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Vygotsky's theory of mediation in digital learning environment: Actuality and practice

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This paper researches Lev Vygotsky's theory of mediation in order to address the challenges of forming a holistic approach in the analysis of digital learning environments. It attempts to analyse Lev Vygotsky's approach to mediation and sign operation in learning, as well as the role of communication in the Zone of Proximal Development in order to establish the actuality of Vygotskian theory for the analysis of learning and teaching in terms of digital educational environments. To this end, this paper analyses how the simultaneous representation of artistic texts through various digital media, i.e. study material, shapes the process of learning and teaching. The paper explores the role of inner speech in mediation of study material by means of various sign systems, in order to illustrate the educational value of using various forms of media in learning. The theoretical foundations developed in the paper were illustrated by the examples from the digital platform 'Education on Screen'. The platform represents a research project of the Transmedia Research Group at the University of Tartu, Estonia. The platform offers digital solutions for learning literature, history, social and culture studies in terms of school curriculum.

KEYWORDS mediation, digital learning, inner speech, multimodality, zone of proximal development

1. Introduction

The importance of Lev Vygotsky's works for understanding sign operation in the behaviour and development of humans was actualized by V. Ivanov (1962: 4). In his report Ivanov formulated Vygotsky's main theses (1962: 118) on the basis of 'The Psychology of Art' (Vygotsky 1974) and therefore emphasized the importance of Vygotsky's research for the study of semiotics as well as for the foundation of Tartu-Moscow Semiotic School.

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This paper adapts Lev Vygotsky's approach to mediation in learning (Ghassemzadeh, 2005) to digital environments. In doing so, it pursues four objectives: (1) to assess the actuality of Vygotsky's notions of symbolic and human mediation for digital learning; (2) to examine the concept of the Zone of Proximal Development; (3) to analyse the application of this approach in the teaching paradigm of digital learning; and (4) to analyse the role of inner speech in the context of symbolic mediation in digital learning in the context of multimodality.

Digitalization has proven its use in meeting a wide array of educational demands, such as: (a) forming the classroom design itself where instruction and classwork are organized in digital space; (b) organizing classroom management; (c) organizing in the framework of digital activities or applications; and (d) organizing online educational resources, similarly within personal digital devices, and complementary materials. Therefore, I argue for the necessity of building a holistic approach towards analysing the process of learning in digital environments to find solutions to the challenges of using digital technologies in education.

Recent studies (e.g. Peters, 2000) have formulated a number of new approaches that adapt learning paradigms and methods to the digital turn in education by adapting digital environments and media. However, I argue that the question of integrating a semiotic approach into learning that can articulate the way in which digital media influences learning and its role in effectively facilitating learning via digital environments needs thorough research. An analysis of the way mediation happens in a digital learning environment can thus be suggested as a way to build understanding of the influence of digital technologies in the classroom. An analysis of the educational value of digitalization in learning poses a challenge to the theoretical foundation of Lev Vygotsky (1979, 1991, 2015), which combines symbolic, communicative and developmental processes in the context of learning. Some recent studies have examined Vygotskian ideas and principles in semiotic analysis of learning by means of digital technologies (e.g. Semetsky and Stables 2014: 69–86). However, few studies (e.g. Niemi et al. 2014; Ottesen 2006) have attempted to analyse his theory as a foundation for research on mediation in digital learning, as well as in analysing symbolic, communicative and developmental functions of digital environments.

Even though the digitalization of learning can arguably make education more entertaining, arousing more interest from learners through interaction by means of digital media, educators and policy makers should not regard it as merely a conversion of printed materials and classroom realia into forms of digital media. Rather, what I argue for is the importance of building a coherent approach to designing an educational environment that considers the full effect of implementing digital media in learning and teaching. The paper offers new insights into learning, as facilitated by digital mediation, based on Lev S. Vygotsky's pedagogical contribution to semiotics. Considering the number of different media used in contemporary digital education, this approach uses a symbolic form of mediation in digital learning environments. Thus, I draw on Vygotsky's theory of mediated learning and his use of signs in learning and

teaching. Although Vygotsky did not express an interest in semiotics in particular, his research on symbolic mediation and the role of communication in learning has a semiotic dimension (Wertsch 1985; Veer and Valsiner 1994). This aspect of his thinking plays an important role in his educational theory in general.

At the same time, the theoretical argument that I develop is illustrated by practical examples that I observed in the development of the educational platform 'Education on Screen' (Ojamaa et al. 2019), which consists of three educational environments: 'Literature on Screen', 'History on Screen' and 'Identity on Screen'. This platform is a research/educational project of the Transmedia Research group of the Department of Semiotics at the University of Tartu. The rationale of this project is to offer online solutions to issues related to learning culture, history and literature in the framework of school curriculum. The online educational platform 'Education on Screen'[1] ('Haridus Ekraanil', Est.) communicates popular artistic texts from Estonian literature. The platform consists of three learning environments, where each environment is dedicated to a particular artistic text, such as 'Rehepapp' by Andrus Kivirähk in the environment 'Literature on Screen', 'Seltsimees laps' by Leelo Tungal in 'History on Screen' and 'Truth and Justice' by Anton Hansen Tammsaare in 'Identity on Screen'. At the same time, the platform presents the literary texts with their cinematographic versions and their adaptation into other forms of media. Activities on the platform included reading classical Estonian artistic texts, with the help of various multimedia exercises[2]. Thus, the paper reviews the actuality of Vygotsky's theory in analysing digital educational environments using the case of the platform 'Education on Screen'.

