The Innovative Technologies of Education in the Higher Economic Education of Ukraine

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Abstract:

The article deals with the problem of professional training of future specialists in economics to work in the foreign exchange market based on the MetaStock computer program.

The aim of the article is to reveal the peculiarities of the technical methods of preparing future economists for the testing of trading systems based on the software product such as MetaStock. The algorithms of students work with the MetaStock computer program with the aim of acquiring skills in the currency market based on computer technologies are determined. It is determined that the prerequisite for successful professional activity in the foreign exchange market is the mastery by future economists of their professional knowledge, skills and skills of trading systems testing while using the MetaStock computer program.

It was proved with the help of experiments that the implementation of these methods of training of future economic specialists for testing trading systems based on the computer program MetaStock has led to a significant increase of their readiness to work in the currency market on the basis of computer technology.

Keywords: Professional Training, Future Specialists of the Economic Profile, the MetaStock Computer Program, Information Technologies, Currency Market.

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1. Introduction

At the current stage of development of the global financial system, the currency market functions due to the use of the latest computer and information technologies (Bondarenko, 2009a). The use of special computer programs during the professional activity in the foreign exchange market raises a number of new requirements to the quality of training of future specialists of the economic profile in universities and colleges (Akhmetshin and Osadchy, 2015). The processing and mastering of learning information should be based on the analysis of integrated databases and knowledge about the object of study, their research or their use for specific tasks (Gurzhij *et al*., 2003). In the current conditions of the economic and financial crisis, consumption structure is depraved and investment risks increase. All these lead to the deterioration of the economic situation leading to a decline in production, increasing unemployment, limiting credit operations (Bondarenko, 2010), creating social tensions, devaluation of citizens' savings and as a result – in the fall of the living standards (Bondarenko, 2009b; Meskhi *et al.,* 2016; Vasin *et al.,* 2017).

Under these conditions, the state and the society need highly skilled specialists in the field of finance, foreign exchange market and monetary policy, who will have the necessary knowledge about the currency market, currency transactions, financial instruments, central banks, monetary policy instruments, as well as skills and abilities of working with computer programs and technologies related to work in the foreign exchange market. Instead, the use of computer technologies in preparing future economists for work in the foreign exchange market in higher education institutions has not been well studied yet. That is why the problem of using computers and information technologies in the training of future specialists of the economic profile to work in the foreign exchange market becomes particularly relevant nowadays.

2. Methodology

In the scientific literature such term as the *"information technology"* is defined differently depending on the sphere of use of this term. So, according to Cherenkov (2002), information technologies should mean a set of methods, production processes and software environments that are intended for the collection, storage, processing and information search. Zhaldak and Ramskyi (2001) define information technologies as *"a set of methods, tools and techniques, which are used for implementation and provision of the information processes in various fields of human activity"*. Grinberg and Korol (2003) define *"information technologies"* as *"a set of methods, ways, techniques and means of processing of the documented information, which contains application software tools and the regulated order of their use, and also it implements the information process in accordance with the requirements"*. Scientists have researched theoretical and practical aspects of professional training of future economists (Latyshev and Akhmetshin, 2015; Osadchy and Akhmetshin, 2015; Akhmetshin and Vasilev, 2016). Kolesova (2010)

researched theoretical and practical aspects of the formation of critical thinking of future economists with the help of means of interactive learning technologies. Koval (2007) has deelpy researched the problems of the information technologies training of future managers-economists. Levochko (2009), Pukhanova (2009) and others in their researches give the basic principles of the training of future economists.

However, the problem of training of future economists for testing trading systems while working on the currency market on the basis of computer technology needs further study. The aim of the article is to reveal the specifics of the technical methods of preparing future economists for the testing of trading systems on the basis of the software product as MetaStock.

The training of future specialists of the economic profile was carried out at higher educational institutions during the teaching of normative educational disciplines, such as:

- ✓ International settlements and currency transactions;
- ✓ Central Bank and monetary policy;
- ✓ Financial market;
- ✓ Organization of activity of the currency exchange and forex operations.

The basic theoretical material was presented to students in the form of lectures, during which knowledge of the currency market, currency transactions, fundamental and technical analysis of the currency market, which was carried out using verbal methods was formed in future economists minds. During practical classes of these disciplines skills and work skills in the foreign exchange market on the basis of computer technologies were formed, which took place using visual methods, such as: illustration, demonstration, work with price diagrams, etc., as well as the method of practical actions.

