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Dossier: VYGOTSKY'S DEFECTOLOGY

Vygotsky's Defectology: A Misleading Term for a Great Conception

Defectologia de Vygotsky: um termo equivocado para uma grande concepção

La defectología según Vygotsky: un término equivocado para una gran concepción

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ABSTRACT

Although defectology is a misleading term (suggesting the opposite of its meaning) it is a great conception offering solutions to a lot of problems tied to inclusion as a demand of modern society. Therefor I will 1) disclose the theoretical roots of the conception, 2) trace its historical development in order to show how it was misunderstood, 3) apply the conception to inclusion and 4) demonstrate some practical examples showing that the conception is also important for educational practice – among other things by helping to close the gap between theory and practice.

Keywords: Psychology; Education; Vygotsky; Defectology.

RESUMO

Embora defectologia seja um termo equivocado (sugerindo o contrário do seu significado), é uma grande concepção que oferece soluções para muitos problemas ligados à inclusão como uma demanda da sociedade moderna. Por isso vou 1) revelar as raízes teóricas da concepção, 2) traçar o seu desenvolvimento histórico, a fim de mostrar como foi mal interpretado, 3) aplicar a concepção à inclusão e 4) demonstrar alguns exemplos práticos que mostram que a concepção também é importante para prática educacional – entre outras coisas, ajudando a fechar a lacuna entre teoria e prática.

Palavras-chave: Psicologia; Educação; Vygotsky; Defectologia.

RESUMEN

Aunque defectología sea un término equivocado (sugiriendo lo contrario de su significado), es una gran concepción que ofrece soluciones a muchos problemas relacionados con la inclusión como una demanda de la sociedad moderna. Por eso voy a primero, revelar las raíces teóricas de la concepción; segundo, trazar su desarrollo histórico, con el fin de mostrar cómo fue mal interpretado; tercero, aplicar la concepción a la inclusión y, por último, demostrar algunos ejemplos prácticos que muestran que la concepción también es importante para la práctica educative – entre otras cosas, ayudando a cerrar la brecha entre teoría y práctica.

Palabras clave: Psicología; Educación; Vygotsky; Defectología.

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Introduction

Inclusion, with regard to society and classroom, is nowadays omnipotent in public discussion and literature. And actually you cannot overlook the connection with Vygotskian defectology. But surprisingly the term defectology is hardly to be found in respective recent literature. Searching for the term "defectology" in recent literature's keyword-register one hardly find hits. More than this there are scholars suggesting to avoid the conception (THEUNISSEN, KULIG, & SCHIRBORT, 2007). These surprising facts make it necessary to ask for its causes.

Therefore, in the following sections, I will start with addressing the Vygotskian notion of defectology in the light of the theoretical background and historical development and show how it was misunderstood before I discuss theoretical consequences for inclusion in the context of education. I will finish this paper with examples showing how the theory of defectology can be put into practice.

The Theoretical Roots and Notion of Vygotskian Defectology

1 The Crisis of Psychology

Vygotskian defectology was integrated in his psychological theory and not something special separated from the general theory, it was the other side of the same coin (VYGOTSKY, 1983, 1986, 1993, 1998).

The *crisis of psychology* (VYGOTSKY, 1985) is an important point to understand the underlying theoretical problem in order to grasp the intention of Vygotskian defectology.

One aim of psychology in the socialist Soviet Union including cultural-historical theory – motivated by methodology –, was the consistent application of historical and dialectical materialism and the dialectical method (Hegel, Marx). Therefore, it is no surprise that Vygotsky set himself the task of writing the "Capital" of psychology (VYGOTSKY 1985): "The only legitimate application of Marxism to psychology is to create a general psychology", which is a "theory of psychological materialism or the dialectics of psychology" (p. 250, transl. by H. G.).

His starting point was the work on the solution of the crisis of psychology. The conflict between psychology oriented on science on one side and on humanities on the other is the main characteristics of this crisis. The competition between empirical-analytic and hermeneutic paradigm is not completely unknown in recent pedagogics and is still present in psychology! Vygotsky criticized that the scientific method (Pavlov) does not capture the human being as a subject, especially not in the subjective sense. Surely, there are biological determined psychical functions resulting from functions of the nervous system that can be observed by objective scientific research methods (measurement). On the other hand, results obtained by introspection or psychoanalysis (intended to capture immeasurable sense) are difficult to objectify. Although the wholeness (meaning level) is addressed here, it remains unclear how this is build up from the actually existent elements of the nervous processing.

The two theoretical approaches and the methods used in them contradict each other. There is an antithesis between arbitrary, conscious, purposeful processes on the one hand and instinctive, unconscious, automatically processes on the other, forming attention, memory, thinking etc. They are of the nature so different that they cannot be examined with the same methodology.

Vygotsky concludes that behavior, experience and the unconscious are concepts that can no longer be explained on a consistent theoretical basis. The relationship between affective and cognitive processes remains unexplained. Elementary psychic processes (i.e. primary psychic functions and the behavior based on them) can be explained with the methods of scientific psychology, but complex culture-related mental processes of high degree cannot. This applies to secondary mental functions and the related experience.

