

Using the Possibilities of MS Excel and MATLAB in the Teaching of Mathematics

E. N. AHMADOVA

Western Caspian University, Department of Information Technologies, Azerbaijan

B. H. ASGEROVA

Azerbaijan State Oil and Industry University, Department of Computer Engineering, Azerbaijan

A. İ. CABBAROVA

Azerbaijan State University of Economics, Department of Mathematics and Statistics, stat_aynur@mail.ru

A. M. HASANOVA

Azerbaijan State University of Economics, Department of Mathematics and Statistics, afethasanov73@gmail.com

M. H. ALMAMMADOVA

Azerbaijan State Oil and Industry University, Department of Computer Engineering, Azerbaijan, almammadovamehriban@gmail.com

Abstract

In the article, the degree of assimilation of the material during the use of different reporting and visualization programs such as MS EXCEL and MATLAB in the study of the same topic was evaluated.

Keywords: *Interactive lessons, interdisciplinary integration, teaching method, graphs of functions.*

INTRODUCTION

When the topics of informatics are explained, it is very important to apply its methods and tools in the direction of solving the problems of other disciplines. The teaching of informatics in connection with other subjects is one of the means that creates a favorable foundation for in-depth mastering of the basics of other sciences[1]. His teaching related to various subjects has a wide range of possibilities[2]. At the same time, it is very important to teach other subjects in connection with informatics. Studying their theoretical foundations,

applying them and solving their problems using the possibilities of informatics allows to get better results. Informatics has new information technology tools that enable faster calculations and efficient problem solving. Organization of interactive lessons with the application of information technologies increases students' interest in subjects and their activity. Interdisciplinary integration creates conditions for increasing the efficiency of classes[3].

The question of which methods of informatics to choose in the process of teaching the topics of the subject "Mathematics" is very important

from a methodological point of view. When teaching the chosen topic for practice "Graphs of functions", two different information technologies were used. The article describes the results of this experiment.

USING THE POSSIBILITIES OF MS EXCEL AND MATLAB IN THE TEACHING OF THE TOPIC "GRAPHS OF FUNCTIONS"

Let's consider simple examples on the topic "Graphs of functions":

1) on the interval $[0; \pi]$ by the values of the argument x with the step $\pi/2$ it is required to calculate the corresponding values of the functions

$$y_1 = 3x + 1, \quad y_2 = \sin x$$

and construct the graphs of these functions;

2) on the interval $[-2\pi; 2\pi]$ by the values of the argument x with the step $\pi/50$ it is required to calculate the corresponding values of the functions

$$y_1 = 15 \sin 3x + 1, \quad y_2 = \sin^2 2x^2 + 7x^2, \\ y_3 = y_1 + y_2, \quad y_4 = y_1 - y_2$$

and construct the graphs of these functions.

To perform these tasks, first the values of the argument are calculated with the required step, then the corresponding values of the functions are calculated. After that, the points are established and connected in the rectangular coordinate system according to the corresponding values of the argument and the function. The functions given in the first task are relatively simple. However, it takes a lot of

time to perform calculations in the traditional way, and despite trying to be more careful during calculations, students make some mistakes and this also manifests itself in the construction of graphs, making it difficult to properly examine and compare poorly drawn graphs. Performing the second task in the traditional way requires more time and attention, as can be seen from the expressions of the given functions.

Calculation of the values of various functions and their more accurate description in mathematics lessons can be presented more conveniently by using information technologies and applying certain practical skills obtained from informatics. Two different approaches were used for teaching the topic: using the MS EXCEL program, using the MATLAB environment.

