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# Features of learning motivation in the conditions of coronavirus pandemic (COVID-19)

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**Abstract.** Maintaining motivation plays a special role during the introduction of distance learning in connection with the coronavirus epidemic. To analyze the features of motivation in different learning conditions, a graphic model of the student motivation has been presented. The effectiveness of the model was tested in both offline and online learning. The study showed that the influence of the main motivational components in the conditions of offline learning varies from primary school to higher education. The youngest students are best motivated to learn in a situation where the inner desire to learn something new is constantly supported by external stimulation. In primary school, the motivating influence of teachers and parents gradually decreases, but both the negative and positive influence of an important environment (friends, reference adults) increases. Adolescents have clearly defined learning goals. The impact of online learning on this category of students is quite controversial. The study has found mixed trends – both an increase in motivation for learning and a sharp decrease. The first group is quietly moving to online learning, making extensive use of the Internet. The second either completely lose motivation to learn or shows unstable motivation, which either sharply decreases, then just as sharply increases.

**Keywords:** learning motivation, online learning, offline learning, educational processes,

## 1. Introduction

The coronavirus pandemic that has swept the world has set before scientists (and primarily teachers and psychologists) the task of working out methods of influencing students and pupils of secondary schools with the help of which it would be possible at least to keep learning motivation sufficient to master the educational material. Unfortunately, the first studies show that teachers and parents are not always ready to involve students in effective work in online learning conditions. Thus, “Educational Agency of Kyiv” conducted a study on distance learning

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in the capital [13]. It was attended by 34,000 respondents – students (grades 4 to 11), teachers, and parents. The survey was conducted using the electronic questionnaire method in two stages – in early April, 2020 and in the first week of May, 2020. According to the study, 78% of schoolchildren in Kyiv are involved in distance learning. According to parents, the most common reason why children are not involved in education is lack of technical means (25% of those who do not study remotely) or the Internet. According to the study, almost a third (34%) of those who dropped out of distance learning ignore the learning process altogether.

The situation is not much better with those who are involved in online learning. The smaller the students, the more control they need from adults, the higher their need for external motivation for learning activities, constant approval of the least success. As practice shows, only a small part of young schoolchildren have an intrinsic motivation to take responsibility for their academic success. The majority is guided by the incentives created by the social environment – negative: fear of punishment, desire for material reward, fear of social exclusion, or positive: the desire to bring joy to parents, pride in their status, and the pleasure of being praised. In conditions of severe quarantine, the social environment has narrowed to the framework of an individual family, whose members are not always ready to further positively stimulate the child's learning, provided they watch online lessons together and good (poor) performance is the result of joint efforts [10]. With age, the role of awareness of the need for learning increases, and therefore learning motivation requires less control and stimulation from adults. The reasons for gradual age-related changes in the characteristics of motivation to learn to lie in the very essence of the phenomenon of motivation, which is one of the most difficult in psychology, and even now it is in the process of forming unified (or at least close) views on the essence, structure, and mechanism of influence on a person. For educational practice, it is especially important to develop provisions on the power of influence of individual components of motivation. However, this issue is only in the early stages of development.

## 2. Background: review of the literature

Psychologists have been studying motivation for a very long time, but, unfortunately, a generally accepted understanding of the phenomenology of this phenomenon has not yet been created, although there are already several fundamental models designed to visually represent its operating mechanisms. The most authoritative of these has long been Abraham Harold Maslow's theory of motivation. This theory was based on the understanding of needs as the main motivators of activity. Motivating needs were divided by prominent psychologists into lower and higher, creating the Maslow's hierarchy of needs ("Maslow's pyramid", figure 1) [12, 16]. Maslow [12] was convinced that if a person is not satisfied with the basic (lower) needs associating with survival (physiological needs, needs for security, love and belonging to something, the need for respect), then it is unlikely to have higher needs which include cognitive, aesthetic needs and needs for self-realization, creativity.

In most images of Maslow's pyramid, higher needs are combined into one block, which is called self-actualization needs, in others, the "self-actualization needs" block is separated from the blocks of cognitive and aesthetic needs. That is why the Maslow's pyramid can be depicted as a composite of five or seven blocks (figure 1) [12, 16]. Maslow's model of motivation,

despite its external attractiveness and clarity, overtime proved to be dysfunctional, internally contradictory, and did not allow applying its principles to explain the real behavior of people.



