The Market of Ukrainian Printed Books with Augmented Reality: Assortment, Problems and Communicative Aspects

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Abstract

Augmented reality (AR) in printed books brings new possibilities for enriching the reader's experience as well as making the product more attractive to customers. In order to investigate the functionality of augmented reality elements in books and the feasibility of their use this article analyses the Ukrainian AR book market; identifies the Ukrainian publishers that use the technology, describes the promotional activities they do for such books; and assesses the possibilities of readers' access to AR elements in the analysed books.

Given the small number of books using AR available on Ukrainian market and the lack of a standard in its description the search for such books and publishers was carried out manually. In this research we used both classical methods for the analysis of the book market and publishing products, and a system of methods aimed at the analysis of data atypical for the book market, such as the analysis of technological aspects of software or augmented reality.

The first group of publishers consists of specialised publishing houses, for which book production with AR is the main type of activity. The second group includes publishers that have some augmented reality products in the assortment. Within the third group of publishers, books with augmented reality are exclusive; AR technologies are not their area of interest and development.

The most common way to present information about AR in books is to indicate it on the cover; some books have it mentioned on the websites of publishing houses and bookstores, and others use bibliographic details or front and back information for this purpose.

There are mainly children's fiction and educational AR books in the analysed collection, which use different ways of entering augmented reality, such as a QR code, an application or an Instagram effect triggered by an image. These books incorporate 2D and 3D animation, music, sounds, and voiceover; some include a fully recorded audiobook.

Experimental test use of available applications for Android and iOS devices showed some issues in their work due to inconsistency of support, as well as promising possibilities for development. Recommendations on implementing AR elements into publishing products were formulated and possible ways of further research were outlined.

Keywords 1

Publishing market, augmented reality, augmented reality books, interactive capabilities, book promotion

1. Introduction

The definition of augmented reality (AR) refers to a type of virtual environment or virtual reality. Virtual reality technologies completely immerse the user in a synthetic environment, where it is

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impossible to see the real world around you until you plunge into virtual reality completely. Unlike this technology, augmented reality allows the user to see the real world, while virtual objects are superimposed on or integrated into the real world. It follows that this technology complements reality and does not completely replace it. In fact, it seems to the user that virtual and real objects coexist in the same space.

Researcher Ronald Azuma, in his article *A Survey of Augmented Reality*, describes the properties of augmented reality that are widely used today to define the technology. AR technology combines real and virtual objects that are reproduced in real time. It is interactive and also registers or places virtual objects in a real environment [1].

In recent years, augmented reality technology has been introduced into many areas, for example in AR shopping, for travel and learning needs. Of course, the publishing sphere is not an exception. The essence of AR use in books is that when a smartphone or a tablet camera is pointed at the trigger, interactive content opens to users. Readers see virtual objects with animation or video, which they can interact with and control in a story space. Augmented reality is definitely the technology of the future. That is why it is significant to evaluate how it is being used in the contemporary Ukrainian book industry.

Given that today's recipient is primarily visually oriented, finding new ways to engage them in reading is a challenge for modern publishers. The need to intensify interest in books and promotion of reading is a general global trend, to which for instance the Ukrainian Book Institute responds with its activities and projects.

That is why the main goal of this study is to investigate the functionality of augmented reality elements in books and the feasibility of their use; to look at them through the eyes of an average reader (user) and evaluate how readily they are available. This will make it possible to assess the challenges faced by modern publishers and give them recommendations on implementing AR elements into their publishing products.

2. Related Works

Most available sources on the topic analyse concepts, typology [2], [3] or even philosophy of augmented reality [4]. A significant number of works describe its educational and learning purposes [5], research reader's motivation, attitudes [6], concentrate on discovering new levels of reader's experience [7] or making physical printed books more functional [8]. The group of researchers from the University of Surrey in their recent press release [9] announced new unexpected ways of possible book transformation with the means of AR.

