KALLIPOS: The Project that is shaping the OER landscape in Greece

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Abstract

This contribution aims at presenting KALLIPOS, a large-scale initiative for developing high quality digital academic textbooks and making them available through open licenses. The presentation analyses the complete workflow of the Project, highlights its unique characteristics and presents participation and usage statistics, with the aim to evaluate its contribution to shaping the Open Educational Resources (OER) landscape in Greece. The main challenges and lessons learned by this innovative Project are summarized, while some more conclusions on the role of OER are derived.

Keywords: KALLIPOS, Open Educational Resources (OER), open academic textbooks, open licenses, digital Repository

1. Introduction

Education for all or *Open Education* is a slogan used to express one of the fundamental human rights as stated in the Universal Declaration of Human Rights (UN General Assembly 10/12/1948, Paris):

> "*Everyone has the right to education. Education shall be free, at least in the elementary and fundamental stages. Elementary education shall be compulsory. Technical and professional education shall be made generally available and higher education shall be equally accessible to all on the basis of merit*" (Article 26).

Since then, many movements and organizations have made it their flag and core target: UNESCO, Commonwealth Of Learning, Open Education Consortium, to name a few. However, an important shift in the motives and the supporters of Open Education is being realized nowadays. From a pursuit of volunteers and non-governmental organizations, it is becoming part of the strategic plans and initiatives of systemic bodies and governments as an important instrument of growth. This is not accidental. In the Society and Economy of Knowledge, Open and Continuing Education is playing a vital role and, as such, it has been included in the list of Sustainable Development Goals (SDG) of the UN Agenda 2030 (**UN, 2015**):

> "*Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all*" (SDG 4).

Moreover, for this particular SDG, OECD notices in its 2017 report "*Education at a glance: OECD indicators*" (**OECD, 2017**):

> "*Making SDG 4 a reality will transform lives around the globe. Education is so central to the achievement of a sustainable, prosperous and equitable planet that failure to achieve this particular SDG puts at risk the achievement of the 17 SDGs as a whole*".

Open Educational Resources (OER) are one of the basic pillars of Open Education. They include open textbooks and e-courses, open-access scholarly publications, video lectures, presentations, images, infographics, interactive games, quizzes, tutorials, learning tools, open software add-ons, podcasts, etc., in which "*one has a free, formal grant of permission to engage in the 5R activities (Retain, Reuse, Revise, Remix, Redistribute)*" (**Wiley, 2018**), as opposed to "*traditionally copyrighted resources*".

The power of openness lies in its inherent multiplying effect: anything open in the aforementioned definition can be grown exponentially by the contribution of the entire Community. Working this way, the open Internet is becoming the locomotive of the 4th Industrial Revolution. There are, however, two main challenges that have to be addressed, in order to make the OER a reliable, complete and persistent body of scholarly knowledge:

(a) *Funding: Who pays for the creation and maintenance of the open material*. Given the fact that the creator of the material does not expect any profit in return, after releasing her/his work to the public, someone has to pay for it in advance. Moreover, someone has to take care of the material, to be up to date and accessible by the Community, in the long term.

(b) *Quality: What measures are being taken to assure the desired quality of the open material*.

In this contribution we present **KALLIPOS**, a large-scale, nation-wide Project which is active in the framework of OER (with specific focus on the open academic textbooks for Greek Universities) and explain how it addresses the aforementioned challenges. In **section 2**, the scope and the main characteristics of the Project are summarized. The Project workflow is presented in **section 3**, highlighting the emphasis of the Project on the quality of the produced textbooks. **Section 4** presents the main publishing methods used, as well as the digital Repository through which the educational resources are made available to the public. **Section 5** gives some participation and usage statistics. A **final section** summarizes the main conclusions and reports on some important lessons learned through the course of the Project.

2. Evolution, scope and main characteristics of KALLIPOS

The Project has been developed in two phases. In the first phase (2013-2015) it was co-funded by the EU and the Greek State and had the impressive outcome of 520 undergraduate textbooks, written in Greek (**Koutsileou, Kouis, & Mitrou, 2018**).

