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Practicing Transdisciplinarity and Trans-Domain Approaches in Education: Theory of and Communication in Values *and* Knowledge Education (V*a*KE)

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ABSTRACT

(Academic) disciplines are a means to structure science and are not appropriate for epistemic discussions. Instead, it is proposed to use the concept of Trans-Domain Approaches (TDA). A TDA typically consists in a General Theory GT that integrates and transcends the Domain-Specific Theories (DTs) referring to a research topic. The constructivist teaching-learning tool Values *and* Knowledge Education (V*a*KE) is used as a prototype to analyze different features of a TDA. First, the theoretical framework of V*a*KE is analyzed under the perspective of TDA: V*a*KE integrates several constructivist theories, particularly about moral judgment competence, constructivist knowledge acquisition, and social constructivism. Then, the communication between stakeholders is analyzed more in detail, based on Shannon and Weaver's channel model. The analyses focus on communication among researchers, between researchers and practitioners (teachers), between practitioners and students, and among students. Several conclusions with respect to TDA can be drawn.

Keywords: Transdisciplinarity, Trans-Domain Approaches, Education, Communication, Values *and* Knowledge Education (V*a*KE)

1. INTRODUCTION

Today's world – social as well as physical – is threatened by an increasing number of challenges, like abuse, autocracies, climate change, corruption, disdain, fake news, floodings, forest fires, geological events, hunger, inappropriate consumption, injustice, lack of sustainability, migration, pandemic, pollution, poverty, racism, violence, wars, etc. But there is also increasing knowledge related with these challenges. None of them can be reduced to being the topic of one single field of research, particularly considering that many of these challenges are related with each other. These challenges can only be overcome through transdisciplinarity in its broadest sense: All sources of information and action possibilities that are available must be used, without regard to disciplines. There is only one restriction: Assumptions that cannot be considered as scientific are not acceptable. This is because scientific criteria are the best that humanity can do to get viable statements, i.e., statements that comply with the actual needs, in particular overcoming the challenges [1]. Science is not a guarantee against errors, but it permits to minimize them. But science needs to be optimized itself, and transdisciplinarity is a means for that as it permits to capitalize on all insights that have been produced with scientific methods.

This holds also for education, which I regard to be the most important generic means to overcome the challenges because it addresses all people and permits to focus on specific challenges if necessary. Transdisciplinary student competence is certainly a goal of education, but the teaching concepts – the tools used in education – should be transdisciplinary as well to comply with the complexity of the topic; hence such a tool – Values *and* Knowledge Education (V*a*KE) – and its relation to transdisciplinarity will be in the focus of the present paper.

I do not want to provide a definition of transdisciplinarity here – I have discussed this issue elsewhere [2]. Suffice it to say that the principles that are actually meant with *transdisciplinarity* do not relate to the academic disciplines used to structure the universities. Instead of transdisciplinarity, hence, I speak of *Trans-Domain Approaches* (TDA). A domain is a set of fairly homogeneous scientific statements about a research topic that is clearly (based on scientific arguments) distinct from other such sets. (Academic) disciplines can be interpreted as domains, but there are also domains that do not relate to such disciplines. *Trans* refers to an integration and extension of the domains. A TDA as *system of statements* consists of a theory that integrates and transcends the different perspectives of the respective fields or domains [2]. TDA as *action* is the attempt to develop and evaluate such theories. In this paper, the focus will be mainly on the former.

Typically, a TDA consists of a *general theory* (GT) that contains (elements of) the relevant *domain-specific theories* (DTs) and puts them in a common framework (see figure 1; [3, p. 53]). I do not want to go more into details as these are presented in [2].

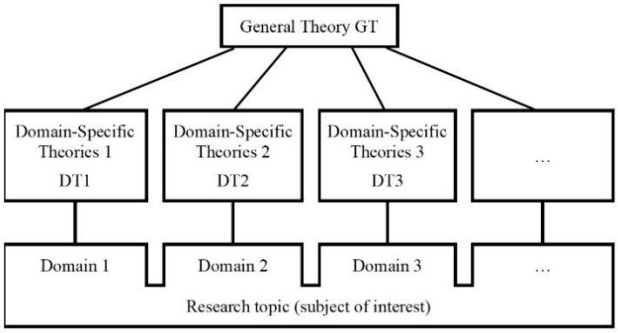

Figure 1: TDA as relationships between general theory (GT), domain-specific theories (DTs), domains, and research topic (from [2, figure 1])

The present paper deals with the question of applying TDA in practice through education. For this, the constructivist teaching tool Values *and* Knowledge Education (V*a*KE) will be used as an application example that puts TDA into practice on many levels. First, V*a*KE will be shortly introduced (chapter 2), then it is shown how V*a*KE as GT integrates theories (DTs) from different domains (chapter 3). Chapter 4 addresses the different facets of communication in V*a*KE as related to TDA: among researchers, between researchers and practitioners, between practitioners and students, and among students. Finally, some conclusions are drawn.

