

PERSONALISATION OF DISTANCE AND E-LEARNING FOR LEARNING CONTENT

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ABSTRACT. Personalisation of learning, i.e. adapting the learning content according to the specific preferences, needs, interests and learning styles of each learner, increases the efficiency of e-learning and distance learning. A large number of training courses on one and the same subject can be found on the Internet, presented in different ways, with varying degrees of multimedia use, of different duration and degree of complexity. The learner has the difficult task to choose from the wide variety of electronic courses the most appropriate one for his style of learning, basic competencies and skills. This is not always possible, and even when finally a course is chosen, the probability of achieving the initial goal (reaching a certain level of competence on a given issue) for a short time is quite small. The article discusses the individualisation of learning as a set of procedures, approaches and techniques to provide learners with the means to make progress in their own capacities and leisure, to choose the type and mode of delivery of teaching materials on the basis of their preferences.

Keywords: personalisation, adaptive approach, e-learning and distance learning

ПЕРСОНАЛИЗИРАНЕ НА ОБУЧЕНИЕТО ПРИ ЕЛЕКТРОННИ И ДИСТАНЦИОННИ ФОРМИ ЗА ПОЛУЧАВАНЕ НА УЧЕБНО СЪДЪРЖАНИЕ

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РЕЗЮМЕ. Персонализирането на обучението, т.е. адаптиране на учебното съдържание на базата на специфичните предпочитания, потребности, интереси и стил на учене на всеки обучаем повишава ефективността на електронното и дистанционно обучение. В Интернет пространството могат да се открият твърде много учебни курсове по една и съща тема, поднесени по различен начин, с различна степен на използване на мултимедия, с различно времетраене и степен на сложност. На обучаемия е поставена трудната задача сам да отсее от голямото разнообразие електронни курсове най-подходящия за неговия стил на учене, базисни компетенции и умения. Това не винаги е възможно, а дори и да се стигне до избор на учебен курс, вероятността да се постигне първоначалната цел (достигане до определено ниво на компетенции по даден проблем) за кратко време е твърде малка. Статията разглежда индивидуализацията на обучението като набор от процедури, подходи и техники за предоставяне на обучаемите средства, които да им позволяват да напредват според своите възможности и свободно време, да избират вида и начина на доставяне на учебните материали на базата на предпочитанията си.

Ключови думи: персонализиране, адаптивен подход, електронно и дистанционно обучение

Introduction

Over the past two decades, e-learning and distance learning have become a part of our lives as a way to quickly and comfortably acquire new knowledge and skills without having to break away from our usual work.

Through the Internet, different educational institutions offer a variety of courses on topics that are of interest to us, and the problem for each learner is to choose the most appropriate and effective one for them, which is not an easy task.

Even if the learner chooses the best course according to understanding, there's no guarantee that he/she will achieve his/her original aim – i.e. the necessary set of competencies and skills, because his/her basic knowledge and competences rarely match with the style and manner of presentation of the educational content. In order for the learner to achieve the set goals there is an increasing need for the so-called personalisation (individualisation) of the training offered through various electronic and distance forms.

Requirements for the individualisation of the e-learning

The individualisation of learning could be seen as a set of procedures, approaches and techniques to provide the learners with learning content, which will enable them to progress according to their capabilities and free time, to choose the type and mode of delivery of learning materials based on their basic competencies and preferences (Aleksieva-Petrova et al., 2017). In addition, learners want their e-learning to be as close as possible to their personal style and way of acquiring the learning content, i.e. to be able to adapt the learning content to their knowledge, which is very difficult to be achieved.

The individualisation or adaptation of the learning content to the learners' personal characteristics is a complex process that requires:

1. Initial data collection for each learner, which includes at least:
 - Information about his/her interests;

- The level of knowledge in the field;
 - The style of studying and learning.
2. Sustained storage of the received data, its maintenance and use in the search for and supply of appropriate teaching materials;
 3. Accumulation and storage of learner behavioural data when interacting with the eLearning system, which means that the system needs to monitor and remember:
 - The topics of learning materials which the learner was searching for;
 - How often a particular learning material has been used;
 - What keywords have been used most often in search of information in the system;
 - What results have been achieved in the knowledge control,
 - Has the learner used learning materials which do not reflect his style of learning, etc.?
 4. Analysis of collected data on learners' behaviour.

