

## Didactic Usability of the Information Communication Technologies in Home Economics and Technologies Lessons

Lasma Dauvarte<sup>1</sup> Mg.paed.; Vija Dislere<sup>2</sup> Dr.paed.

Latvia University of Agriculture, Latvia

[lasma.dauvarte@llu.lv](mailto:lasma.dauvarte@llu.lv)<sup>1</sup>; [vija.dislere@llu.lv](mailto:vija.dislere@llu.lv)<sup>2</sup>

**Abstract:** Using information and communication technologies (ICT) in education gives an opportunity to use all the technological advantages. If the computer at school recently was associated only with the teaching of informatics, then today is used also in other study subjects. Usage of ICT can serve as a tool for preparing *Home economics and technologies* lessons, for frontal visualization of data, as well as for organization and evaluation of students' practical work. The aim of the study is to explore and justify the didactic usability of ICT in the study subject *Home economics and technologies* in elementary schools; design and approbation of the developed evaluation tests in textile technologies using the software package "Tests". The study was conducted in Latvian University of Agriculture (LLU) in the Institute of Education and Home Economics (IMI) and in ten different regional schools of Latvia. Teachers of the study subject *Home economics and technologies* and the university lectures were involved. As a result the didactic usability of ICT facilities was theoretically established. Practical tests were developed and tested in the study subject *Home economics and technologies* with a choice of textile technologies in: knitting, clothing, weaving and sewing. Tests were developed using the P.Caune's software package "Tests" foreseen for preparation, filling and knowledge assessment. Didactic usability of the ICT in *Home economics and technologies* lessons for preparing theory explanation includes: preparing video material and creation of presentations; for implementation of practical workshops: creation of different compositions, use of picture or photo, drawing, designing patterns for clothing, preparing examination papers, test-building in e-environment; making crossword puzzles. The most important thing in any learning process about didactic usability of ICT is to prepare teachers to understand their teacher's role and learn to respect the learners' autonomy, authenticity, learning styles and motivation. Didactic use of ICT provides a modern *Home economics and technologies* teaching and learning, increase learning effectiveness, develops students' ability to learn, as well as prepares pupils for life in modern information society.

**Keywords:** education in school, didactics, ICT, evaluation tests in Home economics and technologies.

### Introduction

With the development of information and communication technologies (ICT) the union "man – computer" has become an urgent issue that affects not only specialists, also society as a whole. Today's information society requires to know how to use and operate with ICT. While introducing ICT in education occurs an opportunity to use technological advantages such as: to connect moving and unmoving images, to insert audio and video materials, to create tests, to use voting machines. Therefore it can be assumed that interaction between the human and the computer is communication since it has not only informative, but also spiritual character; and learning process is mutually enriching and interaction of laborious nature (Agejevs, 2005). The range of available learning technologies has rapidly increased with development process of the schools' ICT infrastructure. Modern ICT qualitative and quantitative progress has been happening in unprecedented pace and rapidly expanding use of technologies. Similarly explains professor J. Grundspeņķis (2009) that cybernetics is the science of control and communication in systems. Cybernetics looks at three systems' characteristics: high system complexity; system–probability (stochasticity); self–regulation of system. An important contribution of the process of introducing ICT in schools are: the updating of computer hardware, software, network and staff development. They are seen as valuable if there is evidence that they have made a real impact in raising student achievement (Ķikāns, 2009).

According to authors' working experiences intensive use of mobile technologies among school students can be observed. Consequently authors conclude training becomes interesting using new technologies, challenging and exciting from point of view of both the teacher and the learner. It

improves quality and attractiveness of education and increases learners' motivation to learn. Mobile technologies are becoming increasingly accessible and taking into account its' attractiveness for the students, they are gradually introduced to support a variety of educational initiatives, especially those that focus on the communication process. Laptops that teachers find useful for teaching, management and administration processes with much less enthusiasm are perceived among students because they are attracted by the news of a smaller-sized technologies, such as tablet PCs and multifunctional mobile phones.

*The aim of the study* is to explore and justify the didactic usability of ICT in the study subject *Home economics and technologies* in elementary schools; design and approbate developed evaluation tests in textile technologies using the software package "Tests".

### The use of ICT in the learning process

At present ICT integration in education in different study subjects or courses is significant. Consequently, these technologies appear in a new role – it has become a real theoretical and practical basis for other study subjects as a new practical tool for teaching and learning (Vronska, 2012). As pointed out by T. Koenrad (Koenraad, 2008) effective use of technologies is an essential component to the success of improving student learning in 21st century education. Integrating ICT in pupils' learning could be helpful to streamline lessons' preparation, thereby increasing the productivity of teachers.