During last ten years Ukrainian researchers were also turning their eye to augmented reality in books, first hesitant, but now more widely. One of the most prominent monograph in the field, *Digital transformations of the publishing industry* by Maryna Zhenchenko, briefly mentions a tendency of "gradual transition from the production of individual products to the service-oriented design of customized cross-media publishing projects and services using augmented reality technologies, web analytics data, Internet of things technologies, network communication tools, artificial intelligence technologies for the promotion and sale of publications" [10].

Recently the issue of using augmented reality in books was considered in articles by Svitlana Vodolazka, in doctoral dissertation [11] and series of articles by Anastasia Bessarab, in articles by Yuliia Shchehelska [12] and by Liubov Panchenko et al [13], [14].

3. Proposed methodology

In order to reach the main goal of this research we need to determine which Ukrainian publishers work on the AR market and how they carry out the promotion of such books; to analyse available printed books that implement AR technologies; and to evaluate the types of reading experience they offer. Since we focus on the promotional features of the books, we do not consider textbooks that use augmented reality but are not commercial production. We also do not take into account AR e-books since they do not have a physical printed component.

Taking into account the fact that this technology is a novelty, especially for publishers in Ukraine, the number of Ukrainian books using AR is, statistically speaking, very small. In addition, it is difficult to find information about AR elements in the publication in its description. That is why the search for such books was carried out manually, and this study presents, with very few exceptions, all Ukrainian AR books that are currently available on the book market.

The complexity of the study of the Ukrainian market of books with AR and its development prospects determine the complexity of the research methods we use. The author of the monograph dedicated to the digital transformations of the publishing market [10] outlined the absence of reliable methods of measuring variables as one of the problems of conducting the research upon complex dynamic systems (in particular digital innovations in the publishing industry). This leads to the involvement of survey data, analysis of indirect data and other methods for obtaining objective information.

Therefore, in this research we had to use both classical methods for the analysis of the book market, basic methods for the analysis of publishing products, and a system of methods aimed at the analysis of data atypical for the book market, such as the analysis of technological aspects of software or the typology of augmented reality.

The data collection and comparative analysis methods were used to explore the various examples of available AR books and publishers present on the Ukrainian book market. Using the method of bibliographic information search, systematization and typology, books with augmented reality available in Ukrainian market were identified. The method of commodity analysis of the book product was applied to the way the data about augmented reality in shown in the commodity information about the book and was used for the typology of publications. Systematic and socio-communicative methods were used to analyse the activities of publishing houses and the content of publications, publishers' websites etc. The method of interviewing representatives of each of the categories involved in the process from the production of the edition to the consumer (publishers, designers, bookstore sellers, library workers, buyers, readers) was also applied. The obtained results of empirical information collection were studied and analysed also using general scientific methods of analysis and synthesis, comparison, classification and typology, observation and experiments, generalization and analogy. In order to understand the basic functional features of AR apps and what they bring to the reader's experience, we conducted an experimental test use of the available applications for Android and iOS devices.

4. Results

4.1. Review of publishers specialising in books with augmented reality

Almost a decade has passed between the launch of books with augmented reality in Europe in the early 2000s and their arrival in Ukraine — the active use of AR technologies in Ukrainian book publishing dates back to 2017, when the first publishers and editions of children's books with augmented reality appeared. Over the past 5 years, their number has been constantly growing, and the assortment has expanded to include educational literature and art books [15], [16]. However, this segment of the market is still developing rather slowly, as evidenced by the assortment of bookstores and the observations of researchers. Svitlana Vodolazska, when analysing the factors of the slow entrance of AR technologies into the publishing market in Ukraine, recorded the products of 11 publishing houses on the online bookstore market in 2021, with each publishing house having less than 10 titles [17].

Given this situation, finding information about books with AR and its publishers is quite difficult and had to be conducted manually. It is not very clear in which part of the book this information should be indicated. Existing Ukrainian standards of bibliographic description of books use somewhat outdated approaches and also do not take into account new technological possibilities. The digital data of the Book Chamber of Ukraine named after Ivan Fedorov (a leading Ukrainian organization that contains mandatory copies of all book titles published in Ukraine) do not include augmented reality as one of the book characteristics. Searching by keywords in the catalogues at The Vernadsky National Library of Ukraine (one of the most prominent Ukrainian scientific libraries) gives only one search result with AR.

