currency, on the contrary, strengthens the hryvnia. In the next step of the system, the exchange rate has a positive effect on exports and negatively on imports. As the hryvnia exchange rate increases, exports increase as Ukrainian goods become cheaper compared to foreign ones. For import goods, this is the reverse, if the hryvnia becomes cheaper, then it becomes more expensive to buy foreign goods. The last variable is the difference between export and import, that is, in this model; it reflects the current account balance.

A system dynamic model is useful for exploring the relationships between the variables of the external sector of the Ukrainian economy. In order to continue this research, the model should be improved. In particular, it is necessary to add variables related to the financial account of the balance of payments (FDI and portfolio investments). In addition, variables reflecting state policy (discount rate, foreign exchange intervention) and world conditions (world CPI, world interest rate) should be added.

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A VIRTUAL EXPERIMENT IN PHYSICS LESSON BY THE SYSTEM DYNAMICS APPROACH

Formulation of the problem. The modern stage of development of the system of physics learning experiment characterize by the wide introduction of in-formation and communication technologies and means of virtu-al reality. Making of the modern learning methodical complexes which provides integration of real and virtual learning experi-ment is appropriate. Digital information kit is an essential com-ponent of this complex. It is a set of electronic learning means that together represent a model of learning process and designed for practical using by teachers and students [1, p. 123].

Presentation of the main material. Consider the following distance and time problem: Jennifer and Jamin were on opposite ends of the country, a distance of 3200 miles. At the same time both started driving toward one another. Jennifer drove at a constant speed of 62 miles per hour. Jamin drove at a constant speed of 53 miles per hour. How many hours elapsed before the two met one another? And how far had each one traveled? The answer to this problem is shown in the graph. Visual presentation of the solution with the help of the created model encourages children to analyze the material studied and to apply the acquired practical skills in everyday life.

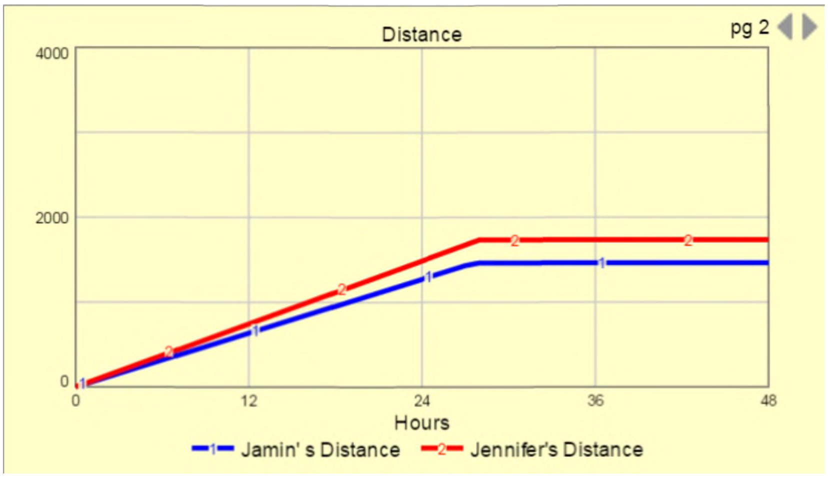

Figure 1. Dynamics of Distance

Figure 2 will find us with children consuming the reality of their pets. So we can compare the real speeds of cats or dogs living at home. This method of using system dynamics is suitable for the interest of 7th grade children in studying physics at school through short-term projects.