2. The role of Vygotsky's symbolic mediation theory

The ability of digital learning environments to represent study material by means of various digital media accentuates the role of mediation as an important semiotic mechanism of learning. The media used in mediation of learning can either complement each other and the study material or develop the story by means of its adaptations into different media (Siegel 1995). Understanding the way mediation works in digital learning environments uncovers new perspectives on the learning process design as well as on teaching and learning paradigms. Lev Vygotsky's theoretical foundation (1979, 1991) has been chosen as a methodology for analysing mediation in digital learning environments in this paper. During his academic career Lev Vygotsky developed a number of concepts, such as using signs as psychological tools or a Zone of Proximal Development, which accentuate the meditative nature of learning, either by means of signs or by means of human mediation. At the same time, Vygotsky's theory is connected with social, cultural and developmental functions. In his analysis of learning and memorizing, Vygotsky (1979: 38–51) accentuates the importance of sign operations occurring

by means of auxiliary signs, 'the use of signs leads humans to a specific structure of behavior that breaks away from biological development and creates new forms of a culturally-based psychological process' (1979: 40). These outer signs act as mediators between the learner and the knowledge to be acquired. Figure 1 illustrates the classical scheme of stimuli-response with the addition of a symbolic mediator (Vygotsky, 1979: 39–40). The scheme represents the sign operation process that is involved in learning and memorizing. The scheme demonstrates the use of an external sign, namely a 'psychological tool' (1979: 52–57), which is characterized by its mediating function (1979: 54) in the structure of a stimulus-response process. This means that in order to learn or memorize, one uses 'indirect (mediated) activity' (1979: 54) by means of symbolic signs, such as schemes or pictures, which means sign operation is involved in such cognitive functions as learning and memorizing.

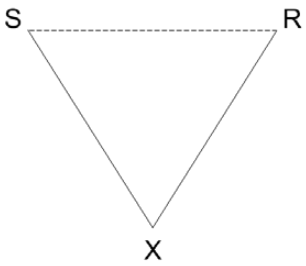

Figure 1. The Vygotskian scheme of stimuli (S), response ® and mediator (X) (Vygotsky 1979)

In terms of digital learning environments, it is necessary to emphasise that the sign that mediates new knowledge can be represented in the form of various media, e.g. video, music, picture or written text. In the context of multimodal representation, each form of media represents a symbolic sign that belongs to a different sign system. Therefore, we can assume that a mediator belongs to a sign system, different from the one used for representing the knowledge itself. This form of representation can be illustrated with the platform 'Education on Screen', where a written artistic text is accompanied by its multimedia representation, and the study material is mediated by means of different digital media.

This form of representation in digital learning environment presupposes the use of several auxiliary mediators, i.e. signs (x) of symbolic sign systems, between the learner and the knowledge. Each of the auxiliary signs belongs to a different sign system (x1, x2, x3, etc.), and therefore we can assume that it is possible to develop the scheme represented in Figure 1 into that of Figure 2. The scheme develops Vygotskian representation of sign operation depicted in Figure 1 and illustrates how mediation proceeds when using several media for the purpose of learning. Such a form of mediation used in digital environments offers the learner the ability,

on the one hand, to communicate with the study material with perspectives of different sign systems, such as film, pictures, collages or scenario, and on the other hand, to familiarize with various signs systems of digital media as such.

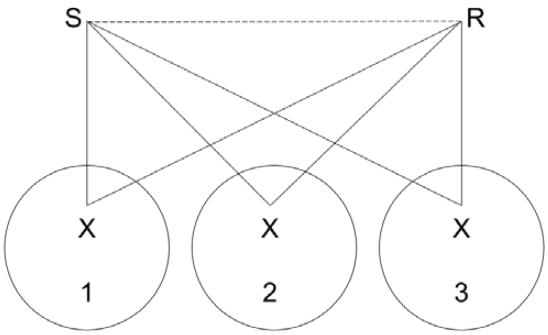

Figure 2. The scheme develops Figure 1 and represents mediation with the help of several media that belong to different sign systems (x1, x2, x3)

This form of representation in learning is widespread in digital education under the concept of transmedia education (Pence 2012; Jenkins 2010), which was considered in the learning design of the platform 'Education on Screen'. The platform offers a means of learning humanities through reading artistic texts in an environment where a mediating sign is represented with a group of texts that belong to different sign systems. Each of these mediatic versions of the text is a part of the initial text's transmedia reality. This ability of digital learning environments to represent study material by means of several forms of media, namely symbolic mediators, possesses an important pedagogical dimension, as it fosters meaning-making (Siegel 1995: 460-461) by communicating a text through different modalities. The meaning is produced by 'moving across sign systems' (Siegel 1995: 461).

This multimodal mediation by means of different media can be illustrated with the educational environment 'Literature on Screen', which is dedicated to an original artistic text by Andrus Kivirähk 'Rehepapp ehk November'. In one of its activities (see Figures 3.1, 3.2, 3.3, 3.4), the digital environment provides the learner with a representation of study material on the mythical creature Kratt from Estonian mythology. The representations include its cinematographic image, ballet and theater images, as well as its representation at a contemporary exhibition and in a board game.