Upon analysing the Ukrainian publishing market through the prism of the specialisation of publishing houses in AR books, which are also compared in Table 1, we have singled out three groups of publishing structures.

The **first group** consists of specialised publishing houses, for which the production of books with AR is the main type of activity; publications with augmented reality dominate in their assortment. Among them is the publishing house *Art Nation Publishing* (an international group of Art Nation companies), founded in 2017 with the aim of publishing books with augmented reality for family leisure. The very next year, in 2018, the publishers achieved significant success, taking first place in The Largest Circulation of One Title rating (640 thousand copies of *Alice Through the Looking-Glass* and 1 million 241 thousand total copies of both books about Alice's adventures). This publishing house develops augmented reality not only for its own publishing products but also offers AR development services to other publishers-customers. On the Ukrainian market, within the framework of the WowBox project, books were also published by other publishing houses under a license (*Vivat, Ranok*).

In 2018, the *FastAR Kids* trademark by the international FastAR company appeared (the publishing house is registered as *Fastbind Ukraine*), which works in two directions: it develops applications and produces children's printed products with augmented reality (3D and professional sound). This publisher developed "live" ABC-books for younger schoolchildren, which got into school and children's libraries thanks to the recommendations of the Ministry of Education and Science of Ukraine *(Live ABC-Book)* and support of the Ukrainian Cultural Foundation *(Kobzar's ABC-Book)*.

In 2021, *White Owl* publishing house was set up, which is focused on experiments with augmented reality in children's publications. As of summer 2022, there are already 5 book titles in their assortment and pre-sale for the next book has been announced.

The widest assortment of informative encyclopaedias for children and teenagers with 4D on the Ukrainian market was offered by the Russian publishing house *Devar*, which also published these products in Ukrainian.

The appearance of competing publishers specialising in AR books should be expected in the near future, considering the development of technologies, readers' requests, the growth of the global book industry and the course of digitisation in Ukraine.

The **second group** includes publishers whose products include publications with augmented reality but they do not form the basis of the publishing program. Such publishing houses publish books with AR together with traditional books, without placing bets on the technological support of the book, yet the range of these publications allows booksellers and readers to expect new products with AR in their assortment as an extension of series or similar publications. We include *Ranok, Talant, Vivat* and others among such publishing houses.

In the **third group** of publishing houses, books with augmented reality are exclusive; AR technologies are not an area of interest and development for publishers. However, the latest trends in the application of augmented reality and, accordingly, new opportunities also stimulated the preparation of one or more editions with an AR effect. In particular, *Old Lion Publishing House*, which is rapidly developing and monitors world book trends, was one of the first to start publishing books with augmented reality: in 2015, a game application was developed for the book *Antomimes* by the *Agrafka Art Studio*, later a *Pumpkin Year* by Kateryna Babkina with illustrations by Yulia Pylypchasta was "revived" with AR.

In 2018, *Kyiv House of Books* published an adaptation of *Forest Song* by Lesya Ukrainka, which is part of a large animation project and contains elements of augmented reality in the book. Other publishers are also individually diversifying their repertoire with AR publications. For example, in 2019 and 2021, the *Hamazyn* publishing house published Anton Khusnutdinov's comics *Nox. Through Consciousness* and *Nox. Path to the Unknown*. In 2020, *Assa* publishing house started publishing a series of translated fantasy books *The World of Supersaurs* by Jay Jay Burridge, funded by the institutional support of publishers from the Ukrainian Book Institute. With the support of the Ukrainian Cultural Foundation, augmented reality appeared in the monograph about the destroyed wooden churches by *Publisher Oleksandr Savchuk*, as well as in the popular-science guide *Pocket City* and a series of postcards by *Gvara Media* and *Skeiron*.

The analysis of the market of AR books publishers shows that the key players are concentrated in Kyiv and Kharkiv; the main years of growing interest and development of AR in the book business are 2018–2021. The development of augmented reality technologies in the book industry stimulated the emergence of new publishing houses on the Ukrainian market.

