UDK: 004:633.71   Stručni rad

APPLICATION OF INFORMATION TECHNOLOGY IN EDUCATION "HERBOLOGY"

Elena Nikolova-Andreeva [1], Svetlana Vasileva [2]

Summary*: This work examines the use of information technologies in agriculture through the application of the didactic test inspection and evaluation of knowledge discipline Herbology. The test is approbated on college students studying "Agroecology and Plant Protection" of Shumen University "Episkop Konstantin Preslavski". The main tasks relate to the disclosure of the opportunities offered by information technology training and acquisition of a knowledge in the study discipline. The test applied is interesting and comfortable for the students because they can easily switch between the test and other program environments where the answer could be found. The results analysis determines the fact that the students acquire more effectively the subject contents in the agronomical subjects with the help of the Information technology than it does compared to the traditional one. This confirms the results from the test. By means of Information technology application the desire for new knowledge acquisition and its consolidation interweave slightly.*

Key words: *Information technology, plant sciences, spreadsheets, test, a posteriori analysis, knowledge.*

PRIMENA INFORMACIONIH TEHNOLOGIJA U „HERBOLOGIJI"

Rezime*: Ovaj rad proučava korisšćenje informacionih tehnologija u poljoprivredi kroz primenu ispitivanja pomoću didaktičkih testova i procenu Herbologije kao naučne discipline. Ovaj test je sproveden na studentima Šumenskog univerziteta „Episkop Konstantin Preslavski" koji studiraju „Agroekologiju i zaštitu bilja". Osnovni zadaci se odnose na otkrivanje mogućnosti koje nudi obuka o ingormnacionim tehnologijama i sticanje znanja u ovoj naučnoj discipline. Primenjeni test je zanimljiv i prijatan studentima zato što oni imaju mogućnost da se lako prebacuju sa testa na druge programe gde se odgovori mogu pronaći. Analiza rezultata ukazuje na činjenicu da studenti efektivnije*

---

[1] Assist. prof dr Elena Nikolova-Andreeva, Shumen University, College - Dobrich, Dobrich, Dobrotica 12, E-mail: nikolowa9@abv.bg

[2] Assist. Prof dr Svetlana Vasileva, Shumen University, College - Dobrich, Dobrich, Dobrotica 12, E-mail: svetlanaeli@dobrich.net

usvajaju sadržaje iz agronomskih predmeta uz pomoć informacionih tehnologija nego putem tradicionalne metode. Ovo potvrđuje rezultate iz testa. Primenom informacionih tehnologija želja za sticanjem novih znanja i njihovo utvrđivanje se donekle prepliću.

Ključne reči: *Informacione tehnologije, naoka o biljkama, tabele, test, a posteriori analiza, znanje.*

1. INTRODUCTION

The utilization of continuous increasing scientific knowledge requires not only efforts but also continuous improvement of training methods, including agronomic and disciplines. Integral part of the overall literacy of modern man today and information technology, they are important in the learning process because the [5], [7] and [8] person perceives about 75% of information about the surrounding world in a visual way, and only 10% - on hearing time. They are part of the changing science and elsewhere entered Informatics. The term "Information Technology" is associated with rapid development of the means of formation, storage, reproduction and dissemination of information.

The application of information technology include multimedia, audio-visual, computer and telecommunications technologies that are interconnected and penetrating each other. Most common in the pedagogical practice discipline „Herbology" are visual aids for training and the computer used for the preparation and demonstration of techniques and visual examination and evaluation of knowledge through electronic tests. So students fall into the vast world, who pull them out beyond the audience and immerse them in the sacrament of wildlife.

There are no studies on didactic and methodological aspects of e-learning in teaching Herbology. A defitsit of theoretical sources is established to mark the basic requirements for organizing, training and conducting exercises with the use of information technology and reporting of student achievements in comparative plan with the traditional way.

The purpose of this paper is to reveal the applicability of modern information technologies in the training course „Herbology" in agronomic fields.