Impact of ICT on learning and teaching indicates that there is the most effective use of ICT in improving the learning experience, where teachers have been able to integrate together a range of technologies such as computers, interactive whiteboards and the Internet. Such an integrated approach in scope of hardware, software and connectivity allows educators to develop innovative approaches to learning and teaching processes.

A high level of knowledge is a precondition for full understanding of a phenomenon or principles of some process, meaning wisdom (Figure 1). Wisdom gives an individual the ability to use their knowledge for creating new knowledge, for some operations or for reaching any purpose.

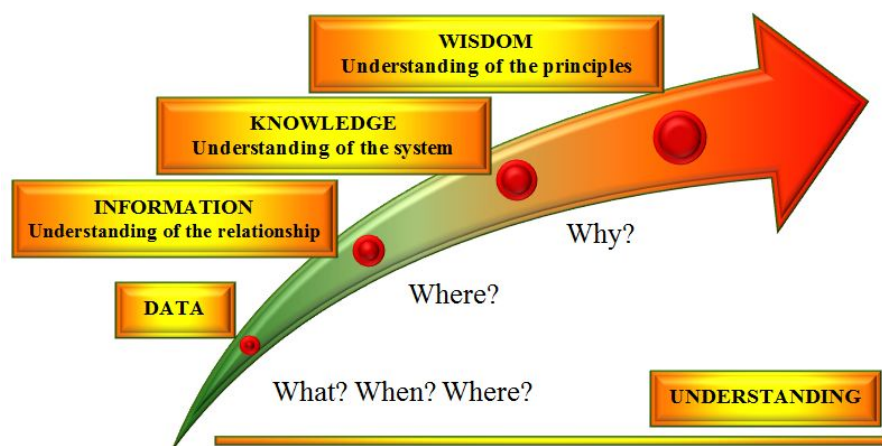


Figure 1. Raising the growth of understanding in the processes of knowledge (Karnītis, 2004).

Human is the most comprehensive, widely known and clearly understandable information processing system. Though man is not only a natural system that is able to process information (Karnītis, 2004). The classical didactic principles should be taken into account during the introduction of ICT in the learning process, because didactics as a science:

- theoretically justify the practice, define the nature of the learning process: systematise knowledge about the learning process, explains the facts and phenomena, formulate law and regulations that reflect practice; established theories serve as a source of research;
- serves as an orientator for practical action for development of learning process. Acquired theory helps the teacher to make decisions quickly and provide educational ambition. As any theory didactics has a legislative function - it defines the conditions to help the teacher to

design practice and create favorable conditions for the development of the pupil's individuality (Žogla, 2001).

In addition within computer-based training one can identify two new principles – the personalization of learning and activity. Based on such exercises training are being explored in two directions – visualization of teaching content and training algorithmization (Cuban, 1993). Computer-aided training is a new methodical system, which allows the pupils to see not as objects but as subjects of the study process and the computer as a learning tool. Pupil move in a new category because of a computer study is the individual and permanent but are being implemented by the common methodology of the training program.

Specialist of ICT S. Sproģe (2007) has described how the basic didactic principles of learning theories can be realized in training:

- *scientificity* – determine the content of teaching, which needs to include not only traditional knowledge but also the basic directions of modern science and its future perspective; wide use of ICT provide scientificity of learning content;
- *systemic approach* to curriculum outline is providing with their structuring, dividing the basic concepts and their interrelations. The curriculum which is structured and divided into different levels of difficulty allows the pupil to include in training not only the themes that provide the required minimum level of knowledge, but also to look at the subject in question in wider terms, increasing the pupil's horizons, build his knowledge much more fundamental, to link the knowledge of the content to other subjects, learning their interrelationships and effects;
- *the principle of availability* of computer-based training moves from the general accessibility to the individual and it is seen as a chance of reaching of learning target. Computational study material offers to pupils: a variety of its acquiring possibilities, the time required for the acquisition, the help to understand different indications, explanation and additional tasks, to give feedback, rise up learner motivation at different levels of learning content;
- *the principle of visibility* – the computerized training could also be called as interactive visibility. The advantage is that pupil can perform various manipulations with either of objects, thus acquiring material not only in static but also dynamic way and under different conditions;
- *systemic and sequencing principle* is related to the creation of training material and operating pupil's learning system while acquiring the material.

