STUDENTS' AND TEACHERS' PERCEPTIONS OF USING ELECTRONIC TEXTBOOKS IN EDUCATIONAL PROCESS

Olga Trishchuk[1], Nadija Figol[2], Tetiana Faichuk[3], Svitlana Fiialka[4]

[1,2,4] *National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute", Ukraine*
[3] *O. O. Potebnia Institute of Linguistics of the National Academy of Sciences of Ukraine, Kyiv, Ukraine*

figol_nadija@ukr.net

The research evaluates the effectiveness of using electronic textbooks in educational process compared to printed publications. The advantages and disadvantages of introducing e-textbooks in higher education institutions are determined. The problems that students face while working with e-textbooks are outlined. Based on the literature analysis, the authors claim that e-textbooks are more convenient and are being increasingly used in the educational process. A standardised questionnaire including 17 questions was developed by authors to determine students' and teachers' perceptions of using e- textbooks in educational process. Data analysis tools comprise the methods of mathematical and descriptive statistics. According to the survey, users want to get cheap but high-quality e-textbooks, with a high level of production, without errors, and with completeness of information. The price and the quality play a crucial role in decision making. Also, the criterion of e-textbooks friendliness is of great importance, including ease of search, the ability to navigate by hyperlinks, and adaptive layout for different devices. The problem of standardisation of e-textbooks may be the subject of further research and practical development.

Keywords: electronic publication; electronic textbook; multimedia; illustration; hyperlink.

Introduction

The educational system has dramatically changed with the introduction of information technologies, which should be taken into account in education. It is also very important to evaluate the effectiveness of introducing electronic textbooks into the educational process. Nowadays, there is a scientific problem regarding identification of e-textbook categories, since there are no clear criteria for differentiating and categorising a certain e-textbook as belonging to a specific type. Therefore, the purpose of our research is to determine the specificities of students' and teachers' use of e-textbooks, to systematise the data obtained, to identify the advantages and disadvantages of using e-textbooks in Ukraine and abroad.

Contemporary scientists study e-textbooks in various aspects: history of origin, form, classification (Kyrychok, 2010), structure (Buhaichuk, 2011; Fiialka, 2008), specifics of preparation and requirements thereto (Anokhin, 2012; Korbut, 2010), didactic possibilities (Gryzun, 2002), technologies and specificities of creation (Bilousova, 2012; Kononets, 2009), and the effectiveness of using electronic educational publications (EEP) (Vasylikiv, 2013; Hrytsenchuk, 2005). The requirements to e-textbooks, set in the relevant regulations and standards, also became the subject of interest of scientists (Vember, 2006; Gavrilova, 2014). The main problems that arise during the editorial preparation of educational publications were also outlined (Alekseyenko, 2006).

The analysis of foreign studies showed the relevance of the issues related to the implementation of e-textbooks in the educational process. The following foreign researchers studied the specifics of using e-textbooks: Baker-Evelet and Stone (2015), Bossaller and Kammer (2014), Johnston et al. (2015), Quesada et al. (2015), Van Horn, Russell and Schuh (2016), Kachler (2017), Gresty and Edwards-Jones (2012), Brew and Boud (1995) and others. Most of their works focus on determining the effectiveness of using e-textbooks using surveys and engaging expert groups.

Johnston et al. (2015) evaluate the experience of students who worked with electronic textbooks during a two-year pilot study. Students participated in an online survey that included questions about perceptions of the usefulness and ease of use of textbooks online (p. 65). Researchers highlight the benefits of implementing e-textbooks, such as cost savings, portability, access to different platforms, and features such as audio, video, text links, and full-text search. They come to the conclusion that one of the most important reasons for the introduction of e-textbooks is cost, as the money spent on textbooks is the lion's share of student spending and debt. However, the question regarding the success of e-textbook implementation today remains open, as it is unclear whether e-format can provide books at a reduced price.

Quesada et al. (2015) study the role of electronic devices in the modern educational process. In particular, they note that a significant step forward has been made as the learning process has improved through the adaptation of the environment to the learner, which is achieved by using touch screens or tactile peripherals. Researchers argue that such devices allow teachers and scientists to reproduce and demonstrate

phenomena that could not otherwise be shown experimentally, so the students are allowed to use handheld devices in the classroom.

Baker-Eveleth and Stone (2015) present the results of an empirical study, a survey of students aimed to find out their opinion about the convenience and feasibility of using electronic textbooks. Researchers, comparing e-textbooks with Facebook, conclude that the reason for the transition to digital technology is convenience and fun. In addition, the data confirm that the design of electronic textbooks contribute to the ease of use and better perception of material.