2. V*A*KE

Values *and* Knowledge Education (V*a*KE [4]) is a constructivist teaching-learning tool that permits to combine the acquisition of knowledge through inquiry-based learning (e.g., [5]) and moral education in the sense of increasing the competence for moral judgment (arguing in favor or against applying specific values in dilemma situations [6]) through dilemma discussions [7]. The procedure consists in a workshop in which first a moral dilemma (a situation in which the protagonist has to decide from two options, and whichever option he or she chooses, some moral norms or values will be broken) is described, and the participants have to decide what the protagonist should do, and why. The dilemma is conceived in such a way that to discuss it competently, the participants need some knowledge. After the first (moral) discussion, the participants recognize that they are missing knowledge, they formulate questions and search for answers through an inquiry-based process. Based on the newly acquired knowledge, they discuss the moral dilemma more competently. A short film illustrates the process [8]. Extensive information on V*a*KE can be found in the V*a*KE handbook [4].

In its prototypical form, V*a*KE consists of a sequence of eleven steps. Experience shows that many of these steps are taken spontaneously by the participants; for instance, when the participants estimate that after some discussion of the dilemma (moral education) there is no progress, they usually decide that they need to answer relevant questions with respect to content (knowledge acquisition). A central issue is that the underlying concept is constructivism [9]: The general assumption is that learning means constructing one's competences (in V*a*KE: knowledge as well as moral judgment competence), in contrast to the traditional view that the competences are transmitted from the teacher to the students. Therefore, the teacher's role is not to provide knowledge; rather, his or her responsibility is to create situations which are optimal for the construction of competences [10]. Consequently, once the dilemma discussion is launched, the teacher restrains from giving input unless asked directly in the inquiry-based steps, but manages the work like moving from one step to the next or organizing specific activities such as role-plays with reversed perspective-taking, brain-storming or special values-identification tasks, etc.

Since the first studies on V*a*KE [11], the method has been evaluated in many studies with different foci. It is not possible here to give a comprehensive account of these studies (see [4]); instead, the most significant results are presented in some keywords (because of space restrictions, the respective publications will not be referenced):

- The students were highly *motivated* and often continued the discussion beyond their classrooms, such as in the leisure time and in their families.
- In all studies, the participants acquired at least as much *knowledge* as the comparison groups (traditional teaching control groups), and in many studies much more, even more than the teacher had known before doing V*a*KE. The V*a*KE group students tended to acquire knowledge on a higher level in the taxonomy [12] – analysis, synthesis, and evaluation – than the control group students. They transferred their knowledge more easily to other topics.
- The students increased their *moral judgment competence* [6] towards a higher stage. They became more sensitive for the moral relevance of situations that formerly they had assumed to be neutral. In contrast to Kohlberg, they discussed not only issues of justice, but also issues of care [13], truthfulness [14] and others.
- Often, they moved on from discussion to *action*, trying to have an impact – at small as it might be – towards what they had recognized as morally justified.

Some more theoretical underpinnings, application issues and research results will be addressed below with regard to how V*a*KE is a practice of TDA.

3. THE THEORY OF V*A*KE: A COMBINATION OF SEVERAL DOMAINS

From the very beginning, V*a*KE was conceived as a TDA. Indeed, the theory of V*a*KE is based on several theoretical frameworks which were all under the same umbrella – constructivism [8] – yet in so different versions that the kinship is not easily recognized: In the interpretation of the founders of V*a*KE, knowledge acquisition and inquiry-based learning are rooted in Piaget's [15] concept of assimilation and accommodation; this concept – with substantial deviations –is also the base of Kohlberg's [6] theory of moral judgment competence with regard to justice, its ontogenetic development and its affection through education [7]. The theory of moral judgment competence with regard to care [13] is based to some degree on the same framework. A further framework that is also rooted in some constructivist thoughts, yet with different references, is Vygotsky's [16] social constructivism, which, however, we have adapted to fit the general theoretical framework of V*a*KE: Knowledge is considered as a collaborative social achievement in the sense of a joint construction by the participants, but the role of the individual is emphasized as well, with a specific focus on the mutual viability checks (see also below, chapter 4.4).

