L.S. Vygotsky and the Digit: Challenge for Cultural-Historical Psychology

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The article ponders, if it is at all possible to include digital technologies into the process of mediation. The latter being the core of cultural-historical psychology by L. Vygotsky. In order to facilitate the discussion, the author outlines the nature of the virtual world, made by digital technologies. It was postulated by a number of researchers that digital technology could serve both as a tool and as a sing. And so — it can be part of the mediation practices. This article claims that digital technologies create a unique environment (virtual reality) that dictates particular ways of conduct, especially for children and teenagers. The author demonstrates how digital technology creates splinter segments in the mediation process, which makes an adult to leave the communication with a child. Which leads to so-called digital chasm, and a child descends into the virtual reality without living through the mediation process. This is why we claim that digital technology can't serve as a sign, the way Vygotsky describes them. The article lists parameters and consequences of the digital schism, such as: event shift, narrative intervention, inversion of functions and flattening of the horizon of meaning. The article proposes a solution — a construction of a search scenario in schools. This search scenario consists of several stages: challenge, analysis, ask-search, discussion, reflection and articulation of knowledge. Each of these stages can include digital technologies in various ways. The article concludes the algorithmic nature of modern schools makes a pupil's behaviour "digital" before digital technologies themselves. And so, in order to overcome the digital schism, one needs to establish search scenarios as a teaching model before introducing digital technologies during a lesson.

Keywords: digital technologies, cultural-historical psychology, L. Vygotsky, mediation, search scenario, digital chasm.

Л.С. Выготский и цифра: вызов для культурно-исторической психологии

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В статье ставится проблема принципиальной возможности включения цифры в модель опосредствования, выступающей в качестве ядерной в культурно-исторической концепции Л.С. Выготского. Автор проблематизирует эту задачу через обсуждение природы виртуальной реальности, созданной с помощью цифровых технологий. Согласно уже существующим допущениям разных исследователей, цифра выступает одновременно как орудие и знак и поэтому может быть использована в практике опосредования. В статье обосновывается, что цифра выступает характеристикой особой среды обитания, виртуальной реальности, которая диктует определенный способ действия и поведения, особенно для детей и подростков. Автор показывает, что цифра совершает расщепление в модели

опосредования, в результате чего взрослый уходит из коммуникации с ребенком. В результате происходит так называемый цифровой разлом, согласно которому ребенок погружается в виртуальную реальность, не проживая акта опосредствования, а поэтому мы не можем говорить о том, что цифра играет такую же роль психологического орудия, описанную у Выготского, которую играл знак. В статье приведены характеристики и последствия цифрового разлома, такие как событийный сдвиг, сценарный захват, функциональная инверсия, сплющивание смыслового горизонта. В статье предлагается рассмотреть в этом случае использование цифры при построении в школе поисковой ситуации, состоящей из нескольких этапов (вызов, осмысление, поиск-вопрошание, обсуждение, рефлексия, знаниевое оформление). На каждом этапе цифра может быть использована в зависимости от задач и в разном качестве. Выводом работы является утверждение, что алгоритмизация поведения ученика, доминирующая в массовой школе, провоцирует цифровизацию поведения еще до цифры. В этой связи для преодоления цифрового разлома необходимо еще до внедрения цифровых технологий на уроке выстраивать проблемно-поисковые модели обучения.

Ключевые слова: цифра, цифровые технологии, культурно-историческая психология, Л.С. Выготский, опосредствование, поисковая ситуация, цифровой разлом.

Mediation and the digital

Digital technologies (in the broad sense, the digital), which are being actively introduced into various spheres of life, have become a serious challenge for the humanities, including the Lev Vygotsky's cultural-historical psychology (hereinafter referred to as CHP). In fact, all the world anthropological and psychological concepts known to us and still serving as the basis for humanitaristics were developed in the pre-digital era. The digital, therefore, did not appear in these concepts. Studies on both the role of computer and information technologies in human development and the associated risks were already carried out in the 1960s[1]; however, the basic CHP postulates have not been fully verified with the digital. And the challenge here lies precisely in the fact that it strikes at the very CHP core — the model of mediation.

What is the subject matter of this challenge and the related problem situation for researchers?

The CHP postulate states that all "higher mental functions <...> are mediated processes, i.e. their structure comprises, as the central and major part of the whole process, the use of a sign as the basic means of directing and mastering mental processes" [2,

p. 126]. According to Lev Vygotsky, the act of development is always presented through the act of mastering a person's behavior by means of a psychological tool (sign). The latter differs from tools of labor in its *orientation* — inwards, to its own mode of action (in contrast to the external object-tool, directed outwards, to the object) [3, p. 90]. This difference is grammatically embodied in a key concept, in a change in the suffix: when acting on an object, the subject performs an act of mediation, acting through a tool. When influencing oneself, the subject performs an act of mediation, mastering one's behavior, acting with the help of a sign[2].