In the current, second phase (2020-2022), named **KALLIPOS+**, an even bigger objective has been set: to develop more than 700 academic textbooks of a broader scope and type, which are expected to become available within less than a year from now [the first sixty of them are already in the **KALLIPOS Repository** Apart from undergraduate textbooks, which still constitute the main target category of the Project, new categories have been included in its scope, like postgraduate-aiding books, monographs and extended bibliographic guides. Books will be available in other languages as well, apart from Greek. After the completion of this phase, more than 1200 high-quality, digital textbooks will be available for open use by everyone: students, teachers, researchers, lifelong learners, science lovers. The subjects covered by the KALLIPOS+ books belong to all sciences, as shown in the pie-chart of **Figure 1**, typically classified in six (6) Thematic Areas. The existing books of the first phase follow a similar, more or less, distribution.
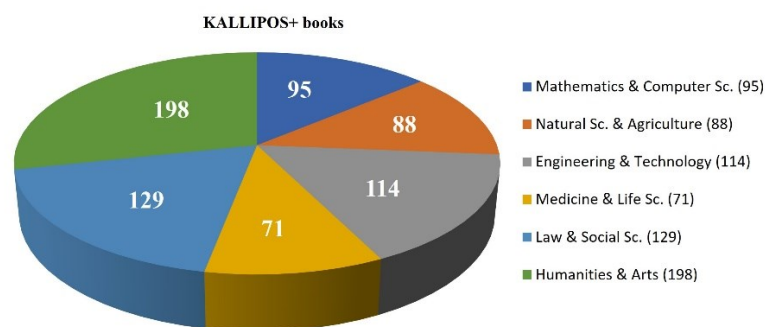
Figure 1. Thematic distribution of KALLIPOS+ books.

After the addition of the new content, the **KALLIPOS Repository** will probably become the biggest Repository of its kind in the world. Just for comparison, **Table 1** summarizes the size of some well-known open textbook Repositories around the Globe.

Table 1. Open textbook Repositories and their size
(sampled on 5/9/2022).

Repository	# of books
Open Textbook Library	1087
Teaching Commons	541
Libre Texts	398
BC Campus	382
GALILEO Open Learning Materials - University System of Georgia	107
American Institute of Mathematics	60
Washington University in St. Louis	47
Milne Open Textbooks	46
College of the Canyons	40
Open Oregon	39
KALLIPOS (after publishing the KALLIPOS+ books	>1200

The main characteristics of KALLIPOS are summarized below:

- A huge human network of contributors - more than 2000 persons: authors (mainly Professors), evaluators, language and technical editors, librarians, ITC experts, …
- A well-defined workflow, from the open calls for authoring proposals until the final stage of book editing and uploading on the Repository (see next section).
- A dedicated Steering Committee of more than 40 distinguished members of the Academic and Research Community with a long teaching experience, who supervise and guide the Project workflow.
- Three publishing lines, originating from different primary formats and resulting in printing-quality PDF and EPUB formats: Word/InDesign, LaTeX and xml-based DocBook (see section 4).
- Quality assurance of the produced material, through setting specific educational criteria and evaluating proposals and delivered material against them.

- Structuring of the material in terms of learning objects (book chapters, tables, multimedia and interactive components, …), annotated by a rich set of metadata in order to facilitate easy search and retrieval.

3. Project workflow and quality standards

This section summarizes the workflow of the Project, with emphasis on those actions that aim to keep some quality standards for the created books.

3.1 Project workflow

Figure 2 shows the basic workflow of the Project. It consists of three stages:

Stage A: *Submission and evaluation of authoring proposals*. Open Calls for Proposals (CfP) are issued, with a specific deadline and a specific budget per Thematic Area. The budget offered for each book is of the order of 10K€ (8K€ for authoring and 2K€ for editing and formatting), with small variations depending on the size and the category of the book. The submitted proposals are delivered to the Project Scientific Committee (SC) for evaluation. External evaluators are engaged to assist the SC members in their evaluation task, whenever necessary.

Stage B: *Authoring*. It lasts from 4 to 18 months, depending on the maturity of the existing educational material and the size of the authoring team.

Stage C: *Editing and Publishing*. It is performed by the Central Support Team of the Project and professionals in Linguistic and Technical editing. Then, experienced librarians are engaged to add appropriate metadata and publish the book on the digital Repository.
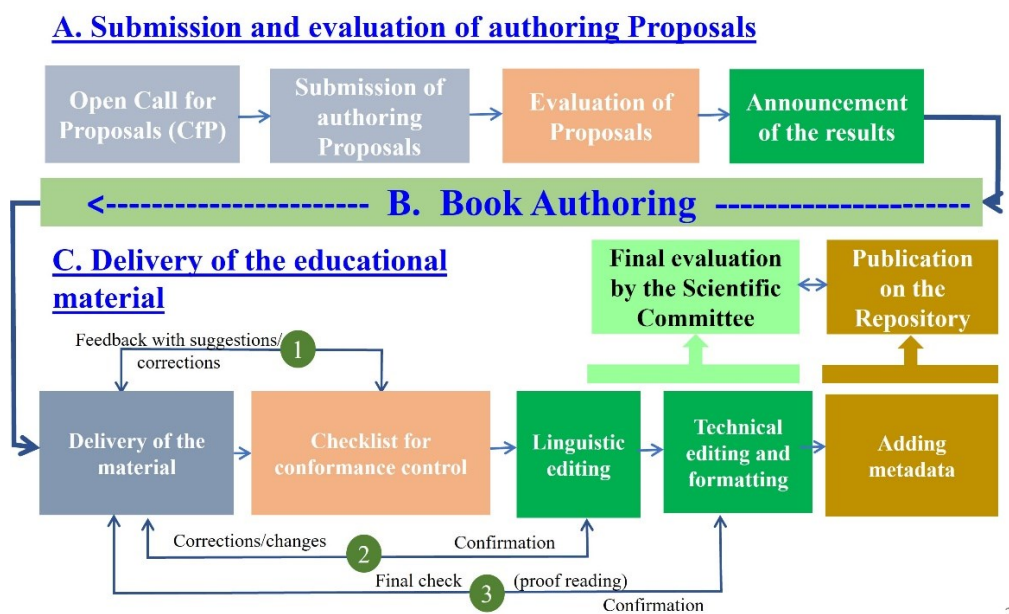