This representation is realized in the platform by means of several digital media, such as pictures, written artistic texts, videos and an interactive game. The representation also includes transmedia adaptations of the character in theatre, opera, art and board games. The digital environments 'History on Screen' and 'Identity on Screen' also represent a similar way of multimodal mediation in learning. For instance, in 'History on Screen' and 'Identity on

Screen' most of the study materials from the map section are represented by means of various multimedia mediators, in an attempt to involve the learner in a multimodal dialogue with the study material.

Figure 3.1. Example of representations of the mythical creature Kratt in the educational environment 'Literature on Screen'. The illustration from the film 'November'

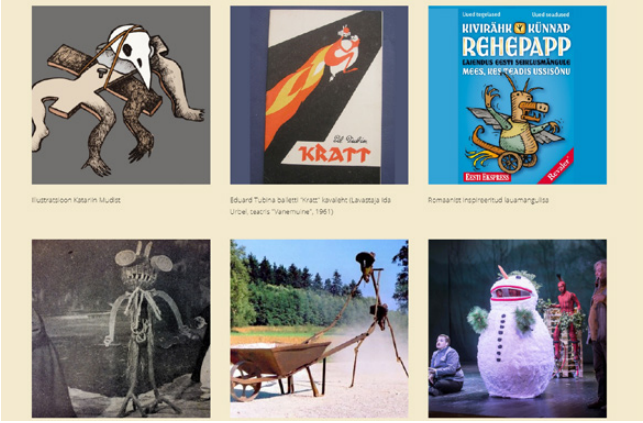

Figure 3.2. Example of representations of the mythical creature Kratt in the educational environment 'Literature on Screen'. The illustrations of the creature in different interpretations of the novel: an illustration by Katariin Mudist, the illustration for the ballet, the game, the decoration for the ballet, the film materials, the opera

It can thus be suggested that multimodality should be considered in learning not as a merely mode of representation. The digital media are related to digital artistic languages and thus can be acquired in learning as psychological tools in terms of meaning-making. The methodology of the learning environment may consider the representation of various modalities of text as artistic texts, that are able to convey meaning. Therefore, multimodality can be represented in learning as a form of mediation in terms of meaning-making.

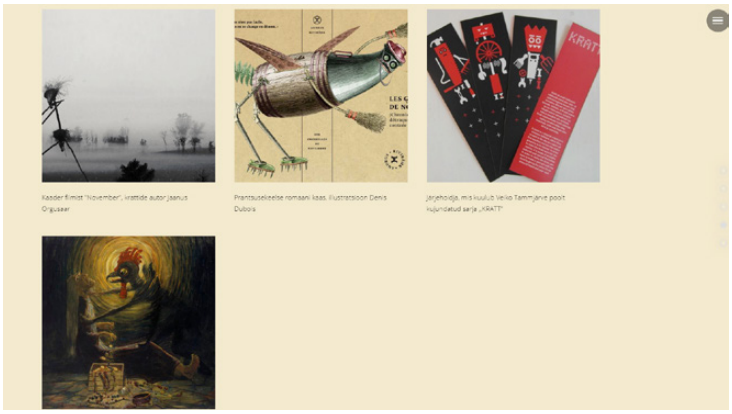

Figure 3.3. Example of representations of the mythical creature Kratt in the educational environment 'Literature on Screen'. The scene from the film 'November', the illustration from the French version of the novel, the illustrations by Veiko Tammjärve, the picture

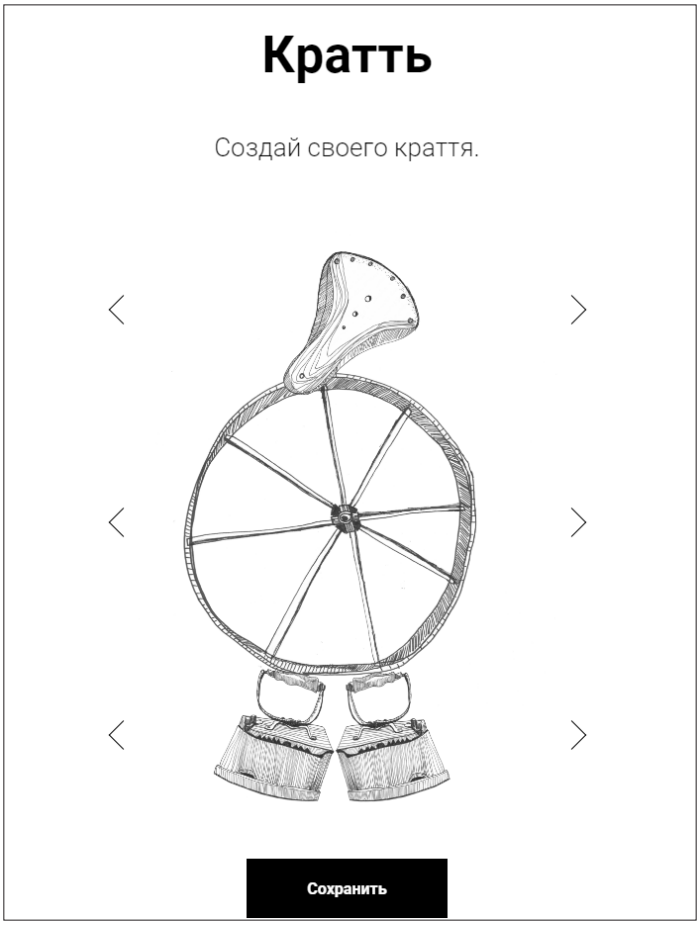

Figure 3.4. Example of representations of the mythical creature Kratt in the educational environment 'Literature on Screen'. An interactive game of making the creature.Figures 3.1, 3.2, 3.3, 3.4