The technical methods of preparing future economic specialists were used, during which the students have formed the skills of working in the currency market on the basis of computer technologies. The form of independent work of students was also used. During their independent work student studied the lecture materials and the recommended literature, they worked with the textbook and the dictionary of terms, used in the foreign exchange market, and they solved the matters and used methodological recommendations.

3. Results and their discussion

The formation of the readiness of future economists to work in the foreign exchange market on the basis of computer technology was carried out in accordance with the following principles:

- ✓ financial awareness of future economists;

- ✓ flexibility of decision-making when working in the foreign exchange market;
- ✓ initiative of future economists in the foreign exchange market.

An important role in the preparation of future economists to work in the foreign exchange market is the learning of trading strategies and tactics. Therefore, a special attention was payed to the study of this material by students.

During the lecture, future economists have learned that trade tactics are necessary in order to minimize the risk of performed operations and they allow not only to minimize risk, but to maximize profits. Students found out that there are standard situations that show the best ways for further development, but sometimes there are such situations, when additional resources are needed to successfully resolve them.

The learning material about the market with limited amplitude was rather important for future economists. Students found that in a market with limited amplitude, the levels of support and resistance are clearly outlined. So, it is necessary to open positions near these levels. In case when the market broke the level of support or resistance, it is necessary to use a stop of expenses or a return turn tactics. During Range Market, there are certain goals for the received profit. The goal is to reach the trader's position of a certain level and this goal is reflected as a percentage of the amplitude.

The acquisition by future economists of the experience of forecasting the changes of exchange rates by involving them in the technical analysis of the foreign exchange market was realized during the preparation of students for the technical analysis of the currency market, which took place during the process of conducting additional lectures and practical classes on such normative discipline as the *"Financial Market"*. The peculiarity of this discipline is that there is the topic *"Foreign Exchange Market"* in its course, because the currency market is one of the segments of the financial market.

However, as a rule, on the study of this topic is given a limited number of study hours, during which students do not have time to perfectly learn the necessary knowledge to carry out technical analysis of the currency market. That is why in the course of this discipline, a series of additional lectures and practical classes took place, during which students acquired the necessary knowledge, they solved the tasks of calculating the technical indicators of the foreign exchange market that took place at the operational stage of the study on the preparation of future economists for work in the foreign exchange market on the basis of computer technologies, during which future economists acquired the skills of technical analysis of the currency market.

The use of technical methods of training of future specialists of the economic profile for working in the foreign exchange market on the basis of computer technology

consisted in the following. The training of future economists for testing trading systems based on the MetaStock computer program began with an explanation of the need and importance of trading systems for the successful pursuit of professional activity in the foreign exchange market. Future economic experts should learn that the testing system helps the trader to determine what profit or loss can be obtained by using certain rules of commerce.

Therefore, it is necessary to draw students' attention to the fact that the optimization of trade rules will help them to determine the optimum trading parameters for work in the foreign exchange market. During testing, the MetaStock program stores all transaction information. Students can have a report to inspect transactions, which were generated by the developed system. They can use their money balance as an indicator on the diagram, as well as show on the diagram of the purchase / sale arrow. It is also recommended for the future specialists in the economic sphere to conduct a comparative test of trading systems in order to find out which of them is best suited for this currency. Each detail, which is connected with the trading system, test, and reports can be printed or saved to a file by students.

After that, the future economists were offered to open a schedule for the currency which they want to test. They should select the System Tester from the Tools menu or click the System Tester button on the toolbar. The System Tester dialog proposes you to create, to test, to compare, to print, or to make a trading system report. Firstly, the "System Tester" dialog shows the names of various examples of trading systems. It is recommended for students while creating the new system to follow this algorithm:

1. in the "System Tester" dialog it is necessary to press the button "New";
2. the System Editors dialog has text fields for the system name, notes, and rules (rules determine when future economists want to open / close long and short positions in the currency market);
3. it is necessary to enter the name of the system "My First System" (you should draw students' attention to the fact, that they should not enter the names used in the MetaStock program or the names of systems that already exist;
4. it is necessary to press the "Enter Long" button and enter trading rules to enter the long position: cross (close, mov (close, 25, simple)). This rule, as most rules in the system Metastock, is written in English. It should be explained to the future economists in such way: "You need to enter a long position if the closing price crosses from above up a simple 25-day moving average." Students can use the abbreviation "C" instead of "Close" and "S" instead of "Simple" just like when creating custom indicators. Then it is necessary to enter the following information for the trading rules, which should be remembered. Students should remember that it is necessary to click the appropriate button to enter each of the rules (i.e. Close Long, Enter Short, and Close Short):

a)   Close Long: cross (mov (close, 25, simple), close);
b)   Enter Short: cross (mov(close, 25, simple), close);
c)   Close Short: cross (close, mov(close, 25, simple).