Figure 2. The basic workflow of the Project.

3.2 Quality standards and controls

At this point, it is important to highlight the specific actions and filters within the above workflow, that aim to maintain quality standards of the produced material.

1. _Proposal eligibility requirements_. The main author of a proposed book, who is responsible for the coordination of the authoring team and the submission and implementation of the Proposal, should belong to specific categories of the teaching and research staff of Universities and State Research Centres. The co-authors should hold a PhD or MSc degree in a related subject. Moreover, any proposed undergraduate textbook should cover at least one one-semester course included in an existing Study Programme of a University Department. There are also limits concerning the maximum number of Proposals and the maximum budget that any physical person could get from the Project.

2. _Proposal evaluation criteria_. The Proposals are evaluated according to specific criteria, explicitly reported in the CfPs (summarized in **Table 2** below).

Table 2. Criteria for Proposal evaluation.

Category	Criterion
Authoring team qualification	Relation to the proposed book subject; teaching and research experience
Proposed book subject and structure	Importance and timeliness of the subject; structure and inclusiveness of the content
Expected use	Expected number of courses and students, that will use the proposed book
Maturity and time plan	Maturity of the existing material (lecture notes or book chapters); authoring time-plan
Special features	Use of multimedia and interactive components
Open license	A bonus is given for the most open Creative Commons license

3. _Authoring and editing standards_. Detailed instructions are given to the authors beforehand, for structuring and formatting their books. An intermediate deliverable, half of the proposed book in terms of complete chapters, is a contractual commitment by the authors (this step is not shown in the workflow of **Figure 2**). At this stage, a first compliance check is performed by the Central Support Team (CST) and a respective notification is sent back to the authors for corrective actions and improvement. The most important and thorough processing, however, is performed after the delivery of the final material by the authors (stage C in **Figure 2**). At this stage, after a general check of the compliance of the delivered material with the approved proposal and the evaluators' comments, the book is handed over to the linguistic editor first and then to the technical editor. The editors are selected by the authors from a pool of professionals registered at the Project's Registry. The editing is performed through successive cycles of cooperation between the authoring team and the editors, under the continuous monitoring and the support of the CST. Finally, librarians are engaged to add metadata and publish the book on the Repository. In parallel to these editing steps, the content is roughly checked and approved by the SC members.

4. Publishing methods and the digital Repository

The main publishing methods of the Project are schematically shown in **Figure 3**. There are two primary formats which the authors can choose from for their writing: LaTeX or Microsoft Word. The first is chosen mainly for mathematical documents and can produce high quality printable formats (PDF). MS Word documents, on the other hand, can follow three different lines of processing: (a) to be processed and transformed into PDF; (b) to feed Adobe InDesign, a professional desktop publishing tool which can create

high-quality graphics and give output documents in PDF or EPUB[1] form; (c) to be transformed into an XML-based format and processed with DocBook[2].
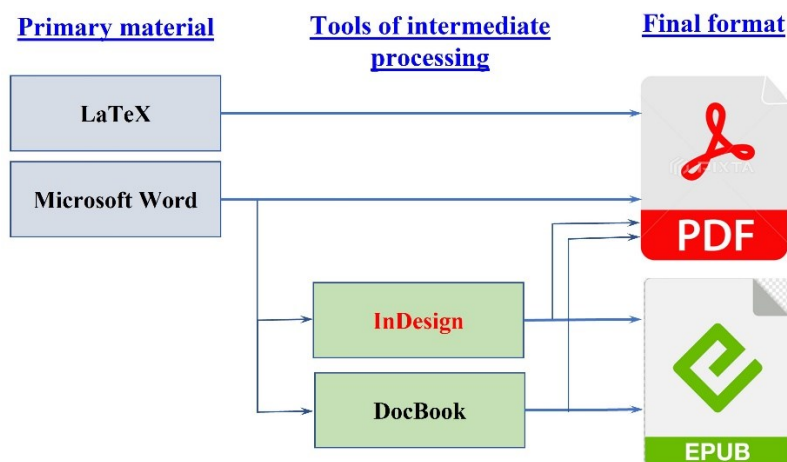

Figure 3. Publishing methods used in KALLIPOS.