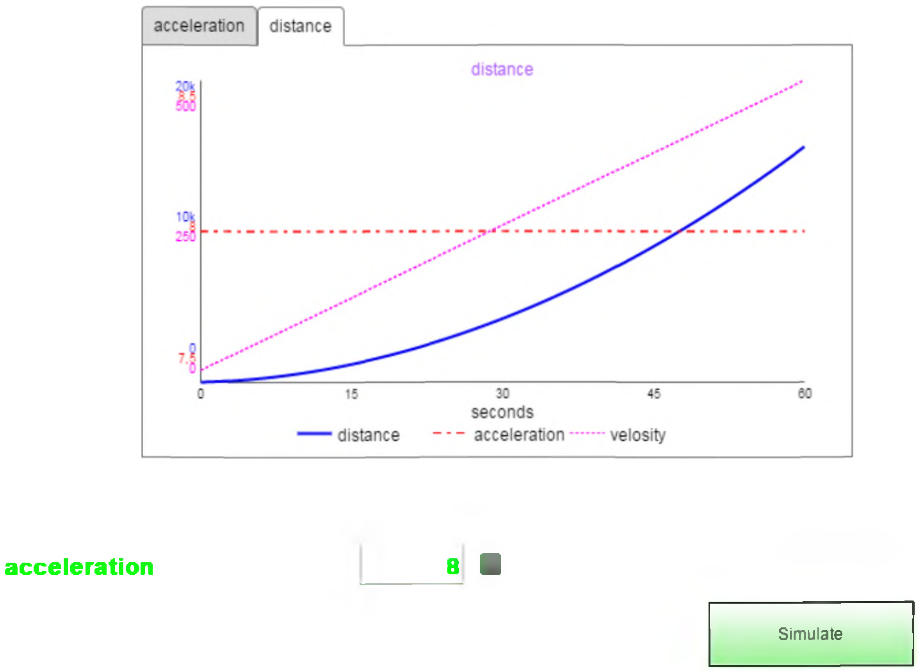

Figure 2. Dynamics of Distance, Velosity and Accelaration

If you like Xtreme sports, bungee jumping is the game for you. The sport is exciting. The pace is fast. And the risk is real! But maybe you don't have a bungee jumping facility nearby. Or maybe you don't have a strong desire to test the bungee cord with your life. If that's the case, virtual bungee jumping is what you want. And you can get it right here. Your challenge in the first round of experiments is to choose the best bungee cord for your weight. When you jump with the "best" cord, you will almost (but not quite) touch the pavement below the platform. Too few strands in your bungee cord will send you crashing into the pavement and too many will give you a short ride. In the second round of experiments, you can do bungee jumping on a variety of planets. You'll have complete control over the apparatus. You'll truly be able to boldly go where no person has gone before! You have two options for exploring the structure of this model. First, you can take a guided tour, in which you can walk thought, the essential structure of the virtual bungee, which is an idealized spring-mass system. Just hit the spacebar to walk through the key relationships that govern a simple harmonic oscillator (Figure 3).

Or, if you'd like, you can look at the model that was used for the second round of simulations. It is on your choice. In either case, when you're all done, you can click the home button to return to the main screen.

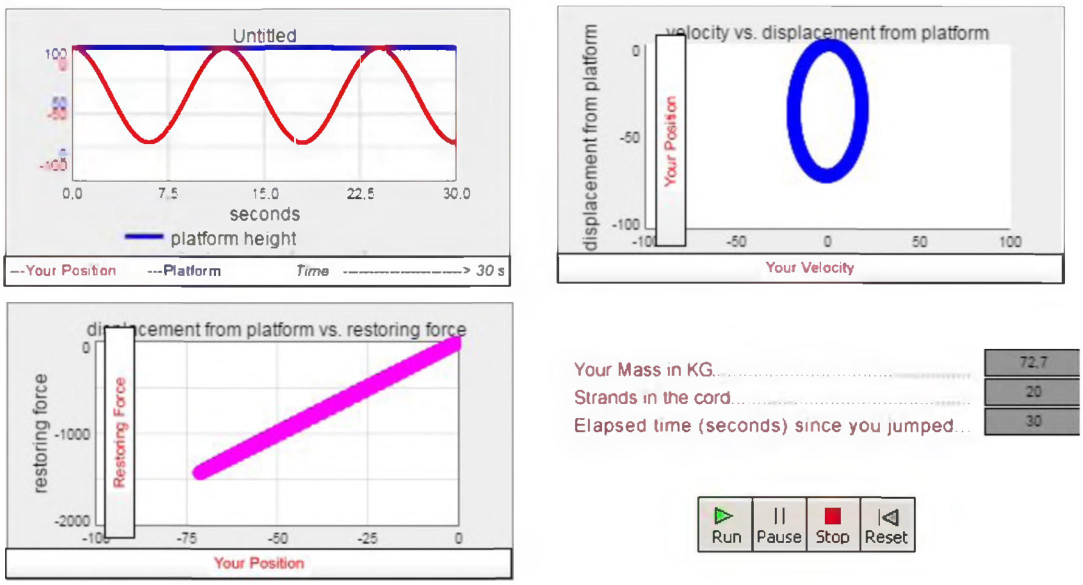

Figure 3. Harmonic oscillations

Conclusion. Experience in the introduction of system dynamics to the teaching of physics has shown that it not only eliminates the use of other methods and forms of training, but also facilitates their skillful combination.

The use of such an approach to teaching physics in the modern school is the implementation of an active approach to learning, focused on the development of cognitive and creative abilities of students enshrined in the Concept of physical education. I am convinced that the future of the Ukrainian school is to transform it into a circle of comprehensive and harmonious personality.

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SYSTEM DYNAMIC MODEL OF BACKWARD–LOOKING MONETARY POLICY DECISIONS

In developed countries, the primary objective of monetary policy is to achieve and maintain price stability in the country. Stabilization policy means how policymakers should use their tools to influence the behavior of inflation and output. Stabilization policy often begin from an assumption that their goal should be to keep inflation low and stable and to minimize departures of output.

The goals of stabilization policy should be models that give accurate statements about how the policy should be conducted, so here we consider a model where private behavior is backward- looking.

In our model, economy is described by two equations, one characterizing aggregate demand and the other characterizing aggregate supply. The first equation is the representation of the traditional curve IS. The second equation is the representation of Phillips curve. The following two equation describe the behavior of the two driving processes- shocks to the IS curve and to the flexible- price level of output. Also we assume that ε_t^{IS} and ε_t^{Y} are independent white- noise process. The final equation suggests that there may be a constant gap between the Walrasian and flexible- price levels of output.

The model is described by such system of equations:

$$y_t = -\beta r_{t-1} + u_t^{IS}, \beta > 0 \quad (1)$$

$$\pi_t = \pi_{t-1} + \alpha(y_{t-1} - y_{t-1}^{n}), \alpha > 0 \quad (2)$$

$$u_t^{IS} = \rho_{IS} u_{t-1}^{IS} + \varepsilon_t^{IS}, -1 < \rho_{IS} < 1 \quad (3)$$

$$y_t^{n} = \rho_Y y_{t-1}^{n} - \varepsilon_t^{Y}, 0 < \rho_Y < 1 \quad (4)$$

$$y_t^{*} - y_t^{n} = \Delta, \qquad \Delta \geq 0 \quad (5)$$