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## **Editorial message**

Dear Colleagues,

JIIIM is an international, multidisciplinary, blind peer-reviewed journal that publishes research efforts on all aspects and issues regarding Information Science and Integrated Information Management. The current issue publishes research articles about archival as well as educational subjects.

The first paper presents The University of Thessaly Historical Archive that was used as a paradigm for implementing a new way to deal with complex archival collections. Digital archival items were preserved and enriched with high-quality metadata. The integrated platform implementation resulted in an efficient automated approach to managing the University of Thessaly archives and archival collections, which comprised different digital object formats and included a high volume of digital items, making THE.ME.DO.COM a very successful project example.

The second paper presents a survey about the health information behaviour of undergraduate students at the University of West Attica. The survey took place among students of the Department of Archival, Library and Information Studies, where information literacy is taught and in the Department of Physiotherapy, where health subjects are taught. The aim was to discover if any or if both of the above target groups have adopted efficient health information behaviour. The findings are unique in the Hellenic academic environment and lead to the suggestion that information literacy skills should be taught to every Department of the University.

The next paper concerns a survey that investigates the causes of teachers' mental and physical burnout during Covid-19. The survey reveals that the Greek educational system was not adequately prepared to support the educational process, and it suggests that it should improve the mechanisms to support teachers in the performance of their current and future duties.

The fourth paper presents digital archival repositories of archival institutions, cultural and information organizations and history research projects. It highlights the need for classification by the creator in order to improve the evaluation of the content and architecture of digital repositories. A convergence between research and academic institutions and memory institutions and the development of joint scientific projects is in the interest of the preservation of historical archives, but also of the community to which the stakeholders involved in such projects are addressed.

Special Issues proposals should be sent directly via email to the Assistant Editor-in chief ([dkouis@uniwa.gr](mailto:dkouis@uniwa.gr)). Finally, we expect your contribution and active support with remarks and points of improvement.

**Assistant Professor - Assistant Editor-in-chief**

Dimitrios Kouis

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# Managing digital archival collections by integrating Archivematica, AtoM and VuFind software: *the University of Thessaly Historical Archive case*

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### Abstract:

**Purpose** – The great number of documents and records produced by universities leads to large archival collections within these Institutions. As a result, libraries and archival units apply new and innovative information systems to manage and exploit their archival collections for education and research purposes.

**Design/methodology/approach** – The current research took place under the THE.ME.DO.COM EPAnEK (2014-2020) project, which mainly aimed to develop two web platforms for the preservation, documentation, management, and dissemination of the University of Thessaly archival collections, which constituted its Historical Archive. For this purpose, the Archivematica, AtoM and VuFind open-source information systems were configured and integrated, while innovative metadata creation coding was created for the project.

**Findings** – Digital archival items were preserved and enriched with high-quality metadata in Archivematica, uploaded and described according to international standards in AtoM and distributed with smart search routines with VuFind. The integrated platform implementation resulted in an efficient automated approach to managing the University of Thessaly archives and archival collections, which comprised different digital object formats and included a high volume of digital items, making THE.ME.DO.COM a very successful project example.

**Originality/value** – The University of Thessaly Historical Archive was used as a paradigm for implementing a new way to deal with complex archival collections. Other University Libraries or Archival Services could efficiently utilise the project results.

**Index Terms** — Archives, Open-Source Systems, Digital Preservation, Documentation, Text and Data Mining, Thessaly

## I. INTRODUCTION

The rapid developments in digital technologies, which took place during the last few decades, have profoundly affected how digital collections are managed by the library and archive services worldwide. These changes have renewed the interest in how archival collections are used for practice, research and education in many scientific fields, including historical, cultural, and literary studies leading to an "archival turn in various disciplines" [1,2,3,4,5].

Universities produce a vast number of documents (administrative, research, event, cultural and other) during their daily operation, resulting respectively in large, constantly augmented archival collections. Furthermore, they may acquire additional, either personal or organisational, archives by various processes (purchasing, donations etc.). These collections are managed by University Libraries or by separate archival administrative units to be preserved and made available for education and research [5,6].

In 2018 the University of Thessaly Senate established the University's Historical Archive (HA) as a Central Library Department with a mandate of collecting, recording, preserving, organising, digitising, disseminating and managing the archival collections already owned or to be obtained by the University. For this purpose, the University Research Committee provided the funds for the lease and renovation of a building for housing the HA in the Tsalapata complex in Volos (Fig. 1), while the University purchased the initial technical infrastructure and equipment.

Within the same year, a research project titled "THESSALY MEMORY DOCUMENTATION AND COMMUNICATION (THE.ME.DO.COM)" was approved for funding under the

single State Aid Action "RESEARCH - CREATE - INNOVATE" support measure of the Operational Programme Competitiveness, Entrepreneurship and Innovation 2014-2020 (EPAnEK). THE.ME.DO.COM was co-funded by the European Regional Development Fund of the European Union, and the research results presented in the current paper were a part of the project's implementation. The project partners were the University of Thessaly and DataScouting (a software research and development

company). Three University units were involved in the project: the Library and Information Centre, the Department of History, Archaeology and Social Anthropology and the Department of Architecture. The primary aim of THE.ME.DO.COM was to create two new innovative integrated web-based platforms: one for preservation-management-dissemination of digital documents belonging to the University's archives and a second one for text and data mining of these documents.



**Fig. 1.** The University of Thessaly Historical Archive building (Central Library branch) in the Tsalapata complex in Volos

## II. METHODOLOGY

The University of Thessaly archives are comprised of:

- records from its administrative and academic units (Governing Committee, Senate, Rector's Office, Public Relations, Research Committee, Academic Departments, Administrative Divisions etc.),
- records from individual collections donated by external scholars or former academic staff (i.e. former rectors, professors emeriti, etc.),
- industrial records (brought in with respectively acquired local industry buildings) and
- records from previous higher education institutions, which either acceded to new academic departments or merged with the University of Thessaly.

These archival collections included documents in both physical and digital (already digitised or born-digital) formats.

The first step of the research process was to review the University's archival collections and decide which would be included in the THE.ME.DO.COM project collections. This selection was based on the fact that the relevant groups of documents were part of distinct archival collections or archives, which in turn belonged to the

University of Thessaly Historical Archive. Twelve archives from other University Institutions were comparatively studied to make that decision. These archives were selected according to the following guidelines:

- they represented typical cases coming from different continents (Europe, America, Australia)
- they were related to universities of different periods ('historic'/old and newer)

Based on the comparative study and the precondition that the respective documents should be directly or indirectly connected with the founding and operation of the University of Thessaly and the cultural heritage of the Thessaly region, the criteria for the selection of the material that would constitute the primary project collections were:

- representativeness of categories and material type or format
- emphasis on the operation and the historical evolution of the University of Thessaly
- physical document preservation condition
- the relative ease of access to the respective documents

Taking into account the criteria mentioned above, the

following archival collections were selected for digitisation, archival documentation and description:

- **Kitsos Makris Personal Archive** (personal archive of the renowned Greek folklorist K. Markis).
- **Professor Pandelis Lazaridis Personal Archive** (archival collection of the first president of the Governing Committee and first elected rector of the University of Thessaly).
- **Matsaggos Tobacco Industry Archive** (archive of one of the largest Greek tobacco industries, founded in the late 19th century and operating in Volos until 1971).
- **University of Thessaly Governing Committee Archive** (initial University governing body which operated from 1984 to 1999).

Additionally, during the second phase of the project's implementation, and following the merging of the University of Thessaly with the TEI of Thessaly and the TEI of Lamia, it was also decided to include the **Archive of the Pedagogical Academy of Lamia** to expand the Historical Archive coverage to the region of Central Greece, following the University's recent geographical and academic expansion.

The next steps of the initial research process included the formulation of detailed specifications for:

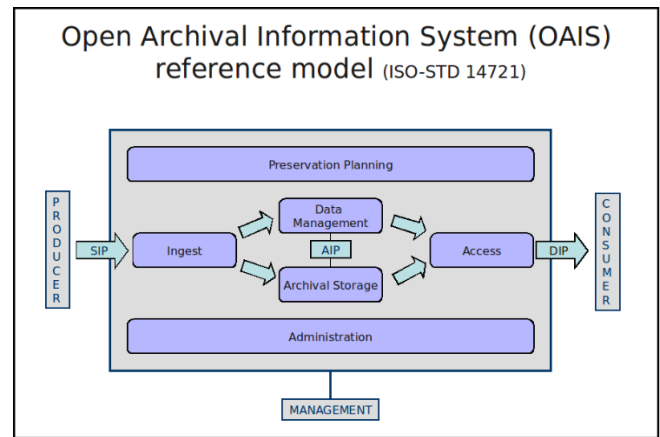
- *Digitisation and production of Optical Character Recognition (OCR) text files by document type.*
- *Archival classification and definition of levels of archival description for each collection, including instructions for the levels, extent and process of the archival description.*

Due to the large volume of the respective archival items, digitization that was carried out to representative documents of each collection has provided a sufficient number of digital documents to be utilised by the project platforms.

### III. TECHNOLOGIES AND SOFTWARE ARCHITECTURE

#### A. Digital Content Preservation Information System

The digital content preservation information system that has been chosen to meet the needs of the Historical Archive of the University of Thessaly was **Archivematica** (<https://www.archivematica.org>). This software is a free, open-source digital preservation system designed to maintain long-term access to digital memory objects. The software supports the Dublin Core and PREMIS (Preservation Metadata Maintenance Activity) metadata standards and is compatible with the ISO-OAIS (Open Archival Information System) functional model (Fig. 2). Additionally, it can be integrated with various software platforms and tools which manage digital objects, often used for archival collection management, including Access to Memory (AtoM), DSpace, CONTENTdm and ArchivesSpace [7].