What does mastering one's behavior mean? It means mastering a mode of action by a person (a child) with the help of an adult mediator and use of a tool and, thereby, shaping one's own subjectivity. To be more precise, when mastering a mode of action, the latter "enters" an individual, becoming the new functional organics of that person, who forms a new "functional organ", as V. Zinchenko liked to reiterate[3]. It is important to present the process of mastering a mode of action as a subject actually living the very process of mastering. As B. Elkonin writes, it is important to understand how a stimulus that was previously external to an individual turns into

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[1] По See, for instance [1]. For obvious reasons, it is impossible to imagine construction and description of a mediation model in these works that involves the digital. Nevertheless, the authors tried to dispel a number of myths created by various representatives of transhumanism (for example, the myth according to which the brain thinks, and therefore it is possible to develop an artificial intelligence model based on brain activity analysis as an example).

[2] This distinction disappears when translated into English. All translations use the term *mediation*. Moreover, Western authors, including CHC followers, focus on the instrumental side of an act — on the action of a subject with the help of an instrument. One half of the act of development (mediation) is discussed; the other, the main half — mastering one's behavior — is forgotten (for more detail, see [11]).

[3] In writing, for example: pen — hand — arm — local zone in the brain in the form of neural connections.

an internal means, or how a sign "turns into an internal means of constructing an action" [15, p. 233]. This is the key CHC issue. Rather than how a stimulus that has become a means works, the question here is about a stimulus becoming a means, in living through the "interval" within which a stimulus is transformed into a means.

The point is that the very act of mastering involves effort, experiencing and living through the inner sense of oneself. B. Elkonin (with reference to the works of Lisina, Zinchenko and Gordeeva) fixes the key problem that the completeness of an act of *mediation* presupposes living through personal effort, "a sense of one's own activity". A person (a child) physically lives the act of mastery, overbears this act, living it in the fullness of self-feeling; seeing, hearing and feeling a psychological tool physically and sensory, with one's body. That is, the means through which a person masters a mode of action with an object and thereby masters oneself, one's affect, is felt bodily, sensory, in the fullness of presence. In principle, various modes of action and basic activities are mastered, for example, reading, writing or dancing. It is the emphasis that is important. The core of the mediation model is not just mastering a cultural tool in itself but whether a person further masters one's mental processes with the help of these means and whether the formation of a new personal organics further occurs through the process of mastering? In other words, a person can master an external action of a pen when writing. Or can learn to read and somehow start reading. But the question is different: does a person master oneself, one's affects, doing actions with writing or reading, control one's writing with a pen? What is the fullness of living and managing this living?

Some scholars, including the author, already put forward an assumption that the digital (digital technologies) constitute a new *means of mediating* [9; 10; 11; 12]). At the same time, according to O. Rubtsova, digital technologies act both as a tool and as a sign [9, p. 121—122][4]. Yet if the digital is a sign, then what way the digital is mastered as a sign and what does a subject of action, a child, feel when operating the digital? Isn't such an assumption an oversimplification when we consider the digital a sign and a tool? I believe that the digital is more than a sign and a tool. It is a new type of environment where a child lives. Moreover (and this is the main thing), in this environment there is no adult mediator familiar to us.

Lev Vygotsky once noted: "<...> the inclusion of symbolic operations enables emergence of a psychological field with a completely new composition that is not

based on the existent in the present, sketching out the future, thus, creating free action, independent of the immediate situation" [4, p. 50].

Lev Vygotsky makes using a psychological tool and creating an opportunity for a mediated mode of action in a semantic field directly dependent, in isolation from the current (visible) situation. The action mediated by the sign and its mastering (appropriation), and the mastering of oneself through it are carried out substantively and bodily. And the subject controls this action, rising above the current situation, from the semantic field.

It refers to the effort associated with overcoming the current situation "by building one's own field of action, deliberate in its dynamics and mediated in its structure," as correctly noted by A. Egorova [7, p. 18].

What is essential for us to understand here? It is important to pinpoint that the act of development is built in conjunction with mediation and mastery, when the very sequence, logic and structure of the action of mediation and mastery is anyhow lived and experienced directly-bodily and sensually, by all senses. A child sees, hears and feels with one's hands an object and a sign that becomes a psychological tool and means; more precisely, this object and sign is sort of drawn directly by the entire personal organics of the child. For example, the child writes the first letter on a blank sheet with the whole body. Although the sign itself is not felt, the very act of writing the sign is experienced. The pronunciation of the first word during the act of reading occurs with the whole being. A sound is pronounced aloud, through the voice and through the whole body, hearing which the speaker masters both the sound and the letter, and through this — oneself.