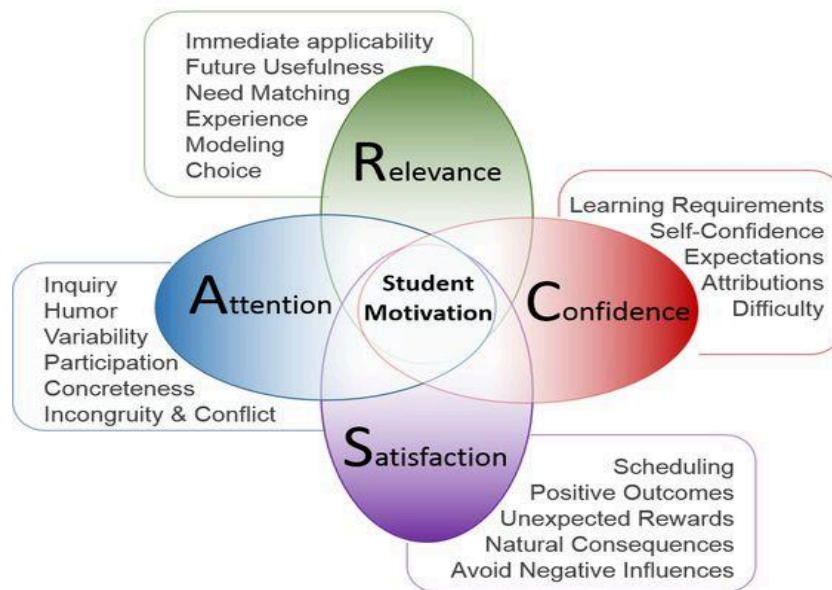
**Figure 1:** Maslow's hierarchy of needs (Maslow's pyramid) [12, 16].

However, unfortunately, it was not possible to fully achieve its goal, namely to develop methods that would allow an abstract model for solving practical problems, in particular, increasing the motivation of schoolchildren and students. Therefore, psychologists have switched from trying to build a holistic model of motivation to consider individual motives and mechanisms to increase their impact on students or workers [1–3, 5]. In particular, very interesting from this point of view is the so-called ARCS motivation model (figure 2) developed by Keller [8, 9], which allows the teacher to assess their impact on student motivation.

Based on this model, Keller [9] developed a special matrix, which calculates students' positive and negative reactions at different stages of learning. Almost simultaneously with the development of Keller [9], a thorough study of individual motives began, the totality of which (blocks) determine learning motivation. The following 4 main blocks were formulated [6, 11]:

**1 block.** The personal significance of learning for the student (subject of learning).

For a small child, learning is a natural process, they learn constantly, getting to know the world, knowing and realizing it. The motivation for learning in the early stages is an innate need to understand the world in which you live. Such an understanding has always been and is a prerequisite for survival. Older preschoolers and younger schoolchildren deepen their knowledge of the world in two ways – by practically exploring it and purposefully studying it with the help of specially organized learning. For adolescents, the main source of knowledge is learning. The motivation of adolescents and young people increases significantly when combining a well-understood goal and purpose.



**Figure 2:** ARCS motivation model [8, 9].

**2 block.** External and internal learning motivation.

The effectiveness of learning motivation largely depends on the values important to a particular individual. What is most important for a teenager is to achieve something (a life goal or a solution to a given problem); to enjoy the very process of cognition; raise your image in the eyes of others; deserve praise or reward; prove something to yourself or avoid anxiety and feelings of defeat. Personal values are directly related to the internal or external type of motivation. The relationship between external and internal motivation is quite complex, and according to Ryan and Deci [14], Wulf and Lewthwaite [19], external motivation can both strengthen and weaken internal motivation. Mixed motivation arises in the case of a combination of internal and external influences. This combination can be both positive and negative [14, 19]. In particular, internal motivation can be enhanced by positive external motivation when parents support and encourage the adolescent and weakened in the case of indifference to the student's successes and failures. A special case of mixed motivation, according to Lai [11], is the motivation to learn due to internal pressure, such as commitment or guilt. Numerous studies [1-3, 5] show that good internal motivation is correlated with both better academic performance and life success in general.

**3 block.** The goals of the motivated activity are indicators of what the individual focuses on when performing a particular task.