Bossaller and Kammer (2014) investigate the problems that arise with the introduction of e-textbooks, in particular, accessibility, confidentiality and access, as well as cost. Regarding the availability of electronic publications, researchers claim that most students are regular Internet users and have access to a network connection (p. 68). Consequently, the digitisation of books is is a challenging task. It has been found that a bulk procurement scheme, university-level negotiations, the creation and publication of open access textbooks rather than through a publishing house can indeed offer lower prices for students. At the same time, another independent survey (eCampus 2012) found that only 45% of students choose e-texts for a lower price. The Student Research Group of Public Interest found that 75% of students prefer a printed textbook over a digital one. Such studies show that comparing the cost of e-texts to printed ones is not an easy task. Reader settings, ownership, printing, and availability must be included in the total cost. In addition, the new models make sharing impossible, as the purchase of a used book (cited by Bossaller and Kammer,2014).

Thus, most publications focus on determining the effectiveness of e-textbooks, on specific field studies, surveys and the involvement of expert groups. In our opinion, such experimental works are lacking in Ukraine, and this gap is intended to fill our study, which was based on a pilot survey during a two-year experiment in leading higher education institutions in Ukraine.

We hypothesise that e-textbooks are more convenient and are being increasingly used in the educational process. It is conceptual to find out whether all participants of the educational process are aware of the term "electronic textbooks", because, there are no clear criteria for defining this type of publication. The next question that needs to be answered is what criteria influence the desire to use or refuse to use e- textbooks. Based on analytical reasons, this may be the price and quality of e-textbooks, which we will also try to test using an empirical method.

Methodology

In order to find answers to the research questions, we have chosen a quantitative design to our practice-based investigation. We consider our research as quantitative, because it includes the collection and analysis of quantitative (close-ended) data on perceptions of using electronic textbooks by different reference groups (students and teachers). Our research was conducted according to this scheme: quantitative data collection, quantitative description and analysis resulting in interpretation.

The survey is cross-sectional – with the data collected at one point in time. The selection process included a random sample, in which each individual in the population has an equal probability of being selected (a systematic sample). Statistical processing of empirical data was performed by using the SPSS PC program. Descriptive statistics were used to summarise single variable indicators (random sample statistics); as well as correlations between two or more variables (correlation-regression analysis). The method of mathematical statistics – statistical observation – was applied. A pilot survey was conducted among students of the Publishing and Printing Institute of National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute", as well as a general survey in 5 regions of the country by representative sample.

Participants

In 2017 a selective survey was conducted among students of the Publishing and Printing Institute of National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute" to determine a wide range of questions related to functioning of e- textbooks. This social group was chosen deliberately, as the respondents were not only users, but also future experts in publishing industry.

In 2019 there was a need to comprehensively evaluate the perception of e-textbooks by students through expanding the study's geography. These are the students of leading Ukrainian institutions of higher education from different regions of Ukraine: Oles Honchar Dnipro National University (Dnipro), Zaporizhzhia Polytechnic National University (Zaporizhzhia), Taras Shevchenko National University of Kyiv (Kyiv), National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute" (Kyiv), Borys Grinchenko Kyiv University (Kyiv), Ukrainian Academy of Printing (Lviv). Among 1125 respondents who took part in the survey, 277 were men and 848 were women aged 18–25.

A separate survey was also conducted among teachers from five faculties of Igor Sikorsky Kyiv Polytechnic Institute (the reference group was 60 people) for a comprehensive understanding of the effectiveness of the use of electronic publications in the educational process

Before the experiment started, participants were informed about the nature of experiment, the confidentiality of the observation data, their right to familiarise with the experiment results and were asked for their permission to publish the results of the experiment. Participants could stop the participation in the survey at any time.

Instruments for data collection

A standardised questionnaire including 17 questions was developed. The main criteria for forming the questions were: respondents' correct interpretation and awareness of of the term "electronic publication"; identifying resources and devices that the respondents use in searching for information; the degree of reliability of information given in e-textbooks; quality markers of the publication (completeness of information, ease of search, possibility of constant updating and amending information, ease of access, etc.); motives and incentives that influence the decision to purchase an e-textbook; assessment of factors that influence the decision to use e-textbooks (good reviews, high quality of execution, authority of the publisher/authors, professional need, low price); reasons for refusing to purchase an e-textbook (large number of errors and poor design, inconvenience of search, incompleteness of information, high price); the importance of availability of illustrations, multimedia tools, additions (see Appendix).

