Defining the Value of a School Subject

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Abstract

One consequence of school performance measures is the prioritisation of some school subjects above others. The English Baccalaureate (EBacc), introduced in England in 2011, measures pupils' progress in five subjects only (English, mathematics, science, a humanities subject and a language), and excludes creative subjects such as design and technology (D&T). This suggests that some subjects have greater value than others but the justification for some subjects' inclusion and others' exclusion has been based on a perspective that draws on ideas from Hirsch (2006) and Young (2008). Counter arguments to this perspective have tended to focus on the economic and intrinsic value of the excluded subjects. This suggests that school subjects do have multiple values. The aim of this research is to establish a framework that could be used to explore and define the value of a school subject.

Once the subject-value framework was established it was tested using data gathered from interviews with people who had an interest in education and specifically, D&T. The values they attributed to D&T, such as how it might benefit pupils whilst at school and in later life, were explored and analysed using the framework. The results suggest that the constructed subject-value framework can be used to analyse the values individuals attribute to a school subject. A range of goals and benefits related to the subject can be determined, although distinguishing between the different types of goals needs further research.

Most values identified focused on how D&T helped individuals prepare for life beyond school. Additionally, the values reflected the economic justification for education, inasmuch that pupils learn skills in D&T they can use in future careers.

This constructed subject-value framework could be used as a means of analysing curriculum policy as it influences the values different people attribute to a subject. Further work could assess if this paper's findings are replicable or similar by testing the framework against other non-Ebacc subjects.

1. Introduction and Approach

1.1 Introduction

Reflecting on our school years, we probably remember which subjects we thought were useful and which we did not. But how is useful defined? Different school subjects are perceived to be of different value to young people and this value may be realised whilst they are at school or later in life, for example in their home or employment. Also, different people place greater value on some subjects compared to other subjects, which can be dependent on their role, experience and age. For example, school leaders and governments suggest explicitly why a subject might be useful to an individual and society through policy documents, such as the English National Curriculum, and implicitly through school performance measures, such as the English Baccalaureate (EBacc).

The Ebacc is a performance measure that emphasises the importance of a broad and traditional curriculum (Department for Education, 2016) focusing on pupils' progress in five subjects (English, mathematics, science, a humanities subject, and a language), and excludes creative subjects such as music, drama, and design and technology (D&T). An argument for introducing the Ebacc was to increase the number of pupils following a broad and balanced curriculum (Education Committee, 2011) through to the end of secondary school, with the five Ebacc subjects providing the essential knowledge all pupils need as part of a general education. Justification for these arguments was influenced by Hirsch's (2006) views about cultural literacy and Young's (2008) views about powerful knowledge (Department for Education, 2011). Thus, the Ebacc implies that these five subjects are more valued than others due to their epistemology and their role as gatekeeper subjects; suggesting they open more doors to higher education and high earning careers than other subjects.

My interest focuses on the criteria for judging the contribution a school subject makes to an individual or to society, and its purpose. As I have already suggested, this topic is particularly relevant in a period where some subjects are perceived to have a greater purpose or value to an individual's education and to society.

1.2 Research aims and questions

This article aims to explore and define the value of a school subject by establishing a subject-value framework. In the first part of the article the subject-value framework is built from value theory and views about the purpose of education. In the paper's second part, the

framework is tested using the school subject D&T, a non-Ebacc subject, and two research questions are posed:

1. Can the subject-value framework constructed in the first part of this paper be used to define a school subject's value?

2. Do the values attributed to D&T by a range of people reflect contemporary curriculum policy, economic drivers and other aims of education?

D&T is chosen as the focus because there has been a dramatic decrease in the number of pupils studying the subject. This is partly due to the Ebacc's introduction and a revised National Curriculum (Hardy, 2015a), which led to national campaigns by the subject's association, D&TA (Design and Technology Association [D&TA]) in 2011 (We believe in Design and Technology) and 2015 (Designed and made in Britain...?). The campaigns emphasised D&T's value to the national economy and an individual's employment prospects, plus how pupils developed an enterprising attitude because of their D&T lessons and gained transferrable skills (e.g. problem solving, creativity and critical thinking). These campaigns highlighted the ongoing argument about the vocational value of D&T, which has been shown in earlier work by McCulloch, Jenkins, and Layton (1985), Penfold (1988) and Wakefield and Owen-Jackson (2013). Due to its dramatic rise and fall between 1990 and 2011, and its contested value and place in the English National Curriculum (Bell, Wooff, McLain, and Morrison-Love, 2017; Hardy, Gyekye, and Wainwright, 2015; Hardy, 2015b; 2016) D&T is the focus of this study.

In the next section, value theory is used to construct a subject-value framework that defines the value of a subject.

2. Defining the value of a school subject

Value is a complex construct due to its 'varied and shifting connotations … in ordinary speech' (Kluckhohn, 1951, p.389). In the context of this complexity, discussing the value of a school subject requires some definition and clarity which, along with a framework, can be used to explore the different forms of value a subject has. Rokeach's (1968; 1973) definition of a value is used by established researchers in education, sociology and psychology (such as Feather, 1975; McKernan, 2008; Schwartz and Bilsky, 1990; Wigfield and Eccles, 1992), and so the framework is built from his definition of a value:

> [A value is] an enduring belief that a specific mode of conduct or end-state of existence is personally and socially preferable to alternative modes or end-states of existence. (Rokeach, 1968, p.160)

His definition focuses on the consequence of holding certain values: '… [it is] a standard or criterion for guiding action, for maintaining and developing attitudes towards relevant objects and situations ...' (1968, p.160). His definition has dual aspect elements: the present ('a specific mode of conduct' and 'how one ought or ought not to behave'), and the future (the 'end-state of existence').

Rokeach disagreed with behaviourists such as Hilliard (1950) whose definition of values focused on the value of an object or situation, such as an item of furniture or, in this paper's context, a school subject. Hilliard (1950) determined that 'value is affectivity occurring in the relational contexture determined by the reaction of an organism to a stimulus object' where the stimulus object can be a 'thing, situation, action, occurrence, [or] symbol' (p.42). When comparing Rokeach's and Hilliard's definitions, Hilliard considers that the value a person attributes to an object is a consequence of their affectivity towards the object whereas Rokeach considers that a person's values originate from a belief and lead to an attitude, which might include a feeling or way of behaving towards a thing, situation or object.

These two views disagree about the definition of value – the person holds the value (Rokeach), or the object (e.g. a school subject) causes the value (Hilliard) - but affectivity is common to both (Hitlin and Piliavin, 2004), which is the feeling or response to the object (Hilliard) or the feeling or response because of the value (Rokeach) (figure 1).