Table 1
Publishers of books with AR

Publisher, series	City	Start year of publication of AR books	Number of AR books	Reader's age group	Genre
Old Lion Publishing House	Lviv	2015	1	8+	stories
Art Nation Publishing	Kyiv	2017	7	12+	fairy tales
FastAR Kids	Kyiv	2018	19	5+	ABC-books
Kyiv House of Books (Mavka)	Kyiv	2018	1	6+	fantasy
Ranok	Kharkiv	2019	7	12+	fairy tales
Talant (iExplore)	Kharkiv	2019	4	6+	encyclopaedias
Hamazyn	Kyiv	2019	2	7+	comics
Vivat	Kharkiv	2020	7	12+	fairy tales
Assa	Kharkiv	2020	1	9+	fantasy
Publisher O. Savchuk	Kharkiv	2021	1	18+	monograph
Gwara Media	Kharkiv	2021	1	18+	travel guide
Smile (A gift for a smart person)	Kharkiv	2021	4	3+	cognitive
White Owl	Kyiv	2021	5	3+	fairy tales

The basis of the assortment of Ukrainian AR books is children's editions targeting children of middle school age and teenagers, however, there are many editions for the youngest readers aged 3 years and up (the majority are editions of fairy tales, encyclopaedias and ABC-books).

Publications for adult readers also use augmented reality, although this development is not as intense as in children's literature. Diversification of adult reading with additional technical possibilities is also one of the trends in the Ukrainian book market. One of the factors that stimulated the introduction of the latest technologies in the book industry was the grant opportunities provided by the Ukrainian Cultural Foundation, created in 2017, which financed innovative publications that have high artistic value and cultural significance and promote the latest book publishing technologies. Augmented reality has become one of the innovative components of publications on culture and art, as well as fiction. A demonstrative example of the apt use of augmented reality in an art publication is the publication of Stefan Taranushenko's book *Destroyed Masterpieces of Ukrainian Wooden Sacred Architecture*, which was carried out by the publisher Oleksandr Savchuk. The publication contains 3D models of the destroyed temples, which allow you to see the churches in detail and preserve their images for posterity. One of the factors behind the use of augmented reality in such publications is to attract the younger generation to the study of ancient architecture and the preservation of cultural heritage.
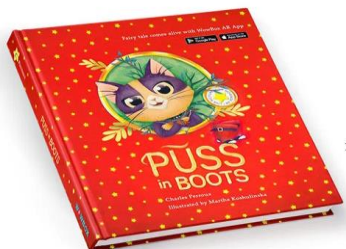
4.2. Information about augmented reality in books

In publications with augmented reality, the digital factor is an important component of the book, so informing the reader about the availability of AR technologies is an important part of product information. While researching Ukrainian publications with augmented reality, we found that there is no single search algorithm either on the publishers' websites or in the networks of online bookstores. Searching the catalogues of children's or adult libraries for information about such publications is almost completely fruitless.

Modern technologies and methods of informing about the book on the websites of publishing houses, bookstores and online stores make it possible to provide a detailed description of the book, including its technical parameters: volume, format, presence of illustrations and other details, yet information about augmented reality or additional applications for its use is absent in most of the cases studied.

Having analysed an array of publications with augmented reality, we summarised the typical trends in presenting information about AR in publications:

1. the most common is the indication on the cover ("augmented reality", "live book", "bring me to life", "book comes to life with the app...", "free app", "living encyclopaedia", WOW, "volumetric illustrations inside", images of Google Play and App Store logos, AR marks, smartphone and sound icons, etc.);

2. on the websites of publishing houses and bookstores, information about AR can be added to the title of the publication (*Sleeping Beauty. A Tale with Augmented Reality*, Bookstore Ye) or displayed in a section (on the website of the *Smile* publishing house, the section *Books with AR Effect (Augmented reality))*. On the individual websites of bookstores and other stores, such information is provided in the section *Other Characteristics* ("3D effect", "Devar Kids application");