The results obtained after the behavioural analysis can be used by developers of learning materials (in most cases, these are teachers or authors of the courses) to obtain adequate information to what extent their training units are of interest to the learners, if they are tailored to their needs and preferences and are useful for improving the individualisation of learning.

Approaches to e-learning personalisation

Segmentation

The first attempts to personalise the e-learning and distance learning are based on the so-called segmentation of the content. According to this approach, the learning content is divided into modules, each module incorporating a certain level of knowledge and skills, starting from the lowest level (for beginners in the proposed subject matter) and moving on to the next, more advanced levels of knowledge (Ivanov, 2012).

This approach has been borrowed from the traditional training methods, as it is most used in language teaching. Both in the traditional and e-learning, this approach necessitates the learner to undertake a test in order to determine the level of knowledge and depending on the results (i.e. the gaps in his/her knowledge), the learner is advised which level is appropriate for him/her. The learner has to achieve the results expected at the respective level before moving on to the next one (Fig. 1).

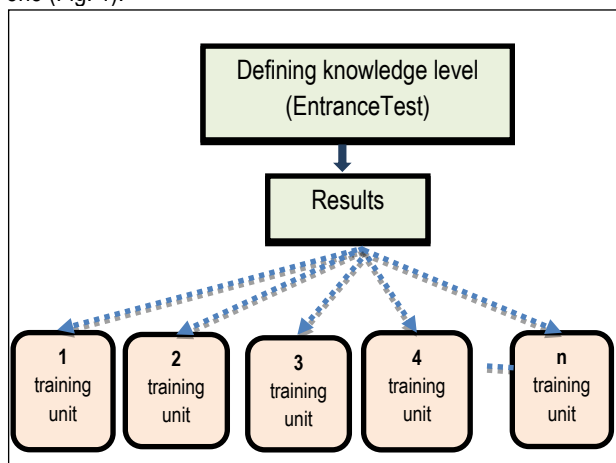


Fig. 1. Segmenting the learning content

The segmentation of the proposed content is not particularly appropriate for the personalisation of e-learning, as it only takes into account the level of knowledge of the learner, and not the style and manner of learning of each individual.

Personalisation (individualisation)

The most effective approach for personalising the learning is based on the dependence on the individual's learning style.

The learning style reflects the way the information is perceived and processed (Totkov, 2014). When a teacher knows the trainees' learning style, he can choose appropriate training methods to ensure learning efficiency (Yanev, Ivanov, 2016). It reflects the different ways in which people perceive, think, remember, and learn.

Each person gradually develops behaviour and specific approaches to learning, i.e. each individual has his/her own style of learning. This is related to three processes that are responsible for the differences in styles:

- Knowledge – the way of acquiring the knowledge;
- Rationalisation (conceptualisation) – each individual's ability to process the information;
- Motivation and emotions – decision-making process, values and emotional affiliations, which are strictly individual, hence this process is the most difficult to be summarised.

The approach used in modern distance and e-learning systems is to gather sufficient personal information in order to "recognise" the individual learning style of each learner. On the basis of this knowledge, the system could select appropriate learning content corresponding to the specific learning style.

The implementation of this approach is not an easy task, since in e-learning the teachers who provide the electronic content might have no direct contact with the learner, which makes it difficult to build a personal profile.

For this reason, in modern electronic and distance learning systems additional features are incorporated aimed at monitoring student's behaviour and storing characteristic information for each individual in the relevant database.

In order to comply with the relevant regulatory mechanisms on personal data protection and privacy of the information, prior to the training it is necessary each learner to be aware what kind of personal information the e-learning system collects and processes to customise the training. In case the learner does not agree to the processing of this type of information, he/she must be aware that it is impossible to get a customised training content and depending on the implementation of the e-learning system the learner can benefit only from the opportunity for segmentation or can access only specific modules.