From the three publishing methods used in KALLIPOS, the last one, DocBook, is the most promising one, due to its versatility in producing various output formats and the ease in making revisions, a very desirable feature for content preservation and updating.

The **KALLIPOS Repository** is built on the open-software platform DSpace - latest version 6.3. The content consists of books, chapters and other learning objects (video and audio clips, interactive objects, mathematical objects, …), organized in the six (6) subject categories (or Thematic Areas) shown in **Figure 4(a)** (the same as in **Figure 1**). A rich metadata set is used to annotate the learning objects, facilitating search and retrieval. In the initial page of a book [**Figure 4(b)**] one can see the book cover and its basic metadata (title, authors, ISBN, thematic terms, keywords, abstract), as well as labelled tabs for viewing or retrieving the full text, the Table of Contents, a concise leaflet (brochure) of the book in Greek and English (see example brochure in **Figure 5**) and a book presentation by the authors themselves in ppt and/or video (a new feature available for the KALLIPOS+ books only). Other supplementary features, like usage statistics in terms of book views and downloads, are available to the authors upon demand.

Work is in progress aiming at enriching the Repository with advanced AI mechanisms for semantic classification and searching at chapter and learning-object level. With the aid of these advanced tools, teachers and students will be able to find the most relevant content to their specific work subjects and courses, not only within the KALLIPOS Repository, but in other repositories and databases as well [see **Giannopoulou, Makris, & Mitrou (2022)** in this Conference].

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[1] EPUB (from *Electronic PUBlishing*) is a vendor-independent XML-based e-book format, promoted by the International Digital Publishing Forum (IDPF).
[2] DocBook is an XML-based semantic language that enables its users to create document content in a presentation-neutral form.
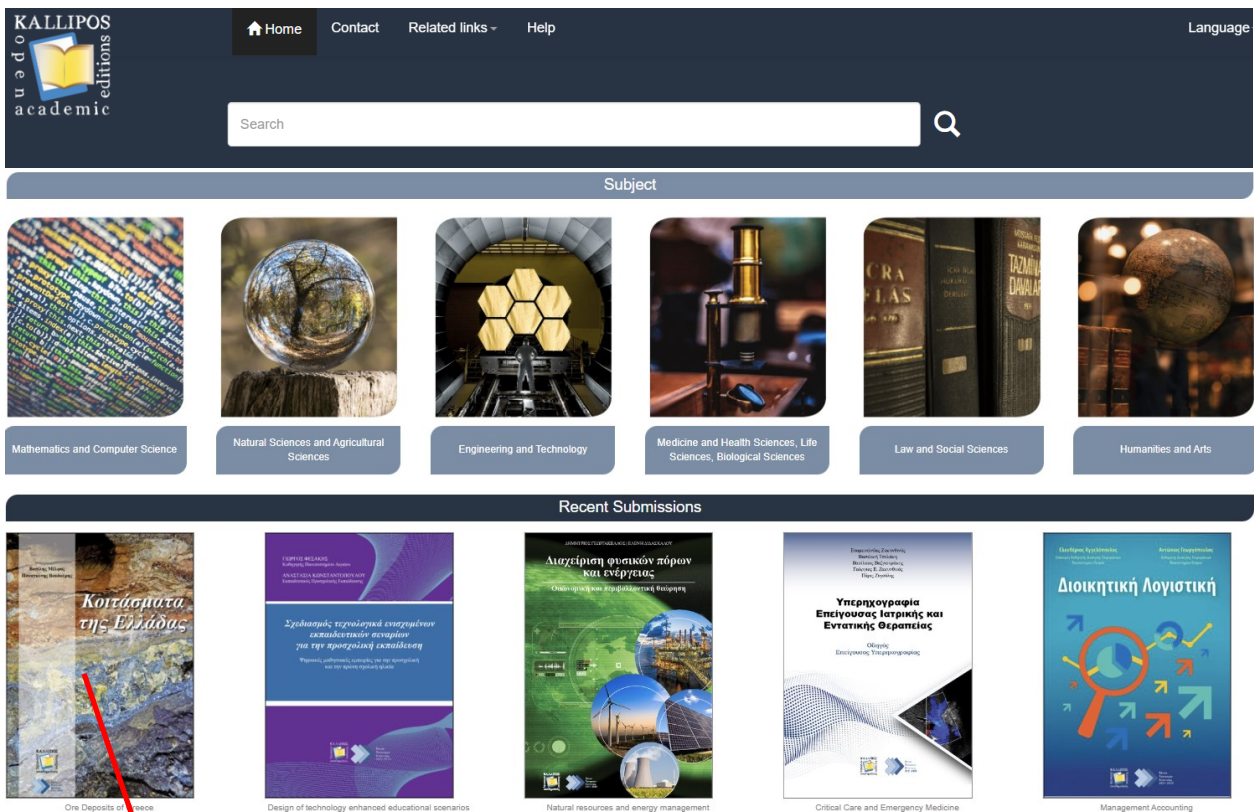
(a) Repository home page
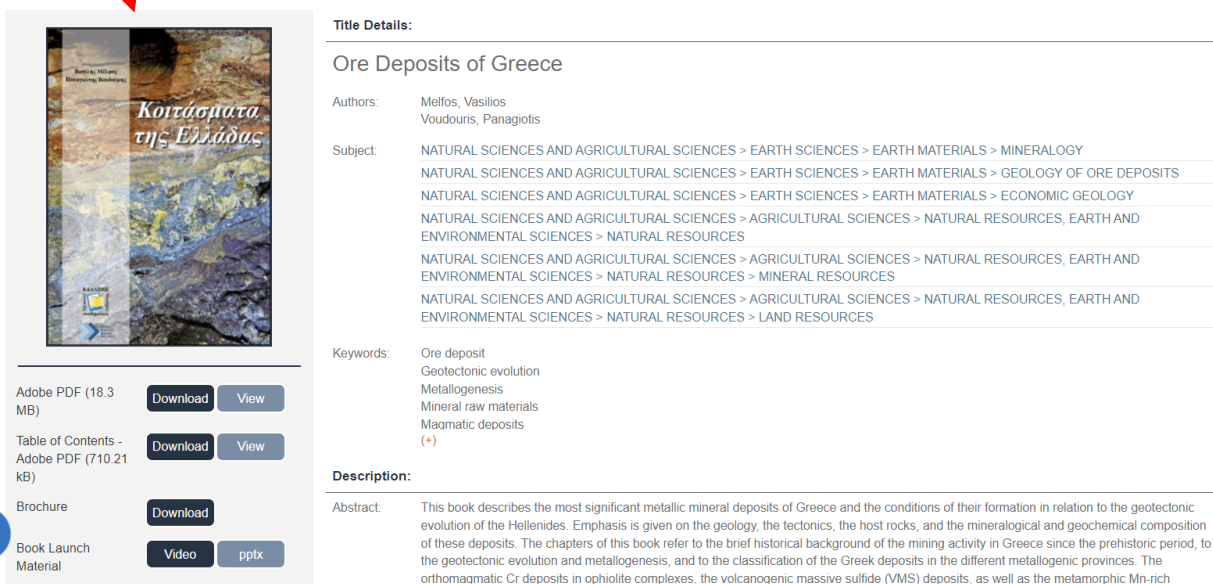
(b) Book initial page