3. indication in the bibliographic information and on the front and back (back side of the book cover, endpaper, separate pages with a description of how to bring the book to life, etc.). An example of presentation of information about augmented reality in the title, and therefore also in the bibliographic description, is the 2nd edition of Stefan Taranushenko's book *Destroyed Masterpieces of Ukrainian Wooden Sacred Architecture*: *A Book with Augmented Reality (Publisher Oleksandr Savchuk)*. Some publishers of children's books with AR indicate the following information on the end pages (*Charles Perrault. Sleeping Beauty: Augmented Reality Book 6+*. The book is part of the WowBox project). The *White Owl* publishing house indicates the authors of augmented reality on the end pages.

Figure 1: Information about the book and AR on the website of the publishing house (Art Nation)

Considering the peculiarities of books with AR, it is important to note that they also require a special approach to the promotion of the published product. Book trailers and video reviews are effective means of promoting book products with augmented reality because they visually demonstrate fragments of augmented reality, interactive capabilities, encourage purchase, allow you to navigate technical features and familiarize yourself with the content. In the Ukrainian segment, book trailers are not a common genre of advertising printed products, however, in the description of publications with augmented reality on the websites of online stores, bookstores or publishing houses, as well as on social networks, there are usually short clips, book trailers or links to short videos on YouTube.

Table 2
Availability of information about AR in product characteristics

Publisher	Book cover	Bibliographic information	Front and back matter	Publisher's website	Video review
Art Nation Publishing	√		√	√	√
FastAR Kids	√		√	√	√
Kyiv House of Books			√	√	√
Ranok	√		√	√	√
Talant (iExplore)	√		√	√	√
Hamazyn	√	√	√	√	√
Vivat	√		√	√	√
Assa	√			√	√
Publisher O. Savchuk	√	√		√	√
Smile	√		√	√	√
White Owl	√		√	√	√
Gwara Media	√	√	√	√	√

Some publishing projects have a separate website or a page on the publishing house's website or on social networks, which complement the reading of the book, provides detailed instructions on using augmented reality and accompanying materials. Anton Khusnutdinov's comics *Nox* (Hamazyn) and *Destroyed Masterpieces of Ukrainian Wooden Sacred Architecture* by Stefan Taranushenko (*Publisher Oleksandr Savchuk*) have the pages on the websites and the children's books by *White Owl* are linked to the publisher's Instagram account.

4.3. Interaction with AR books and its communicative potential

The use of augmented reality undoubtedly creates new opportunities for publishers to stand out from the competition and offer readers a new reading experience. The advantage of this technology is the ability to use both the physical space of a printed book and the digital space of augmented reality.

For example, *Art Nation's* AR books use marks in the table of content to navigate within the printed body of the book, *Cinderella* by *White Owl* even offered olfactory experience of specially created perfumes on its pages (only 100 printed copies had this feature).

This market is growing, developing and has many prospects: as mentioned in AR market research statistics, "71% of consumers say they would shop more often if they used AR" [18]. However, it also means more challenges for publishers and other professionals in the book industry.

Many factors influence the choice of exactly how AR elements will be used in the book, primarily financial. Developing a complicated AR application to support the book content may double or triple an average book budget [19]. Simpler options for augmented reality, for example, just the development of virtual models, can be more profitable and easier to maintain. Although, for instance,

in the book about destroyed wooden churches by *Publisher Oleksandr Savchuk*, the budget for developing models and maintaining a web resource also exceeded the cost of publishing a book by almost 1.5 times, as we can see from the financial report in public access [20]. This project was financed by the Ukrainian Cultural Foundation, which is why the publisher had the opportunity to develop AR elements at an appropriate level.