**Fig. 2.** The OAIS reference model (*SIP = Submission Information Package, AIP = Archival Information Package, DIP = Dissemination Information Package*)

It can be seen in Fig. 2 that within the OAIS reference model, three kinds of information packages exist: the Submission Information Package (SIP), which is the information sent from the producer to the archive, the Archival Information Package (AIP); which is the information stored by the archive, and the Dissemination Information Package (DIP), which is the information sent to a user when requested. Archivematica is a software platform that realises the OAIS reference model.

Archivematica processes digital objects, which it transforms into Submission Information Packages (SIPs), then applies format policies and creates repository-independent Archival Information Packages (AIPs) and finally uploads Dissemination Information Packages (DIPs), containing descriptive metadata and access copies, to the selected access system of the installation (e.g., AtoM) [8].

Submission Information Packages (SIPs) always contain the digital object to be preserved and the necessary metadata about it and its content. The requirements and restrictions applied to the SIP content for each type of digital object are described in the preservation plan of each type in the Preservation Planning menu of Archivematica (Fig.3).

The Archivematica system aims to create Archive Information Packages (AIPs) based on international standards containing all the necessary information. The relative AIPs include a METS XML file with an implementation of the PREMIS retention metadata. It is pointed out that the "METS schema is a standard for encoding descriptive, administrative, and structural metadata regarding objects within a digital library, expressed using the XML schema language of the World Wide Web Consortium [9]". METS focuses on relating the content of an item to the content and metadata of other digital items included in a digital library. These correlations constitute a process that takes place within repositories or between repositories. METS is a content and metadata management scheme that creates meta-metadata extracting and associating the semantic content



of digital documents [10].

The Dissemination Information Packages (DIPs) do not have a clear structure, and one or more AIPs can produce them. A DIP is a collection of digital content consisting of one or more digital files related to each other. These files may contain metadata and/or files that "bind" the individual pieces.

The process of storing a digital object in the Archivematica system to its final conversion involves multiple steps, which include:

- the conversion of the digital object into a SIP

- the subsequent conversion of SIP into AIP and DIP
- the storage of the AIP
- steps related to finding and retrieving DIPs from storage

The workflow within the system is visually shown in Fig.3. From the end-user perspective, all Archivematica functions (steps) take place within a web-based dashboard (Graphical User Interface: GUI), which can be accessed by logging in through a web browser.

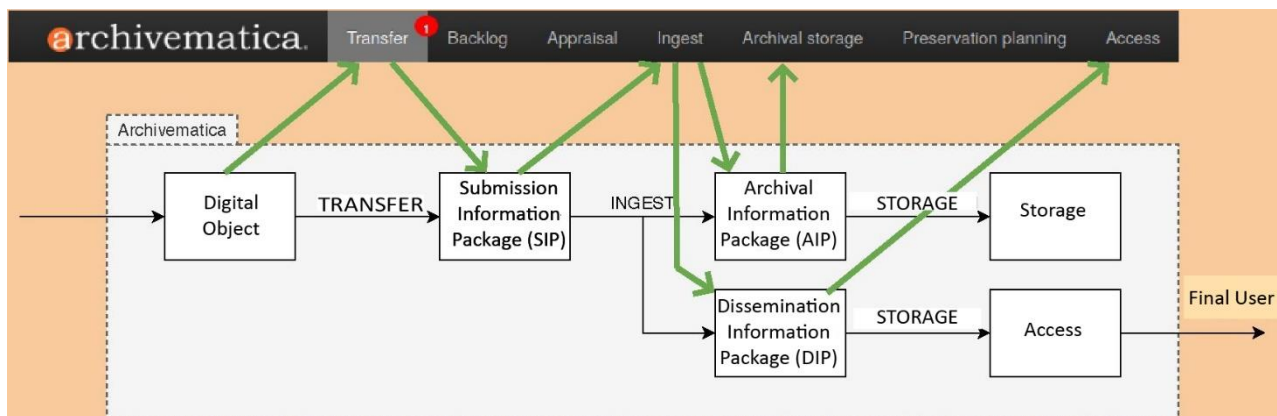


Fig. 3. Archivematica workflow

The steps listed above are directly related to the dashboard GUI. More specifically, the tabs which were used in the University of Thessaly Archivematica

implementation (digitalpreserv.lib.uth.gr) included:

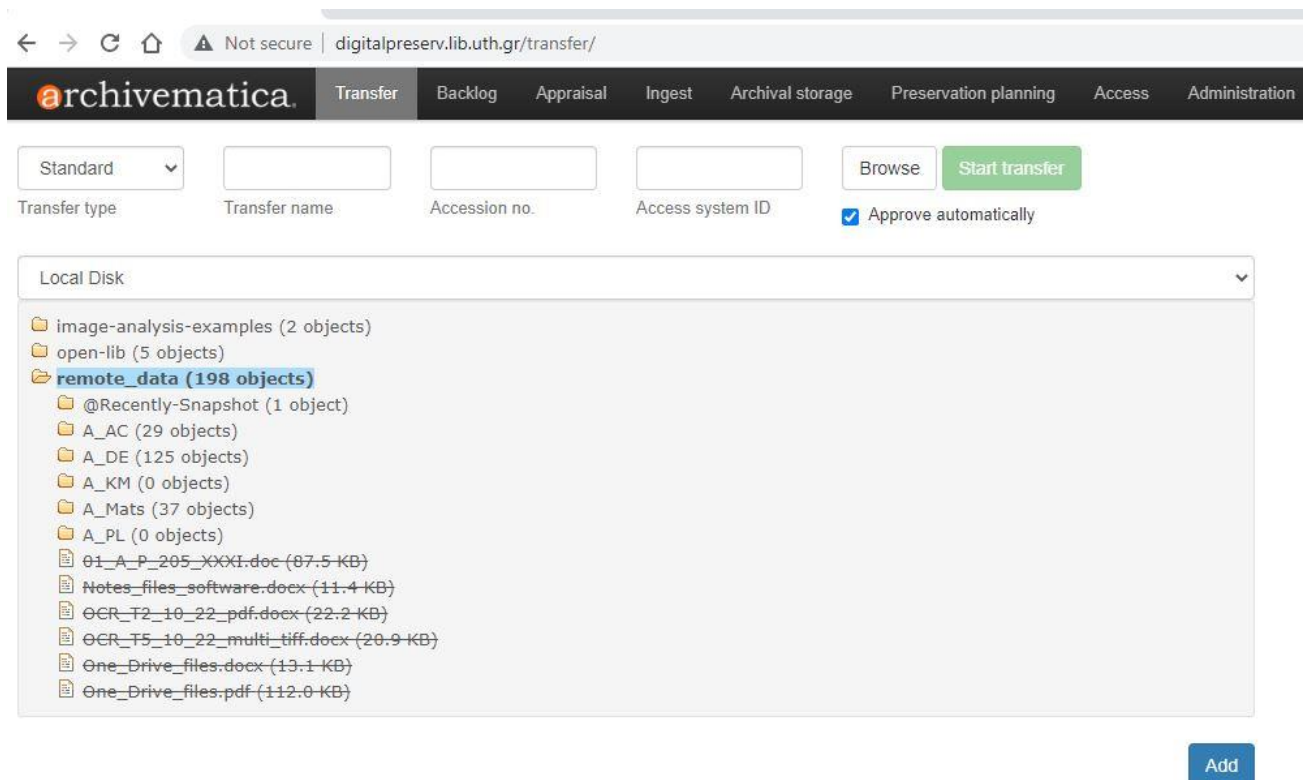


Fig.4. The Transfer tab in the University of Thessaly Archivematica implementation

- The **Transfer tab**: where users import digital objects into the system and convert them into SIPs. For the

current project, digital items could be uploaded to a virtual server hard disk (remote\_data), allowing the

end-users to upload as many items they wish per archival collection at any given period on their own without the need for intervention by system administrators. This has significantly accelerated the uploading process (Fig. 4).

- The **Ingest** tab (processing): where the results of the transport (SIP) become a package on which microservices run to convert them to AIP and generate the DIP (Fig. 5).
- The **Archival Storage** tab: where users can browse the board with archival material and perform searches
- The **Preservation planning** tab: where users can

define preservation requirements for each type of digital object. The file types supported in the system (Preservation planning tab) include groups of common file types like Audio, Database, Dataset, Image (Raster), Portable Document Format, Text (Plain), Text (Source Code), Video etc.

- The **Access** tab: during Ingest, the system can create access copies of the digital objects and package them into DIPs which will be uploaded to some access system (in this project, it was the AtoM system). In the Access tab, authorised users can see the DIPs that have been created and uploaded to the access system.