Broussard and Garrison [3] emphasize mastery goals and performance goals. Mastery goals are focused on learning for the sake of learning, the self-worth of learning, satisfying one's own cognitive needs, while the performance goals are to show the environment one's achievements. Mastery goals are associated with a high ability to analyze information

and planning and believe that effort improves a person's performance. On the other hand, performance goals are accompanied by thoughts about achievements, evaluations, external awards. In the long run, mastery goals are better motivators for learning than performance goals.

**4 block.** Locus of control is the tendency to attribute one's successes or failures to internal or external factors.

If the adolescent has developed an internal locus of control, then the student realizes the importance of their activities to achieve a certain goal and objective, and therefore their motivation for effective learning increases significantly because, as studies have found [4, 15, 17], the individual, in this case, will be as motivated as they feel that they control their own successes and failures. When teenagers have an external locus of control, their learning motivation will be significantly reduced in difficult situations. In particular, difficulties in solving the problem (completing the assignment) will lead to a decrease in efforts and a drop in motivation among students with external motivation, who believe that they lack abilities, parents do not help well, teachers explain poorly and, conversely, cause an increase in motivation among students with an internal locus of control, who associate their success or failure with the expended efforts, since inability for the first group means impossibility that is difficult to change, while failure for the second group means that you just have to try better. In addition to studying learning motivation as a phenomenon, psychologists have studied the features of motivation in different learning conditions, in particular, related to the structuring of information offered to students. In particular, even before the appearance of the first electronic computers, there were studies on the programmed learning [18] (programmed learning, programmed instruction, automatic tutoring, automatic teaching), which with the development of digital technologies (before the advent of personal computers) became increasingly used in studying. It was believed that such an approach could significantly increase learning motivation, as it allows you to learn at a pace that the student likes and receive the necessary help and stimulation in the course of tasks. With the development of information technology, programmed learning has not disappeared, but has become an element of both online and offline learning.

At the turn of the 20th and 21st centuries, a situation arose when the computer ceased to be one of the teaching tools in the hands of the teacher, but tried to replace teachers themselves, creating an opportunity to use the Internet to join both special curricula (based on the principles of programmed learning) and online learning as a way to get an education without visiting a school or university. Despite the indicated advantages of online education, the question of the feasibility of its widespread introduction in the work of higher education institutions (and even more general education schools) remains debatable. The research conducted is often contradictory and does not give an accurate answer about the effectiveness of such a teaching method and the impact on the learning motivation of students and pupils. The coronavirus epidemic has forced many educational institutions to switch to remote learning, mostly online. At the same time, many schools and universities (not to mention students and pupils) were not ready for such a radical change. There were new problems that were related to both the learning process and learning motivation. At the same time, the study of the peculiarities of motivation in remote learning was complicated by purely formal difficulties in organizing the



diagnosis. Currently, the first results of previous studies appear. At the same time, it must be acknowledged that, despite its terrible humanitarian nature, the epidemic has given a positive impetus to the study of those aspects of distance learning, including motivation, to which attention has long been insufficient.

