



Technology and Human Education

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Abstract

This paper argues that structures of technical education are part of general education. Research areas include all objects conceived and produced by humans with an immediate intent of function utility and how this world of artefacts is embedded into the broader socio-cultural context. The omnipresence of this "Leonardo world" (Mittelstraß, 1992) has a lasting influence on our lifeworld. A localisation into a human educational idea is necessary, as argued by Nida-Rümelin (2013). His approach is based on a holistic, lifeworld orientation knowledge. The essential question is how technology can be integrated as a decisive cultural phenomenon into this holistic concept. A hermeneutic approach seems methodologically suitable. It manifests in the sense-understanding of the tangible work as well as its creation and use. The fundamental structural moments in hermeneutic understanding retain their validity. These are according to Danner (2006, 42):

1. *We perceive a thing or a process sensually.*
2. *We recognise that as something human.*
3. *We understand the meaning and the sense of this as human.*

A holistic approach describes the human being in a unity of thinking, feeling and corporeality - merged into a whole that is more than the sum of its parts. The analogy to artefacts is the workpiece in its unity of form, function, material and manufacturing process. It is felt, thought out and self-made. In it, human beings interpret themselves; with it they create their own world, the cultural sphere. This process manifests as a feedback loop between the worlds of objects and human beings.

Due to the technical transformation of the world, increasingly pressing problem areas with global dimensions are widening. The existential challenge is to locate technology in a human world view. This assignment is not least given to pedagogy in general and to a corresponding educational subject in particular: "Technology and Design".

Keywords: *technology, human education;*

1. Introduction

The following examines the relationship between technology and education. In this paper, it seems inevitable to put forward a conception of humankind in which technical education has to be located. It is also necessary to determine the nature of technology and product design. Deriving from this clarification of the substantive characteristics, the legitimation of an independent subject should be consolidated in the canon of general education schools. The following questions arise from this problem structure; they form the starting point for the further course of the investigation:

- What technical reference fields justify a separate and independent subject "Technology and Design" in the canon of general education schools?
- What education-theoretical concepts provide rewarding contributions to an action-oriented and creative encounter with the lifeworld?
- What integration achievements can an educational subject "Design and Technology" provide in the ensemble of the educational canon?

2. Human education

Pedagogy has to do with humans. This simple insight has significant consequences for the selection of technical content, but also for a fundamental idea of education. Ultimately, our image of humanity determines our ideas of science and pedagogy as parts of it. It rules the way we humans interact, communicate and shape the world and ourselves. Thus, it affects the subject canon in schools how this anthropological foundation is laid.



2.1. Holism

In his presentation of the guiding principles for humane education, Nida-Rümelin (2013) pursues a holistic approach. On the basis of a philosophical anthropology he defines the unity of the person, the unity of knowledge and the unity of society as pillars of a humane educational practice. The foundation for this is based on the autonomy of the person, which is founded on reason, freedom and responsibility of the individual (loc.cit., 15). Free of any instrumental appropriation a person should judge and act autonomously. When reasons are carefully considered and the better argument is found, the result is generally binding.

Educational concepts based on pedagogical anthropology tend towards holistic approaches. Litt (1948), for example, takes up Humboldt's idea of harmonious human formation, but criticizes its restriction to language. But he does not make the mistake of rejecting the basic idea of the classic educational ideal. Rather, he is concerned with consequently pursuing Humboldt's demand for the highest and most proportionate formation of human powers into a whole (Humboldt 1969, I: 64). Accordingly, the claim of a comprehensive and holistic education in the interrelation of people and the world in the variety of situations (loc. cit., 64) is only achievable by including the world of objects, in which utilitarian functions are fulfilled, and thus also technology. This area is an essential part of the culture and shapes it in a particularly sustainable way. So Litt takes a turn from classical to real humanism.

3. The essence of technology

Technology plays a crucial role in human development - right from the start. The physical existence of humankind depends on technology and also the flowering of cultures. Tool finds such as the hand axe are considered proof of the first appearance of humans. Entire epochs are named after formative materials and forms of production: Stone Age, Copper Age, Bronze Age, Iron Age; industrial age with intensive mechanization, and digital age.

3.1. Technology as part of culture

Culture is everything that is created by humans - in contrast to nature. Humankind is dialectically referred to both spaces. Cultural achievements include, for example, language and science as well as the shaping transformation of art and technology. Culture is the artificial space that humankind manages. Through culture, humans interpret and determine their nature and being. The technical world of objects occupies a significant place in culture in toto, especially in the modern world of life.

The humanities have shown a reserved attitude towards the technical world of objects. By aesthetic literary humanism technical activity has been banished from the realm of culture and thus of human nature.

Uncontrolled by meaning and value issues, the mechanisation of life assumes a separate existence and leads to technocratic conditions.

3.2. Creativity and technology

The history of technology is a history of inventions. Realizing technical devices is a mental achievement. It requires imagination, thinking of a purpose, anticipatory planning, collecting and analyzing facts, combination skills, mentality, and in-depth knowledge of material properties, manufacturing processes and environmental qualities. The creative aspect of the technical object is manifested not only in its practical function but also in its shape.

Pedagogically relevant is not only something new, but something that is new for the individual. Postinventing has the same educational significance in handicrafts as inventing.