Besides these three basic frameworks – assimilation and accommodation, moral judgment competence, and social constructivism – which were the fundament from the beginning, several psychological theories emerged as important as well, like motivation theories, theories of critical thinking, theories of social interaction, theories of creativity, theories of moral action, and several more. Further, as V*a*KE deals with both *knowledge* (that relates to descriptive statements, *Is*) and moral and *values* (that relate to normative statements, *Ought*), meta-ethics addressing the issue of the relationship between *Is* and *Ought* need to be taken into account (for details, see [2, 17]). Further, since V*a*KE is an educational endeavor, normative educational issues had to be considered to justify its use, a topic of pedagogy. And last but not least, the implementation in classroom and elsewhere was important, which is addressed in educational research. As one can see, then, the theory of V*a*KE can be regarded as a GT according to the above concept of TDA that integrates and transcends the different DTs that have been listed above.

Conceiving the theory of V*a*KE as a GT in the sense of TDA with several DTs permits to do empirical research addressing the different domains simultaneously. For instance, one can refute the myth that values education cannot be done due to the curricular pressure that teachers have to comply with, as the empirical research has shown that V*a*KE students acquire as much knowledge as the control group students, if not more, and their knowledge is of higher quality. One can question the objections many teachers have that the parents, authorities, churches, etc., might oppose values education because they consider it as indoctrination towards problematic values, by saying that not the values themselves are at stake, but the moral judgment competence; but while one can critique indoctrination, one can hardly oppose improving moral argumentation, lest to be identified as fundamentalist, which few people would regard themselves to be.

4. COMMUNICATION

Communication plays a crucial role in TDA, as can be shown when it comes to implementing V*a*KE. Its discussion can be based on Shannon and Weaver's classical communication model [18]. As simple as it is, the model includes the elements that are central in the present context; further analyses can capitalize on more complex models. The model is expressed here in the terms that are used in my interpretation of constructivism and in the context of V*a*KE; a central element here is the concept of subjective theories which is explained briefly first.

Subjective theories [19] are people's convictions and beliefs about the topics at stake. They have the same form and functions as scientific theories, and the principles of TDA apply to them as for scientific theories. However, subjective theories are much more sensitive to biases of many kinds, and they have not been scrutinized [20] but depend on the person's unsystematic experience since usually they are not communicated, in contrast to the scientific theories. People's systems of subjective theories are extremely complex, and only parts of them are actualized in a given situation, depending on the situative circumstances and the focus on which the person puts particular attention, which depends, among others, on normative decisions (see figure 2 in [1]). Perception is determined by the actualized subjective theories: What does not fit in it at all will not be perceived, and what fits to some degree might be distorted or completely misinterpreted to comply with the subjective theory. Only the recognition that the message received is in contradiction to one's subjective theory will lead to a disequilibrium and hence to accommodation in the sense of Piaget [15].

The Shannon/Weaver model [18], then, is as follows:

- Shannon and Weaver distinguish the sender and the receiver. The participants in an interaction take turns as sender and as receiver; the communication principles apply to both directions.
- Both sender and receiver have systems of subjective theories about the topic.
- The sender has a message to convey; he or she encodes this message into a signal (verbal with paraverbal parts or nonverbal). The coding is performed in function of the sender's actualized system of subjective theories. It includes necessarily a reduction as it is impossible to convey the full complexity of one's intended message, and this reduction might include distortions as we are not always able to fully live up to our intentions and may be influenced by biases.
- The signal reaches the receiver through the channel. There might be some noise disturbing the signal, but this is neglected for the present purpose.
- The signal is perceived by the receiver, which means that the message is decoded. This is done in function of the receiver's system of subjective theories, as discussed above.
- Differences in subjective theories between sender and receiver lead to differences in encoding and decoding and hence to misinterpretation of the sender's message by the receiver.

The principles of TDA apply to subjective theories as well as to scientific ones; this means that if the sender and the receiver refer to different domains (and hence have different DTs), a general theory GT shared by both is required to minimize misunderstandings.

Several communication processes can be distinguished with respect to V*a*KE: the communications among researchers (or within the scientific community; 4.1), from the researchers to the practitioners (4.2), from the practitioners to the students (4.3), and among the students (4.4).