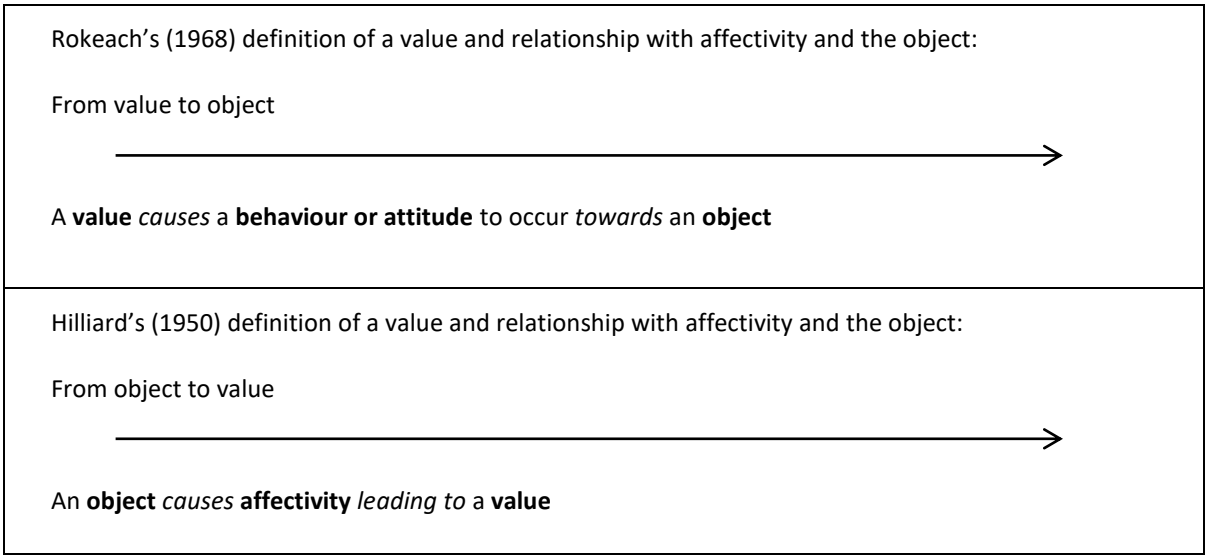

Figure 1 Comparing Rokeach's and Hilliard's definitions of value

Rokeach's definition of value also has a time facet with two elements, the present ('a specific mode of conduct' and 'how one ought or ought not to behave') and the future (the 'end-state of existence'). Rokeach clarifies:

> Present: 'I believe that such-and-such mode of conduct is personally and socially preferable' (1968, p.160), Rokeach labels theses as instrumental values;
>
> Future: 'I believe that such-and-such an end-state of existence is personally and socially worth striving for' (1968, p.160), labelled terminal values by Rokeach.

Hilliard's (1950) definition also includes 'terminal' and 'instrumental' but defines them differently. An instrumental value is 'affectivity occurring in the contexture determined by an organism [e.g. person] and an object' (Hilliard, 1950, p.53) – therefore it is context bound; a terminal value is 'when the object is a last means to the end of affectivity' (p.53) – not related to time but 'for its own sake'. Hilliard explains his definition using the example of a table (the object) and a person (the organism) who proposes to construct the table using tools (another object). Whilst making the table, the tools have an instrumental value, and probably the table in its unfinished form as the person has enjoyment (the affectivity or emotion) as they make it. When the table is complete they will 'enjoy [the affectivity] the finished table "for its own sake'' (Hilliard, 1950, p.54), which is a terminal value. However, Zimmerman (2014, para. 1) uses the term 'intrinsic value' rather than terminal value when he argues 'that the thing has value 'in itself' or 'for its own sake' or 'as such' or 'in its own right'.

Hilliard organises the different elements of a value into a table (Table 1), with nine adjectives spread across four sets. He argues that there are twenty-four different modes of values, each one 'qualified by one adjective from each set and only one' (p.48); for example:

1. Actual direct positive terminal value
2. Actual direct indifference terminal value
3. Actual direct negative terminal value (Hilliard, 1950, p.58)

Table 1 Nine adjectives and four sets (Hilliard 1950, p.48)

Set 1	Set 2	Set 3	Set 4
actual	direct	positive	terminal
		indifference	
potential	indirect	negative	instrumental

Comparing Hilliard's definition with Rokeach's, there are additional features:

> Actual or potential value of the object, which assumes that a person has a value of an object but that the immediacy of the value could be either actual or potential.
>
> Positive, indifferent or negative affectivity towards the object. Rokeach's theory has the premise that we all have the values in his series, therefore they are positive, but the relative importance of one value to the other may differ for different people.
>
> Direct and indirect: direct value is when there is an immediate relationship between the object and the person, an indirect value involves an intermediary or 'catalytic agent' (Hilliard, 1950, p. 56). 'Vicarious enjoyment is an instance of indirect value' (p.56).

Schwartz and Bilsky (1990), who build on Rokeach's definition, have two further attributes also not considered by Rokeach: motivation and interests (figure 2).

A value that is an individual's concept of a tran-situational {	GOAL terminal instrumental	}
goal that expresses {	INTERESTS Individualistic Collectivist Both individualistic and collectivist	} interests concerned with
motivational domain {	MOTIVATIONAL DOMAIN Enjoyment…power (7 domains in total)	} and evaluated on a range of
importance from {	RANGE very important to unimportant	} as a guiding principle in his/her life.

Figure 2 Schwartz and Bilsky's mapping sentence to define values formally (1990, p.553)

It is worth pausing to explain Schwartz and Bilsky's (1990) presentation of their value definition, which is a mapping sentence (Guttman in Hackett, 2016) and a feature of facet theory.

Facet theory was devised by Louis Guttman to understand human activities and knowledge, where the 'activities are formed of discrete components' and a facet categorises each discrete component as a set (Hackett, 2016, para 10). The mapping sentence 'is a formal statement of a research domain which includes the respondents, sub-categories of the research content along with the range over which observations will be made, in the structure of a sentence written in normal prose' (Hackett, 2016, para 12) and consists of three types of facets: population (respondent), content, and response (range) (Guttman and Greenbaum, 1998). Consequently, a mapping sentence makes transparent the areas considered within the

research domain and shows the relationship between the facets, clarifying the boundaries of the study.

Schwartz and Bilsky's definition of a value has four facets (goal, interests, motivational domain and range) and a respondent (the individual). Hilliard's four sets in Table 1 could be relabelled as facets; set 1 becomes importance, set 2 interest, set 3 affectivity and set 4 goal, and the 24 modes of a value each form a different sentence. Table 2 combines the four different definitions of a value discussed earlier (Rokeach, Hilliard, Zimmerman, and Schwartz and Bilsky) into five facets.