Submission Information Package	UUID	Ingest start time																														
Latin-english	f229aa66-1c83-49b2-a2ed-5e9a602cdcdb	2020-04-22 09:44																														
<p>► Microservice: Normalize</p> <table border="1"> <thead> <tr> <th>Job: Normalize [?]</th> <th>Awaiting decision</th> <th>Actions</th> </tr> </thead> <tbody> <tr> <td>Job: Resume after normalization file identification tool selected.</td> <td>Completed successfully</td> <td></td> </tr> <tr> <td>Job: Move to select file ID tool</td> <td>Completed successfully</td> <td></td> </tr> <tr> <td>Job: Identify file format</td> <td>Completed successfully</td> <td></td> </tr> <tr> <td>Job: Do you want to perform file format identification?</td> <td>Completed successfully</td> <td></td> </tr> <tr> <td>Job: Grant normalization options for no pre-existing DIP</td> <td>Completed successfully</td> <td></td> </tr> <tr> <td>Job: Set remove preservation and access normalized files to renormalize link.</td> <td>Completed successfully</td> <td></td> </tr> <tr> <td>Job: Check for Access directory</td> <td>Completed successfully</td> <td></td> </tr> <tr> <td>Job: Check for Service directory</td> <td>Completed successfully</td> <td></td> </tr> <tr> <td>Job: Identify manually normalized files</td> <td>Completed successfully</td> <td></td> </tr> </tbody> </table> <p>► Microservice: Change SIP filenames</p> <p>► Microservice: Remove cache files</p> <p>► Microservice: Include default SIP processingMCP.xml</p> <p>► Microservice: Rename SIP directory with SIP UUID</p> <p>► Microservice: Verify SIP compliance</p>			Job: Normalize [?]	Awaiting decision	Actions	Job: Resume after normalization file identification tool selected.	Completed successfully		Job: Move to select file ID tool	Completed successfully		Job: Identify file format	Completed successfully		Job: Do you want to perform file format identification?	Completed successfully		Job: Grant normalization options for no pre-existing DIP	Completed successfully		Job: Set remove preservation and access normalized files to renormalize link.	Completed successfully		Job: Check for Access directory	Completed successfully		Job: Check for Service directory	Completed successfully		Job: Identify manually normalized files	Completed successfully	
Job: Normalize [?]	Awaiting decision	Actions																														
Job: Resume after normalization file identification tool selected.	Completed successfully																															
Job: Move to select file ID tool	Completed successfully																															
Job: Identify file format	Completed successfully																															
Job: Do you want to perform file format identification?	Completed successfully																															
Job: Grant normalization options for no pre-existing DIP	Completed successfully																															
Job: Set remove preservation and access normalized files to renormalize link.	Completed successfully																															
Job: Check for Access directory	Completed successfully																															
Job: Check for Service directory	Completed successfully																															
Job: Identify manually normalized files	Completed successfully																															
asdf	5c7aed30-5471-493e-8b5d-7f4846313ac4	2020-04-21 08:20																														

Fig.5. The Ingest tab in the University of Thessaly Archivematica implementation

#### DataScouting Microservices

One of the main objectives of the current project was to develop software that would mine a text passage and extract some metadata about it. DataScouting developed specific microservices for that purpose which comprised:

- Language detection
- Semantic Analysis
- Automatic speech recognition
- Image analysis

The above microservices were added in the "Characterise and extract metadata" Archivematica microservice that runs on the Transfer step (Fig. 4). The results are saved in a metadata.csv file.

The Language detection microservice recognises the language of a text. It is used in text files (PDF) and in-text transcriptions (OCR) from images (PNG, TIF, JPG etc.). The result is the language identified as most likely for the text.

The Semantic Analysis microservice performs semantic analysis of text and is employed in text files (PDF), in-text

transcriptions (OCR) from images (PNG, TIF, JPG etc.), and in audio transcriptions from sound (MP3, WAV) or video (AVI, MP4, MKV, MOV) digital files. The result is a list of words that have a special meaning, such as persons, places, etc.

By combining the language detection and the semantic analysis microservices, the developed software finds the passage's language when it is not known (most texts are in the Greek language with some variations in English), the part of speech of each word and the nominal entities in the passage.

The automatic speech recognition microservice extracts text from sound files (MP3, WAV) or audio tracks of video files (AVI, MP4, MKV, MOV). The result is the transcribed text from the audio part of the video. For this purpose, a new tool was created at Archivematica, named ASR, while a new command named "Extract speech with ASR", which uses the above tool and defines a bash script, was added. The implemented script extracts the sound from files - video type - and executes a request to the endpoint of the previously described program, sending

the sound file. Provided that the export is successful, the script saves the text in XML format inside the METS file of the DIP. Otherwise, the script displays an error message.

The Archivematica system is hosted in the University of Thessaly Central Library infrastructure, while the installation of all the necessary applications (operating system, web servers, database servers and application servers and the OS) have been included.

The metadata produced by the DataScouting Microservices was thoroughly reviewed for different types of digital items uploaded to the Archivematica. The review showed that the microservices produced many subject terms (persons, places etc.) with a variation in success depending on the quality of the digitised item. However, it was noted that metadata terms should be reduced and subjected to quality control procedures to be fully exploited. In either case, it was concluded that they could be utilised as input in the archival management and text and data mining systems of THE.ME.DO.COM.

### *B. Archival Management and Description Information System*

The archival management and description information system that has been chosen to support the documentation of the collections of the University of Thessaly Historical Archive was **Access to Memory (AtoM)** (<https://www.accesstomemory.org/>). The specific software is free and open source and supports the international standards of archival science, such as the standards of the International Council on Archives (ICA). The system is intended for online use with the aim of the archival description of digital objects based on international standards and access through a multilingual environment. AtoM is hosted in the University of Thessaly Central Library infrastructure, including installing all the necessary applications (operating system, web servers, database servers and application servers and the OS). The University of Thessaly installation is bilingual: the main interface is in the Greek language, in which the detailed archival descriptions are made, while selected description entries were translated into English (all the menus and field names are presented in both languages).

As in all modern information systems, AtoM consists of three levels: presentation, application, and data.

#### *Presentation Layer*

This level has direct contact with the users, regardless of their role. Access to the system was implemented via the world wide web (web) for all users.

#### *Application Layer*

This is the level at which all system services are performed and all its operating rules are implemented. The primary role of this layer is to interact with the data layer and feed the presentation layer with the appropriate information. The application layer is entirely modular (supporting different sub-systems), discretely implementing the basic functions of the system, such as importing and exporting content, indexing and storing it,

searching and navigating it., as well as the essential management functions, such as defining access rights, managing users, exporting statistics, etc.

#### *Data Layer*

This level includes the functional units that undertake the storage, organisation, classification, conversion, backup and, in general, the management of the system's content.

#### *Users*

AtoM users are classified according to their access and editing rights. In general, there are anonymous users, authenticated users and administrators. More specifically, anonymous users visit the system intending to locate archival material of interest to them and have access to the digital objects, if they exist, without the need to authenticate. Certified users are authenticated through a username and password and have various rights such as import/export, editing, etc. Finally, there is the administrator, who has almost all rights. The administrator can install/uninstall the system, import/export data, have full access to all data (read, modify, delete, import), change system preferences and appearance, and define new users and user groups.

#### *Metadata*

The AtoM archival description system supports international archival standards as it aims to standardise archival work. For the description of archival collections and the creation of finding aids, it supports the following international standards:

- ISAD(G): General International Standard Archival Description - 2nd edition.
- ISAAR (CPF): International Standard Archival Authority Record for Corporate Bodies, Persons and Families, 2nd Edition.
- ISDIAH: International Standard for Describing Institutions with Archival Holdings.

Apart from the above International Council on Archives (ICA) standards, the system is flexible in using standards utilised by libraries, archives, etc. In addition, it supports the Dublin Core and MODS (Metadata Object Description Schema) metadata schemes.

Finally, the archival description system implements the Open Archives Initiative Protocol for Harvesting (OAI-PMH) to make it accessible to aggregators and increase its visibility and traffic.

#### *Submitting content to AtoM*

All users can log in to AtoM via its home page ([atomarchives.lib.uth.gr](http://atomarchives.lib.uth.gr)), which includes the header bar that provides access to a search box, the browse menu, the log-in button, the language menu, and the quick links menu (Fig. 6).

For users to be able to add or edit content and access the main menu in AtoM, they need to log in using the credentials supplied by the system administrator.

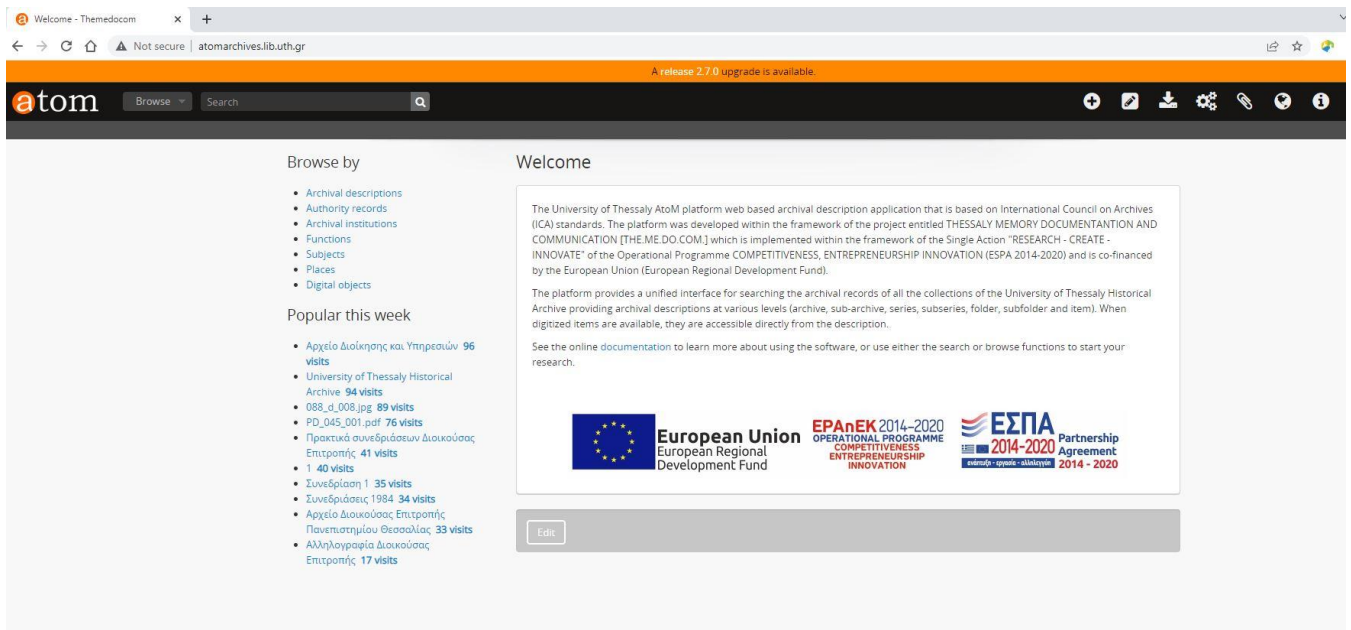


Fig.6. University of Thessaly AtoM home page (administrator view)