The characteristic information collected by e-learning systems is organised generally in the so-called learner's profile, which is basically structured information in the relevant database, separated and describing the characteristics of each trainee. These characteristics most commonly include data about the learner's behaviour, abilities, habits, knowledge level, interests, etc. The characteristic information collected in the individual dossier of each learner is analysed and depending on the results, changes in the behaviour of the e-learning system are undertaken. These changes are usually called adaptation of the electronic and distance learning systems to the learner, and the accumulation of characteristic information about the learner – individualisation (personalisation).

Individualised e-learning takes the trainee out of the standard model of traditional learning. Using modern information technologies, the distance and e-learning systems and the modern communication systems provide the learner with an individual way of learning that includes:

- Individualisation of the provided learning content - in accordance with his/her knowledge and the type of information (text, graphics, audio, video, multimedia, etc.);
- Individual pace of learning;
- Maximum flexibility in terms of time, location and type of device (desktop computer, laptop, tablet, mobile phone) when acquiring the learning content;
- Possibility for individualisation of the current and end control.

To respond to these challenges, e-learning systems should be able to offer an individual learning environment tailored to the characteristics of each learner.

In order to implement this process in modern e-learning systems, training activities are designed to provide each learner with content adapted to his/her characteristics (Monova-Zheleva, Zhelev, 2007). The aim of this approach is to ensure maximum personalisation and the multiple use of adaptive learning activities. As a result, learners will interact with learning activities tailored to their style and specific characteristics.

In practice it is impossible to have e-learning systems with 100% personalised learning environments due to the differences in each individual. The purpose of the approach for customisation of training is to get closer as much as possible to the preferences of each learner (Fig. 2).

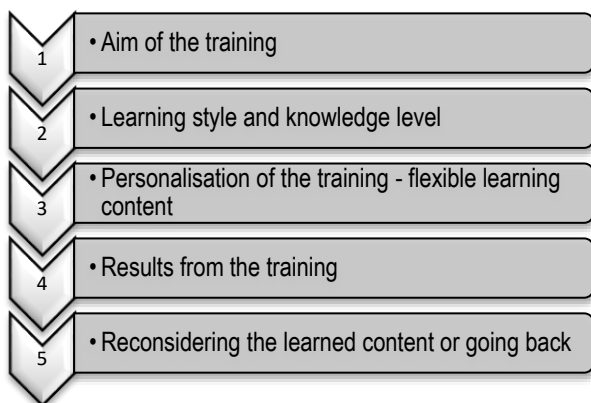


Fig. 2. Personalisation of the learning style according to the individual characteristics

To implement the personalisation, without breaching the requirements for personal data protection there is a need for standardisation and specifications of the systems, providing customised e-learning.

One of the consortia for e-learning – Instructional Management System Global Learning Consortium (IMS) – offers a set of certified products for creating e-learning content, providing this kind of specifications. The aim of the Consortium is for the design of the training units for electronic and distance learning to be more formalised and suitable for interpretation by computer systems.

The process of individualisation can be implemented both by building complex and to a large extent closed systems, and

by using multiple Web-based services. The architecture of e-learning systems offers a clustering of Web services at different levels, including:

- Agents providing the interface between the learners and the educational services. They combine user applications and programme agents to ensure the maintenance of essential elements in terms of the standards for e-learning systems. The agents guarantee the copyright of the educational content, manage the training and provide access to the training;
- Educational services that are a collection of data models and patterns of behaviour. The components constituting this level are characterised by functions that implement a particular behavioural pattern. Each service is identifiable, discoverable, platform independent and included in a grouped logical set. It also disposes of built-in tools to manage access and data protection rights.

Adaptive e-learning

The best results in personalisation of e-learning are provided by using adaptive learning. This is an educational method that uses sophisticated computer algorithms to organise the interaction of the e-learning system (respectively the teacher) with the trainee and to provide personalised resources and learning activities corresponding to his/her unique needs.