4.1. Among researchers

In TDA as action, typically, researchers representing the different domains collaborate to work on the GT by contributing their respective DTs. To ascertain fruitful communication, it is then necessary to establish a (possibly preliminary) common GT within the participating researchers' subjective theories. The first issue in this regard is a common terminology, in the sense that a given term means (more or less) the same for the different researchers. Next, the relevant theoretical assumptions and the methods for checking their viability must be agreed upon.

The communication about V*a*KE occurs mainly within the educational research community. Only exceptionally, representatives from outside participate in the discussion, and only upon special request. An example is Morscher, a philosopher specialized in ethics and meta-ethics, who responded to an explicit request of the organizing committee of a conference on moral and democratic education to present the philosophy's non-cognitivist meta-ethical position [21] – this request was based on a GT that included the DTs of ethics and meta-ethics [2, 17]. Consequently, Morscher argued purely within the philosophical DT, and it is the task of the moral education community to translate it into V*a*KE GT to integrate it into their system of subjective theories. In my experience this was not achieved by all members of this community: Although all of them acknowledge the relevance of the domain of (meta-) ethics, few of them are familiar with details of the corresponding DT. The talk might also have been too complex (e.g., with respect to the terms used and the argumentation logics) given the restricted knowledge in this domain of the conference community.

Within the V*a*KE community, the foci of researchers are quite divergent [4]: Some do research on teacher training, others on language learning, on migration, on consumer education, on biomedical issues, on moral action, etc. All of them bring additional DTs into the GT, thus extending it or generating a GT that is specific to the respective research team. For instance, the Greek team [22] does not use Piaget's concept of assimilation and accommodation [15] described above to account for knowledge acquisition but the principle of conceptual change developed by Vosniadou and her team [23, 24] which focuses on learning in science. The terminology is different, but there is no fundamental difference between the two approaches [25]. This example shows that within a TDA like V*a*KE it is quite possible that different DTs are integrated into the GT by different research teams; in other words, a TDA might change in the details of its DTs without changes in the substance; however, in order to communicate among the researchers of the TDA representing different and possibly competing DTs (like Piaget vs. conceptual change), the common GT (in form of systems of subjective theories of the respective adherents) must be able to account for both.

4.2. From the researchers to the practitioners

Scientific theories cannot be applied directly in practice. Instead, they need to be communicated to the practitioners, who hopefully integrate them into their system of subjective theories (with all distortions that it includes [26]). These scientific theories as perceived, combined with all other elements of the system of subjective theories that are activated, serve as support for the decision (or recommendation) how to act, but do not determine it for several reasons [27].

On this background, the communication between researchers and practitioners with respect to TDA has many facets; I will only discuss two of them, which lead to suggestions about TDAs in general. A first issue relates with the complexity of the situation with which the practitioners are confronted: They contain a lot of uncertainty, uncontrollable features, and haphazardness. It is

impossible to predict precisely how they will evolve and what impact a certain action by the practitioner will have. Nevertheless, this can be predicted with a certain probability. Such predictions are provided by research on a very generalized base that may apply to hundreds of thousands of teachers and millions of students [28]; such general statements can only be quite abstract. This is the generality-concreteness antinomy ([27], based on [29]): The more general a statement is, the less concrete can it be. Practitioners, however, need concrete instruction how to act.

Although V*a*KE has not been tested with so many teachers and students, the statements are still quite general because they are formulated generically: We provided practical suggestions by conceiving prototypical steps of a V*a*KE process. These steps are considered as prototypical because they provide only a general framework for action, but leave it to the practitioners to decide in detail how to act. This must be done in the spirit of the theory: Teachers must adapt the decisions to the specificities of the situation, not against the theory, but create approaches that fit their specific conditions and the theory. To be able to do that, the teachers need to learn not only the prototypical steps, but also the theoretical framework.

Thinking in TDAs is quite unfamiliar to teachers who, in their training, had been taught theories (DTs) separately from each other. Therefore, much effort in the communication must be put not only into conveying the respective DTs, but the GT as a whole, and in particular into fostering the understanding for principles of TDA. Most of all, the concept of integrating several DTs into one GT framework is new to teachers. This includes the importance of theory for action, which is often not recognized by teachers who would prefer clear-cut recipes. Further, the metatheoretical base needs to be conveyed, namely constructivism, which is in contrast to many teachers' actual epistemological beliefs [30, 31]. Also, the concept of values-education as fostering moral judgment competence is in contrast to most people's subjective theories which interpret it as indoctrination. As one can see, there are many differences between the V*a*KE TDA and the practitioners' subjective theories that must be taken into account in the communication.