Table 2 Facets and attributes of a value

	Facet	Attributes
A.	Goal	1. Terminal (Hilliard, Rokeach, Schwartz and Bilsky) 2. Intrinsic (Zimmerman) 3. Instrumental (Rokeach, Schwartz and Bilsky, and Hilliard)
B.	Interest	1. Direct or indirect effect on the person (Hilliard) 2. Interests, which might be for the individual, society or both (Schwartz and Bilsky)
C.	Importance	1. Actual or potential (Hilliard) 2. Range (Schwartz and Bilsky)
D.	Motivation	1. Motivational (Schwartz and Bilsky) 2. Preference to the alternatives (Rokeach)
E.	Affectivity	1. Positive (Hiliard and Rokeach), 2. Neutral (Hilliard) or 3. Negative (Hilliard) 4. Either attitude or choice that results from the value (Rokeach)

The goal, interest and importance facets contain the content elements of the definition of a value; essentially, they are the definition's components. Motivation and affectivity are response facets, initiated by, or resulting from, the respondent's affectivity towards the object being attributed with a value. Because this study aims to define the values attributed to a subject, not the origins or consequences of the values a respondent attributes to the subject, only the first three facets are necessary for this study's subject-value framework.

Future work could explore the origins (motivation) and consequences (affectivity) of the values an individual attributes to a school subject.

The mapping sentence in figure 3 can be presented as the following definition:

> A value is an individual's concept of a specific instrumental, terminal or intrinsic goal that is either potentially or actually important to the individual, society or both as a guiding principle.

A value that is an individual's concept of a specific				{	GOAL instrumental terminal intrinsic	} goal that is
			IMPORTANCE potentially actually	{	}	of interest or benefit to
the	{	INTERESTS individual society individual and society	}	's interests as a guiding principle		

Figure 3 Mapping sentence for definition of a value

This definition relates to a school subject if we look at how different authors propose the value of education, or, the purpose of education. Young (2014) argues that the acquisition of 'powerful knowledge', (knowledge that is specialised and transformative), is different from the instrumental purpose of education, which is to achieve specific qualifications and gain employment. Others who also believe a purpose of education is to acquire knowledge, such as Hirsch (2006) who influenced the curriculum changes designed by the Coalition government in 2013, define knowledge as objective. This instrumental view of education has commonly been translated into a form of schooling built around traditional academic subjects, such as science, maths, history and languages.

Unlike Young, MacAllister, Macleod and Pirrie (2013) argue that epistemic excellence 'should be *an* educational purpose rather than the *only* educational purpose' [emphasis added] (MacAllister, Macleod and Pirrie, 2013, p.162), which leads to a definition of the purpose of education with three factors. Firstly, that education should support pupils in engaging with traditional and practical knowledge, secondly, pupils' capacities and

experiences are important and thirdly, education should promote human flourishing. Similarly, Reiss and White (2013, p.1) present two aims for education: '(1) to lead a life that is personally flourishing; (2) to help others to do so'.

These views of the purpose of education relate to the mapping sentence (figure 3) as it suggests that one value of education (the object) is how an individual gaining an education helps not only themselves (the individual) but also others (society). Furthermore, it could be argued that Reiss and White's and Young's opinions do relate to the present (instrumental) and to the future (terminal). The intrinsic facet of the goal is implicit in MacAllister, Macleod and Pirrie's and Reiss and White's views that education should promote human flourishing.

Subjects, then, sit within formal education. This article makes no attempt to challenge this notion but merely accepts that this is the current status quo. So, if the different facets of the purpose of education can be recognised within the mapping sentence it can be proposed that a subject (that sits within formal education's common structure) will also have these facets. Figure 4 is the constructed subject-value framework in the form of a mapping sentence for the definition of a value of school subject.

The proposed sentence for defining the values attributed to a school subject is:

> A value of [school subject] is a person's concept of the [instrumental/terminal/intrinsic] GOAL that expresses the [individualistic/collectivist/both individualistic and collectivist] INTERESTS that are the positive consequences of INDIVIDUAL [the person/someone else] studying [name of school subject] at a secondary school in England.

The individual facet adds the tran-situational element from Schwartz and Bilsky – that it is not only about the respondent studying the named school subject but can be an inferred value from others studying the subject.