He resumed that it is necessary to search for a *system-forming unity,* because the elements of the system could no longer be integrated into the overall context. He discovered the system-forming unity in the concept of *activity* (LEKTORSKY, 1990).

While trying to solve the crises of psychology, Vygotsky discovered activity as a key-concept of the cultural-historical theory, but also of defectology as an important part of his approach.

2 Activity-oriented Diagnostics

Let us differentiate between activity distinctive for life itself, behavior as a special brain-driven activity of animals and arbitrary, conscious, purposeful activity characteristic for human beings. This human activity is the cause for the development of secondary or higher psychic functions. Psychometric procedures, however, regularly veil a very important aspect of human activity, namely meaningfulness and the experience gained from meaningful activities: It is characteristic for human beings (*subjects*) to engage actively, consciously, purposefully and creatively with the *objects* of the environment (=*activity*). In psychometrics, the human being is not considered as a subject, but, by being measured, is turned into an object and thereby deprived of that essentially human nature.

Vygotsky, however, did not reject empirical-analytical methods in general (particularly psychometrics), but he criticized that using them leads only to descriptions of "frozen" functions of the psychical status. The results obtained by these research methods cannot explain human development, and psychotherapy based on them cannot show the next adequate and necessary steps for the development of activity, consciousness, personality (LEONTEV, 1978), in short, the psychic functions in progress.

It is important to address the process of development of a child's personality in all dimensions, which means the whole process of developing activity in real life situations and the construction of meaning – all this can hardly be grasped by methods of testing. To overcome this problem, he suggested as an alternative that psychological analysis of culture-based higher mental functions should be carried out by the historical (or causal-generic) method. For this purpose, the contradictions underlying development have to be analyzed and the development of new structures and functions has to be examined. They have to be explained by their conditions of origin – object-orientated activity –, instead of only exploring in a descriptive manner existing functions and structures already unfolded. For example, one problem of psychometric procedures (such as intelligence tests) is that they only depict the status quo of a person's intelligence and tell nothing about possibilities of learning and development. These conclusions, however, are of great importance for education aimed at development, and this is the nature of Vygotskian defectology and has to be characteristic for inclusive schooling.

So, therapy as well as classroom has to address the functions and structures in progress, while they are developing, and should not focus on those that have already been developed and therefor can be measured by tests.

3 The Social Nature of Human Development

Cooperation is the dominant characteristics of human society and its development. This means that very different people with very different abilities can cooperate. Only due to the fact that people are different, division of labor has become possible. Within this context, the meaning of "work" or "labor" does not just mean production, but creation of society. Division of labor is a prerequisite for highly efficient and productive work, and it requires social cohesion, because all people doing work depend on each other. After all, I can only specialize and develop individuality in my work, if I can rely on others to do the work I am not specialized in, but which results I need for my living. This is the basis for mutual recognition and respect (to be studied excellently in the so called primitive peoples): diversity of individuals is therefore a value for society; its practical implementation depends on it as well as its development.

However, this value can only be developed if people actually work together and experience this joint activity directly. The essence of the collective activity of human beings is that they pursue common goals, and therefore individual activity is coordinated with regard to these collective goals – thus forming a collective subject. The more division of labor exists, the more singular the contribution of the individual subject is, the more the individual person can evolve his or her own potential. While keeping in sight the aim as a whole, cooperation and communication have to unfold in order to compensate for individual imperfections by the expertise of others, the integration of individual contributions turning into one whole functioning.

In the context of joint activity, by means of cooperation and communication it becomes possible to benefit from the potential of individuals and at the same time compensate for imperfections. This requires the society or community of active individuals.

The development of disabled children depends in the sense of Vygotskian defectology from giving them possibilities to participate in social activities.

Three things are affiliated with the role of joint activity and cooperation for the human development and also for defectology (understood as a developmental approach):

1. Each individual can only act individually in the division of labor if the things he cannot do are done by others. The collective is therefore the prerequisite for individuality, and individuality is the condition for a strong collective. The unfolding of personality is therefore tied to the activity within the collective and within the society.
2. The products of labor, both materially (product of the activity) and ideally (regulation of cooperation and communication) exist as cultural elements between human beings first; only later they exist in individuals and require therefore interiorization (see also AEBLI, 1983): complex (higher) psychic functions are initially interpsychic (between human beings), and then intrapsychic (inside individuals).
3. For (pedagogical) influencing development this means that collective activity has to come ahead of individual activity: that which can be achieved together with a culturally competent partner, is characterizing the *zone of proximal development.* Through interiorization of activity this becomes the *zone of actual performance*. Development is thus the interiorization of cooperation and communication: cooperation and

communication with others precedes cooperation and communication with oneself (thinking as the process of an inner dialogue, see ZUCKERMAN, 2004).

4. *Therefore therapy as well as classroom has to address the cooperation between learner and teacher and among the learners directed to scaffold their learning activity in order to help them to reach their zone of proximal development.*

The Concept of Defectology and the Reasons for Misunderstandings

The term "defektology" dates from the nineteen-twenties. Vygotsky worked for more than ten years on defectology (VYGOTSKJA & LIFANOVA, 2000) and a special volume on defectology has been published in his collected works (see for VYGOTSKY, 1998, 1993).