At the same time, a child controls oneself from the semantic field being above the current situation. If a child does not rise above one's corporeality and the immediacy of living, then a child will depend on one's affects and will not be able to turn the stimulus into a means.

This combination of acting in the semantic field, from which the objective action is controlled, and living the act of mastery in the directly sensory-and-bodily field sets the entire energy of the development act. In this sense, it *takes place*, that is, it *occurs as an event*. It is visible, it is lived through. Again, let's ask ourselves a question — does a human stay in a virtual environment created by means of the digit also occur directly object-bodily and does it take place? Or does such a stay lose the coordinates of chronotopos, that is, its own presence and eventfulness? And if eventfulness still takes place, then what is its quality?

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[4] Additionally, taking into account the above, these works are still more about the tool aspect, rather than the aspect of self-mastery. That is, the digital acts here as a tool and a sign, but in a tool sense. Humans can already do a lot by means of the digital. But the main question remains — what is self-mastery with the help of the digital and does the digital become part of a new functional organ?

In a series of experiments, B. Elkonin and A. Egorova showed that it is precisely this kind of living a sense of one's own activity that is important when mastering a psychological tool [7; 8; 15]. They pointed at the phenomenon of mastering, appropriation of a sign by a person, appropriation of one's own mode of action. As it was evidentiated, it is in acts of mastering one's behavior that the act of mastering oneself can be lived and observed. They demonstrated that in the interval of mastering a psychological tool as a means of a mode of action, it is important to feel action with it: it is necessary for a tool to become sensitive to the object of its application, make it possible for the hand to feel and the eye to see: "Such a testing of a means — a test of the tangibility of its action — is a necessary subjective moment in mastering the mode of action" [15, p. 234][5].

Additionally, the subject of action itself must and wants to see oneself in this living of the moment of mastering and appropriating a mode of action, — not a blind reactive being, but an active subject controlling the act of its own mode of action.

Elkonin and Egorova reached the conclusion that the very act of mastering a mode of action needs strengthening the vision of the very situation of mastering, so it is necessary to build means to strengthen one's own vision. If a subject does not see the situation itself and oneself in it, does not live through one's own feeling of an act, the mode of action does not become one's own, appropriated, but remains alienated, and, therefore, is not mastered [7, p. 20].

Having applied the above requirements to the model of mediation and mastery within CHC framework, let's again put forward the questions:

1. If it is assumed that the digital is a new means of mediation / mediacy, then is it possible to say that it plays the role of the same psychological instrument lived by a person, with the help of which an individual masters one's behavior?

2. If the digital plays the role of a psychological tool, then is it possible to say that the subject also gains and masters it and lives towards oneself though the act of feeling?

3. Is it possible in principle to apply such characteristics related to traditional psychological tools (objects and signs), developed within CHP framework, to digital means, through which virtual reality (VR) is created? Are the ways of human action described in CHP applicable to the course of human action in VR? In this case, we must assume that VR is arranged in the same way as the original social, physical, material reality where humans initially operate. Is it so?

Digital chasm

The younger generation, especially schoolchildren have been living in a digital environment, which is now their habitat, for a long time, since birth. Such presence in the digital environment truly deforms the behavioral structures of children and adolescents. In this situation, the following happens. With the massive introduction of smart digitals into the everyday life and immersion of children and teenagers in the virtual environment, a smart gadget and a child change places: a gadget takes on the active role of the "subject" that affects an individual, and a schooler assumes the passive role of the subordinate "object". This is due to the fact that a smart gadget already has a script of behavior, an algorithm of action. Picking up a gadget, a child with unformed abilities, who has not yet mastered one's behavior, does not simply take a gadget in one's hands. A child obeys the script of behavior wired in a gadget.

We call this phenomenon the *digital chasm*. It means splitting up the basic scheme of adult-child communication, due to which an *adult leaves the child's event field*. Adults are absent in the children's virtual world. On the other hand, smart digital, i.e., digital twins in VR, acting as quasi-mediators, taking up the function of an action pattern, are presented in the form of a ready action, intended to be taken and repeated, bypassing the stage of mediation associated with a child's personal effort. As a result, a child does not live through the very act of mastering one's behavior, does not perform the action of mediation, and therefore does not become the subject of action, since this is not required. Rather, the action is required according to the pattern, the script wired into the gadget.

