"Teaching" Values in Technology Education: A Critical Approach for the Theoretical Framework

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This paper discusses the issues of values in technology education in the context of a critical review of the literature. It presents the findings of this analysis and argues that the typology of values developed in technology education does not represent the full extent of the nature of values in this area and it is not helpful in terms of guiding teachers' practice. Thus, in terms of a typology, it is proposed that a distinction between intrinsic and instrumental values is beneficial for an understanding of values in the area. In relation to the second area of concern, the paper suggests that in order to provide adequate learning experiences to students, teachers need to consider the relationship between effectiveness and responsibility as a starting point for approaching value analysis. The regulative model of professional morality, which argues that all aspects of teaching needs to be moderated by social, ecological, cultural responsibility, is proposed as a framework for the development of an appropriate classroom environment in technology education. The importance of moral values is highlighted in the argument.

Introduction

This paper contributes to the aim of this conference which is to explore learning in technology education by expanding on a discussion of values in technology education. Questions related to values in technology education highlight the importance of a technology curriculum that enriches students' awareness and appreciation of their responsibility as members of a technological society. The necessity of exploring values in technology education has been argued by a number of authors (Layton 1991; Barlex 1993; Prime 1993; McLaren 1997; Breckon 1998; Holdsworth & Conway 1999) as a vital aspect of a comprehensive technology curriculum. However, the typology of values developed in technology education does not represent the full extent the nature of values in this area and it is not helpful in terms of guiding teachers' practice.

This paper critically reviews the approach proposed by those authors and makes some suggestions on how to develop it differently. The paper suggests that in order to provide adequate learning experiences to students, teachers need to consider the relationship between effectiveness and responsibility as a starting point for approaching value analysis. The regulative model of professional morality, which 'limiting the aspects of effectiveness by the aspect of responsibility', is proposed as a framework for development a classroom environment in technology education. The importance of
moral values is highlighted in the argument.

**The starting point**

From the early stages of introducing and developing technology education as a compulsory learning area throughout the world, values had been acknowledged as an important part of the curriculum. In the English Interim Report (DES/WO 1988) the distinction had been made between "intrinsic values – considerations such as efficiency of resource use, value for money; and contextually related values – considerations such as health and safety, user preferences and ecological benignity (1.32 to 1.34)" (DES/WO 1988, p.76). It is also specified that Design and Technology activity involves pupils in making judgments of any kinds – technical, economic, social, aesthetic and others. As pupils' capabilities increase, there should be progressive refinement in the art of making these judgments (DES/WO 1988, p.76).

These two areas of concern: the typology of values used and the reasons why these values are important, provide the initial basis for the following discussion.

**Typology of values in technology education**

The distinction between intrinsic and contextually related values in technology education is an issue that has not been addressed by researchers. Instead, the majority of authors have classified values in technology education under headings related to the proposed areas of judgment making: "economic, aesthetic, moral, environmental, technical, spiritual and so on" (Layton 1991, p.6).

A justification of this typology was proposed by Prime (1993) on the basis of categories developed by Schwartz and Bilsky (1987, 1990). Those categories include a) values that relate to the biological needs of individuals; b) values as 'requisites of co-ordinated social interaction'; c) 'survival and welfare needs of groups'. As a result six sub-categories of values in technology education were identified by Prime (1993): personal, social, economic, political, cultural, environmental. Other researchers (Breckon 1998; Holdsworth & Conway 1999) added moral, technical and aesthetic values to the list.

Thus, the main theoretical assumption for categorising values is that values in technology education are related to human needs. All values identified are treated equally; no hierarchy is proposed. However, on the practical level teachers put the following priorities on teaching values: technical, aesthetic, economic, environmental, social, cultural, moral, political (Holdsworth & Conway 1999). The conclusion drawn by Holdsworth and Conway (1999) is "that there are some teachers who just do not view certain values as relevant" (p.213) to technology education.

**Value judgments**

The main argument supporting the importance of value education in technology relates to the provision of a basis for "value-based decision in the designing, implementing and evaluating of technology, in situations that are ethically complex" (Prime 1993, p.34). Value judgments are considered as "the individual decisions or choices which make the values of people explicit" (Holdsworth & Conway 1999, p.206) and which are "closely
connected to personal integrity and personal identity” (Halstead 1996, p.5). Values provide a basis for choice, decision making and action in a wider context. Value judgements are considered as relative to a particular situation. For example, Prime (1993) argues that technology "often poses real ethical dilemmas in which there are no obvious right answers or altogether satisfactory solutions. In such cases the challenge is to weigh all relevant contextual factors and to be guided by the values deemed to be more important in that situation" (p.32). Thus a relativistic approach to the nature of all decisions is acknowledged and no general guidelines for decision making are given to teachers or to students.

