

# Evaluating Items Structure and Objectivity on E-Commerce Subject

S. Riurean, M. Leba, A. Ionica

**Abstract** — Teaching, but even more important, evaluating students, are both art and science. In this paper there are some diverse models of evaluation items presented to assist the classroom teacher in its mid and final term evaluation for an accurate appreciation of the knowledge and skills acquired by students during academic semester or year. The first part, presents specific structure of few evaluation items - according to their level of objectivity - used in a test construction, followed by a short presentation of the subjects taught at electronic commerce curricula. In the second part, the principles pointed out in the first part are applied to evaluate electronic commerce discipline presented at college level. Illustrations of objectives, testing techniques, and sample test items in this particular subject area are also presented. There are many examples described in different papers of good practices regarding e-commerce evaluation for shops. Some of them mostly describe the issue at a theoretical level and only few make a review on shop created by students. Here are some examples of objective items applied to e-commerce shops with different levels of possible reliable objectivity, together with points of evaluation. This paper is intended to support teachers to find the best ways of using evaluation to improve learning in this specific area – electronic commerce, being also useful for students in teacher-training and graduate programs, curriculum specialists and students interested in developing proper quiz structure.

**Keywords**— e-commerce, various items, quiz.

## I. FUNDAMENTAL PRINCIPLES FOR AN APPROPRIATE EVALUATION TEST

**E**ducational environment is one of the most important area of the human kind taking into account that here is the center of knowledge, but most important the characters of the future specialist are formed. Students' evaluation becomes an important issue taking into account that curricula must be able to give graduates the appropriate tools in order to be good business decision makers, professionals and especially practitioners. Both teachers and students are interested in achieving the first objective assessment based on uniform criteria, known and applied in current college's practice [1].

In light of the high school with evidence of multiple choices, students must be prepared to face and pass with good results these tests with the aim to evaluate correctly their knowledge. In the process of learning, teaching and assessment are important elements closely related.

S. Riurean, is with the University of Petroșani, Department of Electrical and Computer Engineering, Universității str., no. 20, HD 332006 Romania (corresponding author to provide phone: 0040 744 517 396; e-mail: simonariurean@upet.ro).

Any change produced at one of these activities affect other modalities of generating a chain reaction, which recalls and requires revision. Therefore, the teaching-learning-assessment should be designed simultaneously [2].

- Evaluation, as an important activity itself, consist of three main steps:

- Measuring educational outcomes through specific procedures, using appropriate tools purpose (written tests, oral tests, practical projects and portfolios);

- Assessment of results based on uniform criteria;

- Formulation of conclusions drawn from interpretation of the results obtained for appropriate educational decision.

Pedagogical theory and practice operates with several types of evaluations [3]. Taking into account the aim of teaching, assessments can be of three types:

- Initial assessment: is done to start a new cycle of learning;

- Formative assessment: teaching accompanies all stages, is accomplished through systematic examination of all students on all subjects;

- Summative assessment: is done usually at the end of a longer training period.

Regarding evaluation methods, between theory and practice there are huge differences between the Romanian traditional assessment and the new ones.

Traditional methods of evaluation are the best known, so they are still the most widely used. They refer to oral evidence, written tests and practical tests. These traditional methods are well known and applied by all teachers. Unfortunately, they are all based on evaluating the subjects memorized by students not on the subject's interpretation ability or creativity of students.

However new methods of assessment, formative potential that supports individualization act by supporting student education, are less known. These refer to systematic observation of student's work and behavior, investigation, project, portfolio and self-assessment [4].

Today, most of the evaluation tests are conducted by multimedia software, PC's being the main evaluation tool in college's current practice or during an exam. Evaluation tests developed with the support of multimedia specialized software being able to evaluate student's knowledge must be developed by teachers having at least minimal knowledge of information technology and communication [5].

There are various assessment methods used by teachers, no matter the subject taught: various items, projects, papers,

portfolios, learning platform assessment, on-line evaluation [5].

The main qualities of an evaluation tool are: validity, reliability, objectivity and applicability.

Moreover, in order to be considered valid, a quiz must cover the entire content of the exam syllabus in an appropriate manner, taking into account the length, difficulty or importance of various aspects of the content covered.

## II. TYPES OF ITEMS USED TO CREATE A HIGH QUALITY EVALUATING TEST

When we refer to an item, the question, its format and expected answer should all be taken into consideration as one.