Thus, both semantic and functional replacement occurs. VR replaces the original, socio-cultural reality, where the act of mediation and mastery took place. Due to the replacement, a child, being torn away from a living adult who has replaced oneself with a gadget, creates a situation of immersion in VR. The initial situation, which is based on a keen desire to see, hear, feel the living world, is translated by a child into VR, but in a *converted form*, it is embodied in the act of immersion and replacement, because it seems to a child (a child wants) that there, in VR, (s)he will find everything — fullness, meaning, an enduring source, and the joy of meeting and accepting[6]. But at best, a child receives a virtual substitute, a copy of the withdrawn original (person, thing, action, image) (Fig. 1).

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[5] B. Elkonin notes: "Feeling of oneself — this initial form of self-determination and identity — is the deepest existential psychosomatic foundation of human existence and, in particular, the initial condition for the situation of achievement. It is essential that the feeling of oneself as a "primary need" is not a natural given; it is built as a function of a certain type of effort. The type of effort, when the feeling of self establishes, presupposes mediation in its entirety, namely, the strengthening, reflection and return of one's latent, internal "aspirations" to an individual" [15, p. 157].

[6] See detailed representation of virtual reality as a converted form [13].
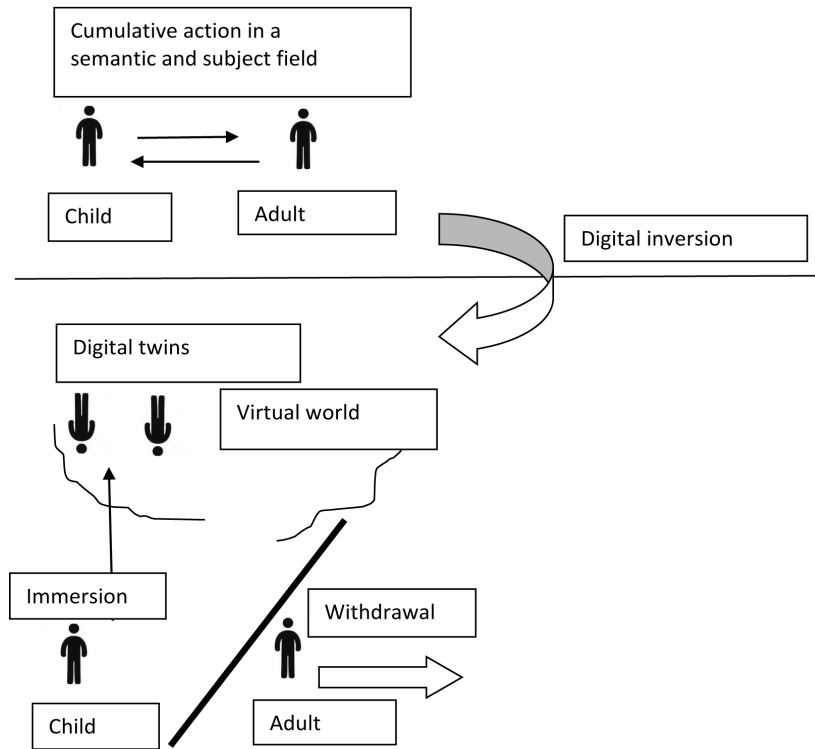
Fig. 1. Digital chasm and replacement

In view of the above, we observe a whole range of consequences of the digital chasm. These consequences are as follows. Let us describe such situation as the fundamental, model one, realizing that variations are possible within its limits.

Functional inversion

A gadget has built-in action scripts that guide a child. The latter does not act, but is led. In a living "cumulative action" (D. Elkonin) a child experiences and lives this joint action with an adult, to whom a child returns one's mastered and meaningful, already appropriated, action, shows it to an adult, seeking confirmation and acceptance. In a situation of semantic loneliness alone with the digital, a child does not have this opportunity, and does not want to, because a child is attracted to oneself by the beautiful world of digital temptations.

In a situation of development (in its norm), a child, in the presence of an adult, performs a mediated action to master one's reactions with the help of signs — tools, as a social situation does not prompt a child: if we take the situation of a child's relationship with an adult in the norm, if an adult does not give any clues. Instead, while in VR, a child immediately receives not just a hint, but a whole navigation of actions, wired into a gadget. The whole scheme of behavior is built in the logic of temptation rather than in the logic of mastering one's behavior: click a button — get a bonus. With such a scheme, the highest ability cannot be formed, since the most important thing does not happen — mediation of behavior by a tool and mastery of oneself, one's reaction. There is no need to perform the action of mediation, exert oneself, as long as you immediately receive a bonus.