There has been significant progress in providing online learning resources used at many areas of study, obtaining the following resources from various sources - both commercial and publicly available (Holmes, Gardner, 2006). For example, the learning process has much more valuable benefit from a wide range of online learning resource availability, as well as from a variety of technologies, such as digital video and photos. On the other hand, animation and simulation have allowed students to learn complex concepts in mathematics and science. Such training tools are particularly effective. Advanced usage of e-resources will make the learning process more interesting, challenging and exciting for both the teacher and the learner's point of view, not only improving the quality of education, but also by increasing learners' motivation to learn. Nowadays usage of electronic or e-learning methods is increasingly becoming a part of learning process of many schools. Consequently technological support to e-learning becomes of great importance, including a variety of e-learning systems.

### **Materials and methods**

The software is a very important condition in order to allow high-quality computer based training. Every year it is supplemented with both professionals in the field, and the teacher designed programs. Within the framework of this research P. Caune's developed test creation tool software package "Tests" is used, which is foreseen for the teaching test preparation, filling and student aptitude test (Caune, 2002).

On the base of software package "Tests" and considering Dz.Betels (2003) advice to test building, there are developed and practically aprobatated tests - *knitting, clothing, weaving and sewing* in the study subject *Home economics and technologies* with a choice of textile technologies for grade 8. The

study was conducted in Latvian University of Agriculture (LLU) in the Institute of Education and Home Economics (IMI) and in ten different regional schools of Latvia: Brocenu Secondary School, Olaine Secondary School No 1, Jelgava Secondary School of Technologies, Elementary Schools of Cesis, Livu, Marsenu, Mengele, Ramuli, Striki, Vecsaule. Twelve school teachers of the study subject *Home economics and technologies* were involved in approbation of the author's tests and they answer questionnaire about usage of hardware in school and about usage of different test design tools in the study subject *Home economics and technologies*. Respondents were aged 29 - 55 years. Friedman test is used in the research.

## Results and discussion

The learning process is often described as a series of phases involving teaching, studying, learning, assessment. According to this line of thinking, teaching affects studying, and studying leads to learning, which is then assessed. In practice, good teaching involves continuous assessment that supports learning.

(Löfström, Kanerva, 2006). Assistant professor I. Lice (2012) analyzing changes of direction of Home economics and technologies study subject emphasizes the increasing usage of information technologies and the self-reflection of pupils as important factors in the development of home economics education. ICT is used in education for supporting students learning or for development of competences, in other words for helping to reach the goals of education. The quality of learning depends on how ICT is used in learning (ICT in Initial..., 2009).

The educator essentially is a change stimulator and promoter. She/he shall do so with the deliberate purpose to guide and to influence the pupils' life with her/his knowledge and ability, with an understanding of the modern economy, politics, social life and its contradictions. It is important to use all the technological possibilities: connect text in multimedia, three dimensional graphics, work with images, create audio and video materials; create tests; use a variety of specialized software, which not only diversifies but also facilitates and enhances the learning process (Vronskis, Vronska, 2011).

The authors believe that the computer can significantly change the learning environment of the school. Availability of a computer at school recently was associated only with the teaching of informatics, however today it has significant influence to other study subjects. It is necessary to diversify the teaching of study subjects by using modern, progressive teaching techniques. For the teacher of *Home economics and technologies* the computer can be as a tool for preparation of lessons, for frontal data visualization as well as for organization and evaluation of students' practical work (Figure 2).

The computer belongs to a technical training tool that could be useful in different learning stages: preparation of lessons, training organization, workshops and training evaluation.

Learning opportunities offered by ICT:

- source of information;
- rationalization of teaching learning material forms;
- increase the visibility level, specify concepts: phenomena and events;
- organizes and directs perception;
- enrich the students' perceptions, satisfy their thirst for knowledge;
- fully comply with the scientific and cultural students' interests and needs;
- develops the emotional attitude to learning information;
- reinforces the interest of learning through an original, new construction technologies;
- makes available such subject matter what would not be available without ICT;
- activates the cognitive activity, facilitates informed student learning process, develops thinking and spatial imagination, perspicacity;
- the tool of repetition, generalization, classification and knowledge control;
- illustrates the link between theory and practice;

- creates conditions for more effective teaching forms and methods of use, helps totality realization of the fundamental principles of the pedagogical process: from the simple to the complex, from the near to the distant, from the specific to the abstract;
- saves time spent on training also energy of the learner and the teachers, thanks to the information compactness of teaching and increasing the speed (Коджаспирова, 2004).

So the use of ICT in education offers many opportunities, but probably the greatest value is not turned to the technologies as a tool, but rather the fact that it is only good if the user knows how to use it.

