

# **PEDAGOGICAL ASPECTS OF E-LEARNING AND THEIR DEPENDENCES ON ICT AND TECHNICAL FACILITIES**

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## **ABSTRACT**

Theoretical concepts and antecedents of e-learning, their contributions and exploitation potency for contemporary applications are themes of the article. Do generally applicable rules independent on used technologies and technical equipment exist? Does it make sense (if yes then when) to transfer material content from one generation of technical tools to another? Considerations are based on experience from Grant Agency of CR project "Theoretical concepts, sources and technical background of e-learning" research. One of the project's intentions is to define the importance of author work on non-aging topics devalued by technical advances.

## **KEYWORDS**

Information and Communication Technology (ICT), Programme Instruction, courseware, e-learning

## **INTRODUCTION**

If we think of e-Learning as of learning mediated by electronic information and communication technologies it is obvious that its theoretical concepts rise from two sources:

- From theory of education providing generally applicable information on different kinds of learning processes and methods raising their efficiency
- From knowledge of electronic information search, processing, storage and transfer methods including multimedia use.

If we want to accept this approach we have to consider the educational (didactic) quality of e-learning study materials as priority. It does not necessarily mean that the study materials should be simple; but their complexity should be supported by clear goals and results explanation or explanation of complexity importance for educational process. Even in this case the education quality is the most valuable element of e-learning study materials.

ICT is a tool – very advanced at the present time and in a way constantly being advanced. The problem is that this tool is being advanced only "in a way". If the development effects up only engineering process, bit rate, picture and sound quality, resources availability, easy text and object manipulation and almost instantaneous possibility of contact with the tutor etc. it does not guarantee the better quality of learning process per se. On contrary some negative effects can come up.

Sometimes we imply that students who choose the e-L form of education have all necessary work habits but we have never clearly defined these work habits. We often require computer, Internet and E-mail user skills. But very rarely (if ever) we explicitly ask for information handling and questioning skills as well as problem formulation and data examination skills, ability of result algorithm development and critical review, ability of judgement formulation and confrontation of controversial opinions etc. (see Example 1). However these abilities and skills are necessary for studying from electronic study materials.

We assume that the teacher's interest is to make studying easier for recipients (students, courses participants etc.) and therefore the study materials should support this effort. Possibility of digitalization of text, picture and sound makes great conditions for that. But it is more demanding on teacher's time, method and requirement elaboration etc., because all author mistakes are fixed, easy to find and their negative impact is increased due to ICT potency.

The most treasured teacher's contribution to successful studies of his/her students is the didactic transformation of study materials. Teacher should be always aware of the fact that his/her educational activity is often the first student's experience with intellectual work methods and their optimization.

## **THE PART OF OUR HISTORY**

Thoughts of the effective use of computer data processing potential for study process are very old. Czech and Slovak researchers have studied this phenomenon - some of their findings had been very interesting however they soon fell into oblivion - or they rediscovered already known findings.

Indisputable antecedent to e-L was computer based learning, programme instruction or computer-controlled education. A lot of Czechoslovak people devoted themselves to the development of this education in spite of the ideological and technical embargo in last decades. Cybernetic aspects of education were optimal topic for computer technology application. The critics of "directed learning" did not often understand that this "directedness" is based on feedback – regulation which is the most effective education method ever regardless of its technical implementation. In contemporary books focused on this historical period we can often find fallacious information on programmed learning. (e.g. restricting to five Skinner's principles incident only the first period of programmed learning development).

Fact that the effect of cybernetic methods did not come up to expectations was largely caused by the undervaluation of author work in this area as well as reluctancy of some teachers to remit his/her methods to close inspection that computer only does as a tutor. Therefore the creations of these enthusiasts who solved each educational problem with such invention, erudition and effort that often put to shame modern Internet multimedia products should never be forgotten.

## **HOW WE ARE GOING ON?**

Irreplaceableness and originality of pedagogical author work led to the attempts to transform products originally created for obsolete technical media to computer-run products.

This attempt was one of the Grant Agency of CR project *Theoretical concepts, sources and technical background of e-learning* goals. The leader of this project is Jana Kapounová from University of Ostrava and the project is being solved at more two Faculties of Education (in Prague and in Pilsen). Those faculties significantly contributed to development of didactic and information technologies as well as technical instruments of education.