The problem is not replacement of one tool with another — a pencil and a pen for a gadget. The problem is that the tool itself (gadget) is fundamentally different. It *takes away the cultural function of the subject* from a child, and acts and works instead of a child. An artificial product, a technical device, and not a person, becomes active: the functional inversion occurs.

Event shifting

Multiple studies show that children are not just present on the Internet and spend many hours there. They live there. They live in the virtual reality. The problem here is not the digital or remaining in the virtual reality. When a child is immersed in VR the *value emphasis shifts* in favor of the virtual reality. A child experiences actions in VR as more valuable. What happens to a child (in fact, to one's digital twin in VR) is more significant for a child than what happens here, in the social reality. The *event center is transferred* from this — the real world to that — the virtual world.

An adult mediator (a cultured adult), who previously created the situation of growing up in the norm of ontogeny, building up the mediation action, is simply absent in VR. Instead, digital twins and virtual interlocutors are presented to a child, luring the latter further and further into the depths of the virtual forest.

Scenario capture

Prior to the digital, adults as cultural mediators used to offer a behavioral scenario to children [16]. Furthermore, a repertoire of different scenarios unfolded for a child in a real social environment, with scripts marked as priority and non-priority.

Therefore, mediation of a children's behavior has always been immersed in the scenario context, presented to a child. The sphere of mediation would perform according to a particular scenario context.

And now children enter the virtual world of temptations. The latter has radically changed specifically the scenario context. Previously, this context was somehow distant from the tool-sign, from an individual line of behavior, albeit related to it. Now a script, and what's more — a priority script is already embedded into a device, a gadget, a mobile phone, a tablet, into a game on the Internet. To be more precise, the scenario context actually shrinks, since adults are removed from this context as carriers. Instead, there is an almost complete replacement of the social reality with a dominant scenario, embedded into the main intermediary — a smart gadget.

Before gadgets, a child each time performed a new action in a new situation, overcoming the difficulties and solving new tasks to fulfill an objective action. With a gadget, a child gets a ready-made behavior script, and instead of a new action in a new situation, (s)he repeats a ready-made script, embedded in a gadget.

Thus, a child does not experience the act of development, since (s)he does not carry out a real action of mediation associated with mastering one's behavior. There is nothing to overcome. Therefore, there are no reasons to form one's own subjectivity.

Semantic horizon flattening

D. Elkonin noticed that there is a certain development lag of the motivational-need sphere behind the operational-and-technical sphere in ontogenesis [16, p. 390]. A combined adult-child action, however, is the unity of affect and intellect. Affect is associated with orientation towards another person, and here social meaning is generated. Intelligence is associated with orientation towards a real object, the conditions for executing an objective action [16, p. 403].

When an adult is replaced with a gadget, it brings radical rearrangements. The whole semantic, motivational-and-need sphere curtails and is replaced with a ready-made way of action, coming from a scenario context, embedded in a gadget. Such pattern copying does not imply any cooperative action.

If a gadget takes the place of an adult, then the motivational side of an action disappears, and the meaning disappears. All that remains is the objective, operational and technical side of an objective action, in a contracted, reduced digital form, which a child does not master, but takes in the form of a ready-made sample scheme from a gadget, in the form of an algorithm, without being able to build joint activities with an adult.

Social vs virtual: changing places

A gadget with an embedded function and a behavior script is not a carrier of a social function. It offers the virtual rather than the real world — a world of converted forms. Therefore, if a child takes it as a model and embeds it into one's behavior according to the internalization pattern, then a child imitates the virtual and not the social world. So, a child becomes a virtual but not a social being; more precisely, a child replaces oneself with one's digital avatar. It is, therefore, the virtual, not social internalization that takes place.

Effort vs convenience, comfort

Lev Vygotsky started out with the Marx's model of work efforts, built as an external activity with a tool directed outwards to transform an object, the nature. In contrast, Vygotsky constructed a model of internal, psychological activity, where the key role is played by a psychological tool, a sign directed inwards, for a person to master one's reactions and transform one's own behavior. It distinguishes psychological tools from technical ones: orientation inwards rather than outwards.

Historically, the development of technology followed the logic of the first model, the logic of improving external tools, technical devices in terms of increasing their effectiveness as well as convenience and comfort for the users, individuals. Humans adapted and developed tools, making them more and more convenient, efficient and smart so a tool became a smart machine. All sorts of ergonomic developments, etc., are associated with it. At the same time, in the man-technology relationship the functionality has been distributed more and more towards the machine to make it convenient for human users who were able to easily master technical devices. Smart technology is mastered according to the principle of a self-instruction manual, wired into technological devices, by pressing a number of buttons, and the machine already works by itself, regulates its own work. The program for its functioning is wired into a technical device. Humans do not need to master it; they prefer to simply use it. In a nutshell, there is no need for a housewife to get into the principles of a smart washing machine. Press the button, and it does the work you require. Thus, humans have been transferring more and more various functions to a tool, a machine, turning it into a smart technical device.