5. it is necessary to check the correctness of entering of all four rules and press the "OK" button.

Students' performance of the specified algorithm will result in a dialog between "System Editors" and the names of the system *"My First System",* after which they should press the "Test" key to start the system test. They should take into account the fact that the duration of testing depends on the number of analyzed periods and the speed of the computer. When the message *"System Test Completed"* appears, then future economists should press the button *"Reports"* and a summary report containing brief information about the test will be displayed on the screen. If students complete an optimization that includes several tests, each report will be output.

Then students were proposed to press the button *"Reports"* to display the *"System Report"* dialog. While doing these things, we need to pay attention to the fact that the table in the "System Reports" dialog contains three reports. *"Results Report"* shows the distribution of profits, losses and trading operations for the system as a whole. A trader report shows the details of each trading operation performed by the system. With the help of the Equity report, students can track changes in money amount. When finishing the review of the report, future economic experts should pay attention to the fact that their schedule appeared a new inner window, containing a line of change in their funds, which shows how their balance of payments has changed during the trade. Then it is necessary to explain to students that arrows on their diagram appear when both long and short positions were opened. The up arrow indicates the opening of a long position, and the down arrow indicates the opening of a short position. The "exit" mark indicates closing of the position; the "stop" mark indicates a stop position on the market.

After that, the students get acquainted with the peculiarities of optimization, which implies the replacement of the parameters of the rules of the trading system on the variables, and then a specification of the range of values, in which these variables may vary. The MetaStock program then performs several tests, during which the variables are substituted from the specified range. Future economic specialists were recommended to introduce optimization variables according to the following algorithm:

1. it is necessary to choose "My First System" in the dialogue "System Tester" and then press the button "Edit";
2. in all four trading rules it is necessary to replace the number 25 with the expression "GRT1" (optimization variable No. 1);
3. press the button "Optimize";
4. after the "Optimisation Variables" dialog appears, press the button "Edit";

5. after the dialog "Variable Properties" appears, we need to enter "Moving average periods" as the description of the variable "GRT1";
6. then print 10 as the minimum value and 50 as the maximum value step and set as 5 (Step value) ;
7. press the button "Ok".

Then the attention of students was paid to the total number of tests (Total Tests), located at the bottom of this dialogue. It was explained to them that this number indicates the number of tests which should be completed. Each time after editing variables of optimization students need to check its value, because it is very easy to create a system that will generate a huge number of tests. After all these steps, students were invited to press the button "Close", then the button "OK" in the "System Editors" dialog in order to return to the "System Tester" dialog.

The next stage of training of future economic professionals for testing of trading systems, on the basis of the MetaStock computer program is the formation of their knowledge and skills of testing the system with optimization variables. It is necessary to use such algorithm in this case:

1. Select the system name as "My First System" and press the button "Test". When performing optimization, the MetaStock program shows information about the number of performed tests, the time since the beginning of the testing, the time remaining before the end of the test, the best and worst profit / loss ratio. It is recommended to show students the additional opportunities of the program for maximum convenience of using it. For example, they can click the button "Minimize" to minimize the "System Test Optimization" dialog box in the icon. Then the process of optimization will proceed "behind the screen", which will release the computer for other tasks. After the "System Test Completed" message appears on the screen, we need to click the button "Reports". A "General report" that contains the input for each completed test will appear.
2. After the "System Test Completed" message appears on the screen, we need to click the button "Reports". A "General report" that contains the entrance for each completed test will appear.
3. Move the report to the right until the GRT1 column appears. The value shown in the upper line of this column is the optimum value of the moving average for the studied currency.
4. Press the button "Reports" to get additional information from the selected test.

Then it is necessary to acquaint future economists with the dialogue *"System Tester",* which is a list of all created trading systems. At the same time we explain to students that the MetaStock program gives an opportunity to create up to 1000 system tests. The selected test system can be edited, copied, deleted and tested. Several system tests can also be selected for comparisons. Let's look in more details buttons of this

dialogue, which future specialists should know and the functions, which are performed by them.