Informatics after grade 7 is no longer taught in elementary school, the teaching is resumed in the 10th grade, but pupils lose their knowledge and skills acquired during two years of teaching. According to the authors, acquired knowledge and skills are strengthened and improved by the process of integration of informatics in study subject Home economics and technologies. Consequently using ICT provides modern teaching and learning process, increases the effectiveness of training, develops students, improving the learning abilities and preparing them for lifelong learning, as well as preparing students for life in today's information society.

Home economics and technologies teacher, who wants to use the computers in the learning process not only for preparation of teaching materials, but also for the students' practical work or evaluation of knowledge, has to take into account pupils' knowledge and skills acquired in informatics lessons. According to the authors view students' knowledge in informatics in grade 5 are small, but pupils of grade 7 have already acquired basic knowledge of computer use and are able to apply this knowledge in other study subjects including Home economics and technologies, if the teacher wishes it.

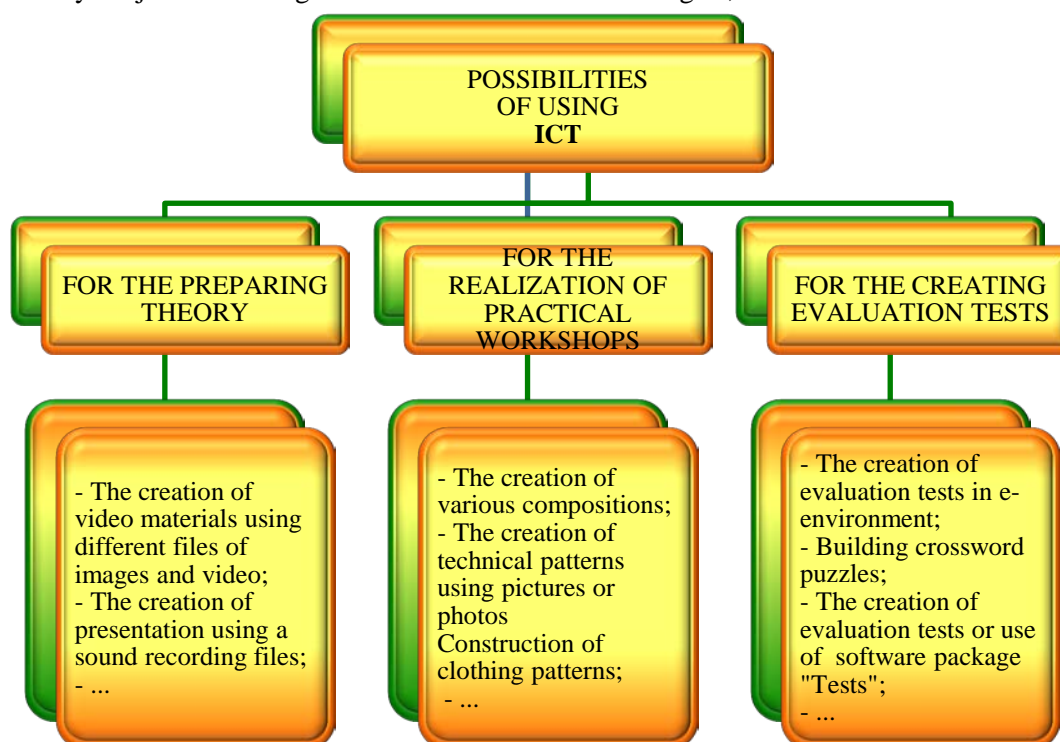


Figure 2. Possibilities of using ICT in study subject Home economics and technologies.  
(authors' construction)

The authors are convinced about the necessity for development of cross-curricular links, as well as on mutual integration of study subjects, and they see the realization of such opportunity in the study subjects of Home economics and technologies and computer science. Use of digital learning materials gives diversity for lessons and motivates students to work. This way of training involves students with various styles of learning: those who perceive study material better listening; those who like visual aids; those who are good at reading.

Testing on the computer is widely used around the world. As an example authors could mentioned "Brainbench" offers evaluation tests on the internet that allows you to test the knowledge in various fields (Brain bench, 2014).

These tests are for fee and they are more usable for commercial purposes, rather than for the aptitude test in educational establishments. However the author is satisfied for the possibility to download free products from the e-environment which could be used in schools, such as the software package "Tests" (Figure 3):

- the author Peteris Caune, version 1.4, the year of development 2002, the program foreseen for the creation and preparation of training test, filling and testing of knowledge;
- the author Dzintars Rove, the year of development 2003, the program is foreseen for creation of the tests with a special program or with the test editor Notepad and filling in (Mykoob educational..., 2014).