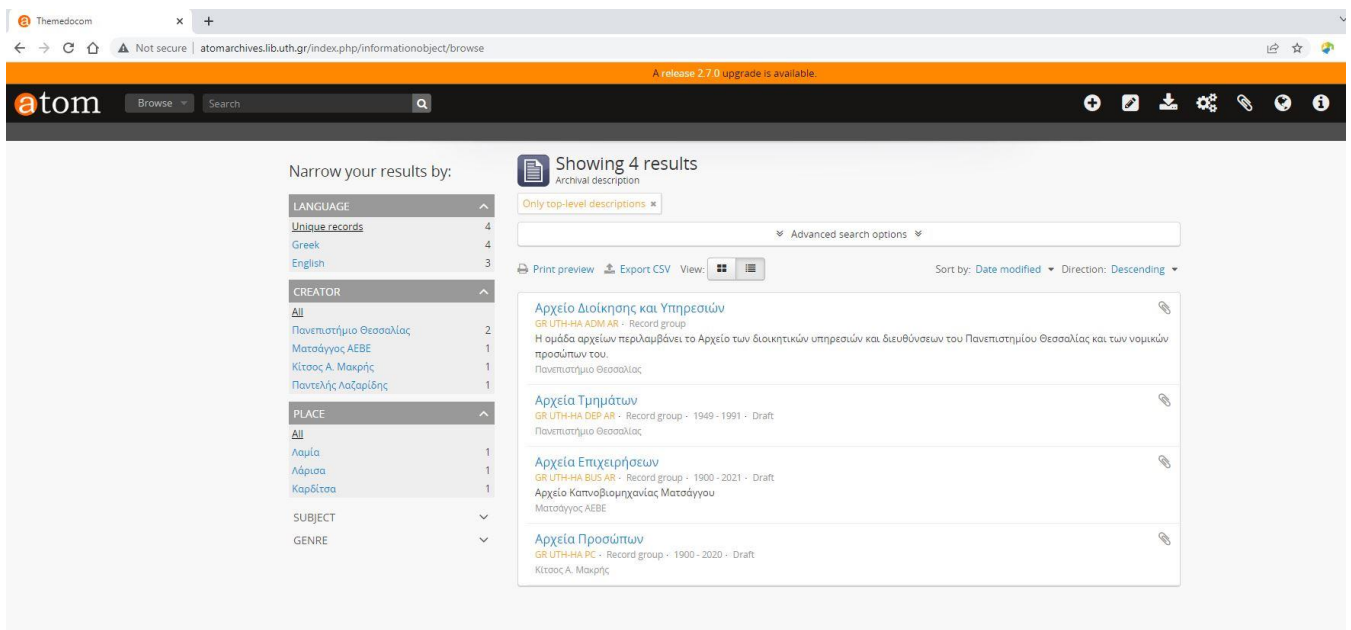


Fig.7. University of Thessaly AtoM Archives Group page

Entry of documents into the information system is done only by authorised users. Content is entered into the information system using forms based on international archival standards (ISAD (G), ISAAR (CPF), ISDIAH).

As already stated, the University of Thessaly Historical Archive (HA) comprises several archival collections. In order for the AtoM system to be able to accommodate all the archives or archival collections that may be later included in HA, the archives have been arranged in four distinct groups which are (Fig. 7):

- Archives of Administrative University Bodies and Units (*currently, it contains the University of Thessaly Governing Committee Archive*)
- Archives of University (academic) Departments

(*currently, it contains the Archive of the Pedagogical Academy of Lamia*)

- Business Archives (*currently it contains the Matsaggos Tobacco Industry Archive*)
- Personal Archives (Fig. 8) (*currently it contains the Kitsos Makris and the Pandelis Lazaridis Archives*)



Record group PC - Αρχεία Προσώπων (Draft)

Extent and medium - This is a mandatory element.

Other languages available

Clipboard

- Add
- Explore
- Reports
- Browse as list
- Import
- XML
- CSV
- Export
- Dublin Core 1.1 XML
- EAD 2002 XML
- Finding aid
- Upload
- Tasks
- Calculate dates
- Last run: Never
- Related people and organizations
- Κίτσος Α. Μακρής (Creator)
- Παντελής Λαζαρίδης (Creator)

Identity area

Reference code	GR UTH-HA PC
Title	Αρχεία Προσώπων
Date(s)	1900 - 2020 (Creation)
Level of description	Record group

Context area

Name of creator	Κίτσος Α. Μακρής (1917 - 1988)
Biographical history	Ο Κίτσος Μακρής γεννήθηκε στη Λάρισα το 1917 και από το 1926 ως το θάνατό του, κατοικούσε στο Βόλο.

Ευθύλεια που χρησιμοποιεί ο Κίτσος Μακρής για τα προσωπικά του...

Fig.8. University of Thessaly AtoM Personal Archives Group page

Τεκμήριο 17 - Αναφορά στο υπό έκδοση βιβλίο του Κ.Α.Μ. "Ο ζωγράφος Θεόφιλος" (Σχέδιο)

Η Ημερομηνία(ες) - δεν είναι σύμφωνα με αντίστοιχες στα υψηλότερα επίπεδα.

Αρχείο Προσώπων > Αρχείο Κίτσου Μακρή > Προσωπικό Αρχείο Κ. Μακρή > Αλληλογραφία > Εισερχόμενη > Προσωπική Αλληλογραφία > Αλληλογραφία με Αστεριάδη > Αναφορά στο υπό έκδοση βιβλίο του Κ...

Other languages available

Clipboard

- Εισαγωγή
- Explore
- Αναφορές
- Browse as list
- Browse digital objects
- Εισαγωγή
- XML
- CSV
- Εξαγωγή
- Dublin Core 1.1 XML
- EAD 2002 XML
- Εργαλείο Ερευνας
- Upload
- Related subjects
- PERSON-Μιμή
- Συνδεδεμένα Φυσικά Πρόσωπα και Οργανισμοί
- Κίτσος Α. Μακρής (Παραγωγή)

Περίληψη

Κωδικός αναγνώρισης

Κωδικός αναγνώρισης	GR UTH-HA PC-KM-SAI-S1-S51-F1-SF1-I7
Τίτλος	Αναφορά στο υπό έκδοση βιβλίο του Κ.Α.Μ. "Ο ζωγράφος Θεόφιλος"
Ημερομηνία(ες)	09-03-1939 (Δημιουργία)

Fig. 9. University of Thessaly AtoM item description page (Greek interface)

Filling in all description fields was not mandatory. As already stated in the Methodology section, detailed instructions for the levels, extent and process of the archival description were created for the HA archives included in the AtoM platform. Description levels for the HA archives may include Fond, Subfond, Series, Subseries, File, Subfile and Item (Fig. 9). In all levels fields that were required to be filled in by the archivists were: Title and

Date (Identity Area), Name of Creator and Repository (Context area), Scope and Content (Content and structure area), and Language of the Material (Conditions of access and use area). On the item level, OCR and automatic speech recognition text produced by the DataScouting Microservices is copied in the Notes Area, while in the Access Points Area, the semantic analysis and image analysis metadata are entered automatically during the

uploading process from Archivematica to AtoM (Fig. 10).

**Fig. 10.** University of Thessaly AtoM item Access points

In addition, editing and/or deleting an existing description is possible.

At the same time, it is possible to automate the process of producing single indices of research tools per selected access point, such as natural persons, collective bodies, thematic headings etc.

Regarding bulk content import, the AtoM archive management system has import mechanisms which support widely used formats such as CSV and XML (EAD, EAC, Dublin Core XML, MODS XML) depending on the type (archive descriptions, established types, etc). It is also possible to import files in SKOS format.

The AtoM Archival Description System can extract archival descriptions, established terms, archival organisations and terms. Export can be done in widely used formats such as EAD 2002 XML, Dublin Core 1.1 XML, MODS XML (Fig. 8-10).

The export of the archival record with the respective standards is also accompanied by information about the associated established terms, the descriptions of the archival organizations and all its child records. Conventional terms are exported with EAC XML and SKOS files but through restricted access to authorised users.

The AtoM Archival Description System, in order to appeal to the general public, even to people who may not be familiar with the new technologies, employed a relatively simple graphical interface.

At the same time, the system is accessible to people with disabilities as the relevant internationally recognised

accessibility rules and guidelines concerning the development of accessible applications and services in a global web environment have been applied, in particular, the Web Content Accessibility Guidelines (WCAG) standard in order to meet at least level AA conformance.