Figure 4. The KALLIPOS Repository (a) home page (b) initial book page.

METADATA

Title: Stochastics of Hydroclimatic Extremes - A Cool Look at Risk

Other Titles: -

Language: English

Authors: Koutsoyiannis, D., Professor, NTUA

ISBN: 978-618-85370-0-2

Subject: MATHEMATICS AND COMPUTER SCIENCE, NATURAL SCIENCES AND AGRICULTURAL SCIENCES, ENGINEERING AND TECHNOLOGY, LAW AND SOCIAL SCIENCES

Keywords: Stochastic processes / Stochastic analysis of extremes / Extreme hydroclimaticphenomena / Hydroclimatology / Hydroclimatic design of infrastructure works

Abstract

Much is said and written about hydroclimatic hazards: storms, floods, droughts. Such hazards have existed and will always exist, while the usual scaremongering on them is of little help to avoid them. Instead, what is needed is a cool look at risk, based on measurement data, using scientific methodology, and ultimately employing technology in the service of reducing hazards and their consequences. This is attempted in the book. Much of it is devoted to the theory of stochastics —the mathematical language for analysing extremes. Stochastics is a scientific area broader than statistics —according to the definition adopted in the book, statistics is part of stochastics. Another part is the theory of stochastic processes, in which time has a hypostasis that is typically absent in statistics. Thus, statistics is in relation to stochastic what statics are in relation to dynamics. The commonly used classical statistics (based on the assumption of independence) is a special case of stochastics and, as the book proves, is inappropriate for the subject. This does not mean that statistics are abandoned or underrepresented in the book. On the contrary, several new developments are presented —most notably the new tool of knowable moments, which have two relevant characteristics: they are closely connected to extremes and their estimation is unbiased in the framework of classical statistics or involves small (and determinable) bias in stochastic processes with dependence in time, whilst the bias in the estimation of classical statistical moments can be huge. The new theoretical analyses are supported by mathematical proofs, which, to improve readability, are contained in a number of appendices in each of the 10 main chapters of the book. Along with the development of the theory, the book is oriented to the application, which is supported by a variety of examples, usually standing out as parenthetical sections or Digressions, as well as by tabulations of mathematical formulae that are used for each task.

