Student F

To inform pedagogical change, students were asked to evaluate how useful the four study sessions had been. This was rated on a scale of 1(not useful) to 10 (very useful). With reference to Table 1 the median scores for each of the sessions 1-4 were 6.5, 7.17, 8.5 and 8.17 respectively. The results are shown in Figure 9.

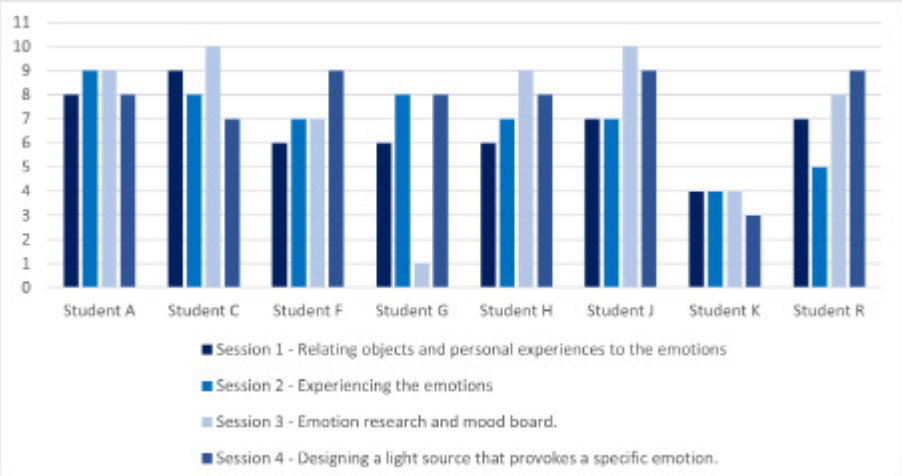

Fig 9. *Usefulness of the four study sessions.*

To further explore how useful the students found these sessions in the build-up to the final design task, the three participants in the student interview were questioned on each session. To start with, they were asked how useful they found the first session relating objects and personal experiences to the emotions. All three students agreed it was a beneficial exercise with one student making the following comment:

> "Yeah. So, it kind of helped you relate from the learning side to kind of the personal experience side of things." – Student J

Session two, experiencing the emotions caused mixed responses. Students commented that the individual emotion activities worked well for some emotions but not for others. They went on to highlight that at times, numerous emotions were evoked and it was not always the planned emotion. They did all agree, however, that the session was useful.

> (Talking about the Disgust activity) - "I think on the fart bomb it made people happy as well because they were like laughing and they were happy. And also, um, I think people got angry on it because it made them angry that you would just do it. But it also made people disgusted as well, which is the main thing." – Student C

The third session was emotion research and mood board creation. The participants spoke highly of the activities and, in particular, the creation of the mood board. When probed for more detail, two students commented on the freedom it provided them along with the effect it had on their emotional state.

> "Well, I think uh, when you, were searching for pictures to put on the mood board, I kinda of got into the disgusting mood and when you search images you found more stuff on there for disgusted as well." – Student C

> "It's just kind of, it was free range for us on what we put on it, and there was no specific what we needed on it apart from, like the emotion. So, I think that helped a bit." – Student J

The last question asked students to identify which of the sessions, if any, helped them the most to complete the final design task. All students mentioned the benefits of the mood boards in their responses. One student remarked that the written activities in session one supported them as well. Another, however, noted the benefits of experiencing the emotions in session two.

> "Yeah, I thought the mood board helped quite a lot in feeling the emotions like helped when it came to the design." – Student F

The findings from the questionnaires and interviews suggest the students found value in completing the mood boards and emotion research. These were identified to be the most useful, closely followed by the design task.

Conclusions

Designing for emotion in secondary D&T education has been an unexplored and complex subject. This study has brought the field closer to understanding this phenomenon by presenting seminal findings, with the aim of establishing whether secondary school students can learn to design a product to evoke a specific emotion.

The analysis of the first research question; Can students be taught to design for emotion? showed an increase in student knowledge around the concept of the six basic emotions. This was evidenced through the positive median changes when comparing questionnaire one and two.

Findings suggested students had developed a detailed design thought process, combined with an increased user focus. The study suggests an increase in participant confidence when designing. Do students understand the importance of designing for emotion and its influence on creative thinking? This study presents evidence towards the notion that students can and do understand the importance of designing for emotion. The medians pertaining to this result at the start and end were unchanged. An increase in student creative ability was seen, with an increased median change and was verbally supported from interviews. Indication of broader design thinking was also found, further supporting the findings from the first research question. The final research question: What pedagogical approaches can educate students to design for emotion? highlighted a clear preference for mood boards and emotion research for aiding design inspiration. The final activity of being asked to create a design for a product with a specific emotion in mind, appeared to be stimulating and enjoyable for all concerned.

This study has made steps towards exploring the effects of teaching secondary school students to design for an emotional response. Given the appearance of the concept in recent years, it is hoped this may encourage further development and curriculum change in design education.

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