The integration of Archivematica with AtoM serves as the platform for the preservation-management-dissemination of archival digital documents belonging to the University's archives as described in the THE.ME.DO.COM project. A similar approach of integrating Archivematica with AtoM was implemented in 2018 to organise and manage digitised materials from the Personal Fonds Rista Odavic kept by the Archives of Serbia [11]. However, this implementation utilised only the standard capabilities of Archivematica without creating additional microservices like the ones developed in the current project, and only one type of personal fond was tested and used.

### C. Text, data mining and dissemination platform

The process involved the design and implementation of an integrated software package through which textual and audiovisual documents would be enriched with machine learning and natural language processing techniques. These modules were built and incorporated as Archivematica microservices, which generate metadata from both the textual and audio-visual parts of the documents that are included in the DIP package

uploaded from Archivematica to AtoM.

The second project platform (archives.lib.uth.gr) is integrated with AtoM and is used for text and data mining purposes of digital documents (items) belonging to the University of Thessaly Historical Archive collections. The software consists of a content indexing and retrieval platform based on the open-source platform VuFind (https://vufind.org/vufind/), but also utilises a set of

modules that will allow the retrieval of additional metadata from the digital items. A special routine was created for the daily export of the metadata from all AtoM description levels (Fond, Subfond, Series, Subseries, File, Subfile and Item) in an XML file which is automatically imported into VuFind (Fig. 11-12).

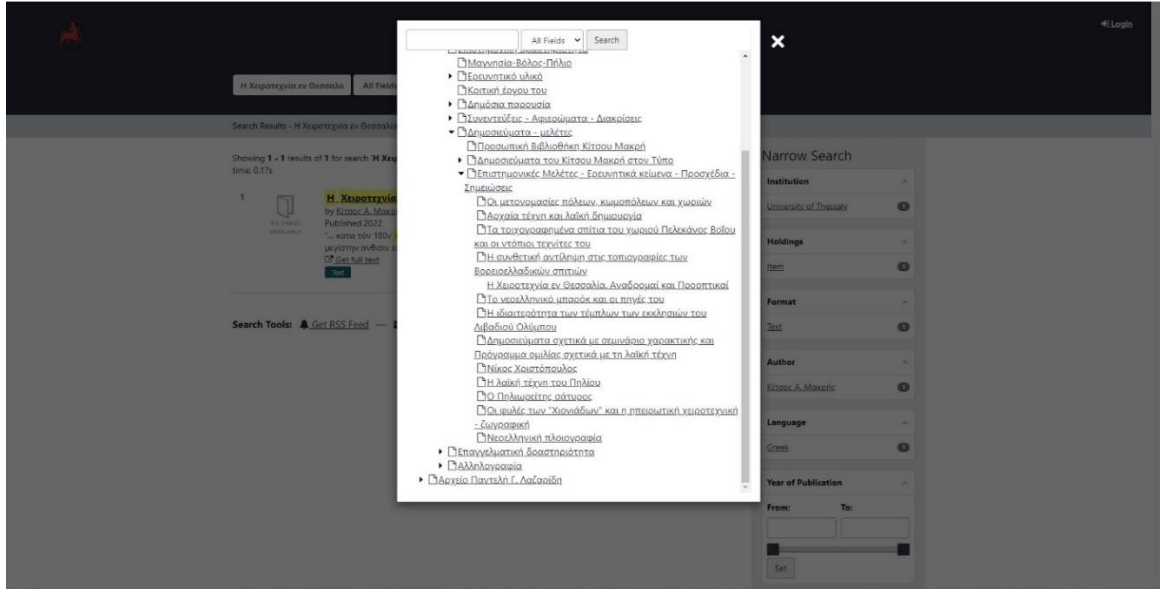


Fig. 11. Archival tree view following a thematic search on the VuFind University of Thessaly HA platform

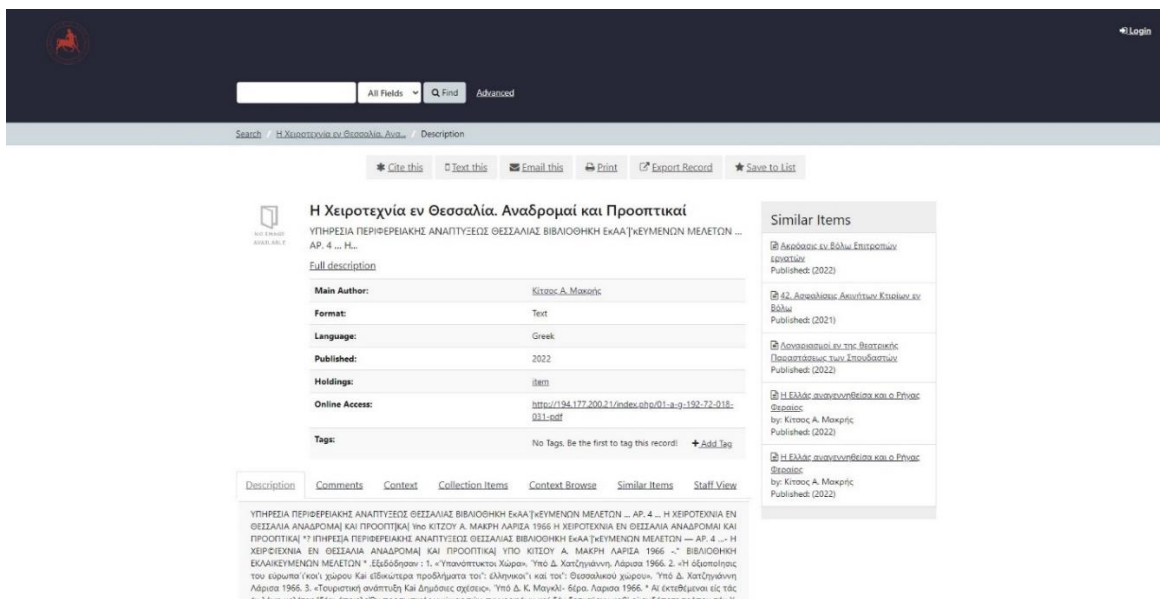


Fig. 12. Detailed item view on the VuFind University of Thessaly HA platform

The final platform will be accessible to the general public, and will be searchable through any metadata. Particular emphasis was placed on the visualisation of results through navigation tools. Additionally, the system is implementing the Open Archives Initiative Protocol for Harvesting (OAI-PMH) to make it accessible to suitable aggregators.

From the previous analysis of the University of Thessaly HA platforms, it seems more probable to utilise AtoM as an internal archival finding aid operated by specialised library staff, while the VuFind platform can be used as the

primary search portal for researchers and the general public. The relative decision will be made by the University Library after the completion of the THE.ME.DO.COM. research project.

#### IV. CONCLUSIONS

The main conclusions of developing two web platforms to preserve, manage, disseminate and analyse archival digital documents are summarised as follows:

The three open-source software applications used

(Archivematica-AtoM-VuFind) proved very successful in realising the main project goal of implementing the two above-mentioned platforms.

Archivematica was employed not only for creating preservation metadata of uploaded digital objects but also as a means of producing textual (OCR), speech-to-text and image-related metadata, and this was an innovative use of the software.

Integration between the three software applications was performed successfully and without significant problems.

The selected implementation showed that it was very effective for dealing with several archives and archival collections having divergent characteristics. The systems could also accommodate all major formats and large quantities of digital documents.

Future developments could include the production of additional digital objects metadata and the realisation of more efficient automated quality control mechanisms on descriptive metadata production.

In conclusion, the presented implementation is particularly effective for managing the diverse and voluminous University archives and archival collections.

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## VI. AUTHORS



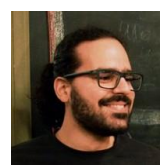
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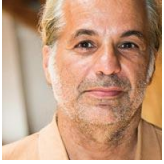


**Stavros Doropoulos** is a graduate of the Computer Engineering Department of TEI of Central Macedonia and holds a Master's degree from the School of Informatics of the Aristotle University of Thessaloniki. He has many years of experience in both implementation and management of European and national IT R&D projects in the field of digital libraries, speech and video recognition, machine learning, big data analytics, software integration, media analysis, and he has published relevant articles in scientific journals. Currently, he is the Chief Information Officer & Software Engineer at the DataScouting software research and development company.



**Apostolos Fanakis** has participated in several R&D projects and was involved in installing and configuring the Archivematica, AtoM and VuFind platforms of the THE.ME.DO.COM EPAnEK (2014-2020) project. Currently, he works as a software engineer at the DataScouting software research and development company.





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# Health information behaviour of undergraduate students in Information Studies and Physiotherapy: a comparative survey

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### Abstract:

**Purpose** – This survey investigated the health information behaviour of undergraduate students at the University of West Attica. In particular, the survey took place among students of the Department of Archival, Library and Information Studies, where information literacy is taught and in the Department of Physiotherapy, where health subjects are taught. The aim was to discover if any or if both of the above target groups have adopted efficient health information behaviour.

**Design/methodology/approach** – The survey investigated the following: the preferred formats of health information sources and the preferred search techniques of the two target groups; their preferred health information sources and the criteria they use to evaluate and trust a health-related source; the main criterion the participants use to evaluate the content of health information sources; and their perception of the term "information literacy". The methodological approach used was a mainly quantitative online survey administered to a sample from the two aforementioned target groups, within a limited time frame, in the winter of 2022.

**Findings** - Physiotherapy students seem less adequately information literate than Archival, Library and Information Studies students.

**Originality/value** – The findings of this comparative survey are unique in the Hellenic academic environment and lead to the suggestion that information literacy skills should be taught to every Department of the University.