Figure 2: AR in Stefan Taranushenko's monograph *Destroyed Masterpieces of Ukrainian Wooden Sacred Architecture* (Publisher Oleksandr Savchuk)
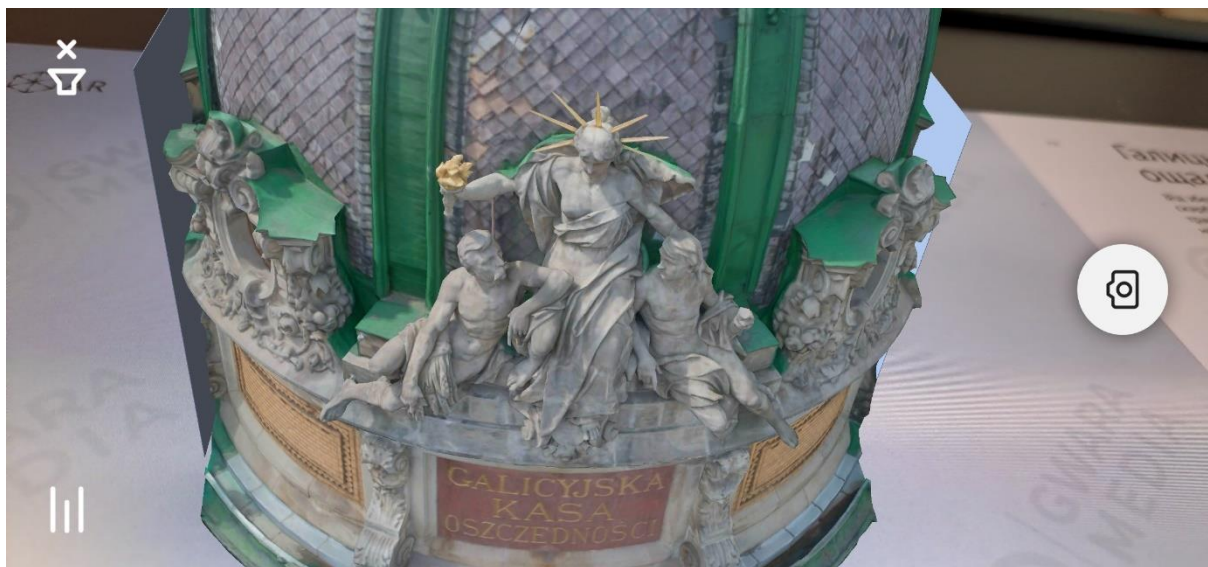
Figure 3: AR in *Pocket City Lviv* (Gwara Media)

In a small experimental test use, we tried to install and run the available augmented reality tools for books. It was found that some applications are not accessible any more, some links gave an error during an attempt to download. Some of AR tools were launched with QR codes, some books had links to a webpage, a file for downloading an application, or to the Play Market or the Apple Store applications.

A comparative analysis of the products by different publishers and features of the functionality of augmented reality is presented in *Table 3*. We analysed both a single title in the publishing house's assortment, and in the case of a series, we analysed the series of titles as a whole.

Table 3

Forms of AR and methods of interaction with books

Publisher	Method of interaction			Animated image		Sound design				Game content
	QR code	App	Instagram effect	2D	3D	Music	Sound	Voice-over	Full audio-book	
Art Nation Publishing		√			√	√	√	√	√	√
FastAR Kids		√			√	√	√	√	√	
Kyiv House of Books (Mavka)		√			√	√	√	√		√
Ranok	√	√			√		√	√		√
Talant (iExplore)		√			√		√			√
Hamazyn	√	√			√		√			√
Vivat		√			√	√	√	√	√	√
Assa		√		√	√	√	√			√
Publisher O. Savchuk	√				√					
Gwara Media		√			√			√		
Smile	√				√			√		
White Owl			√	√		√	√			

Most publishers use specially made applications with image trackers for cameras to catch. AR in Stefan Taranushenko's monograph *Destroyed Masterpieces of Ukrainian Wooden Sacred Architecture* (Publisher Oleksandr Savchuk) as well as in books by *Smile* (series *A gift for a smart person*) send to publisher's webpage with AR content. The AR in series by *Smile* was unsuccessful to launch on Android and successful on iOS.