2. INFORMATION TECHNOLIES USE WHILE ACQUIRING NEW MATERIAL

The name of Science „Herbology" includes two words - the Latin "herba", meaning grass, but in effect, unwanted plants (weeds) and the Greek "logos" - science. It concerns a study of all matters relating to weeds, to develop and usavarshtenstvane methods to control them, but as a science, today it is much more wide open to the achievements of other sciences and especially technological innovation of science in the field of information technology. The amount of information in herbologiyata is very large and is updated quickly and is virtually impossible to include everything in the curriculum. Many new areas of agronomic research influence of individual and cultural development of students. In this sea of information it is important for students to learn to predict and assess the limits and possibilities of agricultural sciences and biotechnology in biological and integrated courtiers garden. One of the examples for IT application in teaching is the test we apply. It is administered to students of Agroecology and Plant Protection at University of Shumen „Episkop Konstantin Preslavski". The main tasks are to identify opportunities offered by information technology training and acquisition of knowledge in the study discipline.

Using the services of a global network the teacher has the opportunity to make the learning process in an attractive occupation, which are characteristic spontaneity of response, freedom of thought and creative response. Multimedia training has an advantage that can combine many different types of information and present it in the best form (graphic, picture, table, etc.) To provide easier understanding of the material. [6] Information Technology does not displace old ways and new opportunities for their realization.

3. DEVELOPMENT AND TEST PROBATON IN HERBOLOGY BY MEANS OF SPREADSHEETS

The structure of workbook of spreadsheets in *Microsoft Office - Excel* is very convenient for typing and probing a normative didactic test. Each question together with the answers being offered is located on a separate worksheet in the workbook where the test is. In [1] and [6] we have the form of the test and its probation described elaborately. Such a test in the discipline of Plant sciences was done with the students from the speciality of Farming [6]. These tests are suitable for the students (as well as for the pupils in the probation described in [4]) for they are able to test their knowledge in a particular subject field. From the suggested workbook-test the learners can go to other (program) environments in oreder to look up in them to give the correct answer of the questions. Each question from the test is on a separate worksheet in the workbook-test. The correct, according to the student, answer is written by the corresponding number in the fixed coloured cell. With the help of the mouse the next sheet-question from the register of the worksheets is selected. The number of the questions in the test is according to the choice of the one setting the task. While the test is being composed, the sheet "Questions" is available. In the columns of the sheet is formulated the question, the first answer is given , then the second, etc. In the last column is given the number of the correct answer. If necessary a graphical object (drawing, scheme, picture, etc.) could be integrated in the sheet-question.

The choice of Microsoft Excel for test probation is not due only to the rich opportunities of environments and the fact that it is studied during the Information Science And Information Technology classes either at secondary schools or in higher education, but it is rather due to the fact that there are modules developed in Visual Basic for Application for aposteriori analysis of didactic tests with optional answers. The logic of the modules is created according to [1, pp. 174-185] and is considered in [2] and [3]. The work of the user with the developed VBA modules, the interface with the user and the tables being created are described and commented in [2] and [4].

We are going to analyze the results from the aposteriori analysis of the test in Herbology which was given to the second year students from the college speciality of Agriculture and plant protection. In this test the number of the questions is 30 and each question is given 5 optional answers. Some of the suggested answers are general and the students are expected to give "the most correct" (the most precise) answer. The modules supply the calculation of the difficulty and the discriminative power of the questions from the test and find the inappropriate incorrect answers (distractors). Thus after the probation it is possible to evaluate to what extent the test is effective and the results from the analysis to help for the improvement for the next probations.

Algorithm of the automatic aposteriori analysis:

a) fill in the general table with the answers of the students and the table with the correct

answers of teh questions from the test (by the examiner);

b) Start of VBA module Sum_goals_of_Students;

c) Sum up the number of points;

d) Sort out the summary table with the answers in descending order of the number of points and defining the extremal groups;

e) Analysis of the difficulty of each question – according to the formula: $P = 100*$<*number of people from both of the extern* *al groups who has done the task correctly*)/(*general number of the people from both of the external groups*). The greater the percentage of learners who have solved the task in a correct way, the easier the task is and vice versa – low value of P shows that the question is difficult.

f) Analysis of the discriminative power of each question – according to the formula $DP =$ (<*number of people from the strong group who have solved the task correctly* > - <*number of people from the weak group who has solved the task correctly*>)/(*0,5*<general number of the people from the two extremal groups*>). Table 1 shows the results from the difficulty analysis and the discriminative power. It is seen in the table that for this particular test only 6 questions (11, 15, 17, 19, 23 and 26) have an acceptable coefficient of discriminative power ($0,4 \leq DP \leq 0,6$). Seven questions (12, 13, 14, 22, 24, 29 and 30) should be reformulated ($0,2 \leq DP < 0,4$ or $0,6 < DP \leq 0,8$), and all the rest of the 17 questions (1-10, 16, 18, 20, 21, 25, 27 and 28) should be replaced ($DP < 0,2$ or $DP > 0,8$). The latter are misunderstood by the students or formuated incorrectly by the examiner.