3. The role of inner speech

The use of such multimodality of mediation allows the platform to establish communication with the learner by means of multiple languages of digital media. This calls attention to an important educational dimension: the multimodal texts of digital media on a platform consider learner's cultural memory, therefore initiating a dialog with the learner's previous cultural and social experience. This dialogue happens by means of a special imaginative and predicative internal code of one's imaginative thinking. This code, which was described by Zhinkin (1998: 146–162), translates the descriptive information received through social and cultural interactions into schematic representations of the external reality. Zhinkin accentuates the unique nature of such representations: 'representations as descriptive components of this code are schematic' (1998: 158). In other words, a significant part of our cultural and social experience, namely the representation of reality, is stored as images or other symbolic forms, and thus "a person's experiences exist "encoded in his inner speech" ' (Emerson 1983: 7).

According to Vygotsky, the way that information is processed by inner speech is imaginative and predicative (Vygotsky 1991; Zhinkin 1998). Vygotsky argues that 'predication is the natural form of inner speech; psychologically it consists of predicates only' (1986: 243). Therefore, we can assume that inner speech follows a special internal code that consists of predicates of internalized texts and sign systems. These fragments of sign systems are joined to each other agglutinatively (Vygotsky 1991; Zhinkin 1998), and thus form a complex imaginative tool that is able to establish translation between texts of different modalities and one's own consciousness. Therefore, inner speech represents 'the sum of all the psychological events aroused in our consciousness by the word' (Vygotsky 1986: 245).

The concept of inner speech plays an important mediative role in meaning-making and interpreting texts of different languages of culture, such as artistic texts or multimedia texts. According to Zhinkin:

> Understanding, that is, the reception of messages, should be viewed as translation from one language into another. Moreover, a language of representation must be one of these languages, since the first, perceived step toward the knowledge of reality is made up of them (1998: 161).

By the language of representation Zhinkin means a language of 'visual messages that get their meaning in the interpretation' (1998: 162) by the viewer. He illustrates the objective-imaginative nature of inner speech with an example of a theatre (1998: 158) that brings associations of what the building looks like and what is around it. Therefore, every time a learner is involved in a dialogue with different cultural texts from a learning environment, he or she translates these texts into the language of inner speech. In the context of digital environments,

we can assume that inner speech plays an important educational function both in terms of understanding and associative thinking. Since the text is translated into the 'objective-imaginative code' (Zhinkin 1998: 159) of inner speech, we can assume that the use of different media allows learners to use different sign systems already internalized by the learner, making them use more complex and diverse code transitions ('кодовые переходы', Zhinkin 1998). It can thus be suggested that these code transitions help the learner see cultural texts from the perspectives of internalized cultural languages of different modalities, thereby bringing more imaginative associations into the learning process. In the context of digital environments, the way cultural texts are organized imitates the fragmentariness and the cohesion of inner speech, therefore attempting to make a more effective dialog with the learner.

As we have observed, inner speech involves both outer and internalized sign systems, and therefore is influenced by the media in which a particular text is represented. The importance of media in the associative and imaginative functions of inner speech in digital environments is accentuated by the special effects of digital media. Kress (2003) accentuates important effects of contemporary digital media, such as 'multiplicity of modes' (2003: 5) where media is able to 'change through their affordances'. He highlights the interactive aspect of media, which allows a learner to create new connections with particular texts by means of 'hypertextuality' (2003: 5). This illustrates an important semiotic dimension of media. Thus, it can be assumed that the hypertextuality of media used in a digital environment allows the translative and associative functions of inner speech to be elevated by establishing more connections with the texts through different modes.

While learning in a digital environment is supposed to frequently initiate a multimodal dialogue with inner speech, it is important to emphasize the limitations of various forms of media in the multimodal dialogue. Any type of text, such as a written text, a painting or a piece of music, has certain limitations. For instance, it is impossible to represent taste or sound by means of visual media or, at the same time, to represent a musical text visually. The digital multimodal representation of study material, by bringing together the abilities of different sign systems, possesses an important developmental dimension, accentuating the important role of social and cultural background in establishing a dialogue with inner speech.

4. The role of creating new texts

The implementation of different media in representation provides the learner with an opportunity to familiarise herself/himself with a particular sign system, such as digital collages, films or comic books. According to Lev Vygotsky '...it's impossible to enter an artistic text completely, in case you are absolutely extraneous to the technique of its language' (1991: 291). Thus, we can assume that the ability of a learning environment to involve the learner in

the process of creating new texts of culture, i.e. texts displayed in different media on a digital platform, possesses an important developmental function in the context of learning through a digital platform. It can thus be suggested that the creation of new texts of culture, while working on a particular task in a digital environment, actively involves inner speech by allowing the learner to represent their learning experience by means of cultural texts. At the same time, it provides the learner with the ability to do a more thorough semiotic analysis of sign systems, namely, languages of representation. Similarly, the practice of creating new cultural texts by means of art illustrates 'a tool of learning to perceive a work of art' (Vygotsky 1991: 291).