Validity

In order to ensure the validity of the survey, the questionnaire were discussed and approved at the meeting of the Department of Publishing and Editing of the Publishing and Printing Institute of Igor Sikorsky Kyiv Polytechnic Institute. The representativeness and objectivity of the questionnaire is confirmed by the participation in the survey of different reference groups. The first reference group consisted of teachers of the Department of Publishing and Editing, who can objectively evaluate the relevance of the questions posed to the phenomenon under study and have a comprehensive understanding of the preparation and production of EEP. The second reference group was the teachers from five faculties of Igor Sikorsky Kyiv Polytechnic Institute (Faculty of Biomedical Engineering, Faculty of Instrument-Making, Physical-Technical Institute, Faculty of Engineering and Chemistry and other departments of PPI). The reliability of the survey of students is ensured by the extension of the sample of research according to the geographical principle (6 higher education institutions have been included) and a quantitative indicator (from 445 to 1125 respondents). The error of conducted repeated surveys among students and teachers was 2-3%, which proves the validity of the conducted survey.

Results

When asked about *understanding the term e-textbook*, 234 respondents (20%) referred to dictionaries and encyclopedias, 401 respondents (35%) referred to manuals and textbooks, 393 respondents (36%) – directories, catalogues, guides and bulletins, and 97 people (9%) – all the listed types of publications. Thus, there is an ambiguous perception and, accordingly, a contradictory interpretation of the term "electronic textbook".

Processing answers to the question about *sources of finding the necessary information* on a particular issue shows the following dynamics: 1016 respondents (90%) would search for information on the Internet; 46 respondents (4%) would use printed publications, 67 respondents (6%) would choose both printed and electronic publications to search for information. These survey data indicate that there is no clear distinction and, as a result, awareness among respondents of the term "electronic publication" and electronic resource (network product). The ultra-low index of using printed media proves the modern benefits of e-textbooks (speed, ease of search, ease of access, etc.).

To determine the *factors* that are critical for students while using an e-textbook, a relevant question defined important, as we think, range of features. Among them were: *completeness of information, ease of search, the authority of the publication; possibility for constant updating and amendment of information; simple access*. Respondents, when answering this question, had the opportunity to select acceptable answers. The result of the survey showed that the majority of respondents (977 people, 87%) consider the *completeness of information and ease of search* as the priority in using an e-textbook. The second importance is given to the *authority of publication* – 493 respondents (44%). Approximately the same number of respondents considered *ease of access* to e-textbook – 377 (33.5%) and the *possibility of continuous updating and amendment of information* – 385 (34%). 192 respondents (17%) were interested in

the *possibility of feedback to authors and editing the text of the publication*. Thus, *the factors of convenient search and completeness of information* are important when using e-textbooks. The *categories of publication authority, ease of access, and the ability to constantly update and amend the information* are somewhat less relevant.

A separate questionnaire block was used to determine *the reasons for purchasing an e-textbook or the reasons for refusing to purchase or use it*. For 756 respondents (67%), *the educational or professional need* is decisive for purchasing an e-textbook; 397 respondents (33%) would decide to purchase the necessary item taking into account the *low-cost* factor; 320 respondents (28%) consider *the high quality* of e-textbook as an important reason to purchase it; only 239 respondents (21%) pay attention to *the authority of the publisher or authors/compilers*. A large number of respondents (865, 77%) would refuse to purchase and use an e-textbook if it contains *many errors and is poorly designed*. Approximately the same number of respondents will not purchase an e-textbook including *incomplete information* (655 people, 58%) and of *high cost* (646 respondents, 57%), slightly less due to the *inconvenience of searching* for necessary materials (497 respondents, 44%).

Determining *the impact of other users' recommendations, feedback and opinions* on the decision to purchase an e-textbook showed that 366 respondents (33%) will surely pay attention thereto, 528 respondents (47%) will sometimes pay attention to others' feedback, 231 (20%) will not take into account others' opinion.

A separate block of questionnaire refers to technical aspects. In particular, the survey showed approximately the same number of respondents who read an e-textbook either only *on computers and laptops* (505 respondents, 45%) or only *on mobile devices* (*phones, tablets*) (547 people, 49%). A small number of respondents (67 people, 6%) use it on all of these devices.