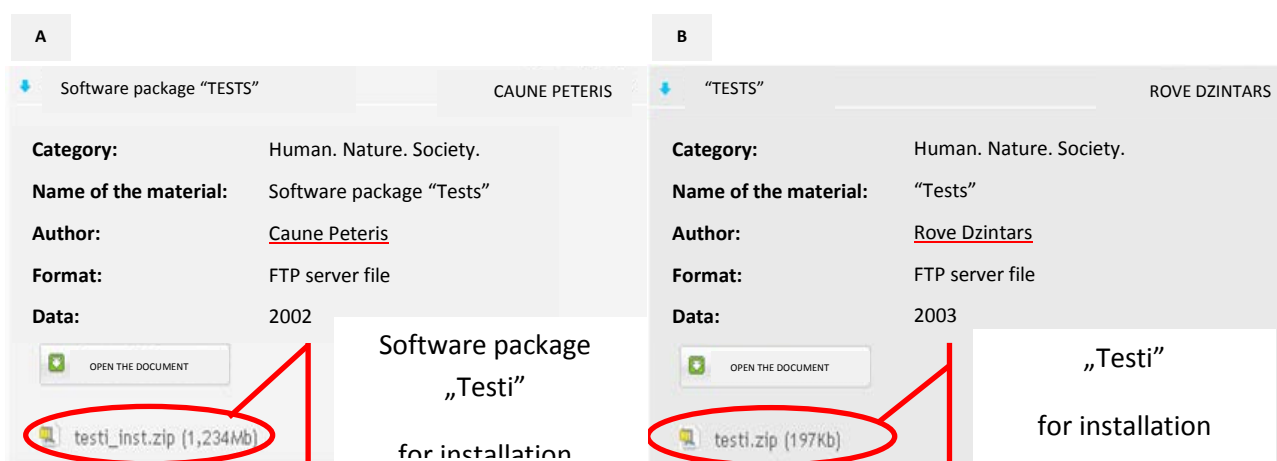


Figure 3. A- software package "Tests", the author P.Caune; B- tests, the author Dz. Rove. (Mykoob educational social network, 2014)

The test preparing program "Tests" is quick and easy. The file for help describes how to create a simple test. In establishing the tests work should be startup by program "Tests" (Figure 4).



Figure 4. The tools of software package „Tests”.

Software package "Tests" does not support animated (moving) GIF images. It is recommended not to use them in your tests, because try to add an animated image will end with a loss of the program. Taking into account the students' age group specifics and the requirements of curriculum standard of study subjects Home economics and technologies and informatics, evaluation tests were designed in textile technologies for grade 8 using the software package "Tests". Tests are in Latvian. Themes of the developed tests are knitting, clothing, sewing and weaving (Figure 5).

*Knitting.* Knitting nowadays. Knitting pattern technical drawings. Sequence of product fabrication. Knit' formatting and evaporation. Knitting in plane.

*Clothing and sewing.* Fashion, youngsters' style. Accessories. Modeling of basic patters of skirts, divided skirts, trousers. Sewing of skirts and trousers.

Weaving. Ways of weaved items. Weaving. Auden and celain. Minigobelen.



Figure 5. Authors developed and approbated evaluation tests in the textile technologies.

Home economics and technologies teachers use computers mainly for distant communication – E – mail (the sum of average ranking 4.5), to search for information (the sum of average ranking 4.46), E – class (the sum of average ranking 4.13), the development of teaching materials (the sum of average ranking 4.08), thus increasing teachers’ personal productivity. The computer is a tool that allows the teacher to execute some already known work more quickly and efficiently, for example: (use of basic software – MS Word, MS Excel and MS PowerPoint) reports, worksheets, tasks and exercises for the electronic creation (Figure 6).