For the experimental test drive, we chose one title from each publishing house (with the exception of the Russian *Devar*, as we wanted to focus specifically on the Ukrainian market subjects), which offered augmented reality in the form of an application, as the most popular form of AR content, and tried to use them. *Tables 4* and *5* provide information about these applications for Android and iOS, respectively. In the tables we have also included characteristics that are important for understanding the app as an element of a book product: developer and time of last update, size and (if available) number of downloads, and overall rating.

Table 4

Characteristics of applications with AR for Android

Book title	App title	Developer	Size (MB)	Last update	Number of downloads	Rating	Successful test use
Alice in Wonderland by *Art Nation Publishing*	Wonderland AR	Live Animations	180	10.01.2020	500*k*+	2.2	–
Live ABC-Book by *FastAR Kids*	FastAR Kids edu	Olga Kazanska	81	23.07.2022	1*k*+	1.5	+

Book title	App title	Developer	Size (MB)	Last update	Downloads	Rating	Successful test use
Forest Song. Mavka by *Kyiv House of Books*	Mavka AR	Signal Red	89	5.05.2021	5*k*+	3.4	+
The World Awaits to Be Discovered by *Ranok*	The world awaits to be discovered	LCC "1+1 Internet"	73	7.03.2019	10*k*+	3.2	+
Extinct Animals by *Talant*	AR Extinct animals iExplore	Red Frog Digital Limited	108	13.03.2020	50*k*+	1.9	+
Nox by *Hamazyn*	Nox Through conscious-ness	Ant3Dstudio	173	25.06.2021	100*k*+	5.0	+
The World of Supersaurs by *Assa*	Supersaurs	–	99.4	–	–	–	–
Pocket City Lviv by *Gwara Media*	Pocket city AR	Skeiron.llc	47	23.12.2021	1*k*+	4.1	+

Application test drive for Android applications was conducted on Huawei P smart+ (Android 9) and Galaxy A53 (Android 12), as shown in *Table 4*. Some applications were difficult to find, one (*Supersaurs*) had several steps installation process, some (2 of 8) were not launching on the devices at all and showed black screen.

Table 5
Characteristics of applications with AR for iOS

Book title	App title	Developer	Size (MB)	Last update	Rating	Successful test use
Alice in Wonderland by *Art Nation Publishing*	WowBox AR	Artnation Corporation	494.2	8 months ago	5.0	+
Live ABC-Book by *FastAR Kids*	FastAR Kids edu	Olga Kazanska	147.9	1 month ago	–	+
Forest Song. Mavka by *Kyiv House of Books*	Mavka AR	Sygnal Red	202.6	2 years ago	5.0	+
The World Awaits to Be Discovered by *Ranok*	The world awaits to be discovered	1+1 Internet	165.6	3 years ago	–	+
Extinct Animals by *Talant*	AR Extinct animals iExplore	Red Frog Digital Limited	622.5	2 years ago	–	+

Nox by *Hamazyn*	Nox Through consciousness	Anton Khusnutdinov	359.5	1 year ago	–	+
Pocket City Lviv by *Gwara Media*	Pocket city AR	Volodymyr Zaiats (Skeiron.llc)	296.7	2 years ago	–	+

Test use of applications for iOS was conducted on iPad 9, as shown in *Table 5*.

Several differences between the same product for Android and iOS were noticed. For example, *Art Nation Publishing* offers one application *WowBox AR* for iOS that works with all books in the series, but separate application for Android, which makes user struggle to find it. Gwara's application *Pocket city AR* uses one app for all products for Android (and female voice is used in audio), but several applications and male voice for iOS.

There was a slightly wider choice of Apple iOS applications which were also working better in general. At the same time analysed applications have quite low average rating for Android applications. Some users described it as a one-time experience for their children in their reviews. And, of course, all of these applications take up a significant amount of memory space, which might be a disadvantage.

Experimental test use showed that AR applications obviously have a shorter lifespan than printed books. However, the back of Vivat books optimistically states that "The expiration date is unlimited" — with proper support that is.

5. Conclusion

Virtual reality in books has extraordinary prospects: the ability to enrich the narrative, invite readers to join the story, see certain phenomena and hear certain objects that may otherwise be inaccessible. Therefore, it is very encouraging that the Ukrainian AR book market is developing step by step.