Thus, this can be illustrated by the approach used for designing the assessment instructions on the digital environment 'Identity on Screen'. The task 'literature as cinema' communicates to learners the way that literature can be represented in the artistic language of cinema. In other words, the lesson represents the way artistic texts written in one sign system, such as literature, can be translated into another sign system, such as cinema. In a series of consecutive tasks learners familiarize themselves with the elements of the artistic text of cinema, such as a storyboard, music, point of view, montage, scenario and picture style. An important part of the lesson is practical: where learners create new texts of cinematic language, such as a storyboard or a scenario. This process of getting to know the semiotic structure of film brings the interaction with its texts in the lesson to a different dimension. Digital media that are used in learning possess an important pedagogical and developmental function of allowing learners to create texts of culture that are close to the original texts in form and structure. Digital tools allow the learner to create not only a scenario, but also a cinematic video clip. Thus, we can assume a meditative function of digital tools in the semiotic analysis of cultural texts which forms an understanding of the cultural languages, i.e. sign systems, used in a digital learning environment.

5. The role of interaction and the zone of proximal development

The process of mediation of learning has been developing at the nexus of symbolic and human mediation. While symbolic mediation, i.e. mediation by means of signs or texts, operates with the learner's imaginative apparatus, invoking inner speech and a sign operation in the process of learning, human mediation brings learning to the dimension of communication, making interaction itself a source of learning. Human mediation has always played an important role in learning, memorizing and interacting with study material as an essential means of mediation. At the same time, human mediation is a significant part of Vygotskian developmental theory and was described precisely in his concept of the Zone of Proximal Development, which has been explained in a number of his works (1979, see chapter 'Interaction between Learning and Development': 84–91; 1991: 391–410).

The common understanding of the concept represents a model for how human interaction works in the processes of learning and the learner's development, considering several levels of development involved in the learning process. The concept categorizes knowledge into (1) knowledge that can be gained independently at the current level of development, (2) knowledge that can be obtained with the help of a more knowledgeable other, level of proximal development, and (3) knowledge that cannot be achieved at the current level of development, namely the level of potential development. Therefore, according to Vygotsky, learning occurs in 'the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers' (1979: 86).

Vygotsky considered a more knowledgeable other to be a teacher or a peer who possesses a certain expertise in the object of study. In the process of interaction, the more knowledgeable other leads the learner to proximal knowledge through guidance and scaffolding. The concept emphasizes the importance of analysing and allocating different types of knowledge in relation to the learner's abilities. At the same time, in describing this concept, Vygotsky points out the significance of interaction, namely communication, in learning.

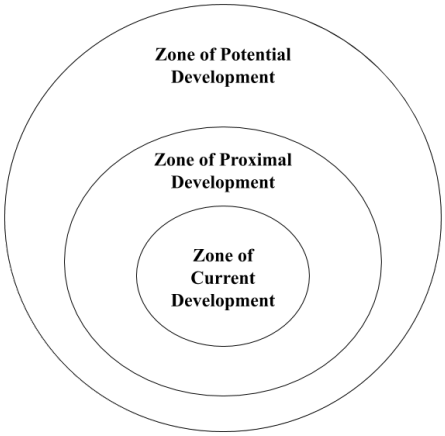

Figure 4. The scheme that represents a common understanding of Vygotsky's concept of the Zone of Proximal Development

In a later analysis of the Vygotskian Zone of Proximal Development, Seth Chaiklin argues for the importance of 'raising doubts' (2003: 43) on this general understanding of the Zone of Proximal Development and argues the importance of considering the concrete meaning of Vygotsky's concept (Chaiklin 2003: 43). Chaiklin gives an overview of the main assumptions that are always involved in the discussion of the Zone of Proximal Development: generality, assistance and potential assumptions (Chaiklin 2003).

In his analysis, Chaiklin pays particular attention to the use of the term 'development' in

the name of the concept, rather than the term 'learning', pointing out that learning and inner developmental processes (2003: 42) are partly united, but mostly separate activities. Thus, we should consider the Zone of Proximal Development to be related to development, rather than merely gaining certain skills (Chaiklin 2003: 43). In the context of digital environment the borders of the Zone of Proximal Development are dynamic and may undergo changes by the correlation of individual learning and the role of a more knowledgeable other. Another important aspect was pointed to by Chaiklin regarding the assistance assumption, where he claims that 'communication in relation to learning' (2003: 43) per se is of a higher importance than the expertise of a more knowledgeable other. This potential assumption emphasizes the importance of the potential development that has to be considered in learning, though there is no convergence with the current developmental level.

6. Digital platform as a more knowledgeable other

The given assumptions emphasize the importance of analysing the role of interaction in learning, attributing developmental functions to communication. Thus, the use of them in the analysis of digital learning environments accentuates the role and the importance of facilitating communication and 'collaboration with more capable peers' (Vygotsky 1979: 86), i.e. the more knowledgeable other, in digital learning in order to concentrate on the developmental side of learning. Human mediation in digital environments is often limited by the number of individual tasks and the use of digital tools as the main form of mediation of study material. This can cause educators to consider digital learning environments to be oriented towards the individual work of the learner. Though recent research (Bockarova 2014) shows that the use of digital tools in the classroom can facilitate the involvement of a more knowledgeable other in one's learning process. Such necessity of communication in learning towards facilitating the pedagogical aspect is illustrated by the introduction of new digital tools and solutions in the classroom. The research (Bockarova 2014) shows that the use of various digital tools in the context of learning offers alternative ways of communication and collaboration between the learner and the teacher, or the learner and her/his peers. That is a consequence of working with digital applications as learning mediators. In fact, when a learner uses an application or other digital medium for learning, it often requires guidance from the teacher or peers. This also illustrates how to use familiar media or tools in a new way. At the same time, increased commenting on the work or self-created tasks of others on the platform exemplifies the growth of interaction in learning.