Very important, especially in terms of achievement tests that are susceptible to scale multimedia applications, is the choice that will shape the types of test items. We will review the main types of items used to tests construction.

Theory and practice of assessment highlights several criteria on which items can be classified. One of the most commonly used criteria is the *degree of objectivity* accomplished by the evaluation tests created by teachers.

According to this principle, items are classified into three main categories:

- Objective items (dual choice items, pair type items, multiple-choices items);
- Partial-objective items;
- Subjective items (direct response).

Objective items ensure a high degree of objectivity in measuring academic achievement and test a large number of elements contained within a relatively short time. Expected

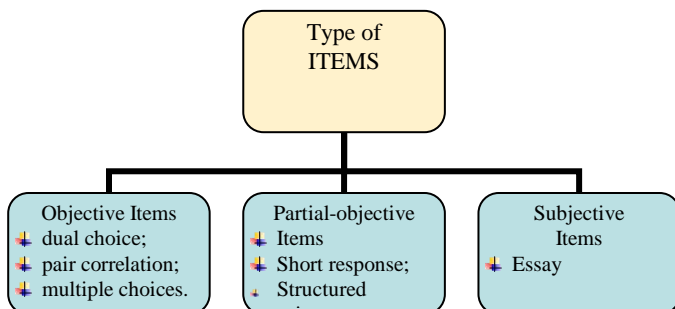


Fig.1. The main items based on degree of objectivity

response is well established as well as its scoring method.

Using semi-objective items, the expected response is not always uniquely determinate methods of correction and grading often induces slight differences from one correction to another. They test a wide range of intellectual abilities, while providing the opportunity to use and aids in solving the proposed assignment.

Subjective items (open response) require a comprehensive response, allowing students to reveal their creative abilities. They are relatively easy to be build, the main problem is how to prepare a scoring scheme so the unity and correction uniformity to be accomplished.

### 2.1. Objective items

The objective items have many qualities such as: structuring tasks proposed to standardize the format of their presentation, strict matching tasks with objectives to assess the ability to test a large number of elements contained in a relatively short time, the possibility of evaluation of the response in short time, the possibility of associating a relatively simple scoring system.

#### A. Dual-choice items

The dual formulation involves a requirement for two variants of response (True / False, Yes / No, Right / Wrong).

Using dual-choice items, the following can be evaluated:

- knowledge of syntactic correctness of expressions (commands, instructions, notations for example);
- understanding the significance of notions of specialized terminology (names, processing tools, solving methods, and so on);
- recognition of explanations, definitions and images.

Items of this kind take the form of questions or statements, reducing the student's effort to identify a second possible response. Also in the category dual-choice items may take part requirements that necessitate the student to anticipate the effect of operations by applying a rigorous system of knowledge in new contexts. These are items with the highest degree of difficulty.

Tests with dual choice items are very often used to run multimedia applications. But discrimination factor is extremely small, the student can obtain an acceptable result on a test composed only of such items randomly choosing one of two admitted responses for each item separately. Typically, dual-choice items are made in combination with subjective items such as: "justify your choice ...", "Type in the correct version ...", "Explain what the error ...".

In these cases, some of points are distributed to correct justification of the choice.

For proper design of dual-choice tests, the following requirements must be taking into account:

- clear expression of statements, without ambiguity or incomplete formulations;
- if required appreciation of true / false, very general expressions should be avoided;
- selection of statements relevant to the category of knowledge or competence test.

For example, the sentence "Any e-commerce software must have a shopping cart. (True / false)" is irrelevant in terms of science and therefore should be avoided in construction of a proper quiz.

- avoid using negative statements, leading to judgments which they use double negation, inducing a high degree of ambiguity;
- avoid placing two ideas in one statement, unless they want to highlight the relationship between them.
- the statements should be approximately equal in length.

### B. Pair correlation items

Pair-correlation items require to make proper associations of information distributed between two columns. The first column contains the statement type (allowed), the second column containing the response data type. The student must link each statement with a single response.

The two columns are preceded by instructions that explain the technique of pair formation (to join them by a line) and indicates whether a response can be used in more than one statement.

With these kind of items, there can be checked the students' ability to establish correlations between:

- functions and instruments;
- symbols and concepts;
- terms and definitions;
- problems and solving methods.