KALLIPOS open academic editions

**Figure 5**. An example of a book brochure, provided by the KALLIPOS Repository.

5. Participation and usage statistics

5.1 Participation of authors/Institutions

As mentioned in section 2 – main characteristics of the Project – a huge network of contributors has been set up and activated in the framework of this ambitious Project. In phase 2 alone, more than 1200 authors, mainly professors from all Greek Universities (and some from abroad), are intensively working to create the (more than 700) books of KALLIPOS+. The bar-charts of **Figure 6** depict the distribution of this precious staff to profile categories and Institutions.
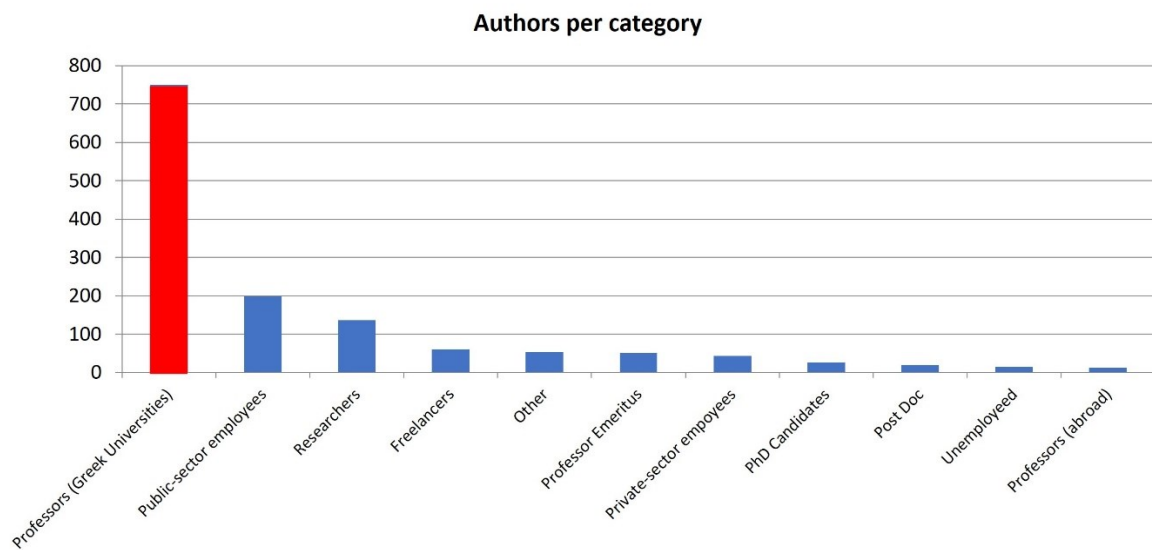
(a)
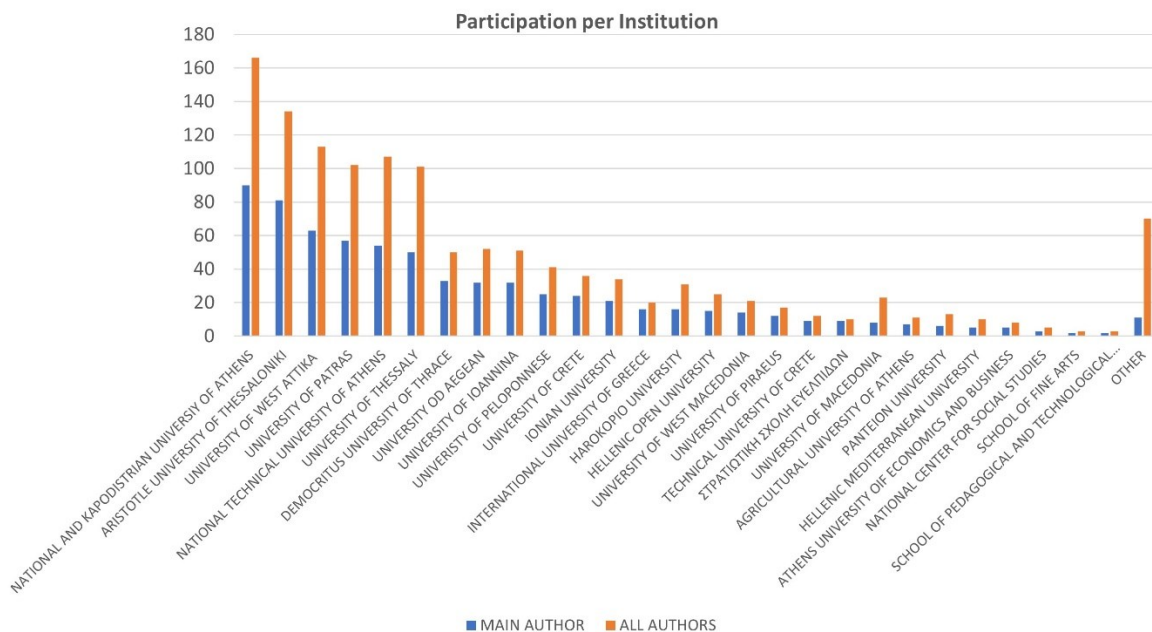
(b)

Figure 6. Participation in authoring: (a) per author category (b) per Institution.