Another example of the developmental function of assistance using digital tools was presented in the research of edusemiotician Inna Semetsky (Semetsky and Stables 2014: 71) which was based on the case study of a school pupil who was suffering severe generalized

anxiety. As a consequence, the pupil experienced a problem of de-socializing from the classroom. At harder stages of the disease, he was trying to distance himself from his schoolmates. Therefore, he experienced serious problems with communication and interaction with the other students. By looking back at Vygotsky's concept of proximal development (1991: 399–400), it was possible to assume the seriousness of the developmental difficulties in the case of de-socialization. Vygotsky (1991: 26) emphasizes that personal psychological functions first appear on the outer communicative level and then shift to an inner personal level. This correlates to the common juxtaposition of 'material-mental' and 'social-personal' in Vygotskian works (Chaiklin 2003: 47). In the context of Semetsky's experiment, the integration of digital learning practices was used as a type of collaborative work. One of the activities was an 'all about me' online assignment. This technology allows students to choose their online identity by creating an avatar and giving a short introduction of themselves. This helped the learner to avoid the anxiety caused by the symbolic representation of her or his identity. The next activity was focused on collaboration where learners had to create a scenario for a short film that was scaffolded with a special digital programme (Semetsky and Stables 2014: 78). The examples mentioned above give an overview of the value of the digital learning environment in the context of fostering interaction in learning. At the same time, it accentuates the mediational role of digital tools and their ability to scaffold interaction and development in learning. It is especially valuable when the interaction in the classroom is rare or blocked by learners' communication abilities.

The examples above demonstrate the importance of assistance assumption in the Zone of Proximal Development in digital learning. At the same time, the examples vividly illustrate the significance of Vygotskian use of the term 'development' in the represented concept. As was pointed out before, Chaiklin emphasizes that 'zone of proximal development is not concerned with the development of skill of any particular task, but must be related to development' (2003: 43). In relation to a digital learning environment, it is necessary to add that in order to gain pedagogical value, a digital environment has to focus on the use of the assistance assumption of the Zone of Proximal Development towards developmental processes rather than gaining skills in a particular task. Additionally, the assistance assumption can be widened in the context of digital platforms. From the perspective of the Zone of Proximal Development, an important function of digital environments is their ability to let learners collaboratively work on complex tasks (even via digital tools) and initiate interaction by sharing the texts, i.e. the results of their work, among their peers. The given examples underline the ability of a digital learning environment to act as a more knowledgeable other, thereby navigating a learner towards proximal development, rather than merely giving tasks and providing answers. Thus, it can be suggested that the role of a more knowledgeable other on a digital platform will be shared between the teacher, the peers and the platform itself as a mediator of learning (Figure 5).

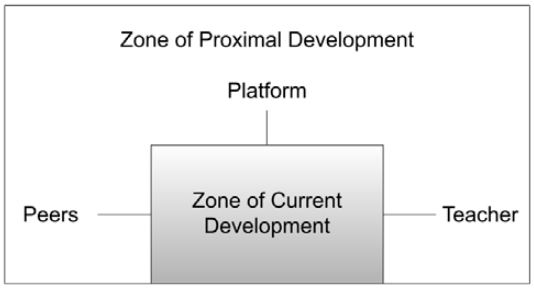

Figure 5. The scheme illustrates the concepts of the Zone of Proximal Development in the context of a digital platform

7. Education on Screen

7.1 Mediation

The methodology of Education on Screen can be analysed in terms of Vygotsky's theory of mediation to accentuate its educational functions. The methodology of the platform presupposes that the multimodal representation of artistic texts in educational environments provides learners with an opportunity to acquire psychological tools. The multimodal artistic texts in the educational environments are represented by means of different digital artistic languages. These artistic languages are not used merely in terms of representation, but also in terms of meaning-making. In the context of educational environments students are offered the tasks that communicate semiotic functions of artistic languages. This is illustrated by means of such tasks as 'Literature as film' (Figure 6). This task offers semiotic analysis of the language of film in terms of its structural as well as semantic features. Thus, it makes multimodality not only a representational feature. In the context of the task the environment offers the learners a possibility of analysing film as a sign system to identify the characteristics that are related to meaning-making. By means of the task learners can practice in making texts in terms of the sign system. Thus, film can be acquired not merely as a form of representation, but also possessing a 'mediational role' (Kozulin 2003: 24) as a cognitive tool. The analysis of the features of mediation is an important part of acquiring such sign systems as a psychological tool (Kozulin 2003: 24). In a similar way, the platform offers the learners to acquire different forms of media as psychological tools in the context of meaning-making. Thus, the methodology of the learning environment considers multimodality in terms of development as a form of mediation in learning.

