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Editorial Introduction

# Instructing Technology, Technological Instruction: Editorial Introduction

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## Abstract
The term *instruction* is multi-layered and used in completely different contexts – from printed user manuals, over explicitly uttered verbal directives to the implicit teaching of forms of conduct by exemplifying them. This issue collects contributions that explore instructions from a philosophical perspective on the relationship between language and technology. The following editorial introduces these contributions and identifies connections between them. Although the contributions in this special issue explore the term *instruction* from different angles, these contributions are all connected by a common thread, namely the philosophical reflection on the relationship between knowledge and action. This relationship seems to be prevalent in both written and verbal, implicit and explicit forms of instruction: instructions convey knowledge about action. Instructing a person or a machine connects the digital with the analogue and the abstract with the concrete while situating both instructor and instructed in a larger socio-technical context.

**Keywords:** Instruction; Language; Technology; Knowledge; Action

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Редакторская заметка

# Инструктаж по технологии, Технологическая инструкция: Введение от редакторов

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**Аннотация**
Термин “инструкция” многослоен и используется в совершенно разных контекстах — от печатных руководств пользователя, явно произносимых словесных указаний до имплицитного обучения формам поведения путем их демонстрации. В этом номере собраны материалы, в которых рассматриваются инструкции с философской точки зрения отношения языка и технологии. Данная редакционная статья представляет эти вклады и определяет связи между ними. Хотя статьи в этом специальном выпуске исследуют термин “инструкция” с разных точек зрения, все они связаны общей нитью, а именно философскими размышлениями о взаимосвязи между знанием и действием. Эта взаимосвязь, по-видимому, преобладает как в письменных, так и в устных, неявных и явных формах обучения: инструкции передают знания о действии. Инструктирование человека или машины связывает цифровое с аналоговым, а абстрактное с конкретным, помещая как инструктора, так и обучаемого в более широкий социотехнический контекст.

**Ключевые слова:** Инструкция; Язык; Технология; Знание; Действие

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This special issue is not only dedicated to a multi-layered term that is used in completely different contexts. The articles also provide a look at the numerous objects that we refer to as instructions. The range is wide: on an airplane, for example, we encounter safety instructions in the form of printed paper with text and images, as spoken words, as video, and as gestures by flight personnel. This example already shows the relevance for the journal: instructions use technology and technique and they also refer to them. Obviously, this is true for user instructions, but work instructions are also only understandable through a socio-technical context in which the work takes place. The technique materialized in the instructions themselves is also worth looking at: Does it make a difference whether instructions are conveyed via video or as text? How does the technique of writing instructions itself evolve? How explicit and how descriptive is the content of the instruction? Finally, digitalisation and robotics also modify the question of the user of instructions: While in the past the users were usually humans (although we may find counter-examples addressing animals, plants, spirits and gods), today the technology itself requires instruction.

A common thread running through the contributions to this special issue is the relationship between knowledge and action. This is rooted in the concept of instruction, since it is through instruction that knowledge about action is conveyed. User instructions convey knowledge about how to act with a technical object, work instructions describe behavior at the workplace, and safety instructions convey knowledge about how to avoid accidents through actions. An important component of action here is physicality: actions take place in the physical world in most cases and the transfer of knowledge into physical action is not trivial.

In her contribution **Instructing To and Instructing In: Two Paradigms of Instruction**, Danka Radjenović (2022) makes a distinction between two ways in which the concept of instruction is used in the English language. The first paradigm – ‘instructing to’ – is predominantly found in the context of technology, especially human-machine interaction. This paradigm is best exemplified by a computer program that performs its functions by following a coded set of instructions. The second paradigm – ‘instruct in’ – can be exemplified in the process of teaching and learning a language. Although a language teacher also ‘instructs' their pupils 'to’ use certain words and phrases in certain contexts or to pronounce phonemes in a certain way, teaching a language ultimately represents a form of ‘instructing' pupils 'in’ using said language freely, creatively, and autonomously beyond the simple following a coded set of instructions.

Regina Wuzella (2022) shows us an exciting perspective on the corporeality of instructed actions in her contribution **Epistemologies of Formalized Sensuality - The Sensory as a Figure of Thought of AI-based Robotic Embodiment**. This paper is about the specific instructions for humanoid designed robots which enable these robots to react appropriately to the sensory input with their own behavior. It becomes clear that looking only at the explicit instructions in the algorithms is too narrow: intuitive sensor-motoric actions in particular require tacit knowledge and intelligence embedded in the body. The fact that  a central control system alone cannot provide such tacit knowledge

and intelligence points out that the translation of knowledge into action has many preconditions in the body itself.

An examination of the media through which instructions are conveyed can be found in the article **Do it Youself at Youtube** by Yegor Grom and Stepan Bytsan (2022). This paper is an empirical work that analyzes instructions for making tools uploaded on the video platform Youtube. These videos are contrasted with journal articles with a similar goal. Again, a key aspect is the translation of knowledge into action. The strengths and weaknesses of different media for conveying instruction are elaborated: While videos greatly simplify direct translation into actions, the textual form has strengths in conveying background knowledge and justifying specific steps.

In her article **Explicit and Implicit Components of Social and Technical Instruction**, Irina G. Belyaeva (2022) returns to instructions themselves and analyzes the concept itself and the forms in which instructions are socially applied. Here, there are several dimensions by which instructions can be classified: Their explicitness, the sign system in which they are written and their functional style. In addition, the user of the instructions is examined: besides human individuals, computer programs can also be considered, so it is proposed that users of instructions should be understood as subjects who modify an object on the basis of the instructions.

In Reiner Hähnle’s (2022) contribution **Program and Code**, the relation between knowledge and physical action is present in a special way. The article emphasizes the distinction between computer programs and code. Programs denote mathematical objects with unambiguous semantics. Code, on the other hand, refers to the physically executable objects that can run on a computer and that have physical effects - be it output on a screen or vehicle control. The distinction is important, for example, because formal verifications (mathematical proofs of correctness) always refer to the mathematical object. A relation between the two distinguished objects is only established by the application context of the program.

A completely different approach to the translation process of instructions into bodily action is shown by Danil Vyrypanov (2022) in his contribution **Staging Notations**. This article considers notations for recording ballet and theater performances: physical actions of people, e.g. dances, are to be recorded as instructions in order to reproduce these actions in the future. The history of notational forms is at the same time a history of the properties and limitations of the notational medium: three-dimensional temporal sequences are to be recorded, often on two-dimensional paper without the possibility of anchoring temporal sequences in the medium itself. However, the limitation can also open up possibilities: For example, a focus on the essentials in the instructions is necessary.

The previous contributions were primarily concerned with the translation of knowledge into actions. In the last paper **Visualizing the Composition: A Review of Latour's Science and Technology Studies and Visualization Practices** by Yingyu Zhu (2022), the question is asked conversely: How can we gain an understanding of processes from existing physical actions and compositions of people and things? For this purpose, the central concepts of Bruno Latour's science and technology studies are first taken up. A main focus of the article is on the visualization techniques through

which the relations of different actants are made visible and thus knowledge is generated. Since the form and expressiveness of the medium play an important role here, the links to design and art are also examined.

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