The availability of multimedia is also perceived differently by users, although the trend of the previous survey is generally the same. 496 respondents (42%) see it as a necessary component of an e-textbook, 285 respondents (25%) want to see only high-quality multimedia in e-textbooks. For 390 respondents (33%), multimedia is not an obligatory criterion . Illustrations are important for 517 respondents (46%), 226 (20%) pay attention to the high quality of illustrations, 377 respondents (34%) do not require images in e-textbooks.

The use of *hyperlinks* in e-textbooks indicated that a significant part of the respondents (514 people – 46%) use hyperlinks. At the same time, many respondents (544 – 48%) ignore them, considering it to be a distraction. 67 people (6%) do not understand the essence of the concept of a hyperlink.

For a deeper and more comprehensive understanding of the effectiveness of using electronic publications in the educational process, a survey among teachers was conducted (the reference group was 60 people). Thus, when asked about understanding the term "electronic textbook", 32 respondents (53%) chose a variant that included all types of publications (dictionaries, encyclopedias, directories, catalogues, guides, brochures, manuals, textbooks), which shows deeper awareness of the term by this reference group.

49 (82%) teachers reported that they look for the necessary information on the Internet (90% of students also preferred the Internet). Moreover, 48 people (80%) also consider the Internet to be the most convenient way to access an e-textbook. Another question considered the devices the respondents use when operate with e-textbooks. 45 people (75%) preferred a computer or laptop. At the same time, the teachers turned out to be less trusting on the Internet as a source of information, as 17 people (28%) would always check the information received in the Internet in other sources, 32 people (53%) would do so if the resource was not known or not too authoritative and only 3 people (5%) would trust the data.

The most essential factors for teachers were *completeness of information* – 38 people (63%), *ease of search* – 35 people (58%) and *ease of access* – 34 (56%), which indicates that comfort is a priority for this reference group. The first two criteria (*completeness of information, ease of search*) were of more importance to the students – 87%, while *ease of access* is more important for teachers – 56% vs 34% of students. At the same time, it is almost not essential for the teachers to *edit the publications themselves* – only 6 people (10%) would choose this option.

The *decision to purchase an e-textbook* is primarily influenced by the *professional need* (43 teachers, 71%), *high quality* of the publication is important only for 9 (15%) teachers, and *low price* for 14 (23%), while students have slightly different indicators – 28% and 33% respectively. And only 21% of students and 20% of teachers, when purchasing an e-textbook, take into account *the authority of the publishers and authors*.

The interviewed teachers do not purchase a publication that has *many errors and poor design*, *incomplete information* – 36 (60%) (students were more categorical, and these criteria received 77% and 58% respectively). They also would refuse to purchase and use the e-textbook of *high cost* (37% of teachers) or due to the *inconvenience of searching* for necessary materials (40% of teachers).

Other users' feedback matters to most teachers, among whom 40% would surely follow the recommendations, 45% would sometimes follow the advice of others, and only 3 respondents (5%) would disregard the opinions of others (for students this index was much higher – 20%).

For teachers, the *interactive components* of an e-textbook were important, such as *multimedia* (53%), *illustrations* (55%), but some of them wanted to see these elements *only in a high quality* – 23% and 17% respectively. 53% of teachers (46% of students) use *hyperlinks* as one of the main functions of an e-textbook, which enables them to expand their cognitive abilities.

Thus, we can conclude that quality criteria (literacy, design), completeness of information, user-friendliness are important to all users in choosing an e-textbook, so researchers should pay special attention to these characteristics when developing new products.

Discussion

The experience of foreign researchers convinces the prospect and necessity of conducting a relevant research in Ukraine. Currently in Ukraine, the field of e-textbook research is developing only in the form of separate technical developments, individual articles on this issue. They are intended to provide guidance on how to build a specific manual, designed to help to use a specific electronic publication, and to emphasise the importance of using computer technology and e-textbooks in a specific field of knowledge. There are very few applicable practical studies on using e-textbooks in education, therefore foreign experience is very useful.

Our survey has revealed that most users perceive an e-textbook as a network product and do not realise the essence of the term. When choosing e-textbooks, users pay attention to the reviews, the price and quality of the publication. Also, for most respondents, the indicators of quality are ease of access, convenient search, and completeness of information.

Our results are in line with other studies investigating motivating factors for using e-textbooks both by students and educational institutions. The perceptions of usefulness and satisfaction influence students' continued use of e-textbooks (Baker-Eveleth and Stone, 2015, p. 1002). Other reasons for using e-textbook are its convenience, price and small weight (Millar and Schrier, 2015, p. 178).