How we showed above the theory of dialectic materialism which forms the foundation for his entire theoretical approach (cultural-historical theory) as well is fundamental for his approach on defectology. First of all, Vygotsky wanted to explain psychological phenomena, not just only describe them. He asked for the reasons of handicaps but did not search for biological ones. He found that these reasons were not primarily physical "defects" but socially determined handicaps. This opinion stems from his theoretical approach that addresses

- the differentiation between primary and secondary psychical functions, the latter are more important than others for human development.
- primary symptoms are formed over by symptoms caused by social deprivation and lack of integration into social life (especially cooperation and communication). This prevents children from making social-historical experiences which are normal for non-handicapped children.
- the dominant role of compensation and education in particular for the disabled child in particular to implement experiences necessary in order to participate in normal social life.

Disabled children have fewer chances to acquire real life experiences. Therefore classroom has to compensate this. It is obvious that the Vygotskian conception of defectology has much in common with the recent concept of inclusion, because the lack of inclusion in everyday social activities and cultural life is actually the reason for the occurrence of the disabled child and not the biological "defects" that are erroneously taken for the causes.

In summary: fundamental to the Vygotskian approach to defectology are the following propositions which theoretical roots I briefly explained above:

- biological handicaps hinder children using (cultural) instruments in activity which evolved in a cultural-historical way. This is the real cause of the handicap.
- therefore, the foremost aim of education and therapy must be to address the acquisition and use of cultural means and instruments in order to enable the child to participate in social life by involvement in the activity needed.
- intellectual functions are not directly caused by biological ones, but by human activity, therefore disabled children have to be offered specially adapted ways of integration into social life, compensating the handicap as well as possible.

Although essential for understanding Vygotsky, mainstream psychologists – influenced by traditionally scientific psychology – used the term only in the sense of an entirely medically influenced intrapersonal category. They misunderstood Vygotsky and believed that defectology would be solely about the investigation of defects.

For example, the traditional mainstream defectology tried to compensate only biological functions: a blind child has to train first of all the "healthy" senses in order to compensate the biological deficits (sensorimotor school of defectology). Instead of this, Vygotsky demands to integrate special training in meaningful real life activities. His opinion was that handicaps in human beings have primarily caused by mediating effects: disabled children are hindered in participating in social life, work, play and learning activity by separation in order to look after their "special needs" in a better way. This is why biological deficits ("defects") affect psychological not directly but in a more indirect way, thus depriving the individual of integration into the particular social activity that causes human psychological development.

The disabled child,

> from a psychological and pedagogical position, has to be approached in the same way as the non-handicapped child. However, the process of education and development of disabled children differs significantly from the norm, therefore the teaching methods have to be characterized always by being special, with a complete and fundamental recognition of the psychological nature of this process (cited in VYGOTSKAJA & LIFANOVA, 2000, p. 93, transl. by the author).

In accordance with this Oliver Sacks (1994, p. 121) points out, the focus of research are not defects or failed functions. Instead, we have to look for intact functions in order to support child development and compensate existing handicaps (ibid.).

Pedagogical therapy, therefore, should not be focused on specific malfunctions of organs or brain damage but on the question of how to compensate the resulting disruptions and problems in order to ensure an "optimal" development. Nonetheless, in the face of these misunderstanding there are tendencies to avoid the concept of defectology altogether THEUNISSEN, KULIG & SCHIRBORT, 2007).

In my eyes the main problem of traditionally, i.e. misconceived understanding of defectology, is reductionism: psychical functions and structures were limited to the biological apparatus or the nervous system, an aspect also discussed by Vygotsky in his notion of the crises of psychology (see above). A similar situation can be observed with imaging procedures in neurobiology (i.e. the debate on "free will" – ROTH, 2017; HÜSING, JÄNCKE & TAG, 2006; RESCHER, 2010) the misuse of certain drugs in psychotherapy, in particular the "Ritalin problem" in ADHS therapy (see JANTZEN, 2007). The logical consequence of this approach is first of all to deal with the physical handicap (sensory, intellectual and others).

How to Apply the Conception to Inclusion

1 Inclusion as a Social Necessity

Inclusion is unquestionably a social necessity, and although it may seem so *looking at the surface of social interaction*, the problem of inclusion does not stem from the fact that politicians have signed the United Nations Convention on the Rights of Persons with Disabilities.

On the one hand, living conditions and the situation of life in modern society change very dynamically and therefore affect children's lives as well. On the other hand, it has to be suspected that without political action the growing heterogeneity of living conditions caused by modern society will lead to a collapse of the structures socially necessary to guarantee social cohesion. This is especially true for the Western societies. Here, the citizens find material and cultural living conditions that correspond exactly to the conditions of the market economy which shapes society to its benefit. This on the one hand is associated with relatively great freedom for living and shaping their lives individually. On the other hand, this freedom of living is bound to conditions not equally accessible to all members of society. Without socio-political measures society would split up and fragment. Deepening differences within society are already evident: between the rich and the poor, between the needs of those adapted to the system and those not adjusted to it, between those at the top and those who are not, between those with secure jobs and the unemployed.