The first group of publishers available on the Ukrainian market consists of specialised publishing houses, for which book production with AR is the main type of activity. The second group includes publishers that have some augmented reality products in the assortment. Within the third group of publishers, books with augmented reality are exclusive; AR technologies are not their area of interest and development. It is obvious that the existence of the first group of publishers on the market may be in jeopardy, as publishers who combine different types of books in their assortment have shown themselves to be much more effective.

It would be very efficient for Ukrainian publishers to look more into developing and providing stable support for applications (specifically for Android), to be more consistent in developing and describing AR's capabilities to help readers find and use its tools to their full potential. Due to *Statista* reports, as of February 2022, Android 11 was the leading mobile operating system in Ukraine, while iOS had only an 8.66 % share of the market [21].

Of course, the faults in functioning and infrequent application updates (and, accordingly, the low rating) may be partly related to military actions on the territory of Ukraine. Therefore, we should hope that publishers and developers will soon have the opportunity to return to their usual work.

The most common way to present information about AR in books is to indicate it on the cover; some books have it mentioned on the websites of publishing houses and bookstores, and others use bibliographic details or front and back information for this purpose.

Analysed books use different ways of entering augmented reality, such as a QR code, an application or an Instagram effect triggered by an image. These books incorporate 2D and 3D animation, music, sounds, and voiceover; some include a fully recorded audiobook, game or quiz. In some projects, however, the AR is being used simply for the sake of the technology itself.

WowBox application invites readers to be aware of the surroundings and gives a friendly reminder for adults: "Keep in mind that this app includes exciting AR content and don't forget to supervise your children while using the app". Proper supervision could be a key for all publisher's activities as well.

Augmented reality possibilities are still developing, however, there is already a noticeable need to implement basic training in augmented reality technology into the education of illustrators, publishers and other industry specialists. This will contribute into more efficient distribution and more appropriate use of the AR technology.

There are mainly children's fiction and educational AR books on Ukrainian market, which is only natural. We found only two Ukrainian AR books intended for adults: Stefan Taranushenko's monograph *Destroyed Masterpieces of Ukrainian Wooden Sacred Architecture* (Publisher Oleksandr Savchuk) and *Pocket City Lviv* (Gwara Media). Both books offer an overview of architectural monuments and demonstrate the extremely necessary and promising trend of digitizing cultural heritage. This trend is important not only because it makes it possible to get acquainted with inaccessible or lost places of interest. Such digitization of architectural buildings, monuments, and museums is especially valuable in the current unstable situation during the Russo-Ukrainian war, when the preservation of cultural heritage is under threat.

The previous years of the pandemic also demonstrate the need for remote learning, and AR books can partially help to solve this problem. In addition, AR can become an essential element of encouragement to read, to the future desire to communicate with the book as such.

The prospects of using AR in the Ukrainian book market are really exciting, given its ability to rethink the functions of the book as a content carrier, to strengthen the content sense, the ability to interest readers with its interactivity etc. The current market situation with AR books can be vastly improved by:

- the expanding of the thematic assortment of AR books for both children and adults with a greater emphasis on exploring, preserving and learning than on entertainment. In this case the resources spent on the development of AR elements would be more efficient;
- introduction of training courses for IT and publishers to develop their skills in creating AR books;
- in-depth information and development of skills in working with AR books for booksellers, librarians and readers. This will help to better promote publications through the AR component;
- defining AR as one of the book characteristics in the publication description in book statistics. This could be very important for publishers, since the AR books would be more visible on a market. In addition, it will give insight into the effectiveness of the publisher's actions.

Appropriate directions for future research in this context would be a more in-depth analysis of augmented reality technologies in books, detailed testing of applications, analysis of perception of such content with the involvement of focus groups, as well as overall review of prospects for using the capabilities of AR for various types of literature. We have only begun to discover the possibilities of augmented reality for book market, and there are still many unexplored aspects of its use ahead of us.

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