These types of items allow a large volume of information in a relatively small time. Discrimination factor is slightly higher than in dual-choice items.

For a proper design of such items, they should be in accordance with the following requirements:

- use a homogeneous material, a relatively narrow range;
- use an unequal number of assumptions and answers;
- arranging the list of answers in a logical order;
- arranging sentences in list so they cannot deduce an association rule.

### C. Multiple-choice items

Multiple-choice items are the most used types of items, especially standardized tests (e.g. college admission, or high school admission, bachelor evaluation for degree and so on).

A multiple-choice item consists of a statement called *the basic premise* or a number of options from which the student must choose one answer named *the key*. All the other answers that not comply with this definition but seeming to be plausible are called distractors. Pair type items should form and check the students' ability to identify:

- definitions and notations;
- suitable tool for manufacturing for example;
- sequences of a program performing a specific process;
- expression is given value;
- specialized relationships, terms and expressions;
- solving methods and techniques for implementation.

Items of this type allow to evaluate a large amount of information in a relatively short time, although they cannot measure student ability to organize and express ideas. They are testing forms with a high precision but the discrimination factor is higher than for other objective items. For a proper design of multiple-choice items, the following requirements should be encountered:

- establishing clear requirements, according to an objective assessment;
- provide all necessary prerequisite information, eliminating any irrelevant material;
- formulate premise questions using affirmations or positive statement;
- construction of plausible alternatives, which are consistent with the premise;

- formulate the item so that there is a single possible correct answer or its best alternative;

- construct few alternatives in such a manner that distractors are obvious wrong answers or less possible answers and the correct key answer is clearly the best choice;

- arranging the list of answers in a logical order so that the search response in the entire list to be done easy.

### 2.2. Partial-objective items

Semi-objective items make up a category of evaluation tools that require construction of a partial or complete response based on a defined task.

Semi-objective items are characterized by:

- creation of higher cognitive situations by requiring the development of response and choice of a variety of default, as with objective items;

- items should allow the possibility to test both various intellectual capacities of the students and teaching results;

- partly subjective reporting in relation to teacher's reply (written answer may be ordered or disordered, expressions used could be clearer or less clear, the terms used may fall in some scientific standards or may be their individual choice, and so on).

#### A. Short response items

Short response items require a short answer or fill out a claim that it makes sense or have a truth value.

Using these types of items, by completing the short answer, the following may be checked:

- knowledge of concepts, terms or phrases, symbols, notations, and so on;

- recognition and nomination of visual elements specific to a work environment;

- ability to integrate the necessary elements of syntactic or semantic terms in a given context;

Short response items appear most often in the form of questions. They require a response restricted form (a number, symbol, word, phrase, a sentence).

For proper design of items with short response / add-on is required to respect the following requirements:

- formulate the phrase so as to permit a single correct answer, if possible;

- targeting a response that represents a synthesis of knowledge or a result of understanding a situation rather than a reproduction of information.

#### B. Structured Questions

Structured questions ask a sub questions system relative to a common theme, objective type answers, short answers or filling, which can evaluate complex knowledge on that topic to find someone without developing an essay (open response).

Through structured questions the ability to develop, step by step, a complex process or system, can be checked.

In order to consider correct evaluation test using structured questions, the following requirements should be taken into consideration:

- the first questions should require simple answers being followed by questions with a gradually higher difficulty level;
- correct answers in quiz should not depend on the previous correct answers;
- there should be a clear consistency between the main question and sub-questions in the entire quiz.

### 2.3. Subjective items

Subjective items form a category of tools aiming to evaluate the students' creativity, originality and even personal nature.

Although they are easily made, subjective items raise many problems of objectivity during evaluation.

Usually, the subjective items are used during an evaluation test when is necessary to address global questions that cannot be evaluated by any of the previous objective items.

#### *Items of essay-type*

Items of essay type can be free or structured.

Items are arranged so that the expected response is to be directed by an indication of the order of treatment, number of lines, the response, ideas to be achieved, etc.

Free essay statement does not provide any guidance or constraints, so the student has the freedom to structure as it sees and how it calls the item. This essay involves maximum complexity operations as analysis, synthesis, and systematic restructuring allowing students to reveal his/her creative capacities.