In reaction to this situation, inclusion is therefore a social necessity. For the educational sector this means that educational institutions should not meet the growing heterogeneity among adolescents by means of differentiation and separate students. In contrast, inclusion as a truly inclusive approach guaranties that communality can be lived in diversity and heterogeneity. This means nothing less than securing the consensus at the base of civil society, which otherwise would split up into parallel societies. In order to recognize the value of difference in communality, the existent heterogeneity must be made productive and fruitful. This can be done by taking up and cultivating the principle of the division of labor, which is fundamental to human social development. Joint activity, division of labor and multi-perspective cooperation is the common work of different people on a common object. This common/ collective object is created through activity; it is of greater value to all if many different sides of the creative process are integrated and individually represented. If all can fulfil/ realize themselves in the collective object, it becomes subjectively valuable and objectively enriched in perspectives and facets for everybody´s benefit. This is a very short summary of the basic approach to cultural-historical theory, insofar as the problem of inclusion is concerned, and of the basic approach to Vygotskian defectology.

From this perspective, today's inclusion is a task of society as a whole that is barely fulfilled. School and classroom that maintains the principals above, can not only unlock every student's potential, but also strengthen the class community in a way that all students benefit from it. This includes all aspects of learning specificities due to gender, linguistic, cultural, social background, learning prerequisites and special learning conditions, personal experiences, and so on.

Pedagogically, therefore, inclusion means to welcome diversity and heterogeneity and to recognize the diversity of children as the acknowledged norm. Difference between children does not conflict with equality, but is actually inseparable from the idea of equality. Equality then means to be equal in difference. In retrospect, it means opposing every sort of exclusion and thus avoiding any unequal treatment (see HINZ, 2004, p. 46f., 2008, 2011 and also 2009, 2010).

2 The Conception of Defectology and its Application to Inclusion

With regard to education and didactics, cultural-historical theory can be characterized as psychological-didactic in essence (GIEST, 2013, 2015, and 2016). This is significant because the gap between education and learning can be bridged, i.e. educational theory according to Klafki (1963, 1964a, b, 2007, see also 1995, 1998, 2000a, 2000b)

vs. learning theory according to Aebli (1981, 1983) – see Staub (2006), Giest & Lompscher (2018). This bridge is the prerequisite for fulfilling the educational promise associated with inclusion and heterogeneity, which applies equally to all members of society. By doing so, the basic process, namely learning, becomes accessible to pedagogical activity. This pedagogical activity is based on psychological didactics and uses the following concepts: interiorization, i.e. stage-by-stage formation of mental actions (GALPERIN, 1992), developing teaching (DAVYDOV, 1988, 1999, 2008), zone of proximal development (VYGOTSKY, 2002, 1993) to name just a few. So cultural-historical psychological didactics took up the basic ideas of Vygotskian defectology and developed them further. This applies also to these concepts.

The concept of *interiorization* states that development is possible only through activity directed to the acquisition of culture. In the context of this activity, both the activity and the active individual develop. However, the activity cannot be performed in a social vacuum although side by side with other individuals, confer the concept of radical constructivism (GLASERSFELD, 1995), but only in community as a joint activity. Partners work together on different levels of competency in order to achieve common goals. In forming a common/ collective subject, cooperation is regulated by communication. Educational work therefore means in essence scaffolding in order to help all learners reaching the *zone of* their *proximal development*. This depends mainly on two factors: on the learning prerequisites, mainly that the common/ collective learning-teaching goal is meaningful and therefore motivating for the learner (cognitive activation), and on the extent to which the pedagogical scaffolds support the learner´s self-regulated learning structures (cognitive structuring). Both factors have been designed in the classroom and form the basis of *developing teaching*. Galperin´s *stage by stage formation of mental actions* can serve as a model for the interiorization of mental actions and for the pedagogical interaction supporting it: its seven steps characterize different forms of carrying out these actions and therefore describe different levels of interiorization: 1. a form unfolding itself in the material act, in the course of practical manipulation of tangible objects (e.g. calculating with real objects), 2. a beginning abstraction shows itself in a materialized form (e.g. calculating with wooden sticks), 3. a symbolic form is used, creating written symbols which are an abstraction of numbers (e.g. calculating with numerals), 4. a form of external speech, whereby the act is transformed into spoken language and its details can be communicated to others (e.g. uttering aloud arithmetic calculations with numerals), 5. a form in which the acting person communicates more or less aloud with himself while carrying out the action, and 6. a form, in which only internal speech is used when carrying out the action (intangible, mental level). At the final stage the action is executed automatically, the learner no longer consciously has to use words as reminders (see GALPERIN, 1992, 1973, 1980, 2014; ROLLETT, 1987 and, for more details section 4).

3 Inclusive Classroom and How to Apply Defectology

The pedagogical-didactic problems associated with inclusion can only be tackled by taking the path of internal/in-class differentiation in classroom.