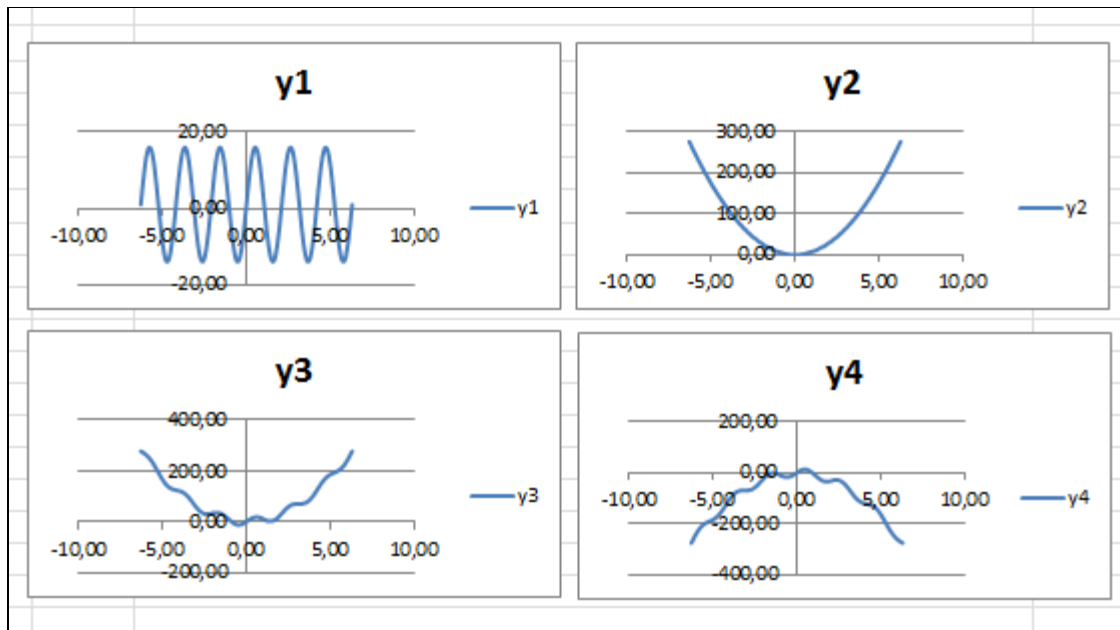
When using the graphical capabilities of the MS EXCEL program to perform these tasks, students' awareness of certain information technologies plays an important role, and when the teacher demonstrates the algorithm for creating graphs, students' worldview, knowledge and skills are formed both about the topic and about the MS EXCEL program.

Both of the given tasks can be performed easily and faster in the MS EXCEL environment. For this, you can prepare a table for each task, calculate the values of the argument in one column of the table and the values of the functions in the other columns. Table 1 prepared in this way shows some of the calculated values of the argument and functions in the second task.

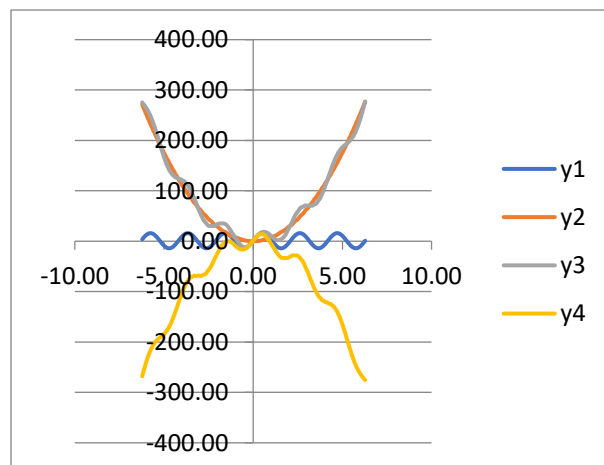
Table 1. Calculated values of the argument and functions for the second task

x	y_1	y_2	y_3	y_4
-6,28	1,00	276,51	277,51	277,18
-6,22	3,81	271,69	275,50	273,82
-6,16	6,52	265,58	272,10	271,75
-6,09	9,04	260,82	269,85	268,25
-6,03	11,27	254,92	266,19	265,71
-5,97	13,14	250,11	263,25	261,83
-5,91	14,57	244,55	259,12	258,39
-5,84	15,53	239,55	255,08	254,00
-5,78	15,97	234,47	250,44	249,30
-5,72	15,88	229,15	245,04	244,42
-5,65	15,27	224,66	239,92	238,30
-5,59	14,14	218,98	233,12	232,96
-5,53	12,56	214,99	227,55	225,58
-5,47	10,56	209,17	219,74	219,72
-5,40	8,23	205,31	213,54	211,69
-5,34	5,64	199,89	205,53	205,07
-5,28	2,88	195,54	198,42	197,32
-5,22	0,06	191,07	191,13	189,74

Then dot graphs for each function on the appropriate ranges can be easily constructed and formatted as desired (Fig.1).

Fig.1. Graphs constructed in MS EXCEL of the functions given in the second task

Note that the values of these functions can be set in the same coordinate system. This is more convenient for exploring and comparing those functions. Fig. 2 shows the graphs of those functions built in the same coordinate system.

Fig.2. Graphs constructed in the same coordinate system in MS EXCEL of the functions given in the second task

Apparently, the application of graphing technology in MS EXCEL ensures that the obtained visual results are more accurate and understandable.