### **3. Method**

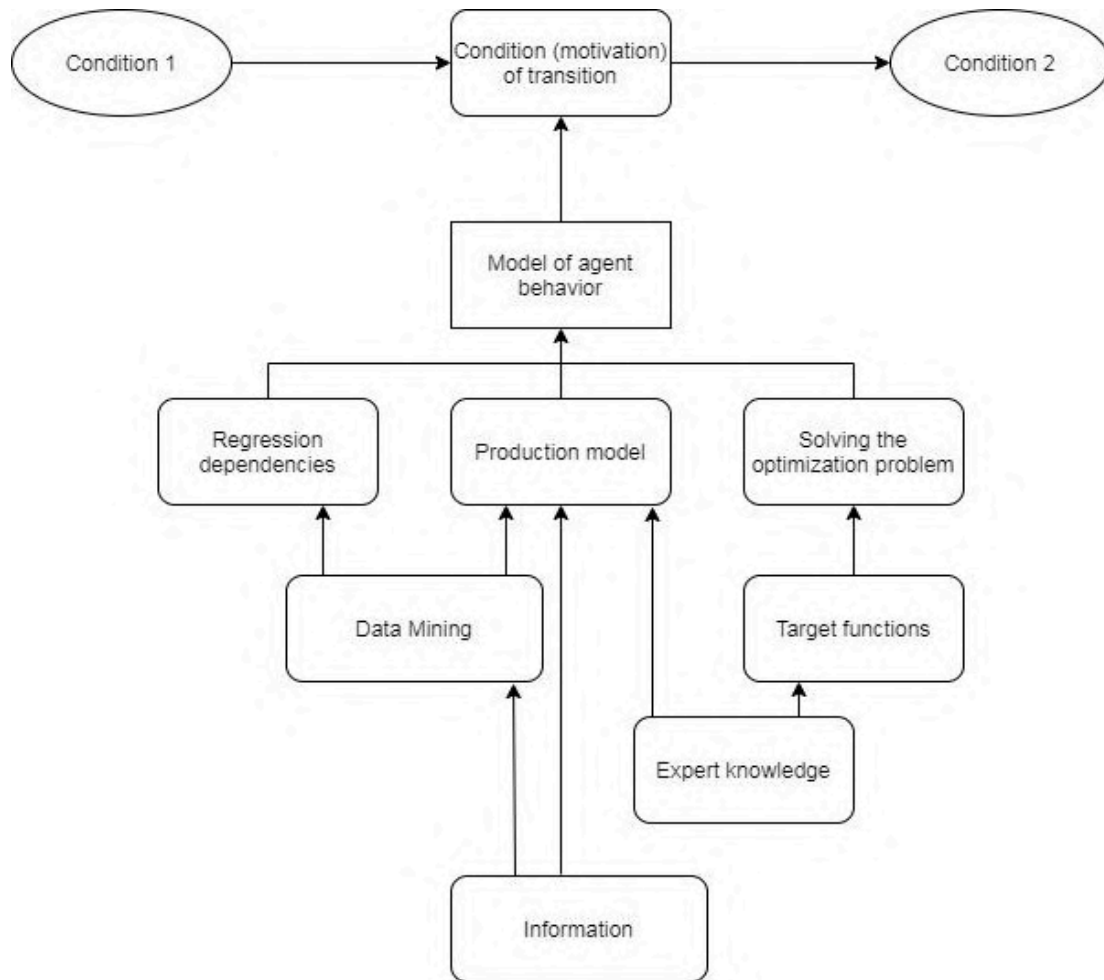
The described understanding of learning motivation formed the basis of a study conducted in 2018–2021 by the staff of the Institute of Psychology of the National Academy of Educational Sciences of Ukraine and teachers of the Kyiv National University of Trade and Economics. During the first stage of the study (2018–2019), 1,200 primary and secondary school students were tested, and therefore the results obtained are only indicative, approximate. Thus, the selection of students for testing was limited to those whose parents (under the law) gave written permission for testing. It is clear that in such conditions sample randomization is impossible, and therefore representativeness is insufficient.

The comparison allowed us to assess the impact of individual components of learning motivation on motivation in general. At the same time, it was found that different age groups of students are motivated to learn differently. For some, the main role is played by a personal interest in the learning process, for others, the attitude of the environment is much more important. The coronavirus epidemic has made significant adjustments to the study plan, forcing attention to the peculiarities of learning motivation of schoolchildren and students in the situation of online learning. It is clear that during the lockdown, it was impossible to carry out full-fledged testing of students, and therefore it was necessary to be limited to interrogations only of those participants of the educational process who expressed such desire.

### **4. Results and discussion**

Based on the above mentioned approach, we used the following model of the learning motivation process [10] that presented in figure 3 and carried out its verification using agent modeling information technology AnyLogic [7].

The first step in building a model is to define the criteria and conditions under which the experiment will begin. An educational institution with 1,200 students will be considered. From the point of view of implementing the model, each student will be an agent. Since, according to the terms, the motivation is new, at first, no one will be interested in and use the advantages from it, the interest of the students will appear under the influence of the sounding of the advantages obtained. After that, the number of interested students will also be influenced by the natural increase that will appear since students who have already received benefits will share information about it with their friends. The latter will add to the model indicators that can negatively affect the operation of the system since they will change the conditions under which the benefits in the model will be obtained. In this model of learning motivation (see figure 3) the agents behavior determined by three basic factors that presented by regression model, production model and model of solving the optimization problem. The regression model is used to estimate satisfaction levels with the teaching methods of academic disciplines. Production



**Figure 3:** Model of agent behavior [10].

model is used for modeling of influence of student communication on social networks on learning motivation since students who have already received benefits will share information about it with their friends. The model of solving the optimization problem is used to assess maximal and minimal level of learning materials by students.