According to Heymann (2010), there is a distinction between closed and open forms of in-class differentiation. Closed forms are dominated by the teacher´s pre-structuring activities (i.e. differentiated tasks are planned by the teacher following an appropriate diagnosis of student´s abilities). Open forms are characterized by the design of an adaptive learning environment in which it is most important that the students themselves design learning contents and individual learning paths.

It has been suggested to distinguish the forms of differentiation according to interest, learning speed, focus on developmental progress and level of competence; in my opinion, open forms of differentiation are suitable for promoting interest as well as learning speed. In the case of internal differentiation, the diagnostic competency of the teacher should be the starting point for corresponding decisions according to the focus on progress and competence levels.

Lütje-Klose (2011) distinguishes between four different forms of learning: coexistent forms, communicative forms, subsidiary forms and cooperative forms. In coexistent learning forms, students pursue different learning goals in a manner of side by side learning. Communicative learning situations are characterized by a common goal for all students, but learning also does not proceed cooperatively, there still is side by side learning. This is contrasted by subsidiary learning situations where students help each other mutually or one-sidedly in a self-responsible way. This also applies to cooperative learning situations, where different goals are acceptable as well. This differentiation is influenced by positions from radical constructivism.

Following Vygotsky participation in real life activity is a basic condition for the development of human personality and psyche and, therefore it is a corner stone of his defectology. The best way of implementing inclusive learning – as an implicit key-idea of Vygotskian defectology – is the learner´s joint activity (see also FEUSER, 1989, 1995; FEUSER & BERGER, 2002). This can be done individually via social forms, i.e.

working with a partner or in a group, narrative circles or cooperative learning. The best way of implementation, however, is project work (DEWEY & KILPATRICK, 1935; DEWEY, 1985/2008).

In all these forms, cooperation dominates. All activity, in its cultural-historical origin, has emerged socially and is therefore tied to cooperation, and that includes learning activity in the sense of conscious, intentional learning. Communication becomes reciprocal, as a means of regulating cooperation of the collective subject, in this case formed by cooperating students and teachers. Fundamental here is the application of the principles of division of labor, of joint activity, of actions; also fundamental are common objectives onto which the learning cooperation is directed.

The most important prerequisite for learning cooperation is to achieve an overall, collective learning subject. This leads to the emergence of a systemic relationship between the cooperating learners who are attuned to act on the basis of common goals and objectives and construct respective meanings. In other words, a more or less complex collective goal is sought, which makes it necessary to join together in order to achieve it, each participant contributing an individual and irreplaceable share to reach the collective goal. The following section shows how this can be put into practice and how the above described concepts of psychological-didactics can be applied.

Examples for the Educational Practice

Since both the realities of the children´s lives and their experiences are individual by nature and therefore are at very different levels of thought, of actions or of aesthetic processing, which are learning prerequisites, classroom practice referring to these particular topics must be inherently inclusive in order to fulfil its task.

The subject matter of learning and learning actions are always linked together and comprise ways of thinking, of working and of acting. Acquiring knowledge about subject matter means the application of learning actions and the appropriation of the learning actions involved. But with regard to learning activity in classroom one aspect has to be emphasized: the acquisition of knowledge about a subject matter or the acquisition of the learning actions themselves. These two aspects will be clarified below by examples.

The following example is focused on *subject matter* and suggested by Christel Manske (2017). Her approach is particularly suitable for school beginners or special inclusion classes for children with learning disorders or intellectual disabilities who have problems in grasping written language. Ms. Manske (see MANSKE, 2013) is an expert teacher for the tuition of children with trisomy 21 and has applied this approach as an integral part of her therapeutic concept of support with great success.

The basic idea is that all children work together on an interesting topic, examples are “the owl as forest bird”, “the fly as an insect”, “the bicycle as a means of transport and a technical product”. Classroom lessons on the particular subject, where knowledge is acquired and exchanged between students, are chiefly based on interaction with real objects (e.g. through audio-visual aids, observation, analysis). Additionally, textbooks that are used are based on different levels of reading competence. These levels have to be differentiated and diagnosed: reading at the level of phoneme-grapheme correspondence; reading syllables and single words; reading sentences and cohesive texts. Above all, the varying complexity of the reading requirements must be taken into account. For each new level of competence it is necessary to make sure that the mental activities required to overcome the actual level are operationalized and turned into an internalized skill in order not to outrun the cognitive capacity of the student. A child who can hardly assign phonemes to graphemes needs to concentrate entirely on that. It is overwhelmed when, at the same time, syllables are to be drawn together to form words. Let me point out that sometimes, especially in the German language, grapheme-phoneme correspondence does not apply. For example, phoneme synthesis of words with vowels produces a correct result only when the vowel is long (as in O-M-A, “granny”). Short vowels, however, as in many prepositions (e.g. in, am, um) and final syllables of words (e.g. rennen, Sender, Lehrerin) are not immediately identified when phoneme synthesis is used, the phonology would not be recognizable for the student (the name Werner would sound like “Wearnear”).

The reading material offered differentiates between different levels and allows reading at individual level, but directed at the next step of development, the zone of proximal development (VYGOTSKY).