**Index Terms** – Information Literacy, Information behaviour, Health information behaviour, Information studies, Health studies.

## I. INTRODUCTION

The outbreak of the Covid-19 pandemic in late 2019 has rendered the efficient search, access, evaluation, and use of health information some of the most crucial information literacy skills an individual must develop. Every day, the Internet and the mass media are flooded with health

information that is intended for the public. However, there are numerous concerns about the reliability of this information, which may often need to be completed, corrected, and biased. This is where every individual's aptitude to evaluate the validity of the information comes into play. Critical evaluation of the information is a skill that can be developed via courses, seminars, and other initiatives relevant to information literacy. The latter's advantages are considered necessary skills, attitudes, and abilities for proper information production, dissemination, and consumption. It is worth mentioning that according to the NHS Education for Scotland, "Information literacy supports individual and organisational learning, creativity and innovation and contributes to improved healthcare delivery through a continuously evolving, reliable information base." [1].

To this end, undergraduate students at the University of West Attica, specifically in the Department of Archival, Library and Information Studies (hereafter ALIS), are offered the chance to learn core information literacy skills. On the other hand, undergraduates in the Department of Physiotherapy (hereafter Phys), at the same University learn about health information. Considering the above, it was interesting to investigate and compare the information behaviour of these two target groups on health issues. The aim was to discover if any or both have adopted efficient health information behaviour.

For this, an online survey was administered to a sample of both aforementioned departments' undergraduates, within a limited time frame, in the winter of 2022. The specific objectives of this survey concerned the exploration of the following topics: the format of health information sources and the search techniques the students prefer when searching for health information; their preferred health information sources and the criteria they use to evaluate and trust these sources; the main criterion the students use to evaluate the content of health information sources; as well as whether they are familiar with the term "information literacy" and the skills it fosters.

## II. RELATED WORK

The relevant literature review focuses on two specific directions, namely scientific publications concerning the information behaviour of information scientists, which are reported first, and scientific publications concerning the information behaviour of health scientists. It has to be noted that there was a lack of bibliography about information behaviour especially focused on the health issues of these two target groups. Therefore, the literature review tries to identify how users of the two aforementioned sectors, namely information science and health science, locate, retrieve and assess the reliability of the information, and not, in particular, health information.

### A. Information behaviour of users belonging to the Information Science sector

The first survey came from the Technological Educational Institute of Thessaloniki, where academic library directors and librarians were invited to be interviewed about the impact of Google on libraries [2]. According to the survey results, the ease of tools and the vast amount of information offered by this search engine are essential factors in librarians' decision to employ it. In particular, Google Scholar proved especially useful for locating scientific information. Nonetheless, they emphasise that the librarian/information scientist's knowledge and professional judgment are crucial for evaluating the quality of sources and properly using Google's tools.

Following that, in 2015, Saunders [3] explored students' information behaviour and skills in the Departments of Library and Information Systems with the help of twenty researchers from eighteen different nations. One of their fundamental research questions was discovering what information-seeking tactics students employ in different countries. According to the research results, students in the information science sector chose the following sources for their information needs: library shelves, personal collections, Wikipedia, library catalogues, and online forums. Furthermore, databases, search engines, social networking sites, video (YouTube), slide sharing (SlideShare) sites, and grey literature also appeared to be among the most frequently used sources [3]. The research also revealed other information resources, such as classmates, teachers, librarians, friends, and relatives.

In another survey, Natarajan [4] identified electronic information resources and the frequency with which students in the Information Science department in the social science library of Jimma University in Ethiopia use them. The survey explicitly listed dissertations, INASP databases, books, journals, digital libraries, other databases, and the University's institutional repository as the primary sources of information in electronic format. Digital maps, other references, CD-ROMs, and newspapers were used less frequently.

To continue, Kurniasih et al. [5] explored how students in the Department of Library and Information Science at Padjadjaran University in Indonesia used search engines. More specifically, the research found that students

mostly use Google/Google Scholar and, to a lesser extent, Yahoo and Bing search engines. The reasons explaining these choices were user-friendliness, the relevancy of retrieved results in digital journals and books, the simple keyword search, and so on [6]. Additionally, the techniques of information retrieval, from most to least common, as reported in this research, were "keywords/entry in pdf, ppt, etc. formats", "Boolean operators", "strategy query: short search with quotes", and "advanced search". According to the survey results, during the search process, participants stated that using proper keywords would get them the desired results; otherwise, the search would not be successful.

Okeji, Ilika, and Baro [6] conducted a more recent survey. The aim was to measure the information literacy competencies of senior library and information science students in Nigerian universities. According to the survey, most students seek information from journal articles, the Internet, databases, and books. This is followed by websites pertinent to their field of study, undergraduate course assignments, local newspapers, conference proceedings, and theses/dissertations.

Finally, another study from the University of Vietnam showed that the Google search engine is the first tool most students choose when looking for information [7]. The majority of them search for information using keywords and titles. It is also noteworthy that the students in their second and third years of study search for information by employing Boolean operators (AND, OR, and NOT) and prefer to search for articles based on the abstract or by analysing the whole content of a source.

### B. Information behaviour of users belonging to the Health Science sector

Iordanou et al. [8] examined nursing students' techniques when looking for health information. The library, the Internet, conversation with fellow students, individual records, educational lectures, and conferences were the primary sources of knowledge they preferred, in declining order. Furthermore, participants relied on scholarly publications and articles from the health disciplines they studied. Several individuals looked for information in databases, the most common of which were MEDLINE and CHINAL. Moreover, students relied heavily on library staff, as opposed to some who turned to them only when they could not find the necessary information on their own.

Following that, Fell, Burnham and Dockery's [9] research focused on identifying the information sources used by physiotherapists when performing the essential steps to search for and retrieve information. Journal articles were prioritised as a source of information, followed by digital databases on medical issues. Furthermore, search engines, colleagues, educational programs, textbooks, and medical libraries fulfilled their need for information. To a lesser extent, physiotherapists used public libraries and other resources. PubMed, Cochrane Databases, CINAHL, MEDLINE via OVID, and Google Scholar were the main search engines for finding and retrieving information. Scopus and

ISI, Web of Science search engines/databases, were used infrequently.

Additionally, a related survey was conducted at the Cyprus University of Technology's (CUT) Department of Nursing [10]. The research's specific goal was to collect credible information and, as a result, to examine the motivations driving the Department's students' information behaviour on health issues. It was found that respondents used search techniques to locate the necessary health information, which was directly dependent on the tools offered by the search engines and by the database websites in the library of CUT. Moreover, familiarity with computer usage and regular Internet access led to more sophisticated search tactics. The most common and applicable search approach was using more than one keyword.

Finally, another survey was conducted in 2015 at Semnan University in Iran to determine whether the digital library contributed to offering reliable information. According to doctors, medical staff, and medical students, the results revealed that doctors relied on their professional experience at a higher percentage than the other two groups, who were primarily informed online. 81.3% of doctors, in particular, preferred to rely on personal experiences, whereas students and other medical personnel appeared to use PubMed and Medline as medical information sources primarily. Finally, it is worth mentioning that despite the instructional seminars provided to these users on how to search for information, participants often had the impression that they had identified the right information based on their needs when this was different [11].

### III. METHODOLOGICAL APPROACH

The methodological approach used in this research is the online survey, administered to a sample from two specific target groups, within a limited time frame, in the winter of 2022.

Initially, a pilot questionnaire containing seven (7) sections and eighteen (18) questions, which arose from the study of the relevant literature review, was designed and distributed to twenty (20) volunteer undergraduate students of ALIS department. This took place to determine whether the wording of the questions was precise and whether the questions or the structure of the questionnaire needed improvement.

After the above procedure, the form of the questionnaire was finalised. The final questionnaire was designed using Google forms, containing informative text on the organisation's details, the purpose of the survey, and the security of the personal data of the respondents. After this, the questionnaire was divided into six (6) sections with fifteen (15) questions. In particular, the logic of the survey is primarily quantitative, namely with fourteen (14) closed-

ended questions (dichotomous, single-choice, multiple-choice, and Likert tertiary scale) and with a quantitative element, namely one (1) open, free text question.

The questionnaire was sent via email to the total number of undergraduate students in ALIS (approximately 400 active students) and in Phys (approximately 400 active students) Departments of the University of West Attica. 70 undergraduate students answered from ALIS (response rate of approximately 17.5%), while only 25 answered from Phys (response rate of approximately 6.25%).

The overall response rate is low for drawing valid conclusions about the health information behaviour of the above target groups. However, researchers of this survey consider that the presentation and the discussion of the data could offer a general but distinct insight into this specific topic.

### IV. COMPARATIVE RESULTS

This section presents a comparative analysis of the results from the two target groups surveyed, namely undergraduates of ALIS and undergraduates of Phys, as well as a correlation with various published surveys concerning relevant topics.

#### A. Demographics

The first question in section one of the questionnaire asked about the gender of the respondents. It was observed that females predominate in both target groups, with 80% in ALIS and 60% in Phys (see fig. 1).