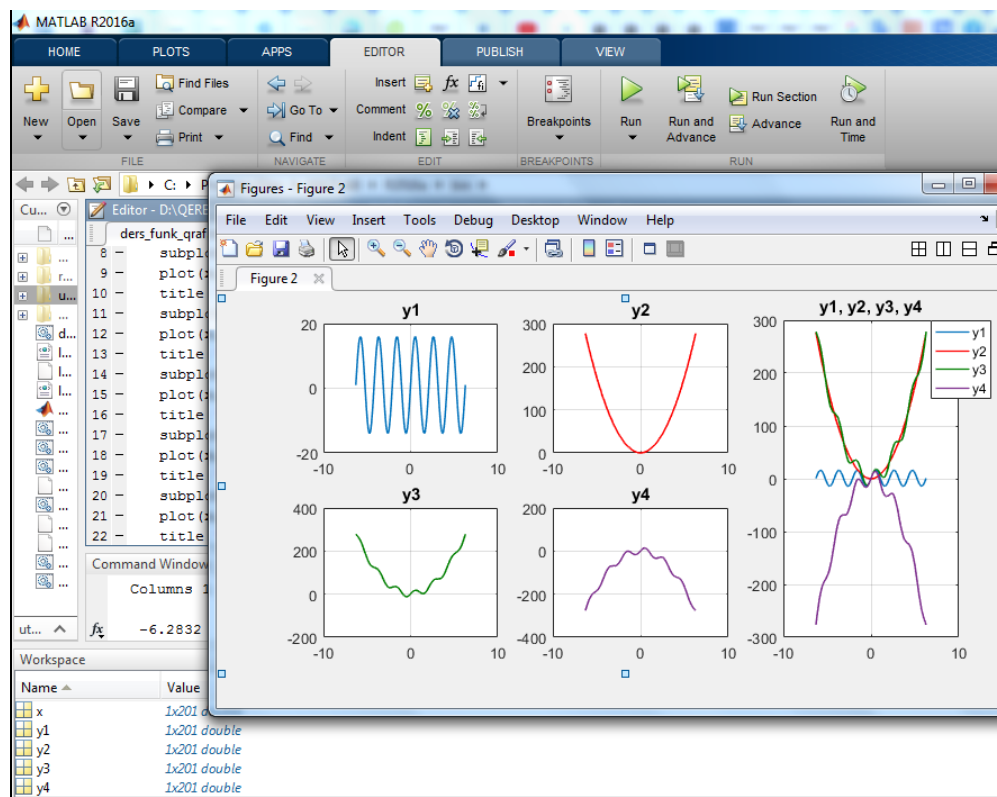
When the MATLAB environment is used to perform the given tasks, it is important for the students to be aware of its capabilities, while the teacher explains the sequence of commands for constructing graphs, the students develop their knowledge and skills both about the topic and about the capabilities of MATLAB.

To obtain similar results for the second task, the following sequence of commands can be used in the MATLAB environment:

```
clc
clear
x=-pi*2:pi/50:2*pi
y1=15*sin(3*x)+1
y2=(sin(x.^2)).^2+7*x.^2
y3=y1+y2
y4=y1-y2
subplot(2,3,1)
plot(x,y1)
```

title "y1"	plot(x,y4)
subplot(2,3,2)	title "y4"
plot(x,y2)	subplot(1,3,3)
title "y2"	plot(x,y1,x,y2,x,y1+y2,x,y1-y2)
subplot(2,3,4)	title 'y1, y2, y3, y4'
plot(x,y3)	Analogous graphs created when the program is
title "y3"	executed are given in Fig. 3.
subplot(2,3,5)	

Fig.3. Graphs constructed in MATLAB of the functions given in the second task



By making necessary changes in the sequence of commands compiled during the construction of graphs in the MATLAB environment, graphs of various functions can be constructed, programs and graphs can be saved in special files.

It should be noted that these environments have wide opportunities for investigating and solving many problems in mathematics.

THE RESULT

Continuous experiments using different methods and tools of informatics should be widely analyzed in order to convey the topics and appropriate calculations to students in a

more accurate, understandable and visual form, which are included in the subject programs of mathematics. The topic "Graphs of functions" from the subject of mathematics was explained in 5 groups in the MS EXCEL environment and in 3 groups in the MATLAB environment for 2 years. After that, the assimilation indicators were examined by groups. The results of the analysis suggest that the teaching method in the MS EXCEL environment was more effective.

In the MS EXCEL environment, students better master the sequence of the construction process and get visual results faster. The knowledge and skills acquired in the MS EXCEL environment provide a foundation for their successful use in solving various mathematical problems.

Reference

- Лапчик М.П., Семакин И.Г., Хеннер Е.К.
Методика преподавания информатики.
М.:Издательский Центр «Академия»,
2001.
- Hajiyeva R.J., Ahmadova E.N. , Asgerova
B.H., Gasimov Z.A., Gahramanli T.B.
Creation Of Connection With Mathematics
Subject Of The Subject Of Information
Science. Journal of Pharmaceutical
Negative Results, 2023, pp.964–967.
- Гурьев И. И. Межпредметные связи в
системе современного образования.
М.:Издательский Центр «Академия»,
2002.