The other goal was the methods and processes analysis that would help to decide whether generally applicable rules for creation of electronic study materials exist independently of used technologies and technical equipment and whether these rules can be transferred from one generation of technical equipment to another.

After collecting and sorting of available materials several products representing most common types of technical processing were selected. They were then transformed to electronic form applying different procedures; the applicable methodology was made for each procedure.

### **Applicable types of tools:**

- Programs for teaching machine KE 30<sup>1</sup> (really simple one, electro-mechanic type, about 1964, more in)
- Diaphones
- Educational films
- Programs for teaching units UNITUTOR1 (about 1965; medium was the film strip; semiconductors, transistors; linear and simply branched programmes)
- Education programs distributed in the form of “disorganized book”
- Programs for IQ 180 (first generation of Czech personal computer, about 1983)

Items No 1, 2 and 3 has been already transformed. The methodology for transformation of large-size wall picture tools is being created these days. The transformation of item No 5 – “jumbled text book” - programmed text from basic university mathematics materials will be implemented next year (after copyright resolving). The example of transformed teaching aid shall be presented at the conference.

After two years of work researchers drew several conclusions. Their validity will be verified in the third year of this research. Some recommendations will appear in conclusion.

## **CONCLUSIONS**

### **Reasons for transformation of materials from obsolete media**

The material should be transformed if:

- the topic is unusual or if the topic has not been yet elaborated or its elaboration is not available
- it contains excellent elaboration of difficult topic (from the educational point of view)
- it contains interesting graphic information, video or animated sequence
- it contains illustrative examples
- it contains useful exercises and problem solutions (they are always handy)<sup>2</sup>
- the feedback and the determination of further progress is solved on high level<sup>2</sup>

NO if:

- comparable topic elaboration exists
- picture and sound materials are of low quality
- there is not sufficiently big or socially substantial target group
- work expenditure/effect ratio is disadvantageous
- the problem of copyright has not been solved.

### **Generally applicable recommendations for creation of e-Learning study materials**

- Perfect content (without mistakes) is necessary but not sufficient condition of success. If missing it is necessary to explain author’s intention and the reasons for not using it.
- Didactic component of study material is more important than the technical one.
- Graphical special effects and animations should be used for didactic purposes only. (Relaxation or other forms of psychical regulation are considered as didactic functions as well).
- Abidance by typographical rules can improve user comfort and simplify the learning process. (meaningful use of colours, austere styles; see Example 4)
- Other factors that influent the learning process
  - Text segmentation (suitable for dyslexic students or students with minor visual impairment; see Examples 5 and 6).
  - Lucidity of topics and their contents
  - Comprehensibility of working methods (easy navigation, intuitive orientation)
  - Use of diagrams, tables, charts, picture illustrations

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<sup>1</sup> described in Tůma, J. et al. book „Modern Teaching Aids in Education

<sup>2</sup> The Examples shall be presented at the conference.

- Global set information structure as well as information structure of each page/window is necessary condition of success. Also sentence structure and formatting belong to this category (see Ex. 7)
- Condition of dynamic feedback is set of questions and problems (as many as possible) related to each topic and each educational goal. This requires results elaboration, example presentations or list of references and links – eventually reasoning for absence of solutions and possibility of alternative solution (correspondence, e-mail option). Most of failures relate to questions and answers formulations – see Example. 8).
- Tasks demanding manipulation of information from study materials not only help better understanding but also help spontaneous learning and knowledge fixation (see Ex. 5)

According to specific features of particular forms (printed texts, computer presentations, web pages, multimedia CD applications, e-mail) conclusions and recommendations as well as valorized methodologies for all transformation procedures will be included in final report next year.

Further information about the results gained so far in the project Grant Agency of CR follows in the contribution by Jana Kapounová and Kateřina Kostolányiová.

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## SUPPLEMENT

to the article by Ohlídková B. and Mlčková M.