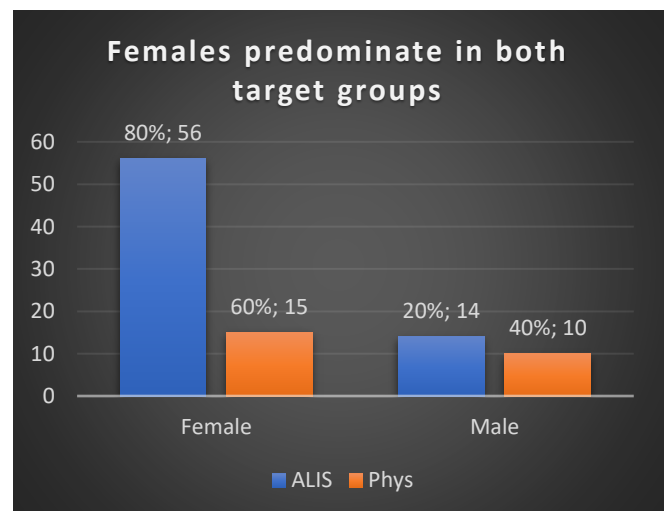
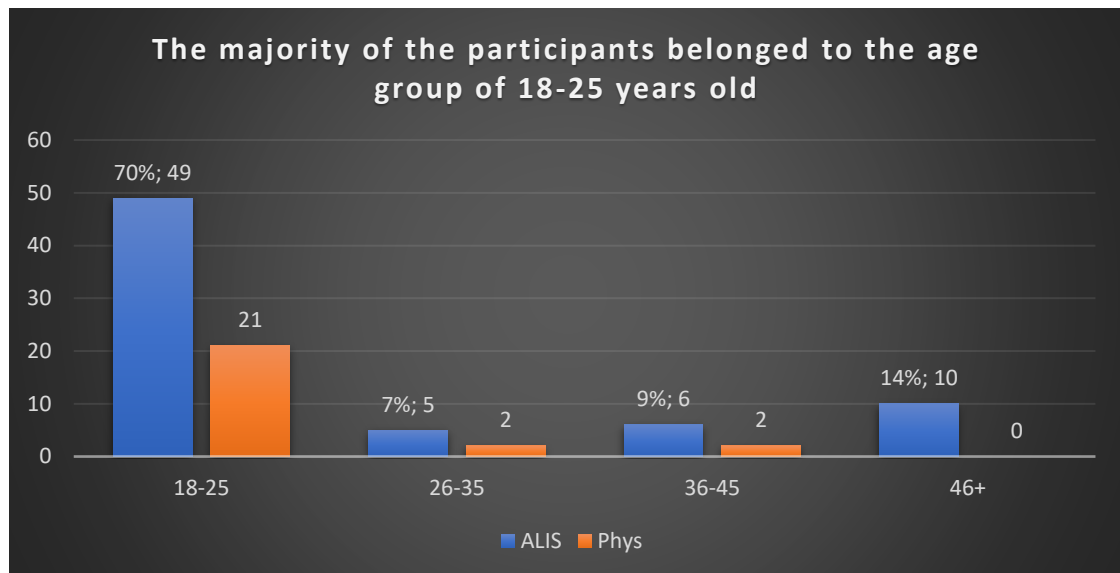


Fig. 1. Females predominate in both target groups

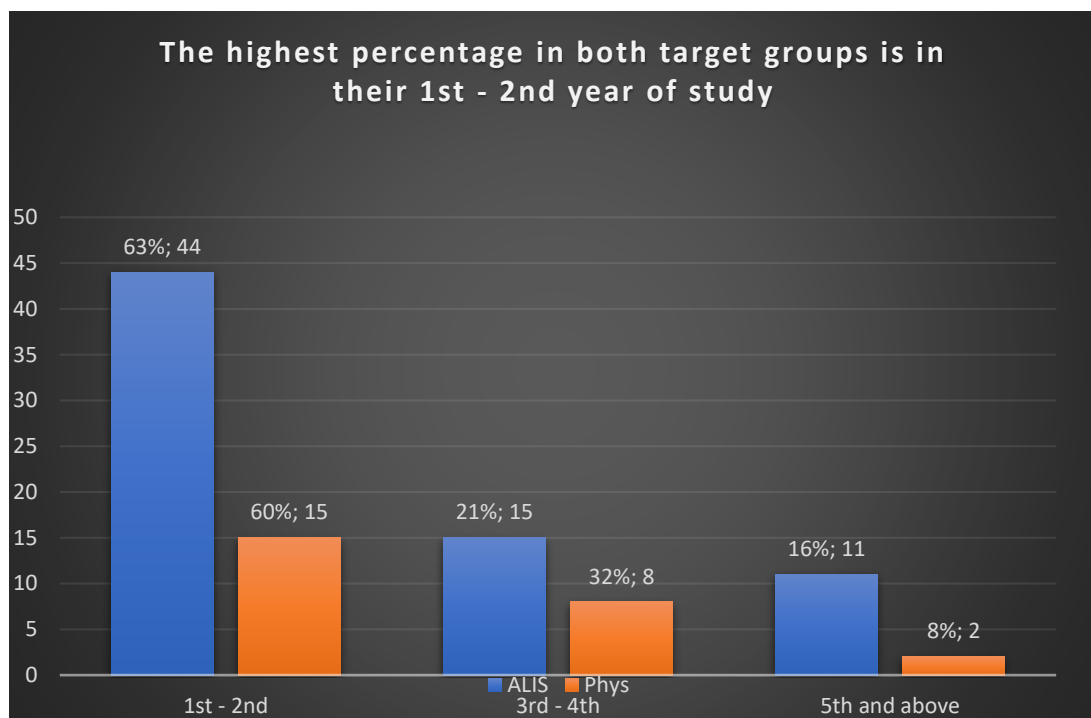
In the second question, participants were asked to choose their age group. The results showed that most participants were 18-25 years old, with 70% in ALIS and 84% in Phys, respectively. It is worth noting that the age group of 46+ years old received no response in Phys. However, it was represented by 14% of respondents in ALIS (see fig. 2).





**Fig. 2.** The majority of the participants belonged to the age group of 18-25 years old

In the next question, about the year of study, it was found that the majority of both target groups were in their first or second year of study, with 63% in ALIS and 60% in Phys, respectively (see fig. 3).



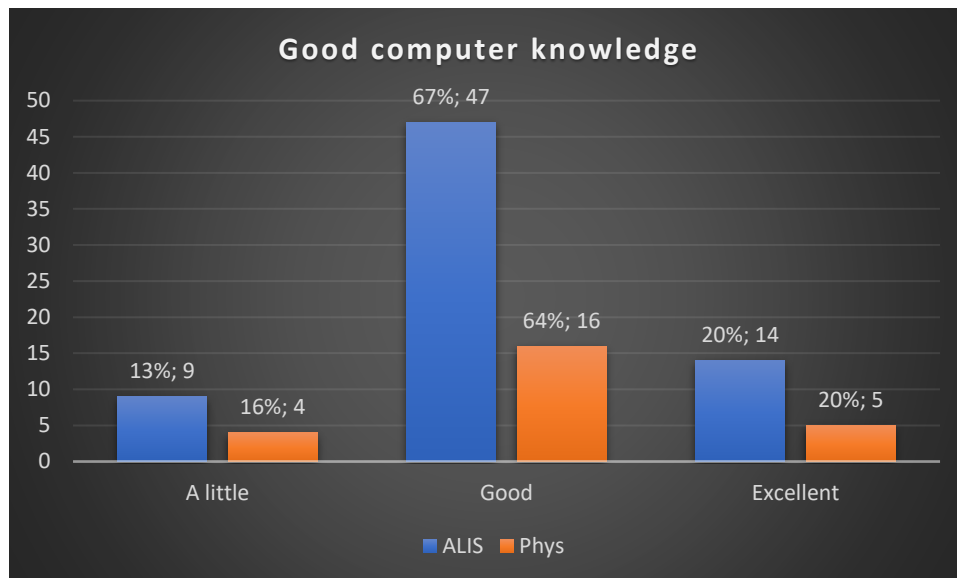
**Fig. 3.** The highest percentage in both target groups is in their 1st - 2nd year of study

To sum up, this survey reflects the views of the female population more than those of the male population. It also reflects more on the opinions of 18–25-year-old students in their first or second years of study.

#### *B. Introductory questions*

The first question in the second section of the questionnaire concerned the level of computer knowledge of the

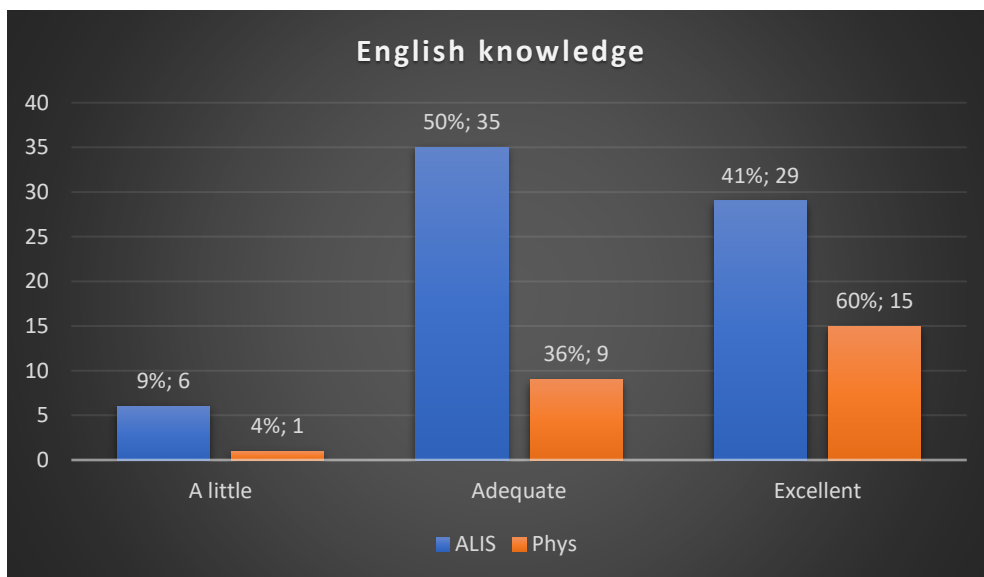
undergraduates. In both departments, the highest percentage stated that "I have good computer knowledge," with 67% in ALIS and 64% in Phys (see fig. 4). A finding that is in line with the results of the surveys conducted by Thi & Thi [7] and Kahouei et al. [11], demonstrating the familiarity that students nowadays have with Information and Communications Technologies.