Such functional outsourcing has gradually delivered. It was important for humans that tools became increasingly smart and efficient machines. Such qualities as efficiency, convenience, functionality have always been the basic requirements for technical devices in terms of work efforts. For technology, it is the norm. This is how all technological progress was built up.

The psychological tool-sign, directed inwards to transform human behavior, however, should not be considered in the same categories — convenience, ease of learning and efficiency. The principles of convenience and efficiency applied to work efforts are adequate, but applying the same principles to a psychological tool in child training and development hinders the child performance. Man — technology relationship is reversed here: on the contrary, convenience, efficiency and outsourcing cannot be the main criteria regarding training. The most important is to create zones of proximal development for a child, generate the situations for development through overcoming that require personal efforts. It should be difficult so that a learner would be able to master one's reactions and construct oneself through this.

With gadgets, the opposite happened. They have entered children's everyday life and changed everything. They are convenient, easy to learn and effective. When gadgets began to replace Textbook and Teacher, Parent and Mentor, when learners began to more and more obey a convenient interface that a preschooler masters at once, then an inversion sprang up: instead of putting an effort, one just needs to grasp and use a convenient and safe gadget. Gadgets are convenient, effective, and quickly mastered; they replace an adult and create the illusion of development.

Then, the main condition of cultural development is not met: humans cease to master their behavior. It is not required in communication with gadgets.

Safety illusion

In the mediation-mastery model an adult shows an exemplar to a child, manifesting oneself as such, a living carrier of an exemplar, thereby building motivation for a child, who, despite a new situation, is ready to take risks. Learning a new action with an object is always risky. Taking the first steps, you fall and hurt the knees. Nevertheless, you try, even if it is painful. But there is an adult nearby who will always help. In the presence and inner participation and assistance by an adult, a child is ready to take risks — perform a participatory action.

In the gadget-and-digit case, you risk nothing. Gadget developers have done everything, so you do not need to put any efforts; they have made it comfortable and painless. You press the keys with your fingers. And you don't get hurt if something goes wrong. You try again, and again it doesn't hurt. You do not receive a response from gadgets in the form of an explicit physical contact. Instead, you get bright, alluring, and seductive pictures and the comfort of a digital journey, but "as if" you are present in the absence. You do not experience the fullness of accomplishing your own action and the feeling of connectedness with the Other (an adult who supports you here). But it is not required.

Thus, the digital, being a VR unit, cannot be felt and lived through in the same way as a thing, object, word,

or sign is experienced in the act of mastering, becoming a means of action of the subject. It does not and cannot, by its very nature, give a sense of self-presence and participatory action. The digital has already been given to the subject of action in the form of ready-made pictures, images, and action scenarios. The digital remains an external image, not felt deeply, not its own, it remains an external picture rather than an appropriated mode of action.

In this context, the digital being a VR unit, cannot in itself act as a means of mediation, if the situation of mastery is not built appropriately, artificially, if the situation of mastering the mode of action and mastering oneself, feeling the very method of mastering is not built artificially, experiencing oneself in the act of mastery. The simplest example is that you need a specially built model of a virtual simulator, for example, an airplane or car simulator. A simulator does not replace a real aircraft, but it can be used to train skills. Although it will still be an artificial situation that does not replace the reality (a simulator will never replace an airplane), nevertheless, a virtual model helps to safely master new ways of acting in the complexly organized reality.

After all, what is important? The psyche is simply not accessed in its pure nature, it is always represented indirectly through texts, stimuli, means, devices, tools ... As B. Elkonin states, Lev Vygotsky reversed this negative connotation and turned it into a positive line of reasoning. This means that the very act of mediation and mastery must be made visible that lived through by the subject. Psychological tools, means, things and signs must be built into the act of mediation, in which the psyche itself begins to be seen, formed, and molded. B. Elkonin resorts to the concept of constructing a "trial-search action". The latter is properly constructed, it is not automatically presented, does not exist as a ready-made action and is not performed automatically, and it is stimulus-reactive [15, p. 152—161].

In this case, rather than talking about the digital as such and VR, we should discuss what it means to build a trial-search action, but already in a hybrid environment, with the help of the digital? And how can the digital be used to construct a search situation for development? When we ask ourselves questions like this, we must remember that the problem is not the digital. We express ourselves incorrectly in our speech patterns. As previously, before the digital, the question was not about what is the sign per se. Without constructing a situation of child — adult mediation, the sign cannot be such a means. It is nothing in itself, an empty grapheme, a form. Therefore, the digital cannot act as a means of mediation in itself, but only in the hands of an intelligent adult. It is generally neutral and ambivalent in relation to the subject of action. But it begins to "speak" and come to life only in a situation of constructing a trial-search action.