Table 1: Difficulty and discriminative power of the test questions

	Strong					Weak					Difficulty (P)	Number of correct answers	Discriminative power (DP)	Strong-Weak
Answer	1	2	3	4	5	1	2	3	4	5				
Z01	**6**	0	0	0	0	**5**	1	0	0	0	91.67%	11	0.17	1
Z02	0	0	**6**	0	0	0	1	**5**	0	0	91.67%	11	0.17	1
Z03	0	0	0	**6**	0	0	0	1	**5**	0	91.67%	11	0.17	1
Z04	0	**6**	0	0	0	0	**6**	0	0	0	100.00%	12	0.00	0
Z05	0	0	**6**	0	0	1	0	**5**	0	0	91.67%	11	0.17	1
Z06	**6**	0	0	0	0	**5**	1	0	0	0	91.67%	11	0.17	1
Z07	**6**	0	0	0	0	**5**	0	1	0	0	91.67%	11	0.17	1
Z08	**5**	0	0	1	0	**5**	0	0	0	1	83.33%	10	0.00	0
Z09	0	0	0	0	**6**	1	0	0	0	**5**	91.67%	11	0.17	1
Z10	**6**	0	0	0	0	**5**	0	1	0	0	91.67%	11	0.17	1
Z11	0	0	0	**6**	0	0	2	1	**3**	0	75.00%	9	0.50	3
Z12	0	**6**	0	0	0	1	**2**	3	0	0	66.67%	8	0.67	4
Z13	0	0	0	**6**	0	1	1	1	**2**	1	66.67%	8	0.67	4
Z14	**6**	0	0	0	0	**4**	2	0	0	0	83.33%	10	0.33	2
Z15	0	**6**	0	0	0	1	**3**	0	0	2	75.00%	9	0.50	3
Z16	**5**	1	0	0	0	**4**	0	0	1	1	75.00%	9	0.17	1
Z17	0	0	0	1	**5**	3	0	0	1	**2**	58.33%	7	0.50	3
Z18	1	5	0	**0**	0	1	2	3	**0**	0	0.00%	0	0.00	0

Z19	1	**5**	0	0	0	0	**2**	2	1	1	**58.33%**	7	**0.50**	3
Z20	0	0	**6**	0	0	2	1	**1**	1	1	**58.33%**	7	**0.83**	5
Z21	0	0	0	**6**	0	0	2	1	**1**	2	**58.33%**	7	**0.83**	5
Z22	0	1	2	**3**	0	1	1	2	**1**	1	**33.33%**	4	**0.33**	2
Z23	2	**3**	1	0	0	2	**0**	4	0	0	**25.00%**	3	**0.50**	3
Z24	1	0	1	**2**	2	3	2	0	**0**	1	**16.67%**	2	**0.33**	2
Z25	**3**	3	0	0	0	**2**	1	3	0	0	**41.67%**	5	**0.17**	1
Z26	0	3	**3**	0	0	1	3	**0**	1	1	**25.00%**	3	**0.50**	3
Z27	**4**	1	1	0	0	**3**	1	1	0	1	**58.33%**	7	**0.17**	1
Z28	0	0	2	**2**	2	1	3	1	**1**	0	**25.00%**	3	**0.17**	1
Z29	0	1	1	**2**	2	1	2	2	**0**	1	**16.67%**	2	**0.33**	2
Z30	0	3	**3**	0	0	1	3	**1**	0	1	**33.33%**	4	**0.33**	2

g) Distractor analysis (incorrect answers) – establish if and to what extaent the distractors are acceptable for probation and if they allow to distinguish the strong from the weak students [2, p.182]. In table 2 are shown the results from the distractors analysis for the test in Herbology. The given in the columns distractors should be replaced.