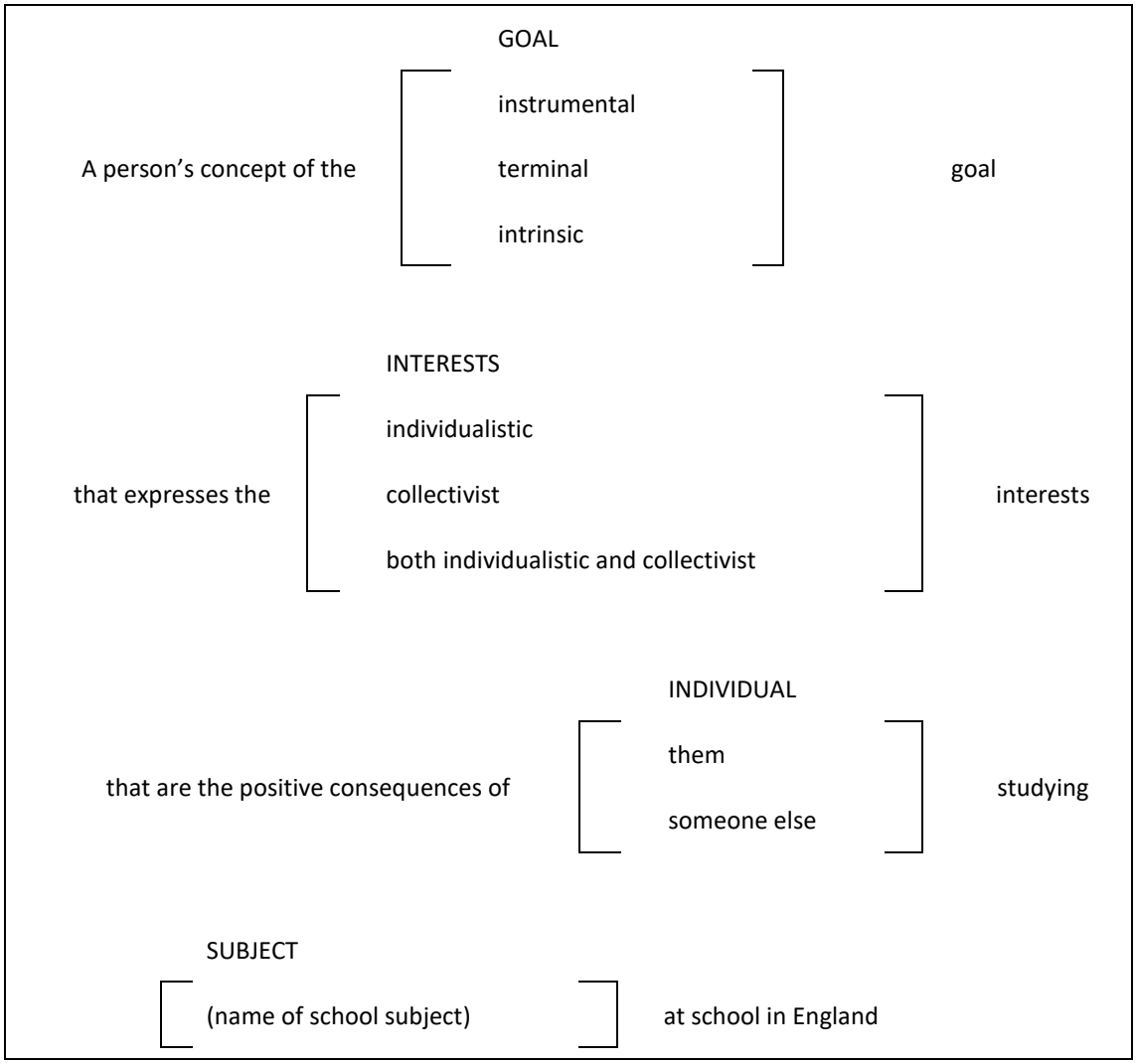

Figure 4 Proposed mapping sentence for defining the values attributed to a school subject

This mapping sentence has three well-defined facets: goal, interest and individual. The elements within each facet are clear, with three goal elements, three interest elements and two individual elements. Therefore, the mapping sentence has 18 different modes (i.e. 3 x 3 x 2); for example, taking the first element of each facet provides the sentence 'a person's concept of the instrumental goal that expresses the individualistic interests that are the positive consequence of them studying [name of school subject] at school in England'. The elements can be used to analyse respondents' opinions about the value of a school subject and show that a value is not a simple concept but one that is complex (Kluckhohn, 1951).

In the next section this subject-value framework, presented as a mapping sentence, is tested using values attributed to D&T in interviews with people who have an interest in D&T.

2. Methodology

This is a constructivist and interpretivist study; my ontological and epistemological positions determined the data collection method and my approach to data analysis, which is discussed in the next section.

2.1 Method

To identify the values attributed to D&T active interviews were used; active interviews (Holstein and Gubrium, 1995) are when the interviewer and interviewee co-construct an understanding of the research domain during the interview. In an active interview the interviewer utilises 'resources, connections and outlooks…encouraging respondents to develop topics in ways relevant to their own experience' (p.17). Therefore, I explored the participant's values of D&T using a variety questions about their D&T history (e.g. if they study it at school), their current experiences, and any perceived influences from their families. The fluidity of the active interview allowed for an exploration of the participants' understanding of D&T and their experiences (whether as a pupil, parent or teacher) through the narrative that came from the participants (Holstein and Gubrium, 1995). Furthermore, and given that Lovejoy (1950) and Rokeach (1968) argue a person's values can only be observed, not heard, the interviews only reveal the participants' perceptions of their values, therefore the data analysis is an interpretation of the participants' perception of their values.

Although facet theory has more commonly been used in quantitative research, Hackett (2016) showed that facet theory and the mapping sentence can be used in qualitative studies as 'provid(ing) a hermeneutically consistent account of a domain of interest' (para 14). In this study the domain of interest is the values attributed to a school subject, with three facets (goal, interests and the individual), providing themes and sub-themes (the elements within the facet) for analysing the values attributed to a school subject.

The study followed BERA's (2011) ethical guidelines; permission was obtained from the schools, the pupils' parents and all participants prior to the interviews taking place; all were made aware of the purpose of the interview and how their data would be used and stored. No identifying features of any institution or participant are given in this paper to maintain participants' right to anonymity.

Twenty-two active interviews, lasting between 15 and 25 minutes, were conducted with a purposive sample representing people who had an interest in education and D&T: pupils (n=12), school senior leaders (n=4), D&T teachers (n=4), D&T trainee teachers (n=3), teacher educators (n=3). Three parents were surveyed for their views about the value of D&T using a paper-based survey; as a school senior leader felt that parents would not be willing to come into the school for an interview. The interview questions were designed using the mapping sentence; for example, participants were asked in the interview to talk about why D&T should be taught in schools and how it could be useful to an individual and to society. The school-based participants (pupils, D&T teachers and senior leaders) were from two schools in an East Midlands city; one a city school, the other in the suburbs of the same city. Therefore, results may not be generalisable to all schools in England because rural schools are not represented in these data. One D&T trainee teacher was studying at a university in the same city and two from a North East University; the teacher educators were from the same North East University as the trainees, a London University and a South Midlands University. Covering several different higher education institutions meant it was possible that a wider range of values would emerge than if all the participants came from only one institution or school (Dow, 2014; Feather, 1975).

The data was collected between March and May 2014 as the impact of the Ebacc was being felt by D&T teachers (Hardy, 2015a); acknowledging that the data reflected a tumultuous time for D&T when D&T teachers were feeling the need to defend their subject (Design and Technology Association and Education for Engineering, 2013; Design and Technology Association, 2015). There is no claim here that the participants' views represent all the values attributed to D&T but they do provide a starting point to explore its value in a consistent manner.

2.2 Data coding

The data was coded using a grounded theory approach (Auerbach and Silverstein, 2003). Computer analysis data software MAXQDA was used to manage the large amount of data. There were three coding steps (table 1). In coding cycle 1 all segments of relevant text were highlighted and coded 'value'. Next, each segment was coded with at least one 'goal' code (coding cycle 2) and one 'interest' code (coding cycle 3), which corresponds to the interest and goal facets from the mapping sentence. The individual facet was included because some

participants had not studied D&T at school, therefore the values they attributed to D&T are because of someone else studying D&T. The initial assumption was that there would be a maximum of nine sentences (three goals multiplied by three interests).

Table 3 Data analysis coding cycle

	Activity	MAXQDA label
Coding cycle 1	Identify value	Code = 'Value'
Coding cycle 2	Identify goal type	Code = 'Instrumental' or 'Terminal' or 'Intrinsic'
Coding cycle 3	Identify interest type	Code = 'Individualist' or 'Collectivist'

After the first coding cycle 436 segments were identified as a value across the 22 data sets. This did not indicate that there were 436 different values attributed to D&T by the participants as repeating themes occurred.

3. Testing the subject-value framework

In this section the first research question is answered - can the mapping sentence constructed in the first part of this paper be used to define a school subject's value? -by examining whether the elements within each facet were sufficient. Essentially, do the three elements in the two facets (goal and interests) provide a hermeneutically consistent account of the value of a school subject?