### Example 1.

<b>A n n o t a t i o n s</b>	Total 90
Professional annotation	18
Confused annotation and resume	42
Exceeding coverage	35
Irrelevant information	40
Important data missing	61
Stylistic mistakes	64
Grammatical mistakes	5

*Only 20% of students of “Diploma work elaboration course” were able to enunciate their diploma work annotation. Nearly half of them confused annotation and resume. Annotation of many was needlessly long. Some students also presented unessential information in their annotations; on the other side a lot of important information was missing (goals, methods). First version texts also contained a lot of stylistic mistakes. 5 grammatical mistakes occurred.*

### Example 2.

The example of transformed teaching aid (diaphone „Baroque Prague“) shall be presented at the conference.

### Example 3.

The example of transformed teaching aid shall be presented at the conference.

Example 4.



A)



B)

*Even simple make-up can improve general appearance: When integrating graphic features it is good to unify the background and frames of the features.*

*Example 1 A) from „Introduction to computer typography (not only) for people with hearing impairment“*

*Example 1 B) the same demonstration processed in Painting program.*

## Example 5.

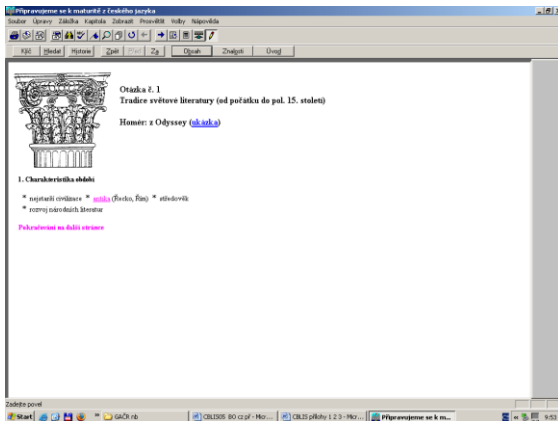


The instructional PC program „Preparing for Language Maturity Exam in“ offers:

- 40 themes to worked out
- 4 vocabularies of special topics
- Standard ways for comfortable seeking
- Assessments for students,
- plentiful text materials
- making student's own notes, printing.

Disadvantage: –design of pages unsuitable for reading at computer screen.

### How pages of the programe look like



### DETAIL

#### Thema No 1.

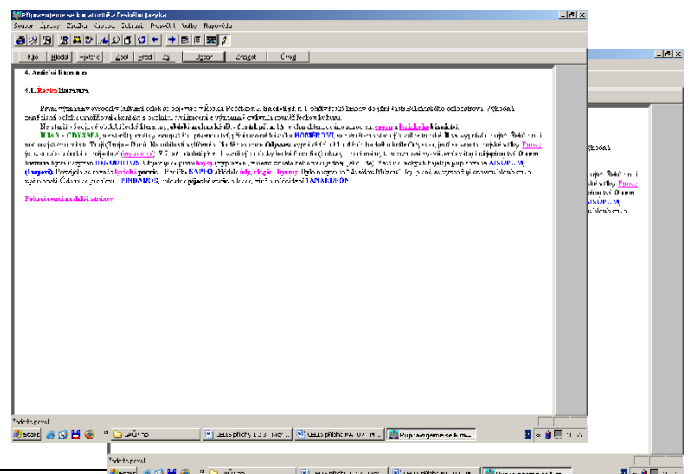
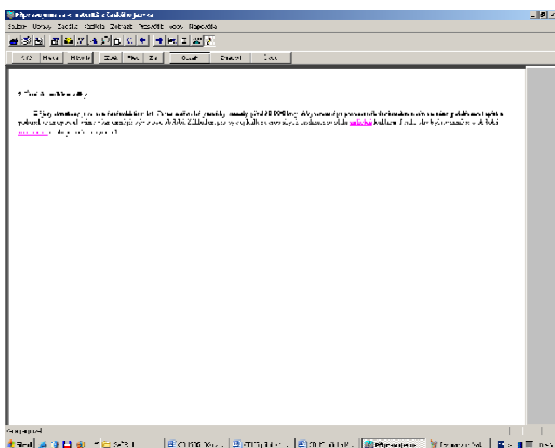
Tradition of Literature worldwide (from the begining og 15th century)

Homér: z Odyssey ([ukázka](#))

#### 1. Charakteristika období

- \* nejstarší civilizace \* [antika](#) (Řecko, Řím) \*
- středověk
- \* rozvoj národních literatur

*Continuing - next page*



#### Redesigne course text this way:

- structure
- study text (to be printed)
- lists of authors, works
- summary
- sheet of authors, works and genres
- vocabulary of special topics
- Power Point presentation