### III. COLLEGE CURRICULA OF E-COMMERCE DISCIPLINE

The Internet, and thus e-commerce, both Business to Consumer (B2C) and Business to Business (B2B), has changed the way companies do business with each other and communicate with their customers.

Due to Internet's exponential growth, information transfer both among companies and between a company and its customers has become faster, albeit technologically more complex, in the e-commerce era. Today, on-line shopping is one of key business activities offered over the Internet.

It has been a challenge for e-companies to develop creative and satisfying ways of communicating with their customers. After all, the Internet is more than two decades old, and till now has been adequate accumulation of knowledge about customers' behavior.

Unlike in conventional shopping where the customer takes the product with him/her or makes specific delivery arrangements in a specific geographical zone, in e-commerce activity, the customer picks a specific delivery method and payment from literally anywhere in the world at any time.

Many surveys on e-commerce sites reveals the increased use and interest focused on e-commerce. Convenience, saving time, safety, absence of sales pressure, and many others are the reasons of this wide spread interest. There is a large literature on website evaluation from the information literacy perspective [11]. For example, in Japan, Ariga and Yoshida developed in 1998 an evaluation standard and checklist to read Web pages critically as teaching materials for a network literacy course and then studied its effectiveness [12].

This e-commerce subject is taught in Romania at many university specializations, but here we are going to present the Commerce Tourism and Services Economy specialization, taught during the second year of study, the first semester.

Electronic Commerce Curricula consists of:

- Definition, history and models of e-commerce.
  - Electronic trading platforms;
  - E-Commerce Security and actual fraud's types and level;
  - Measures to prevent internet fraud, Internet shopping safe;
  - Online shopping and payments. Techniques and methods;
  - Steps to be followed in order to open an on-line shop:
    - from marketing to sales;
    - attracting online customers;
    - best practice to improve services and keep business running.
  - Specific e-commerce models of tourism in Romania.
- Best practice;
- Online advertisement. Definition. Models. Advantages of online advertising versus traditional one. AdWords and Analytics;
  - The legal framework of electronic commerce in Romania;
  - Obstacles to be taken for a fast e-commerce development in Romania;
  - Code of behavior for e-commerce activity;
  - development of a personalized e-shop, based on an open source e-commerce application (Magento 6.2., osCommerce 6.3., PrestaShop).

### IV. EXAMPLE OF EVALUATING TEST AT E-COMMERCE SUBJECT

Topic I - total 36 points.

18 multiple-choice objective items, with five response options from which there is only one correct version.

For each item is given two points.

Example:

The model of e-commerce that allows user to access a company data and transaction, is:

- a. User-to-Business;
- b. User-to-Online Buying;
- c. Business-to-Business;
- d. User-to-Data;
- e. Application Integration.

Topic II - Total 24 points.

16 objective items and part-objective of which:

- 8 items with multiple-choice objective items, with five response options from which there many (or all) possible correct versions, with 2 points each;

Example:

3-D Secure is:

- a. an authentication technology;
- b. uses encryption offered by Secure Sockets Layer;
- c. description of a physical shop;
- d. application of a virtual shop.
- e. a site for commerce.

Note: The question above has 3 correct answers. Only a complete answer (all three of them marked) will be evaluated as correct, given the two points.

- 8 items with dual choice (True/False), 1 point each.

Example:

Encryption is defined as automatic data encoding technique in computer before they are submitted, for purposes of security. (True/False)

Topic III - In total 30 points.

Students must create their own e-commerce shop, using an open source application.

Evaluating this assessment is not an easy job, being difficult to evaluate it with objectivity. That is why, few important indicators have to be underlined and marks as appropriate for evaluation, taking into account common design features for comparison as in figure no 2.

Common design features consist in few specific bookmarks pointed out for a proper evaluation [12].

8 points for contents with:

- useful and sufficient contents;
- comprehensiveness;
- accuracy;
- adequacy for intended users.

8 points for design with:

- font, style, page layout, color, design consistency

c) 4 points for the *site structure*

- organization of information, navigation support.

d) 4 points for *security / privacy*

- no breach of individual right;
- protection against criminal acts.

e) 3 points for *user-friendliness*

- awareness of needs of impaired population;
- regard for browser versions;
- hardware platforms, network speed

f) 3 points for *medium use*

- appropriate use of interactivity;
- multimedia movement;
- application program, sound, video.

g) 2 points for *charm*

- provisions to make users feel comfortable and amused.

