



# Constructivist Educational Psychology and Systemic Thinking: Principles, Concepts, and Examples

Radek Trnka



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# Introduction

During the past decades, the constructivist approach to learning started to gain dominance in education as well as in psychological theory on learning and instruction. This approach showed to be more effective in supporting knowledge acquisition in comparison to the older approach to school learning based on a simple transmission of facts. Constructivist educational reforms have started to be implemented in many countries to overcome the traditional approaches to learning focused mainly on the passive reproduction of knowledge. In modern views of learning, a passive transmission of knowledge is no longer considered to be sufficient (Stroet et al., 2016) and this calls for an intensive implementation of constructivism into school practice and further development of the theory in this field.

As mentioned above, the constructivist approach to learning and teaching showed some advantages in comparison to the traditional approach, for example, better intrinsic motivation of students to learn and their better engagement in school work. The constructivist teaching has also been found to enhance students' responsibility and activity in learning (Ben-Ari & Eliassy, 2003; Hickey et al., 2001; Honkimäki et al., 2004; Milner et al., 2010). The students who were taught in a constructivist school environment better maintained their focus on school work, persisted when work became difficult and were more cognitively engaged when assigned independent work that required planning (see Stroet et al., 2016 for an overview of empirical research in this field).

Cumulative evidence about the effectiveness of constructivist education and also my personal teaching experience gave me a basic incentive for writing this book. I think that the constructivist approach can help increase a student's involvement at school and therefore, it should deserve the special attention of teachers and other persons that actively participate in school education. Furthermore, if students are more actively involved in knowledge acquisition during constructivist education, they may also enjoy their time in school more than when, simply put, they only sit and hear what a teacher tells them. Thus,

more development in this field can also contribute to a better quality of school life of students (and it is not negligible if we realize how much time students spend within various educational systems during their childhood and adolescence...).

As apparent from its title, this book is intended to develop a new bridge between the educational psychology of constructivist processes and systemic thinking. So far, these two approaches have been developed mostly within their own fields and no interdisciplinary overlaps have been built. I suggest that the systems psychology that arose in the background of general systems theory may be highly inspiring for the explanation of findings in the field of educational psychology of constructivist processes. In other words, I argue that the constructivist processes described by empirical research may be interpreted and explained by the principles of systems psychology. Following this position, the main aim of this book is to open a new theoretical perspective on constructivist processes and also stimulate future research and theory development in the field.

At the beginning, it is necessary to say that the content of this book has an exploratory character. As mentioned above, little is known about the interdisciplinary overlaps between the psychology of constructivist processes and systems psychology. To show such overlaps, I utilized the findings of research in several areas of educational psychology, especially in the fields of cognitive processes that accompany school learning and also social processes that proceed in the social system of school class. In other words, two perspectives of educational psychology are considered in this book, the cognitive perspective and the social psychological perspective.

This book aims to utilize the principles of systems psychology for explanations of empirical findings in the field of educational psychology of constructivist processes. Throughout the Chapters 6, 7, 8, and 9, the selected empirical findings are presented to provide examples of phenomena that are expected to have some connections with the principles of systems psychology. Various interpretations from the position of systems psychology are developed throughout these chapters.

To provide a reader with an initial background, Chapters 2, 3, 4, and 5 introduce the theoretical rationale. These chapters have a review character. The main intent is to orient a reader in the theories involved in this book, mainly in the educational psychology of constructivist processes on one side and systems psychology on the other side. Therefore, Chapter 2 outlines the basic principles of constructivism and its application to educational psychology. This theoretical position involves both the principles of psychological constructivism and social constructivism. Chapter 3 introduces the basic principles of systems psychology and systemic understanding of human cognition and learning. By comparing the insights from these two review chapters, a reader may gain an idea about the underlying logic and common aspects of these two theoretical approaches.