Surprisingly, teachers who are informed about V*a*KE often say that they practice that already; a closer look, however, shows that they may execute some V*a*KE elements, but not all of them simultaneously. This means, they mistake V*a*KE as one DT and neglect the other DTs that constitute the V*a*KE GT; possibly they not even recognize the researchers' message about these other DTs. For instance, many practice some kind of inquiry-based teaching, but only with respect to knowledge and not to the values.

These issues demonstrate clearly that the communication about TDA depends very much on the purposes of the senders and receivers, and hence their foci. Researchers on V*a*KE have two goals: First, they want to evaluate V*a*KE, with the idea in mind that the better its scientific support is, the more practically relevant it is. The TDAs for this are mainly scientific. Secondly, they want to ensure the practicability of V*a*KE to face the challenges mentioned above; for this, the scientific TDA must be made compatible with the TDA as conceived by the practitioners. These, in turn, focus in their TDA on the practical application and omit what is not relevant for this; hence, they must be convinced, among others, of the importance of theory for practice.

4.3. From the practitioner to the students

V*a*KE is a type of open teaching, i.e., there is low guidance of the students by the teacher. Thus, the students cannot rely on the teachers' instruction what to do; rather, they must actively take responsibility for their own learning, which consists in constructing competence: They must take the initiative. However, the overwhelming majority of the students are used to be told what to do. At the beginning of a V*a*KE process, thus, the students are usually quite insecure about the activities they are expected to do – they do not recognize that this depends on themselves and not on the teacher. Further, the students are used that the teacher knows the content that is to be taught, tell them about it and often ask questions, whose answer he or she already knows. They are unaccustomed to the principle that they must ask questions and search for the answers themselves, and that the teacher will only respond to direct and precise questions. They are used that the responses and arguments can be classified as "right" and "wrong", while in V*a*KE there is no right or wrong, but only viable or not viable, which they have to decide themselves based on rational arguments. As corollary, it is crucial that in the process of V*a*KE there is not a competition between students, where the one providing the most correct answers has the best achievement, with the consequence that the individual students gets more recognition only at the detriment of the other ones; instead, the discussion of the dilemma is a collaborative endeavor, and the achievement in this process is one of the group and not of the individuals. Other principles apply as well, which cannot be discussed here [4]. This composite of principles can be considered a TDA – more precisely: a sub-TDA to the general TDA, i.e., a more specific TDA dealing with the participants' activities that is subordinate to the superordinate V*a*KE-TDA (for the relationship superordinate vs. subordinate TDAs, see [2]).

Our experience with V*a*KE is that mostly, at the beginning, after the presentation of the dilemma, the students remain silent and inactive, waiting for the instruction. During the discussions, if the teacher is present, they often look at him or her. It might be necessary to give some explanations about the above principles. But once they have captured these, one can recognize a certain relief; in one class, for instance, the students asked the teacher at the beginning of the unit: "Are we going to have V*a*KE, or will we have school?" – the latter obviously with a negative connotation. Very often, after some experience, the students even tell the teacher to go away or simply ignore his or her presence.

For a successful V*a*KE process, it is necessary to communicate the above principles to the students. This can be done verbally. However, in some cases, we have made the experience that the students did not trust the respective explanations but believed, instead, that it was a new trick to manipulate the students – the applied their expectations of teachers being oppressors, erroneously, to the latter's intention in V*a*KE. It became therefore a question of trust: Do the students believe that the teacher will act accordingly to the principles? The most important way to establish trust is to let the participants experience that a person or his or her statements are trustworthy. Accordingly, it is advisable, for the teachers, to go into the process and stick to the principles. Of course, one can talk about these principles beforehand – and we do it usually –, but just telling is not sufficient: The participants must *experience* the implementation of the principles to really trust. This shows that communication can take quite different forms, from verbal, para- and nonverbal to experience.

4.4. Between students

The topics discussed by the students in V*a*KE processes are TDAs since the dilemmas are conceived to address different domains. This begins with the central aim of V*a*KE: to bring together the normative (Ought) and the descriptive domains (Is). This issue has been discussed in [2] from the point of view of TDA. Within Is and within Ought, further TDAs can be found, which have been discussed in [17]: Within Is, one can distinguish the domain of teleological arguments from the domain of deontic

arguments; further, one can distinguish between values topics, like justice, care, truthfulness, honesty, etc. These are considered domains because they are often discussed separately from each other; in the tradition of Kohlberg [6], for instance, the focus is on justice, which was criticized on+ the ground that care is also an important value [13]. V*a*KE combines both [32] and is therefore a TDA in this respect. As to knowledge (or content), V*a*KE discussions always address several knowledge domains across and within scientific disciplines. This would be the classical TDA as discussed in the transdisciplinary tradition which addressed typically only descriptive issues.