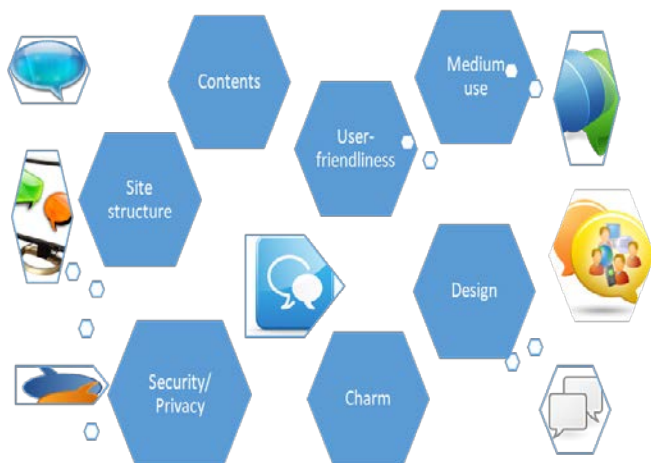


Fig. 2. Common design features for e-commerce shop

Due to exponential growing and evolution of technology, as well as customer's perception and demands, the above mentioned criteria for a proper evaluation regarding an e-commerce shop designed by students are not exhaustive and definitive.

There have been many attempts to underline proper evaluation according to rigorous theoretical constructions and empirical data. For example, Zhang and von Dran supported the Herzberg's motivation theory [14] Jung and Butler underlined 15 important guidelines [15] while [16] described 100 and even more (600) were described in [17].

Still, no matter how many guidelines or how deep the subject is split in how many pieces, is teacher's responsibility to choose proper question for the most important subjects taught at e-commerce. We refer here to the significant subject having practical applications. For example, is less important to know by heart diverse lists of characteristics or advantages than to be able to explain the difference between *http* and *https*.

For the e-commerce site construction and evaluation, other reliable bibliographical sources are [18] and [19].

Still, there are many consideration regarding a proper evaluation of a good e-commerce shop designed by students. Following many years of e-commerce teaching and evaluation, there are some important conclusions that can be drawn.

First of all, students need to be encouraged to let free their imagination and pick up the e-commerce shop's subject according to their own personal preference. No matter if they choose services or products to sell on the platform, the evaluation criteria of their project has to be proper explained before starting the project. This conclusion is based on both perceived usefulness and perceived ease of use. Perceived usefulness refers to the degree to which an individual believes that using a particular system would enhance his/her job performance and on the other hand, perceived ease of use states the degree to which an individual believes that using a particular system would be free of physical and mental effort [20].

Thus, the guide pillars have to be properly marked from the beginning and the evaluation tasks becomes easier for the teacher and closer possible to objectivity goal.

Making the evaluation as from a customer's perspective of value-added is another issue to be taken into account among all the others above [21].

## V. CONCLUSION

Teaching involves great responsibility taking into account that each and every student has to discover the best "professional way" and achieve his/her professional goal after finishing education. In order to precise estimate the information and tools that have been given to future professionals, proper evaluation is a very important step that has to be taken into account. That is why, this stage is important and teachers have to give the right importance to tests they make with the aim of evaluating student's knowledge and acquisitions. Final tests must contain as many as possible item types with the purpose of having a proper image about final acquisition and practical abilities acquired by graduates.

To this aim, this paper presents some examples of possible objective evaluation items and few questions related to significant subject taught according to e-commerce curricula, together with maximum possible points to be awarded for correct answers. A proper complete evaluation, beside questions, consists in evaluation of an e-commerce shop constructed by students. Contents and design should be the most important goals for the students to achieve in their e-commerce shop project, followed by shop (site) structure, security, user-friendliness, medium use and last but not least, charm. All of these mentioned features of the site are gradually awarded with points according to their importance proposed in this paper. Thus, due to exponential growing and fast evolution of online customer's perception and demands as well as technological progress, the criteria mentioned here, for an objective and proper evaluation of an e-commerce shop designed by students, are not exhaustive and definitive, being subject of continuous improvement.