3.1 Goals

In the second coding cycle (Table 3) the different goals a value might meet were identified:

- The positive consequence in the future (terminal);
- The positive consequence now (instrumental);
- The positive consequence that D&T can have 'for its own sake' (Zimmerman, 2014, p.1) (intrinsic).

Some segments could not be coded with only one of these three goals, and four additional elements were added. Thus, showing that the subject-value framework in section 3 does not provide a hermeneutically consistent account of the goal facet. However, when the four new

elements were added all 436 segments from coding cycle 1 were able to be coded with one of the seven elements.

- Instrumental goals were commonly utilitarian. For example, ‘You could make clothes if you wanted to’ (Pupil).
- Terminal goals were for the future, and commonly utilitarian. For example, ‘If I wanted to do it later in life you can make dresses and stuff and then you'd be able to pick up skills that you wouldn't have been able to do because you haven't learnt them before. So, it'd be more helpful for later in life’ (Pupil).
- A value that had an intrinsic goal was not necessarily time-bound, that is either for now or the future, but suggested a feeling of satisfaction or enjoyment. For example, ‘It’s just nice to be able to be creative and when you can say I designed that, I built that, there's a lot of pride in technology’ (D&T teacher).
- Values that were both instrumental and terminal had the idea that the value contributed both to today and the future. Sometimes this was explicit such as when a D&T teacher said ‘[D&T] gives them a bit of a flavour of what's out in industry. What jobs they're going to do in the future’ and implicit when a senior leader commented about ‘being able to do something for yourself. It's learning practical skills’.
- An instrumental and intrinsic goal suggested that an individual gains satisfaction knowing they can do something or use a new piece of knowledge today. A pupil explains why he likes making food in D&T: ‘you feel like you’ve achieved something when you eat it and you like it’.
- An intrinsic and terminal goal was about the satisfaction gained later in life because of their learning in D&T. For example, when a senior leader talked about the ‘passion’ some pupils will have for working in their chosen career.
- Segments within all three goals implied that there was satisfaction in learning something which could be used at school, and beyond. For example, when a science teacher talked about ‘the quaintness of just having something that I've made and then using that I wouldn't have necessarily appreciated then but now I think it's something quite nice to make’.

The instrumental-only goal code was the largest type of goal with 216 segments (49.5% of all goals), a further 156 segments had an instrumental element; meaning 85.3% of the segments had an instrumental element (see table 4).

Table 4 Distribution of goal elements

Code	Number of segments	Coded segments (%)
Goals		
Instrumental only	216	49.5
Terminal only	13	3.0
Intrinsic only	47	10.8
Instrumental and Terminal	121	27.8
Instrumental and Intrinsic	32	7.3
Instrumental, Terminal and Intrinsic	3	0.7
Terminal and Intrinsic	4	0.9

Only 13 segments were coded only as a terminal goal (3% of all goals). The segments coded with the attribute terminal-only predominantly related to employment and the economy. In this type of goal participants referred to the value of D&T in the future but did not mention what pupils were learning today that would contribute to this. For example, one parent commented: 'Practical skills will help them live an independent life more easily and look after themselves' but they did not mention which practical skills they would learn.

With 121 segments (27.8%) coded instrumental/terminal this was the second largest goal type after instrumental-only. The predominant themes related to pupils learning about potential future D&T-related careers, how humans interact with technology and the impact of products on the environment.

Segments coded with the intrinsic-only element (10.8% of all goals) referred to emotions such as pride, enjoyment, fulfilment and love. One teacher educator commented:

> … allow that love of materials and manipulating materials to continue to be developed and not be crushed.

The 32 segments (7.3%) attributed as instrumental/intrinsic were associated with pupils making and creating new products using materials (such as wood, fabric and food

ingredients), the opportunity to be creative when designing, and enjoyment. The idea that learning to make and having the opportunity to be creative was enjoyable and gave satisfaction was a recurring theme in this goal type. Also, some segments had a theme of curiosity and interest, for example a D&T teacher's comment 'just to understand about materials and products' speaks of a curiosity, which leads to individuals learning about materials. This is echoed by a trainee D&T teacher: 'There are going to be some kids that do enjoy it and they want to learn more about it' and a comment from another trainee about 'opening the door' implies a curiosity about the motivation to learn something new. Others talked about the enjoyment and satisfaction gained from learning something new. One pupil comments:

> With a lot of subjects, you do know stuff, but you can't really show that you know it. But with food or DT you can make something, and you feel like you've achieved something.'

This was coded as both intrinsic and instrumental because the pupils are learning something (instrumental) and have the satisfaction (intrinsic) of demonstrating this by making something.

The category terminal/intrinsic contained only 4 segments (0.9%). The idea of a terminal/intrinsic goal is satisfaction felt in the future from something learnt in school today because it enables the individual to do something later in life. For example, it is about individuals learning skills for future use, or for a specific job, but other skills, e.g. cooking, is because it's 'a passion of theirs' (senior leader).

For a D&T teacher it was about the potential personal satisfaction of working for a local company:

> A little Year 7 boy told me yesterday that his granddad worked for a company which is now Siemens, back in the day he worked for Plessey. I said I know the company. They were huge in this city. So, if you can say I've worked for them, in some ways you've made it in life, you've got a bit of kudos. It gives a sense of pride to the area.

This supports the idea that job satisfaction is achieved indirectly from studying D&T in school. Additionally, for one of the teacher educators, it was a career that 'fits' the individual and therefore motivates them in school:

> that aspects of broad vocationalism as part of technology could actually be quite a useful motivational factor for a lot of pupils that would otherwise be disengaged from a rather over-academic curriculum.

Only three segments (0.7%) were attributed as instrumental, terminal and intrinsic. The idea was that talent and interest, combined with learning new skills and knowledge, could be used later in life, possibly in a career. For example, a senior leader comments:

> I think about a lad who we've got in our school who I taught in Year 9, he was pretty good at history, but he always liked design [intrinsic]. He's in the sixth form now and he's going to be a joiner for a very successful local company [terminal]. He's talented and he's practiced, but not only has he just made things with wood all the way through, but he's actually had some proper skills taught to him [instrumental].

A pupil was able to consider how they enjoy learning something today and how it will be useful in the future:

> Well I actually really enjoy food technology, so I think that in the future it will help me to become more persistent in cooking my own meals instead of takeaways and things like that.

Therefore, analysis of data coded as a goal shows that the original mapping sentence (figure 4) contained insufficient elements, and could not provide a hermeneutically consistent account and therefore needed to include four more elements:

1. instrumental/terminal
2. instrumental/ intrinsic,
3. terminal/intrinsic and
4. instrumental/terminal/intrinsic.