Table 2: Inappropriate distractors

	Distractors which are not pointed by either group		Distractors pointed by an equal number of tested people		Distractors pointed in the strong group of more correct answer
Z01	3, 4, 5,				
Z02	1, 4, 5,				
Z03	1, 2, 5,				
Z04	1, 3, 4, 5,				
Z05	2, 4, 5,				
Z06	3, 4, 5,				
Z07	2, 4, 5,				
Z08	2, 3,				
Z09	2, 3, 4,				
Z10	2, 4, 5,				
Z11	1, 5,				
Z12	4, 5,				
Z13					
Z14	3, 4, 5,				
Z15	3, 4,				
Z16	3,				
Z17	2, 3,		4,		
Z18	5,		1,		2,
Z19					
Z20					
Z21	1,				
Z22			2, 3,		

Z23	4, 5,	1,	
Z24			
Z25	4, 5,		
Z26		2,	
Z27	4,	2, 3,	
Z28			
Z29			
Z30	4,	2,	

4. INFORMATION TECHNOLOGY APPLICATION IN COMPARISON WITH THE TRADITIONAL METHOD OF TEACHING.

Fig. 1 shows the average progress of the students from the speciality of Agriculture and Plant Protection in two different years (2 different student groups).
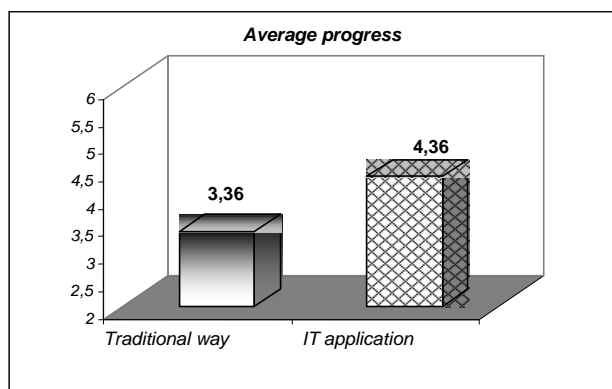

Figure. 1: Comparison of the students' progress

During the first year the average progress of the group is lower with one unit than the average progress of the second year group where IT were applied during the educative process in acquisition of the new material and during the seminars (computer presentations presented by the lecturer, individual search for information in the Internet for a given task or topic). This is a proof for the positive influence of the information technology on the success and acquisition of the subject by the students who are would-be specialists in Plant protection.

5. CONCLUSIONS

In our opinion „E-teaching" in Herbology is a way of satisfaction for the students from the speciality of Agriculture And Plant Protection from the received knowledge and skills for recognition, growing and protection of the plant world. The students have acquired the knowledge on the subject while considering, adding, experimenting, and learning new and interesting events and facts which on the blackboard or even in the library could not have had that compactness. The students are unaware of acquiring new knowledge and skills intertwined with the consolidation. Thus curiosity and interest in the new is transformed into interesting and useful for them acquisition of knowledge which is confirmed by the

final marks in the subject. The teachng realized this way offers the possibility the students-agriculturers to be in pace with the information technology and they themselves to have innovational thinking.

6. LITERATURE

[1] Vasileva, S.: *Spreadheets and a posteriori analysis of normative didactic test*, Beograd – Novi Sad, Tehnologija, informatika, obrazovanje 2, 2003., str. 264-269.

[2] Бижков, Г.: *Теория и методика на дидактическите тестове*, София, Просвета, 1992.

[3] Василева, С.: *Электронные таблицы для апостериорного анализа дидактических тестов*, Тезисы докладов Международной научно-образовательной конференции „Наука в Вузах: Математика, Физика, Информатика”, Россия, Москва, Российский университет дружбы народов, 2009., str. 862-863.

[4] Василева, С., М. Горанова.: *Тест по електронни таблици, апробация на теста и апостериорен анализ чрез електронни таблици*, Научни съобщения на СУБ кл. Добрич, т.5, No. 2, 2003., str. 294-299.

[5] Глушкова, Т.: *Електронен клъстер „ECL-School” на системата DeLC*, Научно – практическа конференция „Новите технологии в образованието и професионалното обучение”, София, 2003.

[6] Николова, Е., Василева С.: *Приложение на информационните технологии в обучението по агрономическите дисциплини*, НАУЧНИ ТРУДОВЕ на Русенски университет "Ангел Кънчев" - 2008, т.47, с.5.1, str.: 41-45.

[7] Панайотова-Стоянова, М.: *Насоки за осъвременяване на обучението по Анатомия, физиология и хигиена*, “Теоретико-приложни проблеми на методиката на обучението по биология за средно образование и ВУЗ (втора част), Стара Загора, ИПКУ, 1993., str. 101-107.

[8] Стоянов, С.: *Виртуален университет - помощно средство за обучение на студенти*, Национална научна конференция „Информатиката в научното познание”, Варна, 2002.