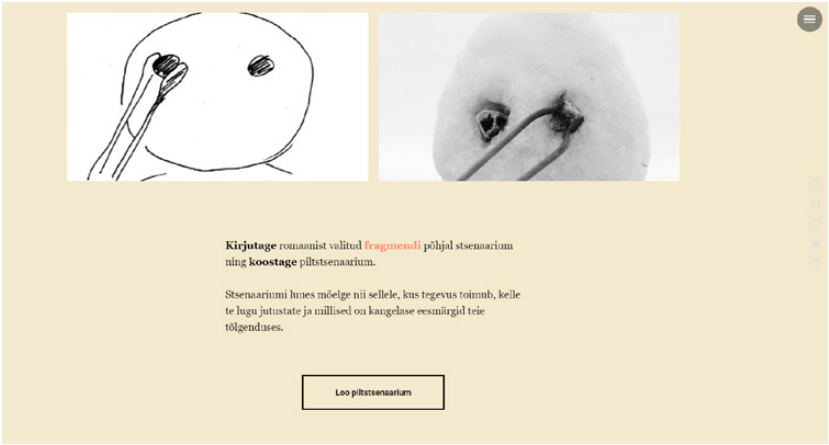

Figure 6. A part of the task 'Literature as film' in which a film is represented as an artistic languages. In this part learners practice making a storyboard

7.2 Inner speech

The representation of texts in educational environments considers the work and characteristics of inner speech. The predicativity and fragmentariness of texts in the learning environment reminds the similar features of inner speech. This allows the learning environments to form associative connections among various fragments of cultural texts. The multimodality of texts allows learners to use more internalized cultural languages in terms of meaning-making. This is illustrated by means of an interactive map (Figures 7.1, 7.2, 7.3), which communicates various cultural texts in a form of imaginative map[3]. The cultural texts are represented in separate lessons in a discrete form using different modes of representation. However, the interactive map as well as the structure of the learning environment allows to form holistic representation of the text. Thus, the educational environments allows to establish a dialog with inner speech by modeling the features of the language of inner speech in the structure of the learning environment and the representation. Considering the features of inner speech in terms of the methodology of digital learning environments has an important pedagogical function, as inner speech is important in terms of meaning-making, creativity and imaginative thinking.

7.3 The Zone of Proximal Development

The educational platform 'Education on Screen' can illustrate the way a digital educational environment fosters the learner's communication and development in the context of learning, i.e. acting as a more knowledgeable other. The methodology used for the platform 'Education on Screen' (Ojamaa et al. 2019) relies on the generality and the assistance assumptions of the

concept in order to develop literacies necessary for maintaining a dialogue with the cultural texts of the platform. Rather than providing learners with a source of answers, the platform emphasizes the importance of communication and developmental functions.

Figure 7.1. The interactive map of the learning environment 'Literature on Screen'.

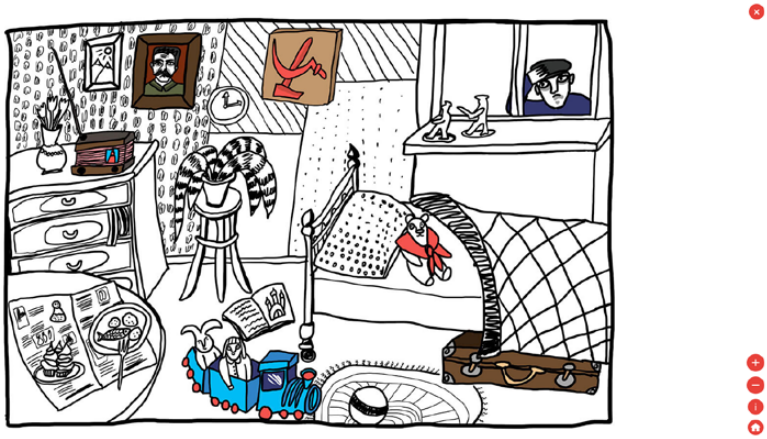

Figure 7.2. The interactive map of the learning environment 'History on Screen'.

The role of assistance assumption in the learning environment design can be illustrated using tasks that require students' collaborative interaction in the process of problem solving. The use of some digital tools on 'Education on Screen' require a certain expertise in various fields of knowledge which initiates peers to act as more knowledgeable others in the completion of the task. This can be illustrated briefly by an exercise from 'History on Screen', 'How do artistic texts mediate the past?'[4]. In this particular activity, the platform initiates collaborative work among students in order to complete the task. In the framework of the Zone of Proximal Development, the task integrates students' diverse experience within the group, providing

the necessary mutual assistance and communication in learning. Such a form of instructional design is actively used on the digital platform for the tasks that communicate complex social, historical or cultural topics. Another example can be observed in the tasks that require certain literacies from the students, such as the lesson 'Literature as cinema' in 'Literature on Screen', where learners collaborate in making a collage of various images of the artistic text. The represented instruction illustrates the important role of previous cultural and social experience in relation to proximal development, when they are used as learning tools.

Figure 7.3. The interactive map of the learning environment 'Identity on Screen'

The given examples show the role of the Zone of Proximal Development and its main assumptions in digital learning environments. They also illustrate the role of human mediation in learning by means of digital tools, where the meditative function is shared between teachers, peers and the digital platform. We can assume that the analysis of the Zone of Proximal Development on a digital platform can create a foundation for analysing the educational value of a platform in the context of communication in learning and, more importantly, in the context of development. Rather than concentrating on the digital component of learning through digital environments, the use of the concept accentuates the importance of verbal interaction and collaboration that can be motivated by the learning environment.