Regardless of the reading competence each child has reached, they all join together in verbal exchange about the object or the realization of an art project (cf. **Fig. 1a, b**).

The didactic material designed to match Manskes approach refers all children’s collective learning activities to one and the same subject, although on different levels of reading competence and, possibly, of subject comprehension. Here, real inclusion (representing the meaning of Vygotskian defectology in the origin) within the classroom has been made to work.

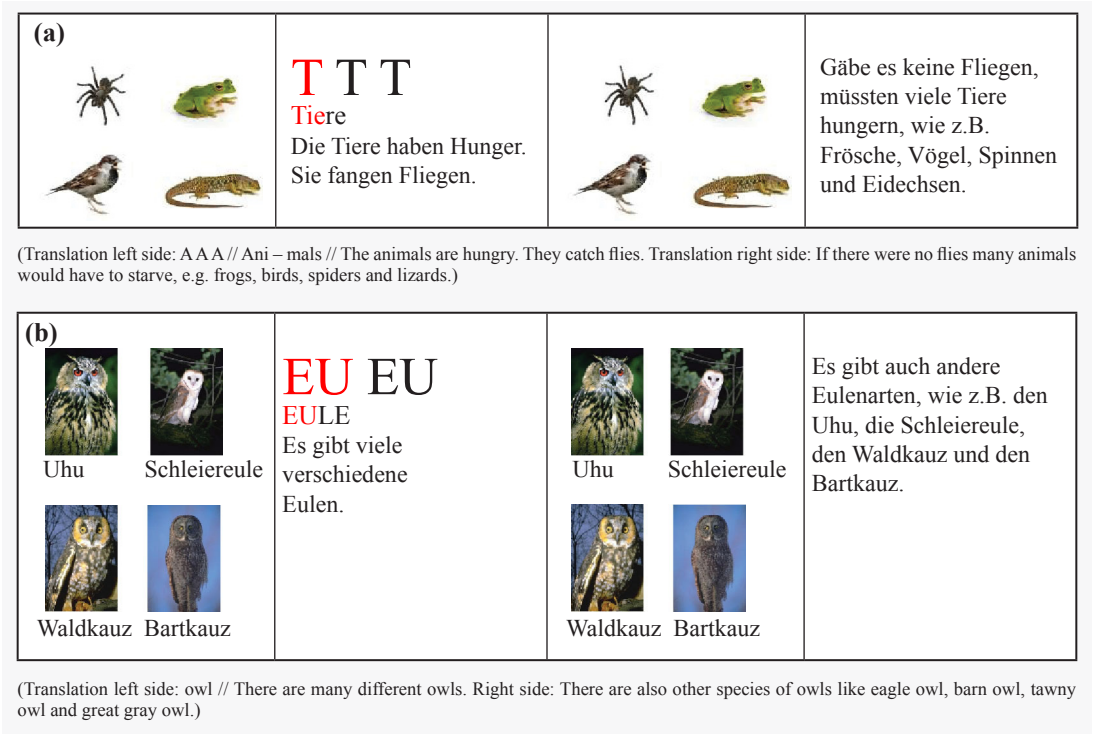

Fig. 1. (a) Textbook pages on the subject of flies. (Left side: phoneme-to-sentence level, right: text level) (according to MANSKE, 2017). **(b)** Textbook pages on the subject of owls. Left side: phoneme-to-sentence level; right side: text level (according to MANSKE, 2017)

A second example refers to the subject of animal adaptation to their environment, in this case demonstrated on the mallard in an exemplary way (cf. AEBLI, 1981). Children start with observations in nature and recognize the striking difference between drake and duck. While the drake, like many male birds, has a strikingly colorful plumage, the duck looks rather inconspicuously drab. Why is that? Some children may already know that the duck lays eggs as it is a bird and also hatches them. Perhaps they also know, from non-fictional children´s books or other media, that cats and foxes hunt ducks because they are predators and feed on other animals. Therefore, the duck must be able to hide away in order to sit on its eggs undisturbed by enemies. Ducks, like chickens, are precocial and therefore have to breed on the ground.

The problem of the mallard ducks and drakes can be tackled at many different levels. On an aesthetic-creative level, several assignments can be specified: either the duck or its environment can be painted or just colored in a way that the duck seems to have disappeared. Alternatively, adhesive picture cards can be used: children can put the duck in "its" proper environment or, playing the game hide and seek, hide the duck. With the appropriate colors of duck and surroundings, the duck seems to be invisible. It is hidden in the picture because it is of the same color as the environment and is out of view for its enemies. A wide variety of coloring pages on this topic can be found on the web, e.g. http://www.1001ausmalbilder.de/Tiere/Ente.html [10.04.2018]. The same fundamental understanding can be gained on a verbal-conceptual level referring to the biological concept of adaptation. A further level of complexity would embed this concept into the theory of evolution. This, however, is only applicable in the case of highly outstanding students in primary school or rather secondary school.