3.2 Interests

In the third coding cycle (table 3) the different interests a value would or could meet were identified:

- An individualistic goal was where the participant referred to the value relating to an individual only, such as when a D&T teacher said, 'It gives them opportunities to do things like problem solving'.
- A collectivist goal was when there was a benefit to society because an individual has studied D&T at school, for example when a pupil comments: 'You wouldn't have things like tables and chairs that we're on now if you didn't have D&T. … because it takes people to do this that are in the D&T industry…'
- Segments labelled with both detailed what the individual learns in D&T that benefits society, for example when a D&T teacher talks about the importance of learning about environmental issues: 'Well I think it's important to know [about] environmental issues, polluting the planet and knowing that they can grow their own foods locally rather than getting them from abroad'.

Unlike the goal facet, no additional elements needed to be added to the interests facet.

Table 5: Distribution of interest elements

Code	Number of segments	Coded segments (%)
Interests		
Individualistic only	377	86.5
Collectivistic only	48	11.0
Collectivistic and Individualistic	11	2.5

Over eighty-six per cent of all segments were categorised 'individualistic' (see table 5), suggesting that participants viewed individuals as the primary beneficiaries of D&T, for example, a pupil comments: 'it gives you the skills you might need for a later career'. Whilst it could have been interpreted that society benefits because the pupil gains these skills, it was interpreted as not being the pupil's focus here – they appear to be only thinking about how they will benefit; therefore, it has individualistic interest only.

Generally, segments were individualistic, such as when the participants believe D&T can benefit a pupil's career or develop skills. For example:

> Training them for the world of work in a different way and it's giving them that opportunity (senior leader).

> If you didn't do D&T in schools, then eventually when it comes to what you want to do as an adult then you'll be thinking I want to take the construction path, but I have no experience whatsoever and I'll have to start again. But if you start in Year 7 you've got five years just to get your head around it and see what it's all about (pupil).

Most segments categorised collectivist focus on the benefit D&T has for the economy, whether directly needed for the economy, such as when a pupil comments:

> You wouldn't have things like B&Q and stuff like that, those DIY shops. [because] you wouldn't know how to use even the basic things like hammers.

Or because certain jobs are filled because of D&T:

> There'd be loads of things that wouldn't be able to happen. There'd be loads of jobs that no one would do (pupil).

Segments coded with both interests had two connected parts. Generally, the first part identified what the individual learns in D&T, the second part identified how the learning mentioned in the first part could benefit society. For example:

> We teach that and that makes people aware of saying right well I'm not going to put that can into that bin, I'm going to make it recycle and we recycle. So, it's having a huge impact on the environment (D&T teacher).

Whilst most 'both' segments were easily identified, some needed more interpretation. A teacher educator's comment: 'learn to communicate with people to get things' appears to be self-serving, the individual learns communication skills that help them get what they want, instead, it was interpreted to mean that by learning to communicate they can explain what they want in a socially acceptable way and consequently this helps the individual take their place in society. Another teacher educator's comment that D&T is 'necessary politically in a

democratic curriculum' is interpreted as meaning that the individual pupil who receives the democratic curriculum is enabled to understand and engage with the country's politics.

The individualistic nature of values generally referred to the individual's making economic gains and employment (e.g. learning skills to use in future D&T related careers) as well as those focussed on generic skills, such as learning how to manage and plan their time and work independently. There was some reference to a collectivist benefit when the participants discussed how the country's industrial and economic competitiveness might benefit because individuals learnt skills for design and engineering careers. However, although the participants explicitly attributed values to D&T that were collectivist, there is an individualistic prerequisite because for the national economy to grow the majority of individuals need to earn an income.

The results of this analysis suggest that the interest facet contained sufficient elements, unlike the goal facet, although their definition needed careful interpretation to be consistently coded and analysed.

Therefore, in answer to the first research question, whether the mapping sentence in figure 4 was sufficient (research question 1), the evidence presented here indicates that it was not because the goal facet did not provide a hermeneutically consistent account of the purpose of D&T. Consequently, the mapping sentence needs to be modified and would benefit from being tested using data collected similar to this study but about another school subject. A modified mapping sentence is presented in figure 5.