8. Applications in Learning and Teaching practices

The contemporary classroom is a classroom where digital media is a part of learners' everyday environment. Being a part of such a multimedia environment means that information is represented through multiple media. The previous chapters identified the educational value of the diversity of media in representation of study texts in learning environments. It can thus

be suggested that in the context of digital environments, the role of the teacher is to scaffold students towards the desired knowledge by adjusting the forms of multimodal mediation and creating necessary links and connections between the learner and knowledge through digital media. Thus, the implementation of a digital environment in learning practices provides a pedagogical methodology with a paradigm where the educator is supposed to adjust the use of various digital multimedia activities in order to provide a personalized learning experience, foster meaning-making in learning and maintain interaction in the key relationships: student–teacher, student–platform, student–peers. The approbation of the platform 'Education On Screen' in the learning process demonstrates the interest of students in using multimodal representation of classical literature in discussion of culture related subjects. At the same time the representation of various modalities of texts in terms of artistic languages allows students to use them in terms of meaning-making. However, it emphasizes the difficulty of teaching various modes of representation as psychological tools, and not merely as artistic forms.

The use of 'Education On Screen' demonstrates the importance of considering the learners diverse cultural backgrounds. This allows learners to be more involved in learning as well as create meaning. Vygotsky argues (1991: 360) that the pedagogical process where a learner only receives facts and information can of course arouse some interest in the audience, but it does not teach a learner how to use and gain the knowledge. According to Vygotsky (1991: 359–360), a teacher who is 'reading the facts' like 'a gramophone' (1991: 360) that plays the same disc, will never give students that variety of educational experience that they could have obtained through collaboration and active learning. Vygotsky proposes that the role of the teacher should be the creator of a learning environment, stating that teaching involves the process that 'forms the relations of a child to the elements of the environments that influence her/him' (1991: 360). Therefore, teaching occurs as the creation of mediative links with mediators in a learning environment, accentuating the importance of an active role for a learner in the process of gaining knowledge. In terms of digital environments with their variety of symbolic forms of representations and the diversity of media used to illustrate study material, the importance of establishing connections with study material by means of certain mediators accentuates the role of teaching, as described by Vygotsky (1991: 360).

The use of 'Education On Screen' in collaborative tasks emphasizes an important pedagogical function in the changes of more knowledgeable other. This allows learners to share the role of a more knowledgeable other and thus, exchange their cultural background. However, in some tasks learners are not equally involved in learning, for instance when making artistic texts. Thus, the role of a more knowledgeable other is not shared enough among the learners. This emphasizes the necessity of guidance and scaffolding in terms of allowing the learners equally practice the acquisition of psychological tools. The concept of the Zone of Proximal Development emphasizes the importance of taking the diverse background of learners into

account in the context of active cultural memory and the knowledge of cultural sign systems. At the same time, the concept accentuates the important role of the learner in the learning process, as well as the necessity of communication in the Zone of Proximal Development. Vygotsky argues that 'a learner is not just swallowing the ready-made food' (1991: 359), but rather learning practices should involve the 'active energy of a student' (1991: 359). As a digital environment shares the function of a more knowledgeable other, it can be suggested that one important use for a digital environment is to organize instructions in a way that will involve learners in interaction, sharing their experience and collaborating in learning. The educational environment attempts to involve learners in communication while they are working together in solving tasks. This calls attention to an important educational and developmental function, since it allows learners to practice the literacy of independently looking for new knowledge on the basis of their background knowledge, i.e. actual development. In this case, the learner is positioned for decision making and problem solving. That makes the learner (rather than the teacher, study material or digital tools) a key source of learning and producing new knowledge. Therefore, the digital tools form a necessary scaffolding in the context of a digital learning environment. Stables and Semetsky (2015: 29) commented on such an approach, describing it as 'the creation of novel meaning for lived experience rather than transmitting some pre-existing facts from a generic teacher to a generic student'.

9. Conclusions

The implementation of the Vygotskian theory of mediation in the analysis of digital learning environments accentuates the influence of digital media, the involvement of cultural experience and the necessity of interaction in learning by means of a digital environment. The ability of such digital environments as 'Education on Screen' to represent study texts by means of various media makes mediation an even more significant part of learning, emphasizing the necessity to consider it not only at the level of methodology, but also at the level of teaching practices. The analysis of inner speech brought in the article identifies the way one operates with cultural sign systems in the context of multimodality of representation of texts in digital environments. Although the social part of learning in digital context changes its usual forms of classroom interaction, it still goes hand in hand with the theory of psychological development, described by Vygotsky (and later developed in the pedagogical science). The analysis given in this paper identifies the necessity for the methodology used in a digital educational environment, considering whether it: (1) scaffolds a learner towards new knowledge with the activities that are based on the knowledge the learner has already acquired and therefore presupposes a learner-centred approach, due to the platform's adjustable context and structure; (2) fosters interaction with and through the platform as a more knowledgeable other; (3) motivates the

learner towards extensive learning and memorizing through the use of various sign systems of media as mediators of learning. Thus, the paper demonstrates the actuality and the educational value of using the Vygotskian approach to mediation, using sign operation and communication in the analysis of learning and mediation in the framework of a digital environment.

NOTES

1 More information on the content of the platform 'Education on Screen' is presented on the website of the platform: https://haridusekraanil.ee/

2 Methodological foundations of the platform 'Education on Screen' were described in the article by the Transmedia Research Group at the University of Tartu (Ojamaa et al. 2019).

3 You can find the digital maps on the websites of educational environments: http://kirjanduse-kraanil.ee/, https://ajalugu.haridusekraanil.ee/en/, https://identiteet.haridusekraanil.ee/en/

4 The example of the task: https://ajalugu.haridusekraanil.ee/en/theoretical/time-together/how-do-the-written-texts-convey-the-past

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