First, you need to create a population of agents. To do this, you need to open a new model. Since a fairly long period of time (up to one year) is considered, it would be logical to use days as a unit of time. The AnyLogic workspace is divided into 3 main areas:

- (1) a palette of tools;
- (2) editor;
- (3) properties.

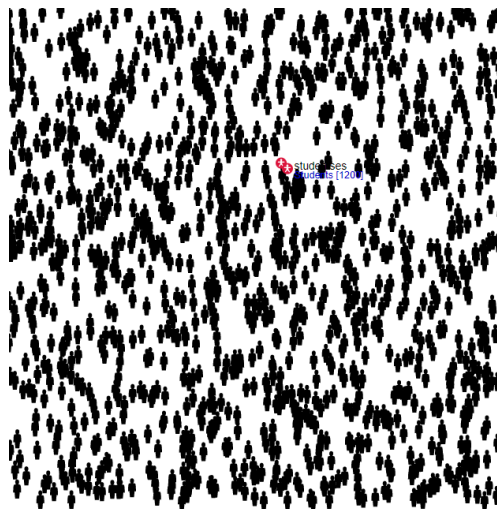
From the beginning, the created model contains one type of agent – Main, one Simulation experiment in which settings for the start of this model are stored, and also the empty database



which can be filled using third-party programs. To add students to the model, you need to create a new type of agent that will be responsible for them, and then create a population of agents that will include a certain set number of identical agents of the same type. For this purpose in AnyLogic, it is necessary to use the master creation of agents, having found it on a palette. After the agent is placed in the work area, the agent creation wizard will appear. Using the program's hints, it was found that the "Agent Population" option is best suited for modeling.

Next, the new agent should choose a name that will reflect his activities. If necessary, the AnyLogic has the ability to connect third-party databases, from which you can take information about some agents. The next step is selecting an animation that will reflect the behavior of the agent. The next element of the work area of the program is the grid, which houses all the other elements (each individual agent has its own grid). Possible options include both 3D and 2D images. Since the use of 3D graphics is not necessary for this model, a 2D model will be selected.

It is necessary to add agent parameters that will represent its static characteristics. Also, at this stage, the parameter "MotivationEffectiveness" will be added, which will be responsible for the effectiveness of motivation. First, we will set a value of 0.01 (this value will then be changed to evaluate the results and study the operation of the model) and the size of the population of agents (1,200 people). To visualize the processes, space will be selected, its size and type will be set. Now the model will accommodate two agents. However, the main agent still agent Main. The model works and places agents in a given area (figure 4).



**Figure 4:** Distribution of agents in a given area.

The next step is creating an interaction diagram. Since the conditions of the model study the school with students who are potentially interested in gaining benefits, create a state of the agent (figure 5).

The color changes to a specific area to be easy to keep track of a particular type of agents (figure 6). They will be responsible for the initial state of the students (Condition 1). Each agent can have several state diagrams at once, each of which will describe an independent aspect of

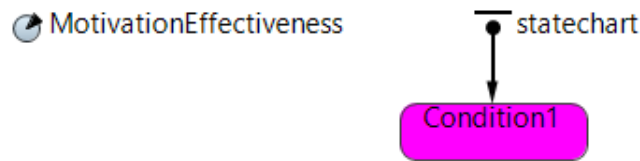


Figure 5: Adding the first state of the agent to the work area.



Figure 6: Adjust state properties.