5.2 Content usage statistics

Statistical data, derived from Google analytics of views and downloads of content components, reveals the extensive use of the KALLIPOS content, from a variety of Community groups, not only from academics. The following charts showcase this use. The time evolution of book downloads [**Figure 7(a)**] is characterized by peaks and fades, following the starts of the semesters and vacation periods, respectively. The two clearly distinguished peaks (shown in red) correspond to the respective pandemic peaks and the difficulties in printed book supply during these periods. In the per-country distribution of users [**Figure 7(b)**], we can notice a considerable use from Cyprus, because of the language of the content (in Greek). Finally, the per-age distribution [**Figure 7(c)**] shows a noticeable use in any age (teachers and life-long learners).
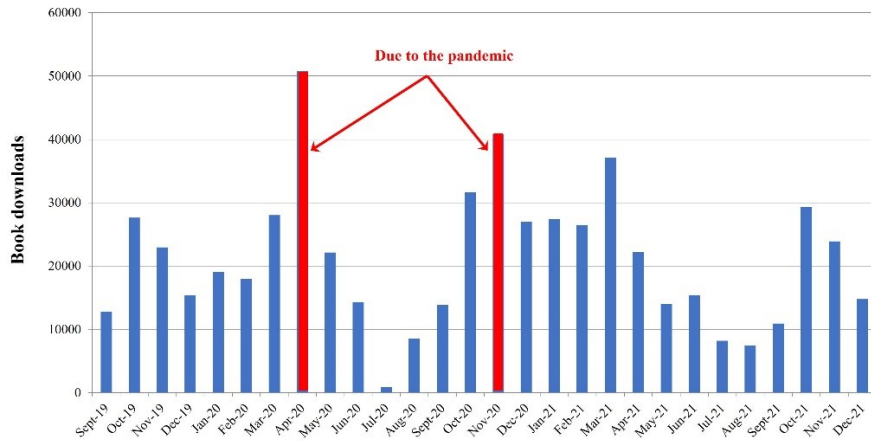
(a)
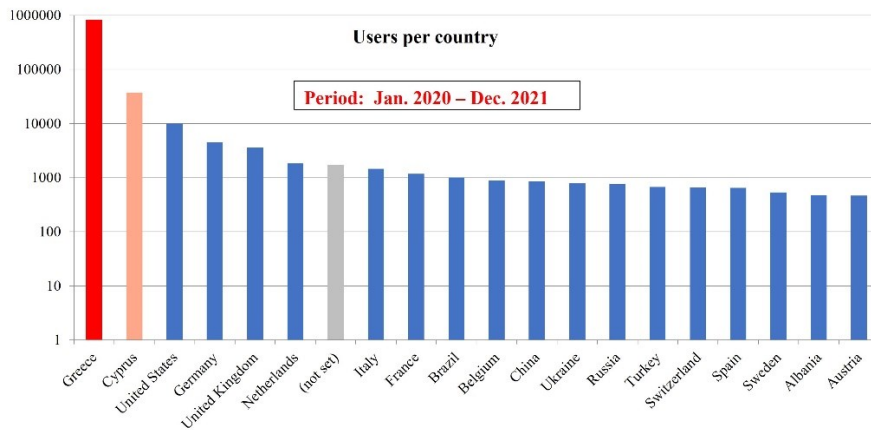
(b)
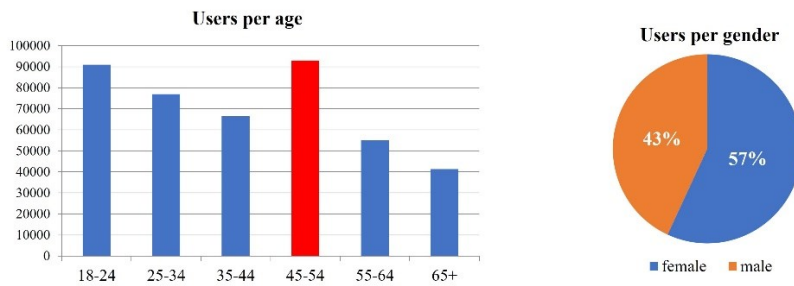
(c)

Figure 7. Distribution of Repository usage (a) book downloads over time (b) users per country (c) users per age and gender.