Many learning problems arise from the fact that the necessary actions required for the learning process cannot be completed. Learners cannot execute the respective assignments and learning tasks and do not reach their learning objectives because they are overwhelmed by the complexity of the learning requirements. They are too complex because students often have not internalized an adequate action model that helps them to orientate and to regulate their actions on a mental level.

Learning actions put into effect a specific learning goal and can be described as relatively demarcated sections in the process of the general learning activity. They are structured temporally and logically and are driven by specific learning motives. Learning actions are carried out according to the actual learning conditions by using external and internalized learning tools and are realized by a specific sequence of sub-actions.

The Russian psychologist Galperin proved in a large number of studies (1992, 1980, see also HAENEN, 1996, 2001) that learning progress and learning outcome depend essentially on the ability to anticipate the objective components of an action to perform, in other words, to orientate on a mental representation. This concept can be found, even though less differentiated, in AEBLI (1981, 1983) and Bruner (1960).

The cause of the ability to anticipate is called *orientation basis*. In order to understand this concept as a kind of guideline to acting, four questions need to be answered:

1. WHAT asks for the required structure and the sequence of sub-actions;
2. HOW asks for proof conditions, means, methods, quality of the action;
3. WHY asks for the reasons of the action and its inner connection;
4. SUMMING UP asks for possible consequences and puts the action into a broader context.

GALPERIN distinguished between three types of orientation basis. They differ in the meta-cognitive effort and the quality of mental regulation needed to execute the learning activity (see **Table 1**).

All three types of orientation basis are used in everyday life. If we look at primary school competence levels, type 1 corresponds to discovery-based learning, free exploration and learning by trial and error. Type 2 applies when students follow the instructions of a worksheet; type 3 can be observed in inquiry-based learning, workshops and project learning.

Looking at inclusive learning, two aspects must be highlighted: first of all, the level of learning activity corresponds to the orientation base applied by the student. For children acting spontaneously it is most likely that they just try out something (type 1), while children who have reached a higher level of mental orientation and regulation would rather act strategically (type 3). Teachers can therefore draw diagnostic conclusions from the types of orientation basis used. The second aspect of importance is that children with learning difficulties benefit particularly strongly from using and appropriating types 2 and 3. These levels of action-orientation and regulation characterize their zone of proximal development. This means, however, that teaching with the aim of promoting development has to focus on just these two types of orientation basis in particular.

Although the appropriation of the basis of orientation is an indispensable prerequisite for conscious and goal-orientated action, it does by no means guarantee eo ipso that the corresponding actions are executed successfully. Actions can be acquired only by acting actively.

According to Galperin, an internal model of actions (*mental actions*) grows from external actions, which means real-life actions with material objects (*concrete-practical actions*). The question is now, how this transformation from the concrete-practical actions to mental actions takes place. Solving this question is also an important development of Vygotskian defectology because it shows a way how to create prerequisites for each child to participate in (higher) cultural life by promoting the development of mental actions.

Every action, according to Galperin, consists of three components, which should be analyzed for diagnostic benefit. These components are: the internal regulation of motivation and drive, important for aiming at goals, setting tasks and planning the action (orientation part of the action), followed by the actual execution of the action according to the internal action model (execution part of the action) and finally a comparison of the outcome with original goal and action plan (action control and assessment part). (It may be useful to distinguish additional between motivation, action-drive and action-planning – see also MILLER, GALANTER, & PRIBRAM, 1960.)

For this reason, the following three steps have to be observed in the formation of learning actions:

A the creation of an orientation basis (*orientation part of the action*);
B the action itself (*execution part of the action*);
C the action control (*control operations*).

Table 1. Types of orientation basis according to GALPERIN

Type	WHAT: goal (What is the aim of the action?)	HOW: Formation of the basis of action resp. operations		WHY: reasoning of the action goal and the way of its execution
		means/methods	action-process	
OB 1	Imagination of the product ("model")	"trial and error" on the basis of individual knowledge (off chance)	off chance, mentally unconscious , either very slowly or hastily	no reasoning or attempts at reasoning without goal-orientation
OB 2	specified/elaborated model of action and product	details available for all necessary instructions to execute the action correctly	"imitation" of details given	reasoning depends on given details and the activated "internal models"
OB 3	generalized model of action and product	details for a generalized procedure of the action	joint elaboration of action by students and teachers	the operations required are goal-driven and hypothesis-based

The starting point is the motivation of the learners and their orientation, based on a differentiated analysis of their learning requirements (e.g. aspects of declarative and procedural knowledge). The structure of the action in particular has to be elaborated by students helped by the teacher. A detailed elaboration is necessary especially when orientation base type 2 applies; in case of orientation base type 3 essential orientation points need to be given to help students orientate independently – see **Table 1**).

The acquisition of the action can now evolve over several stages (see p. 339), depending on the individual starting position of learning. Incidentally, this approach combines learning diagnostics with learning support: whenever a certain stage is reached by the student this indicates the next stage, the stage of proximal development (see **Table 2**).