Within the V*a*KE discussion, different students defend arguments from different domains. Is and Ought are always relevant and related to each other, but the arguments within Ought as well as within Is vary very much, with different participants arguing from different points of view based on different domains.

To be able to communicate with each other, the students need to establish or develop a common GT which can integrate the different domains and the respective DTs; without such a common GT, no communication is possible. This GT develops during the process of V*a*KE, with equitable contributions of the participants (in contrast to the GTs for the other communications discussed in the sub-chapters above); it is a *collaborative co-construction* by the participants, which means that each builds a subjective theory beyond the one he or she had before working together and that, in its essence, is shared by the other participants; the GT, hence, is a social construction, and this is our interpretation of Vygotsky's [16] social constructivism [33]. Our experience is that even with the same dilemma, in different V*a*KE processes (e.g., different classes), students come up with very different common GTs. Further, the discussions force the participants to make their subjective theories explicit (in contrast to the subjective theories being usually unconscious and hence not suitable for communication [26]), which contributes to constructing one's own knowledge. Overall, the students construct a subjective GT that accounts better for the issues of the challenges in their full complexity than their usual subjective DTs can do.

4.5. Conclusions for communication

The discussions of communication between and among different groups of stakeholders in V*a*KE shows many different facets:

- In some cases, the relations are symmetric and the participants are equal (communication among researchers and among students), in other cases there is an asymmetry. In the latter case, it is important to emphasize that in the spirit of V*a*KE, this asymmetry is temporal: In some phases of the interaction, the direction goes from the researcher to the practitioner or from the practitioner to the student; in other phases, the practitioners give information about their working conditions to the researchers and the students show whether and how they have understood and apply the principles of V*a*KE. In both cases, this is a systematic feedback procedure, and all phases considered, there is no power supremacy of any stakeholder group over the other, rather there is symmetry, although with different roles of the different groups.
- In all cases, the members of the stakeholder groups have to adapt their subjective theories so that a common GT can be established. Sometimes the common GT has little leeway, such as when it comes to implementing V*a*KE according to certain principles that have to be shared, in other constellations the leeway is much larger, such as in research and particularly for the students who discuss the dilemma.
- There is not one single way how the communication can be done optimally for a common understanding. One can distinguish instruction that takes into account the receiver's subjective theory from propositions that are uttered with the hope that it will be understood by the receiver. In any case, feedbacks need to be sought to ensure that the communication is based on a common GT, and usually the common GT needs to be made explicit.

These are only a few of the relevant facets of communication. They show that the communication framework is a TDA in itself, if one considers these facets and their manifestations as different domains with respective DTs, with elements of the GT from the Shannon/Weaver model [18] and subjective theories [19].

The Covid pandemic has had a heavy impact on communication in V*a*KE on all levels discussed above, as much of it had to be done virtually, since the different focus of the channel (e.g., the platform that was used) and the narrowed channel capacity led to serious restrictions. The impact of this on the communication TDA will be a highly relevant issue for further research.

5. CONCLUSIONS

The constructivist teaching-learning tool Values *and* Knowledge Education (V*a*KE) has been used to explore some of the many facets of the practice of TDA. The analyses presented above provide clear evidence of the fruitfulness of using a TDA framework for such a complex practical concept as V*a*KE. As such, it seems an appropriate tool to address the challenges mentioned at the beginning, and indeed, it has been used in education for several of them, and further applications are planned.

One can assume that the principles discussed with respect to V*a*KE can be applied to other research topics as well, with adaptations due to the specificities of the respective topics. The discussions show that a concept of trans*disciplinarity* with a focus uniquely on integrating different disciplines would be too narrow and that the extension to conceive trans-*domain* approaches (TDA) permits insights that go far beyond those that can be addressed when referring to disciplines only. This confirms the appropriateness of the change proposed elsewhere [2, 17].