Thus, for students, according to our survey, as well as the results of other studies, the priority is given to the categories of price, convenience and mobility, and further intentions of using e-textbooks are influenced by the gained benefits and satisfaction. For educational institutions, the ability to quickly update information, financial and environmental criteria are crucial.

Examining scientific sources gave us the opportunity to highlight another promising and effective area of research in the field of e-textbiiks, i.e. determining the effectiveness of their use based on multi-platform experiments involving a general range of students over long periods of time. One such pilot project analysed the feasibility of using multiple models to provide students' access to e-textbooks (Johnston et al, 2015). The aim of the study was to address how students perceive the simplicity of using e-textbooks and their benefits; how students' experience of reading e-textbooks differs from reading printed publications, how their enthusiasm for electronic publications changes from initial implementation to actual use.

The results of the research showed that the most important factor influencing students' purchase of textbooks was the requirement by the professor, followed closely by the cost of the textbook. The least important factors were the reputation and perception of the textbook among peers and the potential value for resale (Johnston, at al., 2015, p. 71).

Due to our survey, we were able to find out the distinctive nature of perception and specifics of using electronic textbooks, to systematise the data obtained by two reference groups (students, teachers), to highlight the advantages and disadvantages of using e-textbooks in foreign and domestic experience.

According to the survey, users want to get rather cheap e-textbooks but of high-quality, with high level of execution, without errors, and with a complete presentation of information. The price, along with the quality, plays a crucial role in decision making. Also, the criterion of e-textbook friendliness is of great importance, including ease of search, the ability to navigate by hyperlinks, and adaptive layout for different devices.

Conclusions and Recommendations

Having conducted an empirical research, we are convinced that an e-textbook is a convenient and widespread publication in the educational process. Today, unfortunately, most student users are not aware of the meaning of the term "educational textbook". For this purpose, we consider that its definition in the scientific literature needs to be clarified and edited. The types of e-textbooks, as well as the criteria for their differentiation and categorisation as belonging to a specific type, should also be clearly distinguished.

At present, a single research vocabulary has not been agreed on and this complicates scientific communication and the process of e-textbook development. This problem needs to be solved at the state level through developing clear requirements and even control measures to prevent users from obtaining low-quality electronic textbooks. The problem of standardisation of e-textbooks and their introduction into the educational process may be the subject of further research and practical developments.

Having analysed the scientific works on the researched topic, having conducted our own experimental research with further interpretation of results, we have come to the conclusion that practical developments and analytical research in the area of electronic publications are relevant for the modern educational process. Further research may be done to determine the perceptions and specificities of using e-textbooks by a professional reference group "publishers/editors".

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Appendix 1. Questionnaire

1. What is an electronic publication for you? Select whatever is appropriate;
a)   Internet resources;
b)   dictionaries, encyclopedias;
c)   directories, catalogues, guides, brochures;
d)   manuals, textbooks;
e)   all options.

2. What sources of finding the necessary information do you choose?
a)   on the Internet;
b)   printed publications;
c)   both printed and electronic publications.

3. Which devices do you use to reed electronic publications?
a)   computers and laptops;
b)   mobile devices (phones, tablets);
c)   all of these devices.

4. Factors that are critical while using electronic publications (select all acceptable answers):
a)   the completeness of information,
b)   ease of search,
c)   the authority of the publication;
d)   the possibility for constant updating and amendment of information;
e)   ease of access;
f)   the possibility of feedback to authors and editing the text of the publication.

5. What are the reasons for purchasing the electronic publication?
a)   the educational or professional need;
b)   the low cost;
c)   the high quality of execution;
d)   the authority of the publisher/authors/ compilers.

6. Do you follow the feedback of other users when choosing an online edition?
a)   surely pay attention thereto;
b)   sometimes pay attention thereto;
c)   never pay attention to others' opinion.

7. What are the reasons for refusing to purchase or use the electronic publication?
a)   many errors and is poorly designed;
b)   incomplete information;
c)   high cost;
d)   inconvenience of searching.

8. Do you follow the hyperlinks in the electronic edition?
a)   do go to hyperlinks;
b)   ignore hyperlinks;
c)   do not understand the essence of the concept of hyperlink.

9. Is it important for you to have illustrations in an electronic publication?
a)   important;
b)   not important;
c)   only high-quality illustrations.

10. Is it important for you to have multimedia in an electronic publication?
a)   important;
b)   not important;
c)   only high-quality multimedia.