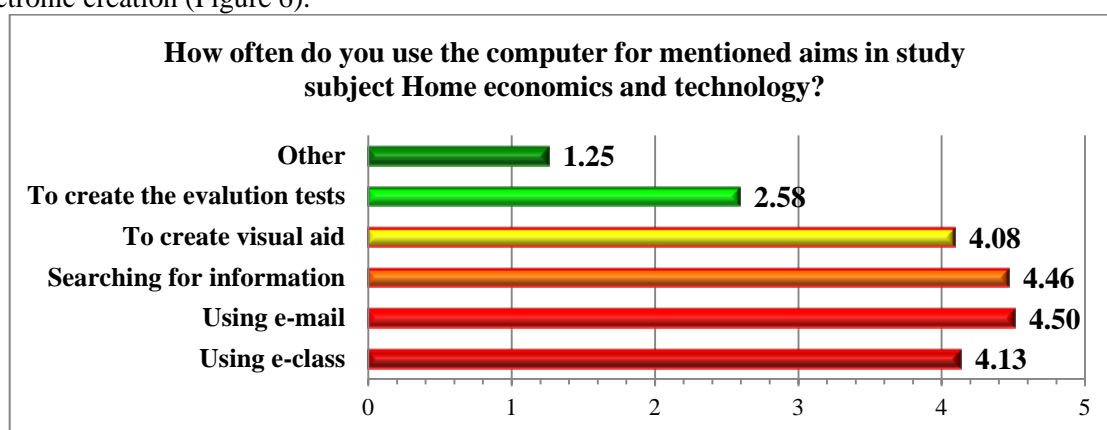


Figure 6. The usage of computer in study subject Home economics and technologies.

Table 1

**Respondent’ opinion how often do they use the mentioned tools for creation of tests in study subject Home economics and technologies**

Friedman coefficient value (Chi – Square) $\chi^2_r = 11,846$						
The significance level of Friedman test (Asymp. Sig.) p – value for both–sided hypothesis $0,037 \leq 0,05$						
	0	1	2	3	4	5
MS Word (Macros)	6	1	-	-	3	2
MS Excel (Macros)	5	2	-	-	5	-
MS PowerPoint (Macros)	5	1	-	2	3	1
Dz. Rove’ software package	12	-	-	-	-	-
P. Caune’ software package	6	2	-	2	2	-
Other	9	-	-	1	-	2

Friedman test p–value (0.037) indicates the statistically significant differences between the criterion ratings. Mean Rank – average ranking of the sum ( $R_i/b$ ) differs in graduation classes (Table 1).

The usage of test design tools in study subject Home economics and technologies described in research shows that the evaluation of the criterion of Dz. Rove’ developed software package is relatively lower (the sum of average ranking 2.29) than P. Caune’ developed software package (the sum of average ranking 3.63) (Figure 7).

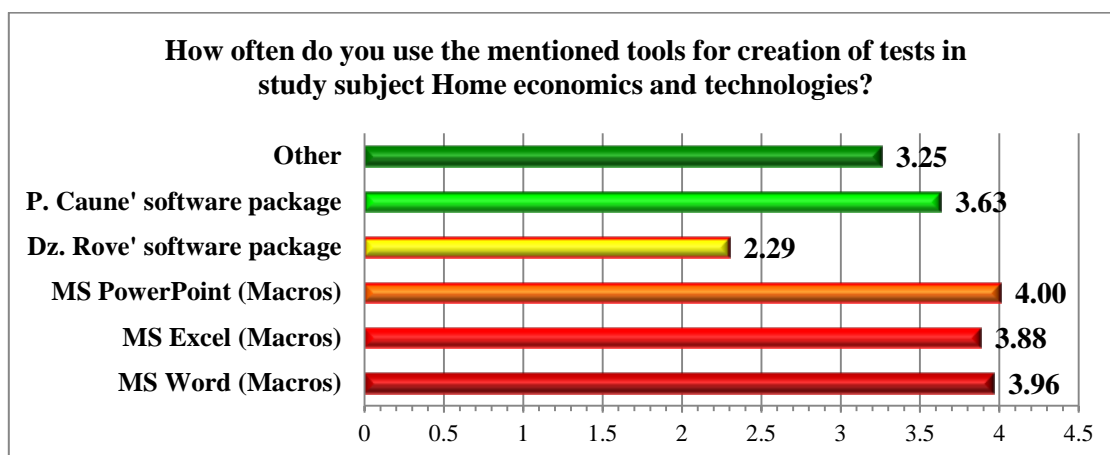


Figure 7. The usage of test design tools in study subject Home economics and technologies.

Table 2

**Respondent 'opinion how are they satisfied with the test creation tools for teachers' needs**

Friedman coefficient value (Chi - Square) $\chi_r^2 = 6,4$						
The significance level of Friedman test (Asymp. Sig.) p – value for both–sided hypothesis $0,171 \leq 0,05$						
	0	1	2	3	4	5
Possibility of use of password	-	-	-	-	1	11
Possibility to limit run-time	-	-	-	-	-	12
The possibility of using the option for each question separately	-	-	-	1	1	10
Possibility to view the correct responses	-	-	-	-	-	12
The summary of evaluation	-	-	-	-	-	12

Friedman test p–value is 0.171. *Mean Rank* - the sum of average ranking ( $R_i / b$ ) does not differ significantly in graduation classes (Table 2). The conclusion is that the respondents are satisfied with the capabilities of the test tools and uses all of possibilities: to use of password, to limit run–time, to view the correct responses, to use the summary of evaluation.