It has to be mentioned that the difference between the interiorization models of Bruner and Aebli on the one hand (see BRUNER et al., 1967; AEBLI, 1981, 1983) and Galperin on the other is how the modus of interiorization works: the all-important role of speech (see also VYGOTSKY, 2002, 1986 on the problem of *Thought and Speech*). Spoken language is the tool that enables an external action to be transformed into an internal, mental one[1]. Therefore in the third stage, the action is commented on verbally, all particular steps, conditions and features of the orientation are expressed by the learner (speaking externally). The action becomes thus transformed into the second level, namely speech-level, and this is a prerequisite for acting consciously. Now, speaking about the action is most important for the learners, and no longer the concrete action itself. The structures required to carry out tasks gradually become more complicated, at the same time support (helpful scaffolding) given through objects, means and certain conditions is gradually reduced. This leads the transition process into the fourth step: here, the action is performed on the basis of "external speech addressed to oneself", whereby the learners express only key words or intermediate results of the action, reducing them gradually to key points. This way they increasingly instruct and control themselves. The teacher is still able to diagnose, control, help and correct as explained above. As action execution is mastered and flows more smoothly, even when tasks become increasingly difficult, intermediate steps begin to be eliminated and the basic structure of the action appears clearly, the fourth step moves on to the fifth step. The action is increasingly based on an action model that is interiorized, internal and therefore entirely mental. Thinking can be described as internal speech, i.e. the action is carried out in an internal, mental form. The orientation basis turns into knowledge, activities turn into abilities and skills (only if this automation is intended or meaningful). The result of this process of acquisition is an action form mastered by the learners that is internalized, reduced, more or less automated and generalized to fit varying tasks of similar kind. An example of this process is described in **Box 1**.

Table 2. Stages of interiorization

Step	Means	Control and diagnostic option
1. materially concrete action	concrete things and objects	control happens simultaneously (following each step of action)
2. materialized action	objects and their symbols, schemes	
3. action of external speech	vocal speech (communicating with others about action)	
4. action of external speech directed to oneself	speech accompanying action (communicating with oneself)	based on partial results
5. action on of internal speech	thinking (speaking internally)	based on final result

Box 1. Orientation on the map

For many students, map reading is a big problem, because a whole series of sub-actions have to be accomplished that the experienced map user is usually unaware of. In order to get orientation of an area with the aid of a geographical map, the map has to be aligned to the north, the present position has to be found on which an imagined compass rose has to be placed mentally on the map (cardinal point), the destination has to be sought, and from the imagined compass rose the direction has to be found out. This action is very complex and difficult to appropriate for many students. It can be relieved by placing a piece of see-through foil with a compass rose on it on the cardinal point and then read the compass direction. This corresponds to the stage of materialized action. The foil supports the action sensorially; it can be performed in a materialized form. Acting is facilitated by the materialization of the compass rose; it no longer has to be done only mentally. The appropriation of the action is accompanied further by a verbal description of the procedure, so that the action turns into speech (stage of external speech). Finally, during the ongoing process of interiorization (exercise ad application), the action can be performed mentally (step of external speech to oneself to internal speech), and the foil is no longer needed. For further examples see Giest & Lompscher (2006) and Lompscher (2002, 2006).

[1] When neither external nor internal speech is used while acting, it remains unconscious (unconscious operations). Our brain orients and regulates our acting simply adjusting it to environmental conditions.

It is obvious that this procedure is of utmost importance for inclusive learning in heterogeneous groups: internal differentiation allows the process of acquiring the learning activities to start at different stages and to be designed differently according to individual learning prerequisites.

Conclusion and Outlook

We have seen that Vygotsky´s conception of defectology is a great idea. However, as it was misleading, it was sometimes misunderstood and even abused. The theoretical background of the conception is the cultural-historical theory. It was developed by resolutely applying Marx's dialectical materialism to psychology. By doing so, Vygotsky found a way to understand human nature and the social nature of the disabled child and how to educate it.

Vygotskian psychology can show a way to bridge the gap and eliminate the antinomy between science and humanities oriented approaches in psychology, thus solving the crisis of psychology. Furthermore, he discovered that human activity is both cultural-historical and social in nature. It is a key concept for understanding and explaining human nature.

Looking at the problems of disabled children, he found that their disabilities do not stem primarily from biology or the nervous system. Handicapped children are hindered from integrating into society and culture and therefore miss out on possibilities that are important and characteristic for all human beings. Therefore, Vygotskian defectology was not aimed at compensating biological handicaps but the social ones. Therapy and classroom practice for children with special needs should not focus on the training of decreased sensory or nervous functions but on socially and culturally determined secondary psychic functions. And the main way of doing this is to give disabled people the chance of inclusion into normal social life in order to participate in human activities.

His approach gives not only basic orientation for promoting the development of disabled children but offers – in the by his students and followers further developed form of psychological-didactics (that includes a lot of demanding and innovative concepts) – concrete suggestions for inclusion in the context of education. In classroom, the heterogeneity of students can be met by using differentiated types of orientation basis (OB 1-OB 2) and differentiated sensory support by applying models of learning that tell something about the learner as an acting subject and the learning action. Step by step formation of mental actions must be observed by starting the interiorization process from individually differentiated steps which includes offering differentiated tasks and other factors that help all children to develop.

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