As it turns out, TDA is not only a philosophy grown in the scientific ivory tower, but it has clear impacts on many fields that affect people's life directly. The challenges to humanity are too complex to be dealt with only within single domains. Education, as an attempt to foster people's sensitivity for these challenges and them becoming actively involved into contributing to overcome them, must take into account this complexity by becoming a TDA itself. V*a*KE fulfills this condition to a high degree. The claim is *not* that V*a*KE is the only possible approach, but our research shows that it is at least *one* of the possible concepts.

The discussions demonstrate the fruitfulness of the concept of TDA as a GT that integrates and extends the different DTs (figure 1). A crucial issue is the search for appropriate GTs as a genuine base for meeting the challenges. The sub-chapter on the communication among participants (4.4) demonstrates that such GTs can be constructed by all people, not only researchers, and that these GTs need to be shared by the participants in the sense of common subjective theories, at least in the regards addressed. However, the different GTs that have been conceived need to be put together. This would be the task of a meta-TDA that integrates the TDAs and its different facets to provide a fairly unified framework. This is a new research topic that cannot be addressed here.

REFERENCES

[1] J.-L. Patry, "Theory-Practice Transfer for Education for Responsibility", Paper read at the **Special Track on „The**

North Star for Research" (NSR 2021), a Meta-Research Project Held in the Context of the Virtual 25th World Multi-Conference Systemics, Cybernetics and Informatics, 2021.

[2] J.-L. Patry, "From Trans-Disciplinary Research to Trans-Domain Approaches". Paper read at the **Special Track on Trans- and Interdisciplinary Research, Education, and Communication: IDREC 2022 within the 13th International Multi-Conference on Complexity, Informatics and Cybernetics (IMCIC 2022)**, published in the Proceedings (this volume), 2022.

[3] D. Rousseau, J. Wilby, J. Billingham & S. Blachfellner, **General Systemology. Transdisciplinarity for Discovery, Insight and Innovation,** Singapore: Springer Singapore, 2018.

[4] S. Weyringer, J.-L. Patry, D. Pnevmatikos & F. Brossard Børhaug (Eds.), **The V*a*KE Handbook: Theory and Practice of Values *and* Knowledge Education**, Leiden: Brill Sense, in press.

[5] M. Dobber, R. Zwart, M. Tanis & B. van Oers, "Literature Review: The Role of the Teacher in Inquiry-Based Education", **Educational Research Review**, Vol. 22, 2017, pp. 194-214.

[6] L. Kohlberg, **Essays on Moral Development: Vol. 2. The Psychology of Moral Development,** San Francisco, CA: Harper & Row, 1984.

[7] M. M. Blatt & L. Kohlberg, „The Effects of Classroom Moral Discussion Upon Children's Level of Moral Judgment", **Journal of Moral Education**, Vol. 4, No. 2, 1975, pp. 129-161.

[8] I. Cohenian, D. Briner, B. Toledano, J.-L. Patry, L. Linortner, R. Nakotechny & R. Eichler-Maron, "The V*a*KE Process", **Youtube,**
https://www.youtube.com/watch?v=VytqZ56KVIY, 2017.

[9] H. von Foerster, E. von Glasersfeld & P. M. Hejl (Eds.), **Einführung in den Konstruktivismus**, München: Piper, 1997.

[10] J.-L. Patry, „Thesen zur konstruktivistischen Didaktik", **journal für lehrerInnenbildung**, Vol. 16, No. 2, 2016, pp. 9-17.

[11] J.-L. Patry & A. Weinberger, A. „Kombination von konstruktivistischer Werterziehung und Wissenserwerb", **Salzburger Beiträge zur Erziehungswissenschaft**, Vol. 8, No. 2, 2004, 35-50.

[12] B. S. Bloom, M. D. Engelhart, E. J. Furst, W. H. Hill & D. R. Krathwohl (Eds.), **Taxonomy of Educational Objectives – the Classification of Educational Goals – Handbook 1: Cognitive Domain,** London, WI: Longmans, Green & Co, 1956.

[13] C. Gilligan, **In a Different Voice: Psychological Theory and Women's Development**, Cambridge, MA: Harvard University Press, 1982.

[14] J. Habermas, **Theory of Communicative Action, Volume One: Reason and the Rationalization of Society**, Boston, MA: Beacon Press, 1984.

[15] J. Piaget, **The Equilibration of Cognitive Structures: The Central Problem of Intellectual Development**, Chicago: University of Chicago Press, 1985.

[16] L. S. Vygotsky, **Mind in Society: The Development of Higher Psychological Processes**, Cambridge, MA: Harvard University Press, 1978.