If the Home economics and technologies teacher manages to use ICT facilities, she/he can successfully use the computers' benefits in Home economics and technologies lessons on her/him own.

Students acquire the knowledge and skills of managing household and the family in study subject Home economics and technologies. Authors uses the benefits of ICT in school subjects, selecting the topics for whom the use of new technologies would be possible and useful also to meet the standard of elementary education compulsory subject content. Home economics sample program indicates that the content of Home economics and technologies is closely related to other study subjects. It would be necessary that teachers work together and subject content of each class is specified and used in connection with other study subjects. Informatics is one of the study subjects that can be successfully used for Home economics and technologies learning process, taking into account the peculiarities of the age groups of pupils.

The study content emphasizes the importance of students' practical activity – it must be planned at least 75% of the entire learning time allowed. Learning process must be organized so that students are able to independently search and find solutions to practical problems, to formulate and justify the choice of technical solutions and choice, to develop inventiveness and imagination, to cooperate and work as a team, to build a creative operational experience, to see and feel and increase the beauty



around you, to evaluate own and others' work and its results. The authors take into account these conditions when information technologies is used in Home economics and technologies lessons.

In the process of preparation of the new generation for modern social life the authors offers to use information technologies. This way pupils learn several skills: to organize her/his life, to keep her/his surroundings in order, to select and cook a healthy diet, to get to know the material cultural heritage.

### Conclusions

- Didactic usability of the information communication technologies (ICT) in Home economics and technologies lessons are the following:
  - for preparing the theory: creation of video material, using a variety of image and video files; creating a presentation using a sound recording files;
  - for implementation of workshops: creation of various compositions; developing technical patterns using pictures or photos; designing clothing patterns;
  - for the development of tests: creating the tests in e–environment; crossword making; using of test design tools.
- The most important issue in any learning process on usage of ICT is to prepare teachers to understand and learn to respect the learners' autonomy, authenticity, learning styles and motivation.
- Doing tests with the computer has the following advantages compared to the traditional testing in writing:
  - all the action takes place with the help of computers, then it is not necessary to copy a worksheet for every student, thus saves expenses for paper;
  - the teacher does not need to fix the student works, because the computer verifies which answers are correct and shows the scores and evaluations;
  - improving the pupil's computer skills;
  - the possibility to use information of multimedia and internet;
  - work with the computer makes the learning process more interesting, because it is different from traditional methods;
  - the student can take the test independently, thus verifying its own competence.
- ICT learning is a crucial factor in the training of youth and also for the development of adult skills. Educator openness to new technologies and willingness to try new programs and communication channels is more important than to be competent in a number of specific programs.
- Preparation of methodological materials and tests requires a knowledge based real execution of operations in a specific order (algorithm) by the given terms, acceptable to students with normal user experience in order to avoid negative psychological stress. Using tests educator must be diversified: prepared, positive, safe, open.
- Using the developed and practically approbated tests in study subject Home economics and technologies with a choice of textile technologies – knitting, clothing, sewing and weaving, using P. Caunes developed software package "Tests", which is foreseen for preparation of teaching test, filling and knowledge assessment, it is possible:
  - to offer more wider opportunities than usual through the tasks on paper, because it is possible to use interactive exercises on computer, which are supplemented with multimedia capabilities (pictures / illustrations);
  - save time, thus allowing more time for practical pupils' work in lessons.
- The study results showed that school teachers of Home economics and technologies used computers – mainly for distant communication - E - mail (average ranking 4.5), to search for information (average rank 4.46), E-class (average rank of 4, 13) the development of teaching materials (average rank 4.08). In addition, P.Caune' test developed software package is used more often than Dz.Roves and they are satisfied with the test tool's creation opportunities offered for the teachers' needs. Friedman test p–value of 0.171, Mean Rank - the sum of average ranking (Ri / b) in graduation classes do not differ significantly.
- As the result of research the authors recommend to use software package "Tests for evaluation and strengthening of students skills " starting from the grade 7, when pupils have acquired basic knowledge of information and communication technologies.