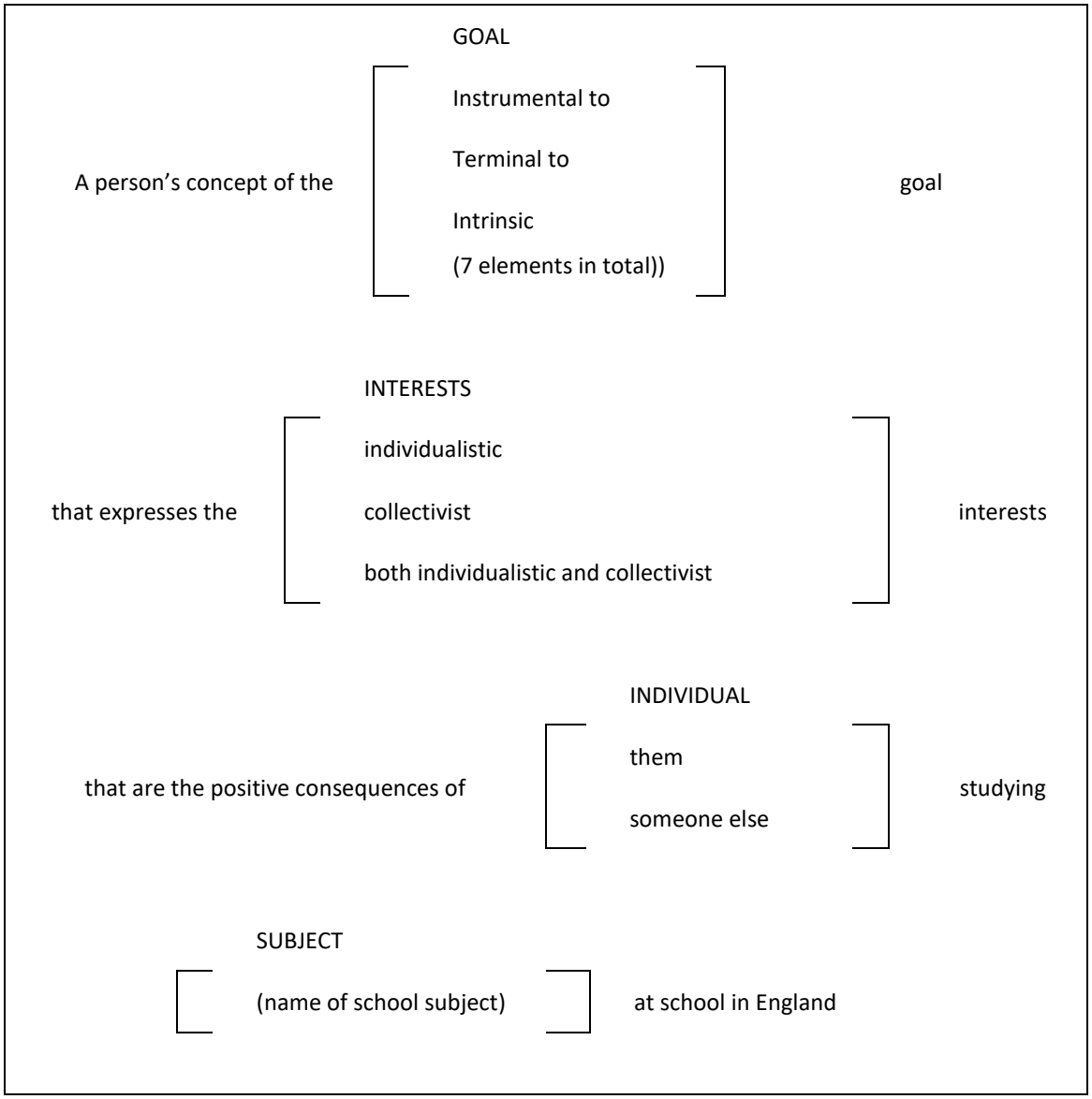

Figure 5 Modified mapping sentence defining the value of a school subject

4. Discussion

In this section the data analysis is explored to answer the second research question - do the values attributed to D&T by a range of people reflect contemporary curriculum policy, economic drivers and other aims of education?

A significant number of the instrumental-only goals were coded as being individualistic, which suggests that the dominant idea held by these participants is that the primary purpose of education is to benefit an individual's life in a utilitarian and functional way. This idea appears to conflict with the 2013 National Curriculum aim of pupils becoming educated citizens (Department of Education, 2013) but it could be interpreted that an educated citizen should be able to look after themselves, which concurs with the curriculum aim of D&T to

'develop the creative, technical and practical expertise needed to perform everyday tasks confidently and to participate successfully in an increasingly technological world' (Department of Education, 2013, p.192). Therefore, the values these participants attributed to D&T more closely reflects subject-specific curriculum policy and to a lesser extent National Curriculum policy.

The values coded as terminal-only predominantly related to employment and the economy. Whilst some pupils did not necessarily have a personal interest in the subject (indicated by their decision to not continue studying D&T post-14) they did recognise that it provides a means to an end, helping some individuals achieve a desired end-state (such as employment in a D&T related career, e.g. designer or engineer), which Rokeach (1968) defined as a terminal value. There is strong evidence in the data that participants can see the terminal value of D&T because 32.4% of the goal segments have a terminal element to them. This supports the argument made by D&TA in their two campaigns (Design and Technology Association, 2011; 2015) that D&T helps pupils in their future careers and the enduring value of D&T as a vocational subject (McCulloch, Jenkins, and Layton, 1985; Penfold, 1988; Wakefield and Owen-Jackson, 2013). The emphasis on work and employment is particularly significant, with values that have a greater percentage of terminal attributes focusing on work-related skills, either for D&T-related careers or those useful in any career.

The notable emphasis on D&T's individualistic benefits implies the participants believed education is about helping an individual succeed and flourish, which supports Reiss and White's (2013, p.1) first aim of education '(1) to lead a life that is personally flourishing'. The implication that the participants focus more on the individualistic benefits of education suggests they place less emphasis on Reiss and White's (2013) second aim of education which is to help others have a flourishing life. However, the mutualistic relationship between Reiss and White's aims when considering how D&T can help the country be competitive through design and engineering suggests the individualistic emphasis could be necessary if society is to flourish.

The idea that studying D&T means individuals are better placed to help society is seen in this shift from individualistic to collectivist in segments coded instrumental/terminal. For example, in this exchange with a D&T teacher:

Interviewee: Well, I think I'm looking at those chairs down there, they're wood aren't they and they've got textiles on them as well. Somebody's had to go through a process of learning about new materials, how they work, how they can construct it, to be able to design that.

Facilitator: So that's one of the things that D&T brings.

Interviewee: If we don't have that, then what's going to happen when we don't have any new designers, or somebody else to develop new technologies?

These different goal elements represent how D&T meets different needs, thus reflecting a broader range of educational aims than those indicated in contemporary curriculum policy (e.g. Department of Education, 2013). By suggesting so many different goals, the participants are acknowledging between them that there are many reasons why individuals value D&T.

In summary, the values espoused by the participants show a bias towards how D&T is of benefit to the individual and of instrumental and terminal value. Therefore, the values attributed to D&T by these participants reflect some aspects of contemporary curriculum policy. Additionally, according to these participants, D&T does respond to economic drivers, but they tended to refer to an individual's economic needs, rather than the country's economic requirements. Finally, there was some indication that D&T met educational aims other than those stated in government policy by helping individuals develop as human beings (MacAllister, Macleod and Pirrie, 2013).

5. Conclusion and future directions

This study's research aim was to construct a subject-value framework that could be used to explore the values attributed to school subjects, with two research questions:

1. Can the subject-value framework constructed be used to define a school subject's value?
2. Do the values attributed to D&T by a range of people reflect contemporary curriculum policy, economic drivers and other aims of education?

There were two justifications for this research; first, the perceived effect of a new school performance measure (the Ebacc), which singled out some subjects and excluded others leading to the decline in popularity of some school subjects (such as D&T) and second, the

ambiguous criteria, used by policy makers, schools and others, for judging the value of different school subjects and the contribution they make to individuals or to society.

Drawing on value theory and prominent views about the purpose of formal education, a subject-value framework was constructed in the form of a mapping sentence (figure 4), which it was anticipated could be used to define, in a hermeneutically consistent way, the value of a school subject. To answer the first research question the framework was tested using the values different participants attributed to D&T; analysis of these values showed that the mapping sentence did provide a means for analysing the values these participants espoused. However, it also revealed some difficulties in the assumed demarcation between the elements within the goal facet. Therefore, the framework was not sufficient and required modification (figure 5). This modified mapping sentence would benefit from being tested with a new study using different school subject.

In response to the second research question, there was evidence that the participants thought D&T could fulfil the National Curriculum aims and provide skills for future employment. But, there was less evidence that participants thought D&T enabled children to flourish or helped others to do so.

Further research could be conducted in three areas. This paper has presented a broad-brush view of the elements within the interest and goal facets; it would be worth exploring any themes that emerged from within the elements. Secondly, this constructed subject-value framework could be used as a means of analysing curriculum policy. Finally, advocates of other non-Ebacc subjects (e.g. music and art and design) could use the framework to define the unique contribution their subject makes to a general education and assess if this paper's findings are replicable or similar.