1. "New". Causes the "System Editors" dialog, in which students can specify the name and rules for a new system test.
2. "Edit". Causes the "System Editors" dialog in which students can edit the selected system test.
3. "Copy". It is used to make a copy of the selected system test. As a result of this option, students will enter the "System Editors" dialog where they can edit the system's copy of the test.
4. "Delete". It is used to remove selected system tests.
5. "Print". It is used to print selected system tests.
6. "Test". It is used to start the testing process of the selected test. It is necessary to pay students' attention that this button is inactive if they have selected several tests, but did not check the box in the "Compare" field. This button is also inactive if there are no open charts.
7. "Reports." This button shows a summary report (or a comparative report, if in the field "Compare " there is a tag) for the selected system test. It is necessary to pay students' attention that this button is inactive if there is no such tag as "R" after the name of the test (it identifies the existence of a report).
8. "Options". This button shows the "System Testing Option" dialog, in which future economists can operate various testing options and reports.
9. "Compare". It is used to compare several system tests. Students should click on this field (to put the tag) to do this. If there is a tag in the field "Compare", then the "Test" button changes the name to "Compare".

Then we need to acquaint students with the syntax of trading rules. They should learn that trading rules are introduced with the use of syntax similar to the syntax of user indicators. As an example, we can show such trading rule to the students as: Enter Long: cross(CLOSE, mov (CLOSE, 14, Simple)). According to this rule of 14-day moving average of this price. Future economists are advised to remember that all user functions for indicators can be used as trading rules. They can combine several functions in the trading rule using operators AND" and "OR". For example: Enter Long: macd ( ) > 0 AND CLOSE > mov (CLOSE, 14, S). This rule requires that the MACD should be greater than 0 and that the closing price should be greater than its 14-day moving average. As an example, we can show a rule to the students that uses the "OR" operator to generate a trading operation when the MACD falls below 0, or when the closing price falls below its moving average: Close Long: macd ( ) < 0 OR CLOSE < mov (CLOSE, 14, S).

Then we explain to the future specialists in economics that several operators may be present in the trading rule, such as AND, OR. The best way to control the behavior of several AND and OR operators in trading rules is using the brackets: Enter Long: (macd ( ) > 0 AND C > 100) OR H-L > 5. By editing trading rules, students can

press the button "Functions". It should be noted that this button is active when the rule is edited, but not the name or description. After the dialog "Paste Functions" appear, which contain the list of available functions, double-clicking on the function name will insert it into the trading rule to the position of the current position of the cursor. Then we explain to students that the trading rule can remain empty. However, they should remember that an empty trading rule never generates trading operations. Trading rules have access only to currency prices (maximum, minimum, closing, etc.) and user "indicator" functions. Future economists must remember that trading rules can not refer to themselves, however, different stops perform these functions. The special variable "P" can be used to refer to the necessary prices or indicators.

After completing all these actions, future specialists should be acquainted with the use of stops. We explain to them that in addition to trading rules, each trading system can have up to five stops, which are used to close a long and / or short position based on profit / loss data during a given trading operation. For example, the stop of the maximum loss "Maximum Loss" will close the position if the loss is greater than the specified value. When a stop is called, then the position closes despite the current status of your trading rule. Students can specify the parameters that cause the stop, as well as the positions that they can close (long and / or short). Stops automatically count commissions for the opening and closing of the position.

For example, the stop of maximum damage - "Maximum Loss" - knows the amount of trader's commission for closing the position and it watches that during closing it was not exceeded the maximum possible damage, even after paying all commissions.

Students can install the stops by pressing the "Stops" button in the "System Editors dialog" dialog. Let's consider in details what kinds of stops in the MetaStock program should be introduced to future specialists economics.

1. Profitable stop. We explain to students that this stop closes an open position as soon as there is a threat of loss in relation to the balance of money that existed at the time of opening the position. The stop settles at a price, where the position can be closed with the preservation of the current cash balance (that is, the balance equal to the amount of money when opening a position). If we want to avoid activating this stop every time when we open a position (because the size of the cash balance due to the opening of a position decreases), the possibility of activating this stop is "switched" only when the price of the currency rises and the position becomes profitable or the profit value rises above the level specified by the user.