Finally, it is useful to see the usage of the KALLIPOS books in undergraduate courses, according to the respective proposals of the teaching staff. The bar-chart of **Figure 8** shows the percentage of the University courses for which an open book of the KALLIPOS collection is proposed for use by the students. To better understand this diagram, take for instance the percentage 5.3% in 2021, which has been derived as this: out of the 40.732 undergraduate courses available in the Study Programs of all University Departments in Greece, in 2.155 of them at least one KALLIPOS book is proposed for use by the students. It is important to note that the 520 books of KALLIPOS (only the books of the first phase are available so far) represent a proportion less than 4% of the active titles used in the undergraduate courses (mainly commercial, in print format). We can see a steady increase of KALLIPOS books with time.
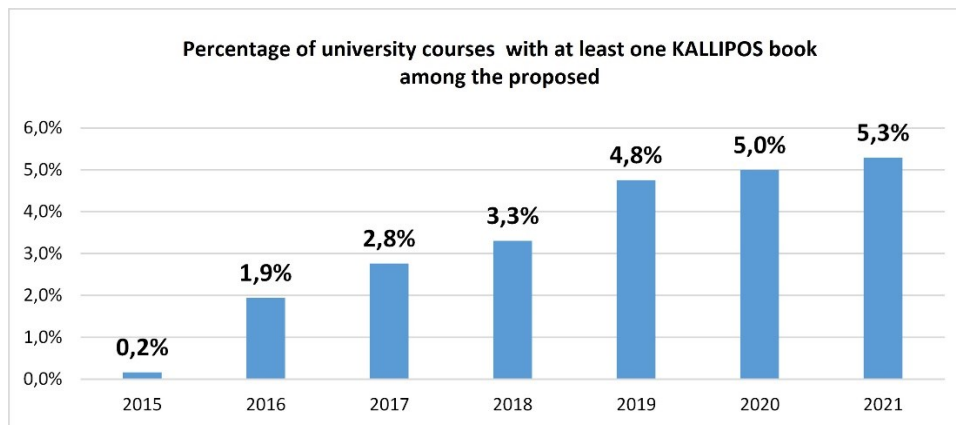
Figure 8. Usage of KALLIPOS books in undergraduate courses.

6. Synopsis: Lessons learned and conclusion

6.1 Lessons learned

This sub-section summarizes some critical lessons learned by the authors from their involvement for more than a decade in the field of OER through the KALLIPOS Project.

- A repository of academic OER (especially of open textbooks) can be useful not only to the narrow Academic and Research Community (students and teachers), but also to the Community as a whole. Among the candidate users are: people involved in programs of Continuing Education and Lifelong Learning; individual professionals who want to update their knowledge in the field of specialization, or even to make a shift in their profession; science lovers, for their personal education; and many others. **Figure 7(c)** is revealing of the age range of such users, while a recent research about the use of the open textbooks of KALLIPOS by the Continuing Education Programs in Greece has given the amazing percentage of more than 80%!
- Building an OER repository should meet some minimum requirements and conditions, in order to be successful and viable, like:
  - o Securing persistent funding for content creation and maintenance. Sporadic grants from donors and sponsors are not sufficient for a continuous operation with professional standards. Public funding seems to be appropriate, given the fact that an OER Repository is an excellent investment for the profit of the entire Community.
  - o Keeping a Support Team active, with specific skills – evaluators, content editors, IT experts.

- o For Higher Education, in particular, a critical volume of content should be developed and offered, covering as many disciplines as possible, in order to obtain a real impact and a considerable contribution to the target of Open Education. KALLIPOS has set a threshold for this critical volume at 10% of the titles used in the undergraduate courses of all University Departments, until 2023, and at 30% in the longer term.
- Horizontal actions with the participation and synergy of as many Universities as possible can obtain economies of scale and save resources.
- Quality is a very critical aspect that should be taken care of.

6.2 Conclusion

KALLIPOS is a large-scale Project with the objective to create e-books for the undergraduate/postgraduate courses of Greek Universities and offer them with open licenses. It is being funded by European (in the first phase) and State funds and is following an elaborate workflow to assure quality of the produced books. In this respect, KALLIPOS has effectively addressed the two main challenges related to the provisioning of OER: funding and quality. After the completion of its current (second) phase, the digital Repository of KALLIPOS will contain more than 1200 textbooks and monographs, well organized in chapters and other educational objects for easy search and retrieval. Such a voluminous corpus of textbooks represents about 10% of all the titles used in the undergraduate courses in Greece. Being offered with open licenses, the books of KALLIPOS are being widely used by postgraduate students and lifelong learners alike. In this respect, with the volume, the quality and the widespread use of its resources, KALLIPOS will substantially contribute to the paradigm change in Higher Education towards the final target of Open Education / Education for all.

KALLIPOS, however, is much more than the books it produces. It is a big, lively network of scholars in various roles (authors, evaluators, editors), being involved in an intensive, cooperative, authoring activity, which improves them as authors and teachers alike.

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