3.3. Technology and science

The technical functioning of devices requires the observance of natural laws. Nevertheless, there are serious differences between technology and science. Science describes the laws of the existing world ("nature") and is based on causal correlations. Technology and product design, on the other hand, refer to the subject area of human-made objects with utilitarian functions. With them people create their own space, the cultural space. In its artificiality, it faces nature. Through the production and use of this world of objects, human beings shape their environment and interpret themselves. Because of that questions about the meaning, purpose and responsibility of human beings become relevant.



4. The technical object in a holistic view

If an image of humanity is valid, understanding human being as a whole of thinking, feeling and corporeality, the view of the whole of the product of workmanship is a natural consequence. Simplified and brought to a programmatic, formulaic denominator, this correlation expresses itself in the structure "the whole person - the whole work". An objective-holistic view grasps the technical object as the result of a coherent interplay of production technology, material, form and function. These sections are interdependent; they interpenetrate and determine the subject matter (fig. 1).

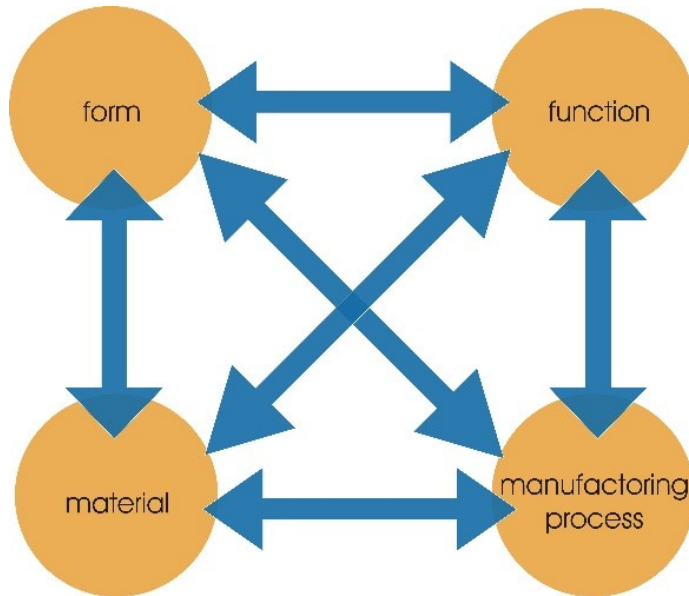


fig. 1

In contrast to free artistic design, the shaping of the technical object is in close contexts to its practical function. Its aesthetic level unfolds essentially as aesthetics of use (see Heufler 2004), distancing itself from art.

The technical object is comprehensively interpreted when manufacturing and use are considered in a socio-cultural context. Humans and world mutually influence each other. With the help of technology, people reshape and transform the world which retroacts on humankind.

5. The "lifeworld" (Lebenswelt)

A determining element among the self-images of humanity is the classification of "nature" and "culture", from which the organization in science and humanities derives. Science investigates causal relationships, and the humanities explore contexts of meaning. The former works "exactly" with proofs, the latter does so "strictly" with evidence (Danner 2006, 27). Science and school organization are largely based on this distinction.

Mittelstraß (1997, 82) questions this contrast between these two paradigms. In his view, both fields of science have the same basic starting point: "the world"; namely the real world, which is the *conditio humana*. He takes up Husserl's (1954) concept of the lifeworld as an uncircumventable *a priori*. As the world which is sensually, vividly, concretely, practically and physically experienceable, it forms the foundation of meaning for all academics. By use of that background Mittelstrass relates the Leibniz (interpreted world) and the Leonardo world (made world) into a transdisciplinary reason; ultimately, he unites both in a single entity. The human being remains the measure of a human being (see Mittelstraß 1997, 87 f.).

The baselines of an educational theory and the reference fields of a holistic craft education fit easily into this idea. Technology and product design are determining parts of the Leonardo world. In order to make this meaningful for humans, the Leibniz world is needed. Technical work with representational holistic aspiration fulfills an integrative function with a formative influence.



6. Conclusion

Technical systems influence our everyday world, our actions and our attitude towards life. Increasingly, however, the ambivalence in the use of technology becomes obvious: In addition to the abundance of opportunities for enriching life and solving the constraints of encountered nature, negative effects emerge. The progressively industrialised ways of working, growing rationalisation and specialisation increase the possibilities of human control and manipulation. The global impact on Earth's ecology is dramatic: The use of modern technology has reached a level that seriously jeopardizes the planet's habitability. An increasing alienation from the lifeworld accompanies the technical transformation.

It is clear that the good and bad consequences cannot be pinned on technology. The person using it on their own terms is solely responsible. In this network of problems, technical education fulfills an important task.

In his pedagogical concept of the mental permeation of technical educational objects, Schmayl (1987, 346 f., 355) points out the following levels of competence: ability and practical mastery, knowledge and understanding, attitude and mindset.

A core competence of technical education is the recognition, analysis and practical solution of technical problems in everyday life. In addition, technical education opens up connections between technology, product design, people and society. It imparts guidelines and categories of meaning for the humanization of the technical world of objects. It requires a separate subject "Technology and Design" with a permanent place in the educational canon of general education schools.

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