We are forced to admit that no model of mediation has been constructed and described so far that would include the digital as a new type of cultural mediator. There are only different assertions. A number of authors indeed insist that the model of mediation, which is the core in CHP, must be and can be used in a new situation of development, and the digital must be included in this model. Other authors state that the digital has already become a new mediator and we are witnessing digital socialization, and such new phenomena as digital childhood, digital education, digital development, etc. are established. Children immersed in VR, lose themselves and the entire social world, but it is a coerced choice: they actually lose the necessary socio-cultural supports and guidelines that children previously used to obtain from cultural intermediaries, adults. Unable to find them, they plunge into VR and find there converted kind of such supports in the form of digital twins, avatars, or replacements.

In view of the above-described situation, we must note that the digital itself cannot be a ready-made means of mediation[7]. It is necessary to build situations of mediation in a special way that include the digital and construct such a field of adult — child interaction where they can build up a joint, cumulative action, but with the help of the digital. This is a fundamentally new task for adults, primarily because the digital, according to its root task, initially acted as a replacement for the "analog", the physical, material world where the human is born. The second point: the digital is more than a technology. It can be used as a means, but it also serves as a characteristic of the human environment. The task for CHP — the need to build up an act of development involving the digital (in its entirety — as a unity of mediation and mastery) — is faced with the fact that the digital (digital technologies) simultaneously act as a means of creating a new, digital reality (VR, in which children plunge using immersive media) and as a characteristic of this new habitat. The digital is more than a tool and a sign; it is a way of living in the new hybrid environment.

They live in the digital. But most importantly, getting into this environment is different than in the case of the first, social world. A child is immersed in the digital world, all without effort. It's like plunging in water. The digital world is accessible and open; one can get into it instantly, in a couple of clicks. The rules of immersion in the digital world are simple, they are accessible even to a small child, the easiest tutorials are wired into smartphones and gadgets, navigation is simplified, and, with some easy gadget manipulations, children enter the world of temptations and things — that are inaccessible and prohibited in the first world — merely in the form of digital replacements. The act of development requires personal effort and the fullness of presence, but immersion in VR does not necessitate such effort, yet the illusion of presence is experienced. There is no need to go through the stages of mediation, VR immersion is safe. A child enters the world of converted forms, replacements are available for the real world, and an individual has an illusion of the fullness of living.

In this case, the task is to return a human to oneself, overcome alienation and deobjectify the converted forms. To this purpose, if we talk about the development of teaching at school with the help of the digital, it is necessary to build a fundamentally different model of teaching. It is precisely such a model of learning that is built up according to the logic of the algorithm, according to the model of the disciplinary matrix, question-answer learning, that does not stand the test of the digital. Algorithmization, i.e., digitalization, begins before the digital. It means that the dependence on the digital must be overcome prior to the digital, building up an appropriate learning model in the classroom.

The digital at the classroom: the search situation

What learning models do we develop and implement in the mainstream school using the digital? The mainstream school as an institution is established as a social machine. Thanks to M. Foucault, the school, along with the clinic and prison, has long been a disciplinary institution of supervision and punishment, in which a person (teacher and student) acts as a subordinate individual, and not as a personality and subject of development. This is because in the conveyor model that dominates the mainstream school, learners can be nothing but a passive function. It stems from programming the behavior of students and teachers, which is the basic process when school is built on the disciplinary matrix model. The principle of behavior algorithmization is already embedded in school, organized according to the conveyor model. Digitalization simply adds to and technically consolidates such algorithmization.

Introduced widely, the smart digital inevitably brings us back to the old behavioral schemes of conduct, when learners are viewed as reactive, passive beings, acting according to the stimulus-response pattern. Researchers point out that the mainstream education returns to associationism and behaviorism, which, it would seem, have long been overcome in the Russian psychological

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[7] O. Rubtsova notes that in the CHP studies no one has raised the issue of the digital per se that mediates activity [9, p. 121]. I must admit that the digital cannot be such — a means — on its own. The reason is simple: it is not a subject. It can be a means of mediating action in the hands of an individual that may be ambivalent: either for good or for evil. Therefore, rather than discussing the digital we should focus on VR and human actions in it.

and pedagogical thought. But digitalization has revived them [5, p. 41].