How to deal with values
Another important area of concern, which is not directly related to the quote from the Interim Report, is what teachers can do in relation to values? The most frequently found answer is to make students think about values. As summarized by McLaren (1997):

Teachers have a responsibility to raise awareness and increase understanding of social, ethical, environmental, economic values and issues involved in design in order that pupils can attempt to make informed, considered and sensitive value judgements (p.259).

Another position balances the cognitive component of values by an affective one. Prime (1993) on the basis of Schwartz's (1992) interpretation of values argues that values have both cognitive and affective components: "developing values through technology education must … address the cognitive component, by exposing children to all the relevant knowledge, as well as engaging their feelings by placing technology in a human or social context that is meaningful and real"(p. 32). The cognitive component is the underlying beliefs in which values are grounded. The affective component relates to the feelings and attitudes towards the object of value. This affective component distinguishes values from beliefs.

The third component of values, a behavioural one, is not explicitly presented in technology education literature. However, it is analysed in the psychological research as an important component of values that may lead to action (Rokeach 1973).

Intrinsic - non-intrinsic nature of values
The argument of this paper is that the interpretation of values in technology education presented above is not sufficient for improving teachers' understanding in this area, nor does present clear guidelines for development of their practice. Several issues following from the analysis will be explored below. The first one relates to the intrinsic - non-intrinsic nature of values.

This distinction has been made by a number of authors, for example intrinsic (good in itself) and instrumental (a means towards the end) kinds of value (Jarrett 1991); or terminal (referring to 'end-states of existence') and instrumental (referring to 'modes of conduct') values (Rokeach 1973). According to Rokeach (1973) terminal values include such concepts as a comfortable, exciting life, a sense of accomplishment, a world of beauty and equality, freedom and happiness, inner harmony, self-respect and social recognition, true friendship and wisdom. Instrumental values encompass such concepts as ambitious, open-minded, capable, helpful, honest, imaginative, intellectual, logical, responsible, self-
controlled.

The examples of intrinsic values presented through the *Interim Report* do not correlate with theoretical interpretations of intrinsic values. They can be defined as instrumental in their nature.

Although most researchers acknowledge a functional relationship between instrumental and non-instrumental values, they see a conceptual advantage of this distinction. This is also true and for technology education. The distinction between two kinds of values provides a broad framework for thinking about values. All categories from Prime's typology can be interpreted differently on the basis of this distinction. For example, personal values can be intrinsic or instrumental, social values can be intrinsic or instrumental and so on. In technology education we are dealing mostly with instrumental values. Thus, it is important to understand the nature of instrumental values and to recognize the importance of the development and careful consideration of them in reaching the aims of technological activity. As stated by Jarrett (1991) "in education the means one uses to reach one's ends are themselves going in some measure to determine the nature of those ends" (p.9).

Two major kinds of instrumental values, according to Rokeach (1973) are those that have a moral focus and those related to competence or self-actualisation. According to Rokeach (1973) moral values refer to those "that have an interpersonal focus which, when violated, arouse pangs of conscience or feeling of guilt for wrongdoing" (p.8). They refer mainly to modes of behaviour and "do not necessarily include values that concern end-states of existence" (p.8). Competence or self-actualisation values refer to personal focus, for behaving logically and intellectually.

For most people values are ordered hierarchically in terms of their relative importance (Schwartz 1992 cited in Prime 1993; Rokeach 1973). As demonstrated above, among technology teachers, values related to competence (technical, aesthetical, economic) have a priority compared to moral values (Holdsworth & Conway 1999). In this paper it is argued that moral values should be a priority in the teacher's and student's hierarchy of values.

**Moral values**

A dichotomy between reason and commitment has been analysed from different perspectives. Habermas (1974/1963) argues that rationality (defined as efficiency and economy) "cannot itself be placed on the same level with all the other values" (p.259) or prevail above them. He cited Hans Albert who made the suggestion:

> to place in the foreground … in the establishment of a criterion for the validity of ethical systems, the satisfaction of human needs, the fulfilment of human desires, the avoidance of unnecessary human suffering. Such a criterion would have to be discovered and established, just as this is true for the criteria of scientific thought (Habermas 1974/1963, p.280).

Thus, rationality, effectiveness must be framed by the moral considerations. Moral values constitute a part of the person's value system. The approach used by Jarrett (1991) gives a useful definition of moral values contrasting them with ethics. For him the moral (morality) is considered as
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an aspect of the ethical, namely that which particularly concentrates on obligation, the ought and ought-not, on duty and conscience and human virtues, where the ethical will also include consideration of the good life, happiness, well-being, admirable conduct over and above the call of duty, and the place in life for such kinds of value as the aesthetic, cognitive, et al. We must add ... some such modification of the ought, to indicate its moral nature, as "with respect to our consideration for the welfare of others, or requirements of our duty" (Jarrett 1991, p.14).