[17] J.-L. Patry, N. Diekmann & S. Weyringer, "Transdisciplinarity and Trans-Domain Approaches in V*a*KE", in S. Weyringer, J.-L. Patry, D. Pnevmatikos & F. Brossard Børhaug (Eds.), **The V*a*KE Handbook: Theory and Practice of Values *and* Knowledge Education,** Leiden: Brill Sense, in press.

[18] C. E. Shannon & W. Weaver, **The Mathematical Theory of Communication**, Urbana, IL: The University of Illinois Press, 1949.

[19] A. Gastager, J.-L. Patry & K. Gollackner, K. (Eds.), **Subjektive Theorien über das eigene Tun in sozialen Handlungsfeldern,** Innsbruck: StudienVerlag, 2011.

[20] A. F. Furnham, **Lay Theories. Everyday Understanding of Problems in the Social Sciences,** New York, NY: Pergamon Press, 1988.

[21] E. Morscher, "Metaethics and Moral Education", In A. Weinberger, H. Biedermann, J.-L. Patry & S. Weyringer (Eds.), **Professionals' Ethos and Education for Responsibility** (pp. 17-27), Leiden: Brill, 2018.

[22] D. Pnevmatikos & P. Christodoulou, "Promoting Conceptual Change through Values *and* Knowledge Education (V*a*KE)", in A. Weinberger, H. Biedermann, J.-L. Patry & S. Weyringer (Eds.), **Professionals' Ethos and Education for Responsibility** (pp. 63-74), Leiden: Brill, 2018.

[23] S. Vosniadou (Ed.), **International Handbook of Research on Conceptual Cchange (2nd Edition)**, New York, NY: Routledge, 2013.

[24] S. Vosniadou, D. Pnevmatikos, N. Makris, K. Eikospentaki, D. Lepenioti, A. Chountala & G. Kyrianakis, "Executive Functions and Conceptual Change in Science and Mathematics Learning", in L. Carlson, C. Hoelscher & T. F. Shipley (Eds.), **Proceedings of the 37th Annual Meeting of the Cognitive Science Society**, Pasadena, CA, 2015.

[25] D. Pnevmatikos & P. Christodoulou, "Values *and* Knowledge Education Meets Conceptual Change for Science Education", in S. Weyringer, J.-L. Patry, D. Pnevmatikos & F. Brossard Børhaug (Eds.), **The V*a*KE Handbook: Theory and Practice of Values *and* Knowledge Education**, Leiden: Brill Sense, in press.

[26] J.-L. Patry & A. Gastager, "Subjektive Theorien", in A. Kraus, J. Budde, M. Hietzge & C. Wulf (Eds.), **Handbuch Schweigendes Wissen. Erziehung, Bildung, Sozialisation und Lernen** (pp. 92-106), Weinheim: Beltz/Juventa, 2017.

[27] J.-L. Patry, „Theorie-Praxis-Transfer: Hindernisse und Probleme", in A. Gastager & J.-L. Patry (Eds.), **Pädagogischer Takt: Analysen zu Theorie und Praxis** (pp. 17-42), Graz: Leykam, 2018.

[28] J. Hattie, **Visible Learning for Teachers. Maximizing Impact for Teachers**, London: Routledge, 2012.

[29] T. Herrmann, **Psychologie als Problem**, Stuttgart: Klett, 1979.

[30] B. K. Hofer, "Dimensionality and Disciplinary Differences in Personal Epistemology", **Contemporary Educational Psychology**, Vol. 25, No. 4, 2000, pp. 378-405.

[31] A. Koutsianou & A. Emvalotis, "Unravelling the Interplay of Primary School Teachers' Topic-Specific Epistemic Beliefs and their Conceptions of Inquiry-Based Learning in History and Science", **Frontline Learning Research**, Vol. 9, No. 4, 2021, pp. 35-75.

[32] J.-L. Patry & K. Schaber, „Fürsorge versus Gerechtigkeit: Argumentieren Frauen anders als Männer? Eine Untersuchung zur Geschlechtsspezifität in moralischen Entscheidungssituationen", Paper read at the **Convention „Moral und Beruf 2010" in Basel**, 2010.

[33] J.-L. Patry & S. Weyringer, "V*a*KE: Theory, Prototype, and Variations", in S. Weyringer, J.-L. Patry, D. Pnevmatikos & F. Brossard Børhaug (Eds.), **The V*a*KE Handbook: Theory and Practice of Values *and* Knowledge Education**, Leiden: Brill Sense, in press.