## Bibliography

1. Agejevs V. (2005). *Semiotika* (Semiotics). Jumava, Rīga, Latvia, 196 lpp. (in Latvian)
2. Betels Dž. (2003). *Rokasgrāmata pārbaudes darbu veidotājiem* (Handbook for manual test makers). Rīga, Latvia, 84 lpp. (in Latvian)
3. Brain bench the measure of achievement. [online] [19.11.2014]. Available at <https://www.brainbench.com/xml/bb/common/testcenter/consumer/testcenter.xml>
4. Caune P. (2002). Mācību materiāli. Cilvēks. Daba. Sabiedrība. Programmpakete „Tests”. FTP servera fails (Training materials. Human. Nature. Society. Software package Tests). [online] [19.11.2014]. Available at [https://www.mykoob.lv/?index/liis\\_macibu\\_materiali/post/1](https://www.mykoob.lv/?index/liis_macibu_materiali/post/1) (in Latvian)
5. Cuban L. (1993). Computers Meet Classroom: Classroom Wins. *Teachers College Record* Vol. 95, No.2, p.185–210, [online] [19.11.2014]. Available at <http://sdexter.net/xyz/CompMeets%20Classroom.pdf>
6. Grundspenķis J. (2009). *Sistēmu teorijas metodes* (Methods of Systems Theory). The Department of System Theory and design, Riga Technical University, Riga, Latvia. (in Latvian)
7. Holmes B., Gardner J. (2006). E-learning: concepts and practice. London, S.
8. *ICT in Initial teacher training* (2009). Finland. Country report. [online] [19.11.2014]. Available at <http://www.oecd.org/edu/cei/45214586.pdf>
9. Karnītis E. (2004). Informācijas sabiedrība – Latvijas iespējas un uzdrošināšanās (Information Society - Latvian opportunities and boldness). Pētergailis, Rīga, Latvia, 208 lpp. (in Latvian)
10. Koenraad T. (2008). Interactive Whiteboards in educational practice. ([online] [19.11.2014]. Available at <http://www.scribd.com/doc/21254905/Interactive-Whiteboards-in-educational-practice>
11. Ķīkāns A. (2009). Mācību procesa datorizācijas risinājumi un to izmantošana vispārējās izglītības iestādēs (Solutions of computerization of learning process and its use in mainstream schools). Maģistra darbs (Master Thesis). LLU, Jelgava, Latvia, LLU, 98 lpp. (in Latvian)
12. Līce I. (2012). Change of directions of Home Economics subject. Proceedings of the International Scientific Conference *Rural Environment. Education. Personality* (REEP), Dišlere V. (Ed), Volume 5, LLU, Jelgava, Latvia, pp. 241–248. [online] [19.11.2014]. Available at <http://llufb.llu.lv/conference/REEP/2012/REEP-2012-proceedings-E-ISSN-2255-808X.pdf>
13. Löffström E., Kanerva K., Tuuttila L., Lehtinen A. & Nevgi A. (2006). Quality teaching in web-based environments: Handbook for university teachers. p.18–19. [online] [19.11.2014]. Available at [http://www.helsinki.fi/julkaisut/aineisto/hallinnon\\_julkaisu\\_73\\_2010.pdf](http://www.helsinki.fi/julkaisut/aineisto/hallinnon_julkaisu_73_2010.pdf)
14. *Mykoob educational social network*. Learning materials. [online] [19.11.2014]. Available at [https://www.mykoob.lv/?index/liis\\_macibu\\_materiali/category/68/filterby/all/filterfields/](https://www.mykoob.lv/?index/liis_macibu_materiali/category/68/filterby/all/filterfields/)
15. Sproģe S. (2007). Mācību procesa informācijas tehnoloģiju laikmetā (Learning process in the epoch of information technologies). Maģistra darbs (Master Thesis). LLU, Jelgava, Latvia, 80 lpp. (in Latvian)
16. Vronska N. (2012). Topošo skolotāju informācijas un komunikācijas tehnoloģiju integrēšanas prasmju attīstība mājdarbā un mājsaimniecības izglītībā (Development of prospective teacher information and communication technologies integration skills in household and home economics education). Promocijas darbs (Doctoral Thesis). LLU, Jelgava, Latvia, 163 lpp. (in Latvian)
17. Vronskis O., Vronska N. (2011). USING of information technologies to improve the spatial understanding of students. Proceedings of the VIII International Scientific Conference *Environment. Technology. Resources*. 2.sēj., Rēzeknes Augstskola, Rēzekne, Latvia, pp.55. – 61.
18. Žogla I. (2001). *Didaktikas teorētiskie pamati* (Theoretical foundations of didactics). RaKa, Rīga, Latvia, 275 lpp. (in Latvian)
19. Коджаспирова Г.М. (2004). Педагогика: Учебник для студентов образовательных учреждений среднего профессионального образования (Textbook for students of vocational secondary schools). Владос, Москва, Russia, 352с. (In Russian)