**Tasks for students  
(to each one theme)**

## The result



### STRUCTURE

1. Charakteristika období
2. Úvod do problematiky
3. Nejstarší kultury
4. Antická literatura
5. Středověká literatura
6. Poznámka

### Theme No 1. Tradition of Literature worldwide (from the beginning of 15th century)

#### LIST OF AUTHORS

- HOMÉR
- HÉRODOTOS
- AISÓP Ezop
- SAPFÓ
- PINDAROS,
- ANAKREÓN.
- THESPIDUS
- ARISTOTELES
- PLATÓN
- LIVIUS ANDRONICUS
- VERGILIUS,
- VERGILIUS,
- VERGILIUS,
- HORATIUS
- OVIDIUS
- SENECA

#### LIST OF WORKS

- EPOS O GILGAMEŠOVI (Sumer)
- BIBLE (hebrejská lit)
- VÉDY, MAHÁBHÁRATA a RÁMÁJANA. (Indie)
- KNIHA PÍSNÍ (Čína)
- AVESTA (Persie)
- ILLIAS a ODYSSEA (Řecko)
- PERŠANÉ
- SPOUTANÝ PROMÉTHEUS
- ORESTEIA
- KRÁL OIPIPIUS, ANTIGONA,

- LUCRETIUS TACITUS
- CICERO
- PETRONIUS
- MARTIAL.
- KÁLIDÁSA

#### Part of the table (sorted by the country)

Countries	Authors	Works	Genres
Řecko	HOMÉR	Ilias	epická báseň
Řecko	AISCHYLES	Oresteia	drama
Řecko	SOFOKLES	Antigona	drama
...	...	...	...

#### Part of special vocabulary:

- **řeč nevlastní přímá** - má podobu přímé promluvy, avšak není vyznačena uvozovkami, graficky, a tak splývá s řečí vypravěče; je slohovým prostředkem prózy 20. stol.
- **slova jednoznačná** - slova mající pouze jeden význam; vyskytují se jen v malé míře (např. jména vlastní, zvukomalebná citoslovce, odborné názvy apod.)

#### Design for print (part of page) ▼

#### Tradice světové literatury (od počátku do poloviny 15. století)

##### 1. Charakteristika období

- nejstarší civilizace
- středověk
- **antika** (Řecko, Řím)
- rozvoj národních literatur


##### 2. Úvod do problematiky

Dějiny literatury jsou staré několik tisíc let. První umělecké památky vznikly před **30 000** lety. Abychom lépe porozuměli dnešní literatuře, pokusíme se zmapovat významná období jejího vývoje. Základem pro vývoj kultur evropských civilizací se stala **antická** kultura. Její vliv byl nejsilnější v období **renesance** a nikdy zcela nevymizel.

##### 3. Nejstarší kultury

Ještě před vznikem řecké literatury se ve **4. a 3. tisíciletí před naším letopočtem** rozvíjely v povodí velkých asijských řek Eufratu a Tigridu, Indu, Gangy a Brahmaputry, v Číně i Africe státní celky s vyspělou slovesnou kulturou.






## 1. Tradice světové literatury

od počátku do poloviny 15. století


1



## Osnova

1. Charakteristika období
2. Úvod do problematiky
3. Nejstarší kultury
4. Antická literatura
5. Středověká literatura
6. Poznámka - použité pojmy


2



## 1. Charakteristika období

- nejstarší civilizace
- antika (Řecko, Řím)
- středověk
- rozvoj národních literatur


3



## 2. Úvod do problematiky

První umělecké památky před **30 000** lety

**Antická kultura**  
základ kultur evropských civilizací




## 3. Nejstarší kultury

Ve **4. a 3. tisíciletí** př. n. l.