#### REFERENCES

- [1]. C. Ionescu, "Metodica predării informaticii", Universitatea "Babeş-Bolyai" Cluj 1999
- [2]. C. Masalagiu, I. Asiminoaei, "Didactica predării informaticii", Editura Polirom, 2004.
- [3]. I. Nicola, "Pedagogie", Editura Didactica si Pedagogica Bucuresti, 1994
- [4]. C. Masalagiu C., Asiminoaei, I. Maxim, "Metodica predării informaticii" Editura MatrixRom, Bucuresti, 2001.
- [5]. C. Petre, Popa, D., et al. – Metodica predării Informaticii și Tehnologiei Informației. Editura Arves, Craiova 2002
- [6]. Stoica A. Evaluarea curentă și examenele, Ghid pentru profesori, Editura Prognosis, București, 2001
- [7]. A Stoica "Vocational Education and Training Reform in Romania and Bosnia-Herzegovina: strategy, legislation, and implementation" European Journal of Education, Volume 38, Issue 2, 213-222 Publisher Blackwell Publishing Ltd. 2003
- [8]. S. Riurean, O. Domsa "Didactica predării informaticii si T.I.C." Editura Universitas, Petrosani, 2013
- [9] J Blazewicz, J. Musial "E-Commerce Evaluation - Multi-Item Internet Shopping. Optimization and Heuristic Algorithms" January 2011 Operations Research Proceedings Springer-Verlag Heidelberg
- [10] Bernard Susser, Taeko Ariga "Teaching e-commerce Web page evaluation and design: a pilot study using tourism destination sites" Computers & Education 47 (2006) 399–413 Elsevier
- [11] Auer, N. J. (2003). "Bibliography on evaluating web information". Retrieved October 20, 2003 from <http://www.lib.vt.edu/research/evaluate/evalbiblio.html>.
- [12] Yoshida, T., Ariga, T. (1998). "Chekkurisuto wo tsukatte Web pe-ji no hihanteki hyouka to sono kouka [A critical evaluation checklist for web pages and its effectiveness]" Proceedings of the 56th conference of the Information Processing Society of Japan (4) (pp. 260–261).
- [13] Zhang, P., & von Dran, G. M. (2000). Satisfiers and dissatisfiers: A two-factor model for website design and evaluation. *Journal of the American Society for Information Science*, 51(14), 1253–1268.
- [14] Zhang, Ping, Gisela von Dran, Ruth Small, Silvia Barcellos (2000), A Two-Factor Theory for Website Design, Proceedings of the Hawaii International Conference on Systems Science (HICSS 33), Hawaii, January, 2000.
- [15] Jung Timothy H, Butler Richard (2000) The measurement of the marketing effectiveness of the Internet in the tourism and hospitality industry *Information and Communication Technologies in Tourism*, pag. 460-472, Publisher Springer, Vienna
- [16] Ivory Melody, Mankoff Jennifer (2003) Using Automated Tools To Improve Web Site Usage By Users With Diverse Abilities IT&SOCIETY, VOLUME 1, ISSUE 3, PP. TK-TK <http://www.ITandSociety.org>
- [17] Carton I (2002) The 160 best practices of the top eRetail sites. Lessons to be learnt for your own site. eShopability Newsletter.
- [18] Lynch, P. J., & Horton, S. (1999). *Web style guide: Basic design principles for creating websites*. New Haven, CT: Yale University Press
- [19] Ivory, M. Y., Sinha, R. R., & Hearst, M. A. (2001). Empirically validated web page design metrics. In Proceedings of ACM CHI 2001 conference on human factors in computing systems, (pp. 53–60) SIGCHI01, March 31 to April 4, 2001, Seattle, WA. Retrieved September 24, 2003 from <http://webtango.berkeley.edu/papers/chi2001/chi2001.pdf>.
- [20] Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology, *MIS Quarterly*, 13,319–340.
- [21] James Ho (1997) Evaluating the World Wide Web: a Global Study of Commercial Sites. *Journal of Computer-Mediated Communication*, Volume 3, Issue 1, 1 June 1997, JCMC312, <https://doi.org/10.1111/j.1083-6101.1997.tb00066.x>
- \*\*\* Programe școlare pentru clasele IX-XII, ECT, CNC, [www.edu.ro](http://www.edu.ro)
- \*\*\* Ghid de metodologie pentru Educație tehnologică, Informatică și Tehnologia Informației, CNC, Editura Aramis 2001