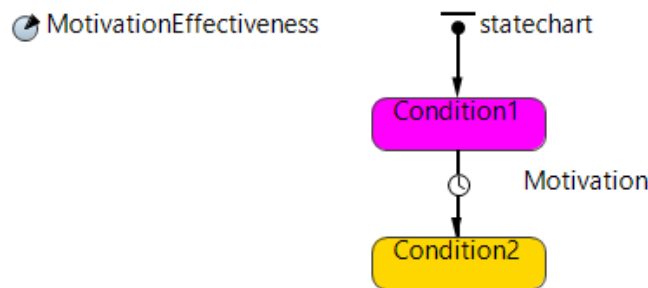


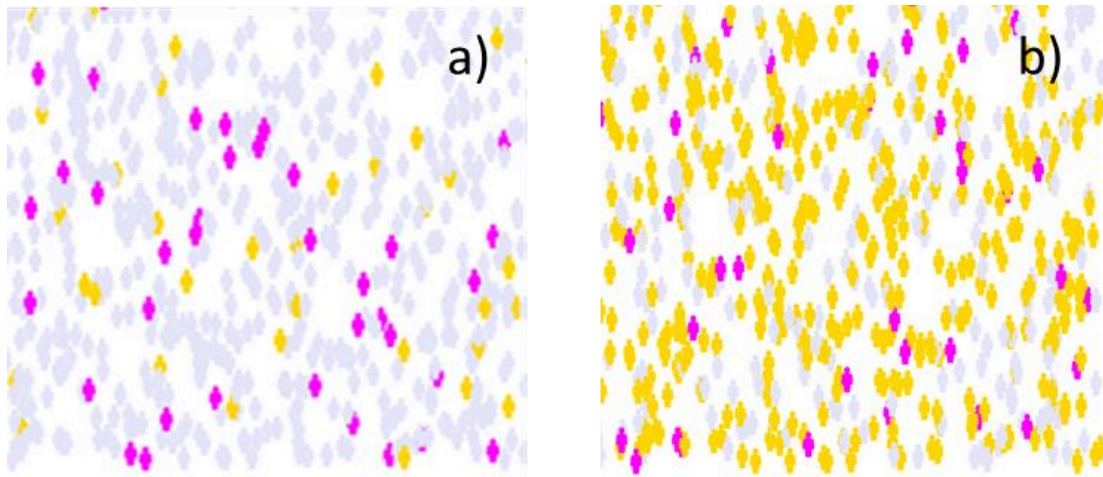
Figure 7: The transition of an agent from Condition 1 to Condition 2.

the agent’s behavior. State diagrams are considered the most convenient way to define agent behavior. They include states and transitions between states. An agent can only be in one state at a time (figure 6).

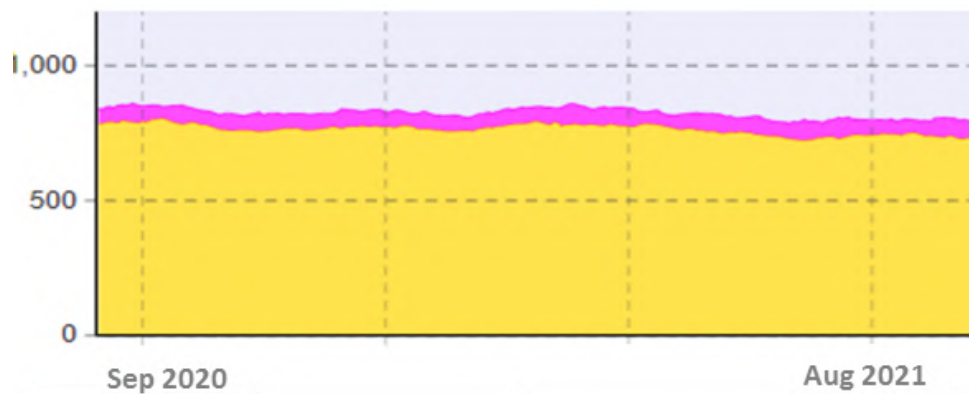
Next, it is necessary to add the transition from Condition 1 to Condition 2. The transition from one state to another will be performed under the influence of motivation, so on the arrow (figure 7), which shows the transition.

During the model operation, it is possible to observe how agents move from one state to another, their color changes (figure 8), which allows to track these transitions and allow to predict the level of motivation of students (figure 9).

The proposed model adequately reflects the characteristics of learning motivation in the context of online learning of standard school and higher education (figure 9). The second stage of the study (2020–2021) was devoted to studying the impact of distance learning on students. Due to the limited number of participants, its results are only indicative. In the course of its implementation, a previously inactive factor of influence of the type of device used by the student on the learning motivation was revealed. The fact is that families rarely have several stationary computers; several laptops or tablets are more common. In a lockdown situation,