E-learning systems using this method, adapt (enable the system to modify) the provision or the presentation of learning content according to the specific needs of each learner as a function of the information about him/her (Ivanov, Zabunov, 2005). The information about a particular learner is obtained through monitoring, analysis and assessment of the achievements and results in the implementation of successfully passed tests, activities and tasks assigned to him/her and the experience gained.

The technology, which enables the implementation of adaptive e-learning systems, covers aspects resulting from the different areas of study, including information technology, using artificial intelligence, psychometry, education, psychology and brain science.

The IMS Simple Sequencing Specification (IMS SS) defines the method for presenting the planned behaviour, so that each training system to arrange consistently the discrete learning units. It defines the required functionalities and behaviours and includes rules, which describe the branch or the so-called flow of training according to the results from the interactions of the learner with the content. Sharable Content Object Reference Standard Model (SCORM) defines a specific way to build learning management systems (LMS). The various versions of SCORM manage basically two things in the e-learning systems: packing (separating appropriate units of study) of the proposed training content and continuous exchange of data during training.

The combination of the IMS SS specification and the SCORM standard allows the adaptive learning strategy to be transformed into sets of rules and operations that manage the sequence of learning activities. These rules are based on the learner's progress achieved in the learning process while simultaneously controlling the learner's access to the learning content.

On the basis of consistency rules for the content offered, the e-learning system registers each activity performed by the trainee. Its progress is monitored by determining the values of a set of characteristics used to record his/her achievements. The results of the analysis of these characteristics and the application of the rules set out in the system determine the further course of the training, i.e. they adapt the learning content according to the knowledge already acquired (Fig. 3).

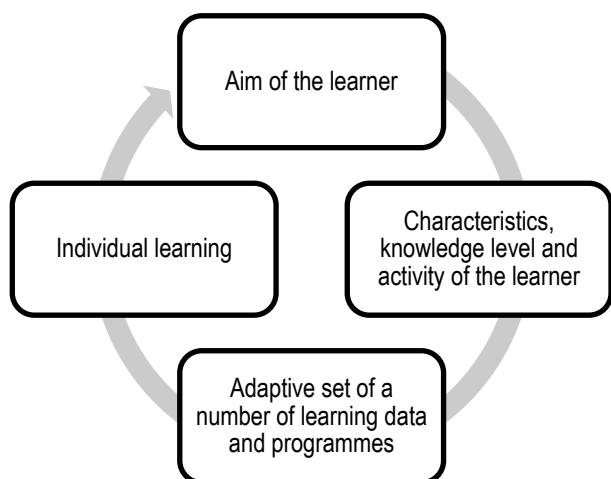


Fig. 3. General scheme of adaptive e-learning systems

Conclusion

The personalisation of learning in electronic and distance learning forms includes all three approaches – segmentation, individualisation and adaptation.

The learning content is divided into separate learning units (groups of topics) that are logically interrelated. The learner fills in a specialised set of e-content questions (so-called entry test) that determines the knowledge level (learning unit) from which the training process begins.

In the learning process, on the basis of an analysis of the information collected by the e-learning system on the style and the method for acquiring the learning content by the particular learner and the results displayed, the system selects the sequence, volume and type of materials to be used by the learner in order to reach a certain level of competence.

Depending on the results displayed by the learner in learning process, the e-learning system may adapt the learning

content for each individual, which is carried out through specific sets of rules and procedures.

The main advantages of personalisation and adaptability in the distance and e-learning systems are:

- Possibility to personalise the learning in a heterogeneous learners' group (learners with different levels of knowledge and learning styles);
- Creating a personal learning flow (individualised learning content delivery);
- Providing an approach which is as close as possible to the learner's style of learning;
- Focusing on filling in the knowledge gaps of each learner (offering additional learning content);
- More efficient use of training time.

According to statistics, the supply of learning content on the Internet has grown by 23% on average per year over the last five years. The large number of courses offered increase the learners' requirements, thus pre-supposing the demand for e-learning systems, which offer individual and adaptive approach to the utilisation of knowledge and competencies.

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