Where should the moral values be placed in technology education? Two areas of application for moral values have been identified by this research: professional morality of technology teacher and moral judgments of students in relation to the products they develop.

Professional morality

In relation to the professional morality of the teacher a concern similar to that expressed by Habermas provides a basis for the theory that starts from the assumption that no professional action should be guided only by "functional criteria of means and end relations under the perspective of functional success" (Oser 1994, p.60). As argued by Oser (1994)

A responsible professional action must be informed by a structure of moral values that enables the actor to estimate positive and negative consequences that concern human beings immediately or indirectly. The relationship between success and care in regard to consequences is the core criterion of this theory (p.60).

Oser (1994) provides a useful model for conceptualising different approaches to teaching on the basis of the relationship between effective and responsible teaching. He proposed four types of possible connections: (a) interpretive; (b) additive; (c) complementary, and (d) correlation or regulative. These models are seen as a useful way of thinking about teaching practice in technology education. They constitute a hierarchical structure of increasing knowledge of how to solve the conflict between aspects of effectiveness and responsibility.

The interpretive model starts with the assumption that good intention is implicitly a moral aspect. "The danger of this model is that people view effectiveness [italic added] as a moral good in itself" (Oser 1994, p.62). Training to the test, technical function and economic success of the product are important. According to the additive model, one should, in general, be success oriented, but in some cases reflections on ethical issues are required. "The danger of the additive model is the absolute separation of two realms [ethical and instrumental] that are, in fact, dependent on each other" (Oser 1994, p.62).

In the complementary model, responsibility and effectiveness are seen as interdependent. In this context, to be responsible means "to measure effectiveness from the point of view of good intentions, estimated consequences, and experienced needs" (ibid., p.62). Each technical act must be reflected. However, this reflection is not structured. "There is not yet a communicative technique for having a professional moral knowledge systematically related to successful professional actions" (ibid, p.62).

The regulative model is based on the idea of limiting the aspects of effectiveness by the aspect of responsibility. In this view, professionals have to know "how to solve problems involving effectiveness conflicts and how to estimate outcomes by balancing
important moral issues" (Oser 1994, p.63). Any teaching act has a moral core. This approach is more time consuming, challenging and demanding, but it will result in feelings of "obligation, shared norms, and engagement" (Oser 1994, p.63).

A current approach to values in technology education that is presented in the literature correlates with the additive model (reflections during the product analysis, classroom discussions or case studies). In most publications it is assumed that teaching moral content (knowledge concerning norms, rules, justice matters, etc) is valuable in itself because it "helps students to develop a moral point of view and helps teachers themselves to understand what morality can contribute to interpersonal life" (Oser 1994, p.90). The complimentary model had been also identified as another model used by teachers (author's observations and interviews in Russia 1999–2001). Teachers believe that morality and responsibility are learnt more on the action level, through models such as teachers.

In this paper, it is argued that the regulative model should be used by technology teachers. They should view the classroom environment and the process of designing and making primarily as "a moral enterprise but as serving functional purposes"(Oser 1994, p.103). It is important that teachers' attention is been focused on moral values and on inclusion of students as real discourse partners in the ethically problematic situations.

Students' moral judgments
Classroom environments that cultivate responsibility will stimulate students to put moral values first. They will not be considered as one category of values among the others but as a reference point for all design decisions. On the basis of research Oser (1994) concludes that "seldom does a teacher state that he or she must set conditions that allow the students to take responsibility; to understand the meaning of being just, caring, and truthful themselves; and to show commitment for their schoolmates" (p.62). The nature of technology education provides a rich context that can be easily moved beyond the concept of effectiveness. Thus, the discussion of values that is presented in technology education literature at the moment, should be replaced by discussion of moral values as a starting point for making judgements made by the students.

Conclusion
In this paper, it is argued that the typology of values developed in technology education does not present the nature of values in this area nor present the approach teachers may use to guide their practice. It is proposed that in technology education teachers mainly deal with instrumental values that can be classified as moral and competence-based. Although competence values receives ultimate attention from technology teachers, it is argued that moral values have to provide a frame for all technological activities and should be at the top of the values hierarchy among technology teachers.

Another point is that three components of values have to be taken into account: cognitive, affective and behaviour. Cognitive component provides the awareness of different values and demonstrates the reasons to put moral values first. Affective component establishes links between the technological task and students feeling by putting technology into the meaningful context. Behaviour component gives students an
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opportunity to act in accordance to their moral values.

To deal with values effectively the teacher has to develop an appropriate classroom environment that will help students to recognise a situation as being ethically problematic; that will enable students to have a voice and express their feelings and thoughts and find a solution that serves the best interests of all parties involved. So students have to be aware of the effectiveness-responsibility framework and use it in their activities. Both objects and technological experiences have to be valued.

Further research is needed in identifying the list of instrumental values (moral and competence focus) that will provide a basis for the practical applications of the theoretical ideas presented in this paper.

References