- v povodí velkých asijských řek Eufratu a Tigridu, Indu, Gangy ...
- v Číně i Africe

**vznikaly státní celky s vyspělou slovesnou kulturou.**

4




## Sumerové - Mezopotámie

asi od začátku 4. tisíciletí př. n. l. do začátku 2. tisíciletí př. n. l.,

- **klínové písmo**
- **sumerská literatura:**  
**EPOS O GILGAMEŠOVI**


5



## Hebrejské písemnictví

- **BIBLE** - první tisíciletí př. n. l.
- křesťanská církev - **Starý zákon** v **bibli** křesťanské
- na začátku Starého zákona 5 knih **Pentateuchu**

6



## Indické písemnictví

- Základ tvořily rozsáhlé **hymny**, tzv. **VÉDY**.
- Počátkem 1. tisíciletí př. n. l. vznikaly **eposy** na základě indické **mytologie**. Nejproslulejší jsou eposy **MAHÁBHÁRATA** a **RÁMÁJANA**.



## Example 6.

<p style="text-align: center;"><b>Výukové materiály</b></p> <p>„studijní opory“ výukový balík - soubor studijních pomůcek a materiálů:</p> <ul style="list-style-type: none"><li>• <b>skutečný balík (tištěné texty, chemikálie k pokusům, audiokazety, videokazety)</b></li><li>• <b>heslo umožňující vstup do elektronického výukového prostředí (textové dokumenty, audiozáznamy, videozáznamy, obrázky, hypertext)</b></li></ul>	<p style="text-align: center;"><b>Výukové materiály - „studijní opory“</b></p> <p style="text-align: center;"><b>Výukový balík</b> soubor studijních pomůcek a materiálů:</p> <ul style="list-style-type: none"><li>• <b>skutečný balík</b> tištěné texty, chemikálie k pokusům, audiokazety, videokazety</li><li>• <b>heslo umožňující vstup</b> do elektronického výukového prostředí textové dokumenty, audiozáznamy, videozáznamy, obrázky, hypertext</li></ul>
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A) B)

Example A) from M. Černá's presentation „Basic HTML Course“ ÚVT UK Prague, 2003

Example B) modified regarding more comfortable reading and understanding

Neodmyslitelnou součástí každého výukového procesu jsou **výukové materiály**. E-learning úspěšně využívá nejen tištěných materiálů a materiálů v elektronické podobě, ale také materiálů využívajících multimediálních prvků.

### 8.1 Výukový materiál

Výukový materiál se k studujícímu dostává buď v elektronické podobě, nebo častěji kombinovaně, v elektronické a tištěné podobě, která se zdá být nejvýhodnější, neboť kombinuje výhody a zároveň potlačuje nedostatky obou.

**Výukový materiál** může být vytvořen jako kombinace textu, animací, audia, videa, grafiky, simulací atd. Užití všech těchto prostředků zvyšuje upamatování daného učiva, neboť látka vnímaná více smysly se lépe upamatuje. **Multimediální prezentace** má prostředky nejen k učení, tj. např. hotové návody a odpovědi, ale může také otvírat problémy a podněcovat k úvahám. Případná **zpětná vazba** může být poskytována jinou cestou v jiném čase (tj. asynchronně, off-line).

Součástí multimediálního materiálu může být i tzv. **live materiál**, který je vyvíjen a aktualizován společně vyučujícím a studujícím, resp. studujícími v prostředí systému řízení výuky a je vhodný jak pro individuální výuku, tak pro týmovou práci.

#### 8.1.1 Interaktivní prvky

Výukový materiál v elektronické podobě může být obohacen i o jiné **interaktivní prvky**. Interaktivní prvky pomáhají udržet koncentraci při studiu, studující má možnost ověřit si své znalosti a hrát si. Tyto prvky mohou nahradit kontakt s vyučujícím a poskytují studujícímu zpětnou vazbu o stavu jejich znalosti.

**Interaktivní prvky** mohou například zahrnovat:

- **Cíl/Klíčová slova/Motivační otázky**, které pomáhají studujícímu pochopit kam budou následující odstavce směřovat a jaké jsou jejich současné znalosti. Motivační otázky budí chuť a zvědavost najít zdůvodnění správných odpovědí na předložené otázky. Motivační otázky si studující zodpovídá sám a správné odpovědi najde v kurzu;
- **Otázky k zamyslení**. Otevřené otázky k zamyslení nejsou testovacími otázkami. Jejich úkolem je pobízet studujícího k zamyslení se nad probíranou látkou, důsledky už získaných

## Example 7.

*Too many colours (7) used in one page, too compact text, unsuitable font for reading from the screen.  
From Education materials chapter 8, „E-learning not only for*