As mentioned above, this book considers both the cognitive and social psychological perspective. I argue that if teachers will be well-known of the students' cognitive processes involved in knowledge construction, they could also improve their teaching and adjust the teaching style to particular audience. If we improve our understanding of "what happens in students' minds" during lessons, we should be able to better apply the didactic tools inspired by constructivism in our school practice. Thus, the knowledge about students' cognitive processes is suggested to be an important prerequisite for the application of constructivist methods of teaching in practice. For these reasons, Chapter 4 provides a short excursion to cognitive psychology and presents basic information about the processes accompanying the conceptual change in the context of learning and education.

In contrast, Chapter 5 reviews the systemic-constructivist view of how knowledge is constructed within the social system of school class. Its content considers social psychological perspective and introduces the constructivist processes on the social level of analysis. This chapter explains the role of contextual and relational aspects in knowledge construction, for example, the role of communication or quality of relationships between social actors in a school class.

After these theoretically-based review chapters, the chapters that seek the overlaps between the educational psychology of constructivist

processes and systems psychology follow. These chapters build on the previously introduced theoretical contexts and provide specific examples of how systemic thinking can be applied for a better understanding of constructivist processes.

Chapter 6 continues in exploration within the social psychological perspective outlined in Chapter 5 and presents the selected empirical evidence from this field. This chapter shows that the process of collective meaning-making in school classes has indeed a character of self-organization, i.e. one of core general systemic principles. This link is discussed and theoretically interpreted in this chapter.

Chapter 7 explores the possibilities of the use of thought experiments in constructivist teaching. The empirical findings in this field showed that thought experiments are very helpful didactical tools for enabling students to imagine situations that considerably exceed their everyday experience. Thought experiment is considered to be very powerful for stimulating students learning and conceptual change. The past research in this field indicated that new knowledge is often constructed through the students' perception, recognition, and systematization of differences. This takes us to the systemic principle of differentiation. From this perspective, human cognition is suggested to be something as a "processor" that is able to process and determine the relationships in the patterns of differences. This general principle is used for the interpretation of the process of knowledge construction when the thought experiments are used as a didactic tool during teaching.

Chapter 8 outlines the research highlighting the importance of students' epistemological beliefs in the context of knowledge construction. It argues that students' epistemological beliefs are key determinants of knowledge construction, because they shape the learning perception, school performance, and knowledge integration during the learning process. The research in this area shows that students' epistemological beliefs are not static, but change in dependence on the particular context, for example the domain of education. The change of epistemological beliefs is another area where the systemic principle of differentiation can be applied. Therefore, the principle of differentiation is used in this chapter for the interpretation

of why learners' epistemologies are modified or changed in particular contexts.

In Chapter 9, research on the use of perspectival approach during teaching is introduced. The perspectival approach to instruction can be utilized by teachers for a better contextualizing of the subject matter. The change of perspective helps students to see the problem from a different angle of view and stimulates their relativistic understanding of the presented issue. In this chapter, the results of the research of use of perspectival approach in teaching are interpreted by the principle of relativity, a systemic principle inspired by the theory of relativity.

In conclusions, a holistic view of the relationships between systems psychology and educational psychological research of constructivist processes is developed. This final chapter synthesizes the insights that emerged earlier in this book. These insights are developed more by considering a broader context of current research and theorizing in the field.

The past paragraphs outlined the main idea of this book and introduced the reader briefly about what this book is about. It is necessary to say that the focus of this book is limited to the aspects of learning in situated, face-to-face contexts, e.g. processes in which knowledge is acquired at school settings. This covers real life, face-to-face interactions and students' personal contacts with teachers. This book is not intended to discuss learning in on-line form, nor any kind of virtual education. Despite the online virtual environment and how digital media play an increasing importance nowadays, this way of teaching and learning is not of interest in the present book.

This book is intended to several target groups. As mentioned above, the main contribution of this book is theory development. Therefore, the book is primarily devoted to educational psychologists and psychologists working in other related areas. It can be also utilized by students of educational schools and universities for further reading, for gaining more in-depth insights or inspiration for their future research or practice. Furthermore, this book is devoted to philosophers focused on educational philosophy, systemic thinking, philosophy of mind, or generally on philosophy of cognitive science. Because some chapters