**Figure 8:** a) Start of model run. b) Changing of agents states.



**Figure 9:** Future level of motivation of students.

when parents, like students, stay at home and work remotely, the best devices go to parents, and children mostly learn using smartphones or, at best, tablets. Learning material is difficult to read on these devices, and it is even more difficult to do homework. Decreased learning motivation due to the inability to fully receive educational information and establish feedback with the teacher was noted by students of all grades. Children of elementary school found themselves in the worst position in conditions of distance learning. The main motivating factor for them is external motivation, they need constant approval of their actions by adults. However, teachers could not track students' actions during online learning, and parents could not or did not always understand how to do so. In addition, under lockdown conditions, emotional stress often arose in many families, sometimes leading to direct aggression directed at both adults and

children. According to parents, there were cases when children simply refused to watch lessons or do homework. Trying to raise learning motivation, teachers filled their lessons with game moments, but sometimes this led to the opposite result – students were attracted only by the game form of the lesson, and not by its educational content. In answers to the questions the conversation, the parents complained that the children did not remember anything after the “game” lessons and tried to continue playing on their smartphones. At the same time, the adults could not notice that the lesson was over and wondered why it was so long. The situation of online learning has caused many difficulties for teachers. They noted that it was difficult for them to conduct lessons without receiving feedback or receiving it at the wrong time and in the wrong form (the students addressed the teachers in the chat while they explained the new material, sent SMS in ultra-short form, so there was no way to understand what they were talking about), to look at the screen and not to see the faces of the children, not to know what they are really doing when they seem to have joined the lesson, but the webcams are turned off. In a conversation, teachers said that they sometimes lost heart and lost motivation to work.

In general, the experimental results of studying the impact of distance learning on students learning motivation shows slow decreasing of learning motivation level from 77% to 73% in the time range from September 2020 to August 2021. As shown in figure 9, the simulations results for learning motivation are in good agreements with experimental data differences do not exceed 7%. After the end of the lockdown, students returned to class, but, according to teachers who participated in the interviews, the results of online learning are very different. Primary school students learned the material worse, and this is understandable – after all, as it was proved at the first stage of the study, external motivation prevails in them, and the goals and purpose have not yet been determined. The loss of constant positive attention from the teacher and insufficient motivation from the parents caused many primary school students to lose interest in learning. In the basic school, the results of online learning depended on many reasons, in particular, here the biggest negative role in the loss of learning motivation was played by the lack of access to a desktop computer, and also with the predominance of performance goals in the structure of motivation since it was impossible to implement them during on-line learning. Among high school students, students with well-defined goals and objectives of learning went through a period of distance learning with almost no loss of success. The locus of control had little effect on the performance of all age groups of students.

## 5. Conclusion

This study showed that the influence of the main motivational components in the conditions of offline learning (with or without the use of computer technology) varies depending on age categories. The youngest students are best motivated to learn in a situation where the inner desire to learn something new (this desire is often not differentiated – the child can respond equally to important and unimportant information received in the learning process) is constantly supported by external stimulation. The role of a teacher can be even greater than the role of parents and friends. It is younger students who have been most negatively affected by the transition to online learning, as parents often simply do not know how to maintain the necessary level of satisfaction from learning. In primary school, the motivating influence of the teacher

gradually decreases, but both the negative and positive influence of the important environment (friends, reference adults) increases. Adolescents have clearly defined learning goals. The impact of online learning on this category of students is quite controversial. The study noted multidirectional trends – both an increase in motivation for learning and its sharp decrease. High school and university students are clearly divided into two groups – those who are clearly aware of the purpose and objectives of education, and those whose goal and purpose are blurred or absent. The first group is quietly moving to online learning, making extensive use of the Internet. The second – or completely loses motivation to learn or shows unstable motivation, which then decreases sharply, then just as sharply increases. Many in this group are painfully going through an internal existential crisis and need the help of psychologists and reference adults. The presented conclusions about the peculiarities of motivation to study in the conditions of coronavirus are only preliminary, indicative, as the number of subjects has decreased sharply compared to the pre-coronavirus period. However, even such limited research suggests that online learning may be as effective as offline learning only for high school and college students. The smaller the students, the more important it is for them to communicate directly with the teacher. Learning motivation in online learning is additionally negatively affected by factors whose effect was invisible when studying the features of learning motivation in offline learning – the device used by the student (smartphone or tablet), the detachment of parents from the learning process, reduced motivation opportunities for influence from teachers. Attempts to raise learning motivation through excessive use of game methods caused a paradoxical reaction among some of the children – psychologically, the teachings were replaced by the game, as a result of which knowledge was not assimilated, although the work was formally carried out.

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