References

Auerbach, C. F., & Silverstein, L. B. (2003). *Qualitative data [electronic resource]: An introduction to coding and analysis*. New York: New York University Press.

Bell, D., Wooff, D., McLain, M., & Morrison-Love, D. (2017). Analysing design and technology as an educational construct: An investigation into its curriculum position and pedagogical identity. *The Curriculum Journal, 28*(4), 539-558. doi:10.1080/09585176.2017.1286995

British Educational Research Association (BERA). (2011). *Ethical guidelines*. Retrieved from http://www.bera.ac.uk/researchers-resources/publications/ethical-guidelines-for-educational-research-2011

Department for Education. (2011). *The framework for the national curriculum. A report by the expert panel for the national curriculum review*. London: Department for Education. Retrieved from https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/175439/NCR-Expert_Panel_Report.pdf

Department for Education. (2016, February 12). *English baccalaureate (EBacc).* London: Department for Education. Retrieved from https://www.gov.uk/government/publications/english-baccalaureate-ebacc/english-baccalaureate-ebacc

Department of Education. (2013). *The national curriculum in England Framework document (July 2013)*. London: Department of Education.

Department of Education and Science. (1990). *Technology in the national curriculum.* (). London: HMSO.

Design and Technology Association. (2011). *'We believe in design and technology' what do you believe in? the design and technology association manifesto for design and technology education*. Wellesbourne, Warwickshire: Design and Technology Association.

Design and Technology Association. (2015). Designed and made in Britain...? Retrieved from http://bit.ly/1n1vm9J

Design and Technology Association, & Education for Engineering. (2013). *Proposed revision of the design and technology programmes of study KS1-3 - draft.* (). Wellesbourne, Warwickshire: Design and Technology Association.

Dow, W. (2014). Implicit theories: Their impact on technology education. In J. R. Dakers (Ed.), *Defining technological literacy: Towards an Epistemological framework* (2nd ed., pp. 149-161). Basingstoke, Hampshire: Palgrave Macmillan.

Education Committee. (2011). *The English Baccalaureate (HC851).* London: The Stationery Office Limited.

Feather, N. T. (1975). *Values in education and society.* London: Free Press (Collier Macmillan Publishers).

Guttman, R., & Greenbaum, C. W. (1998). Facet theory: Its development and current status. *European Psychologist, 3*(1), 13-36. doi:10.1027/1016-9040.3.1.13

Hackett, P. M. (2016). Facet theory and the mapping sentence as hermeneutically consistent structured meta-ontology and structured meta-mereology. *Frontiers in Psychology, 7*, 471. doi:10.3389/fpsyg.2016.00471

Hardy, A. L. (2015a). Why has the number of teenagers taking design and technology GCSE dropped? Retrieved from https://theconversation.com/why-has-the-number-of-teenagers-taking-design-and-technology-gcse-dropped-46361

Hardy, A. L. (2015b). What's D&T for? gathering and comparing the values of design and technology academics and trainee teachers. *Design and Technology Education: An International Journal, 20*(2), 10-21.

Hardy, A. L. (2016). An assortment box of views: Different perceptions of D&T's purpose and structure. *PATT2016 - Technology Education for 21st Century Skills Conference,* Utrecht.

Hardy, A. L. (2017). The consequence of school performance measures: Inequality of access and opportunity. *Race Equality Teaching, 34*(2), 39-43.

Hardy, A. L., Gyekye, K., & Wainwright, C. (2015). What do others think is the point of design and technology education? *PATT29 Plurality and Complementarity of Approaches in Design & Technology Education,* Marseille, France. 217-224.

Hilliard, A. L. (1950). *The forms of value: The extension of a hedonistic axiology* Columbia University Press.

Hirsch, E. D. (2006). *The knowledge deficit: Closing the shocking education gap for American children*. Boston: Houghton Mifflin Company.

Hitlin, S., & Piliavin, J. A. (2004). Values: Reviving a dormant concept. *Annual Review of Sociology, 30*, 359-393.

Holstein, J. A., & Gubrium, J. F. (1995). *The active interview*. London: Sage.

Kluckhohn, C. (1951). Values and value-orientations in the theory of action: An exploration in definition and classification. In T. Parsons, & E. Shils (Eds.), *Towards a general theory of action* (1st ed., pp. 388-433). Cambridge, MA: Harvard University Press.

Lovejoy, A. O. (1950). Terminal and adjectival values. *The Journal of Philosophy, 47*(21), 593-608.

MacAllister, J., Macleod, G., & Pirrie, A. (2013). Searching for excellence in education: Knowledge, virtue and presence? *Ethics and Education, 8*(2), 153-165. doi:10.1080/17449642.2013.843964

McCulloch, G., Jenkins, E. W., & Layton, D. (1985). *Technological revolution?: The politics of school science and technology in England and Wales since 1945.* Routledge.

McKernan, J. (2008). *Curriculum and imagination: Process theory, pedagogy and action research*. London: Routledge: Taylor & Francis.

Penfold, J. (1988). *Craft design and technology: Past, present and future*. Stoke on Trent: Trentham.

Reiss, M. J., & White, J. (2013). In White J. (Ed.), *An aims-based curriculum: The significance of human flourishing for schools [ebook]*. London: Institute of Education Press.

Rokeach, M. (1968). *Beliefs, attitudes and values: A theory of organization and change*. San Francisco: Jossey-Bass, Inc.

Rokeach, M. (1973). *The nature of human values.* New York: The Free Press.

Schwartz, S. H., & Bilsky, W. (1990). Toward a theory of the universal content and structure of values: Extensions and cross-cultural replications. *Journal of Personality and Social Psychology, 58*(5), 550-562.

Wakefield, D., & Owen-Jackson, G. (2013). Government policies and design and technology education. In G. Owen-Jackson (Ed.), *Debates in design and technology* (pp. 7-20). Abingdon: Routledge.

Wigfield, A., & Eccles, J. S. (1992). The development of achievement task values: A theoretical analysis. *Developmental Review, 12*(3), 265-310.

Young, M. F. D. (2008). From social constructivism to social realism in the sociology of education. *Review of Research in Education*, 32(1), 1-28. doi:10.3102/0091732X07308969

Young, M. F. D. (2014). What is a curriculum and what can it do? *Curriculum Journal, 25*(1), 7-13.

Zimmerman, M. J. (2014, December 24). *Intrinsic vs. extrinsic value*. Retrieved from https://plato.stanford.edu/archives/spr2015/entries/valui officia deserunt mollit anim id est laborum.