We believe that one of the answers to this challenge is the development of such learning models where a schooler is considered a subject of development, overcoming stimulus-reactive behavior. We consider the cultural-historical approach elaborated in the Vygotsky tradition [5; 6; 12] as the methodological basis for such models. Instead of a simplified digital-algorithmic approach, the authors of the School of the Future project propose a digital-cognitive approach, rooted in the cultural-historical concept [5; 6].

The key criterion for the adequacy and effectiveness of using the digital at school should be the position a student takes on when learning with the help of the digital: whether a student acts as a passive object of influence, performing tasks according to a given algorithm, or a teacher creates a *search situation of development* when a student's *subject position* is formed? The digital, like any other tool, must be built primarily into the situation of learning and development, *associated with the formation of a student's subjective position.* In this case, the *criterion for evaluating* the use of ready-made digital technologies and the development of new ones should be whether using the digital contributes to the construction of situations of learning and development and the formation of a student's subject position or not.

It has long been proven that student's subjective qualities are formed in the mode of problem-based search learning. Only such a mode makes it possible to overcome the paradigm of algorithmic learning, which dominates the mainstream school and provokes a student to the stimulus-reactive behavior.

Digitization in the manner of algorithmization does not simply begin with technical devices and gadgets, but is triggered by programming student behavior. It is necessary to construct search situations and then embed digital technologies in them to help teachers motivate students for the cognitive search activity.

If, however, a search problem situation is not created in the class, if the lesson is for the most part built according to the "question — ready answer" algorithm, then with such a scheme, the digital will not only fail to contribute to student's development, but will also provoke an even more algorithmic behavior. In this regard, teachers must understand whether they create a search situation for learning/development and what place the digital occupies in this situation.

A search situation unfolds in several stages. At each stage a teacher decides whether to include (or not include) the digital in teaching. A teacher decides at what stage this inclusion is not required, and at what stage the inclusion of the digital in the process is not only justified, but also desirable, and the digital will be an indispensable smart assistant. Let's outline these steps.

1. *Challenge*. Motivation. Presenting a task to students, for the solution of which they do not have ready-made means, knowledge and experience. Creating a problem situation related to a cognitive or real-life problem. Problem formulation. Setting the goals and objectives aimed at solving the problem.

Possible role for the digital: a tool for demonstrating, for creating a provocative situation (pictures, videos, illustrations, examples, etc.).

2. *Sense-making*. Collective or individual updating of knowledge, students identifying a lack of knowledge to solve a problem situation, to complete an assignment.

Possible role for the digital: use of digital educational platforms for online conferences, if necessary and technically possible.

3. *Search — inquiry*. Asking questions, collective search in the class, searching for information, working with textbooks, reference books, information on the Internet, conducting experiments (the choice depends on age, the subject of a lesson, the complexity of a problem).

Possible role for the digital: the use of gadgets and digital educational platforms as navigators for information search.

4. *Discussions*. Work in small groups or in pairs. Students share their solutions, discuss solutions, check, compare, evaluate and correct, correlate their activities with others.

Possible role for the digital: a digital educational platform for online conferencing.

5. *Reflection*. Evaluating what is achieved, establishing a rule, a concept, patterns and new knowledge. Students are looking for a common solution to particular problem situations, they offer an algorithm of actions, they check it, edit, and build up a certain model together with a teacher. Most often, students go through this stage with the help of a teacher, who uses leading questions, find the desired rule, derive regularity, and formulate a concept.

Possible role for the digital: using the digital (appropriate programs, for example, Miro) to assemble a constructor of the acquired knowledge and representations, assembling a configurator (or cluster) of knowledge.

6. *Knowledge formation and reinforcement*. The results of the search and their comprehension and discussion are presented. Formation of knowledge, picture, vision. Verifying knowledge. This stage is final and constitutes some kind of test work (quiz, test, exam, mutual quiz, self-examination, etc.). Based on its results, a teacher and a student by oneself conclude that the search situation has been successfully completed, the student has learned the necessary material and is able to deal with problematic situations; the student develops a subjective position.

Possible role for the digital: a virtual simulator used for training, consolidating the acquired knowledge, rules, concepts with specific examples.

Conclusion

We believe that the challenge faced by cultural-historical psychology in the situation of digitalization is primarily due to the fact that there is some oblivion of spiritual tradition, the mainstream school and the average family have "lost the human", ceasing to treat themselves as subjects of care. In this situation digital technologies have acted as a provoking factor, because in the absence of concern for oneself as a subject of development, the virtual world created by the humans themselves with the help of the digital becomes a seductive substitute for the first world, the human world. In this regard, we all need to return ourselves to ourselves, restore the practices of development and formation of our own subjectivity, however, involving the digital as a smart assistant.

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