2. Inactivation. It is necessary to explain to future economists that this stop closes an open position if the market does not undergo a minimum positive change in prices in a given time. Students are proposed to indicate the minimum change in the price (Minimum Change) and the duration of the

period (Peridods). The Method, by which the Minimum Price Changes is calculated, may be specified as percentage (Percentage) or in absolute units (Points). For example, if future economists defined 2% as the minimum price change within 10 trading days, the MetaStock program automatically closes their long (short) position if the currency price does not grow (drop) by at least 2% in the 10-day window. This stop analyzes only the price change, but not profit and it ignores the commission.

3. Maximum loss (Maximum loss). Students are advised to remember that this stop closes a long position if the amount of material losses exceeds the maximum set value. (Maximum Loss). For example, if they set "Maximum Loss" as 7%, the position will be closed if the loss exceeds 7% of their current income (including commission). We should draw a special attention of future economists to the fact that if they set the value "Maximum Loss", which will be less than or equal to the amount of commission fees for entry into the position, in this case each trading operation will be interrupted immediately after the opening of the position, because all operations will be unprofitable at the time of entry into the position.

4. Planned profit (Profit target). It is necessary to explain to students that this stop closes the position if it reaches the level of the planned profitто For example, if students plan 15% of profits, then open positions would be closed at 15 percent increase taking into account commission charges.

5. Trailing (Trailing). It is necessary to explain to future economists that this stop closes a position when there is a loss of a certain quantity (previously specified profit risk - Profit Rik) from current profit. That is, each time when a positional profit reaches a new maximum, this stop is tightened to the level determined by Profit Risk against this new maximum. The magnitude of the possible loss is specified in the "Profit Risk" field with the help of the percentage method or absolute values.

It is also necessary to draw the attention of future economists to the fact that the MetaStock program provides an opportunity to determine the number of periods during which the stop will be ignored. For example, if students specify number "8", then this stop will have a time lag of 8 periods. This means that the last eight days (profitable or unprofitable) will be ignored for calculation of the current level of the stop. It filters the price fluctuations (up or down) that appear in the last eight days.

It is advised to remember for students that the purpose of this stop is to record profits, but not to limit the losses, because it only reduces the amount of profit that may be lost. Losses are limited by the stop of maximum loss (Maximum loss stop). Since the stop, which is tightened, it is determined by the level of profit, and not by the price level, then there is no need for a special consideration of this stop for short positions. For example, if 10% is specified for a profit risk period of 0, and the current position of the student has a profit of 200.00 $, then the stop will be located at the price at which the future economist's profit could be reduced to $ 180.00 or even less.

4. Conclusions

In the process of applying technical methods of training of future economists to work in the foreign exchange market on the basis of the software product as the program we come to the conclusion that the necessary prerequisite for the successful professional activity in the foreign exchange market is the mastering by future economists of professional knowledge and skills of testing of trading systems.

Traditional and computer-oriented methods and forms of work for the training of future experts in economics for the testing of trading systems on the basis of the MetaStock computer program were used as: a story, an explanation, a lecture, a practical lesson, work with a computer, etc. This was provided by the comprehensive approach to the training of future economists. The effectiveness of the experimental work, which was done at higher educational establishments, on the formation of the readiness of future specialists in economics to test the trading systems on the basis of the MetaStock computer program was measured by a set of diagnostic techniques, which made it possible to compare the levels of formation of this readiness before and after the experimental work.

It was proved with the help of experiments that the use of these technical techniques for the training of future specialists in the economic profile to the testing of trading systems on the basis of the MetaStock computer program has led to a significant increase in the levels of their willingness to work in the currency market on the basis of computer technology. The results, which we have received in the experimental group show that by attracting students to investment activities, it has most significantly contributed to the change in their motivational sphere, it has led to qualitative changes in the personal plan, it has led to the independent solution to the problems.

In the experimental group the high percentage of readiness of future economists was obtained with the help of the selected pedagogical support of the process of personal orientation of students for professional self-improvement. During skilled and experimental work the gradual and purposeful mastering by future economists of the fundamentals of technical and fundamental analysis of the currency market, the ability to use computer technology work was ensured. In the process of skilled and experimental work some difficulties were identified, which future economists can meet in the process of professional training for work in the foreign exchange market: work with technical indicators during the implementation of technical analysis, actualization of the emotional sphere of the person while working on the foreign exchange market.

The development of guidelines for the training of future economists to analyze the results of the testing of trading systems based on the reports of the computer program MetaStock are prospects for further research.

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