**Fig. 4.** Good Computer knowledge

The following question investigated the English language competence of the students in both departments. The disparity in English knowledge between the two groups is significant. The students in ALIS have adequate, though lower English knowledge than those in Phys. The findings

come to confirm the research by Thi & Thi [7], where Information Scientists have lower English language skills in contrast to Health Scientists, who have a better level of English [10] (see fig. 5).

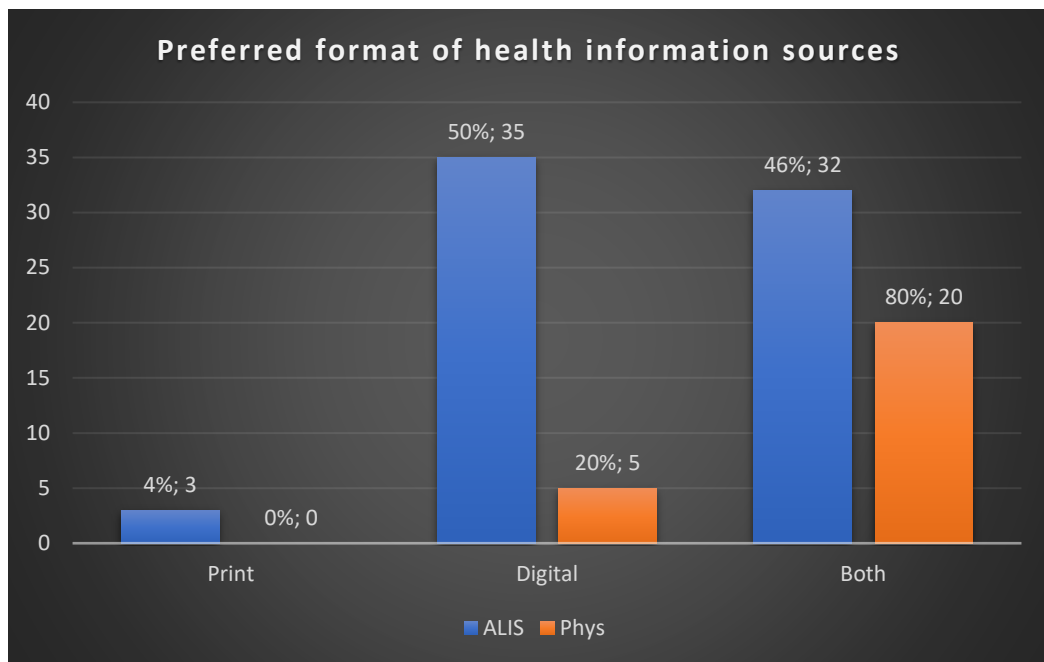


**Fig. 5.** English knowledge

### *C. The preferred format of health information sources and preferred search techniques*

The first question in the third section of the questionnaire concerned the format of information sources students prefer when searching for health information. At this point,

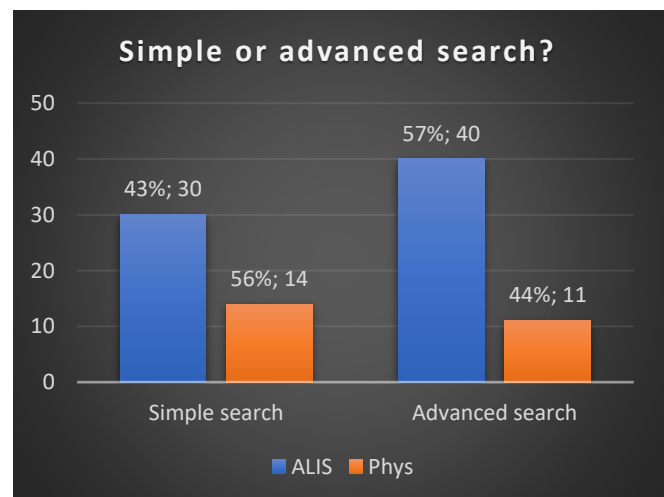
sharp differences were observed. Phys students preferred equally both formats of information sources, namely digital and print, with a percentage of 80%. In contrast, half of the students in ALIS (50%) preferred mainly the digital format of information sources, and almost another half (46%) preferred both formats equally (see fig. 6).



**Fig. 6.** Preferred format of health information sources

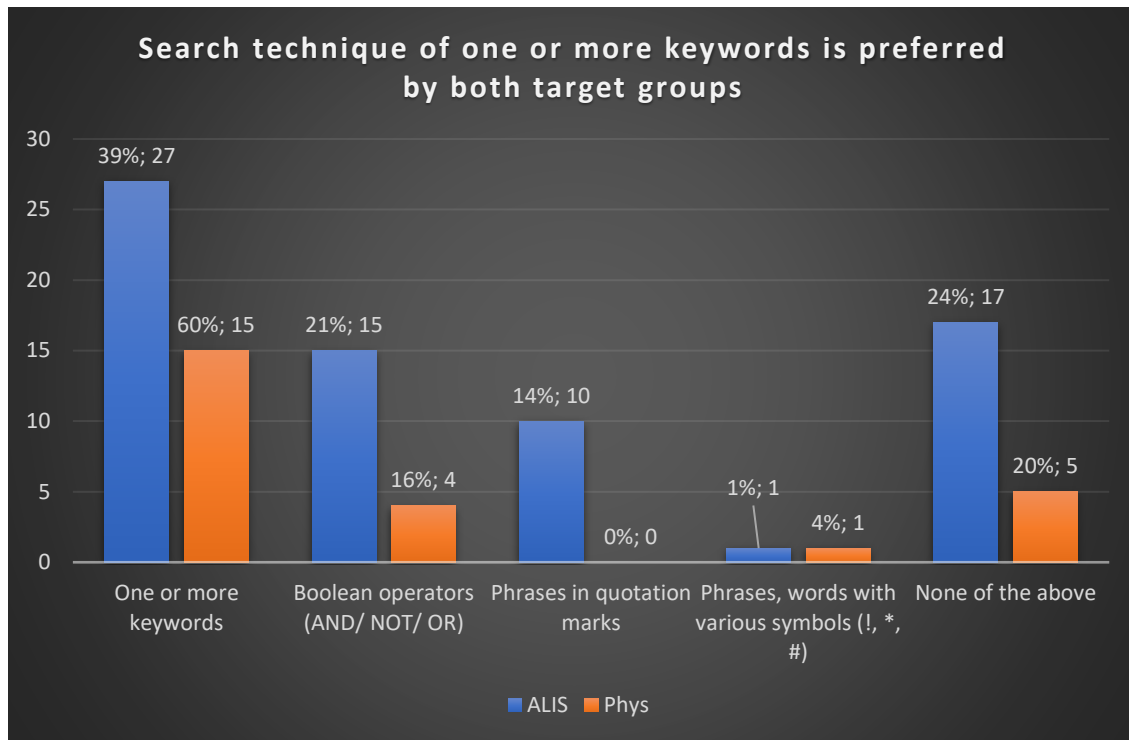
In Kahouei et al. [11] research, health students mainly use digital information. While in the survey by Iordanou et al. [8], both types of information are preferred by health students, which is entirely consistent with the present survey findings. In the sector of Information Science, the research by Okeji, Ilika and Baro [6] agrees with the findings of this research since, in both cases, the digital format of information predominates as a whole.

The next question concerned the preference for simple or advanced search techniques when searching for health information on the Internet, library catalogues, databases, etc. The simple search is preferred by 56% of the Phys participants. In ALIS, however, advanced search is chosen by 57% (see fig. 7). This is an expected difference that can be attributed to the fact that ALIS students are trained early in searching and retrieving information with advanced search methods.



**Fig. 7.** Simple or advanced search

Afterwards, participants were asked about their preferred search technique every time they used the advanced search. At this point, the following similarity can be seen: the search technique of one or more keywords is preferred by both target groups, with 39% in ALIS and 60% in Phys, respectively (see fig. 8).

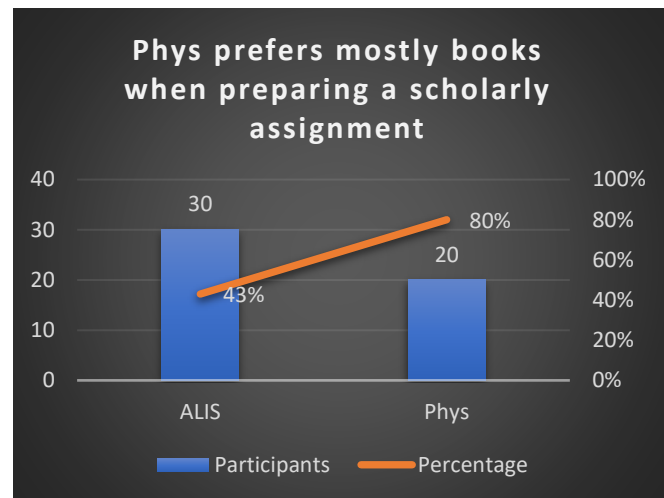


**Fig. 8.** Search technique of one or more keywords is the most preferred by both target groups

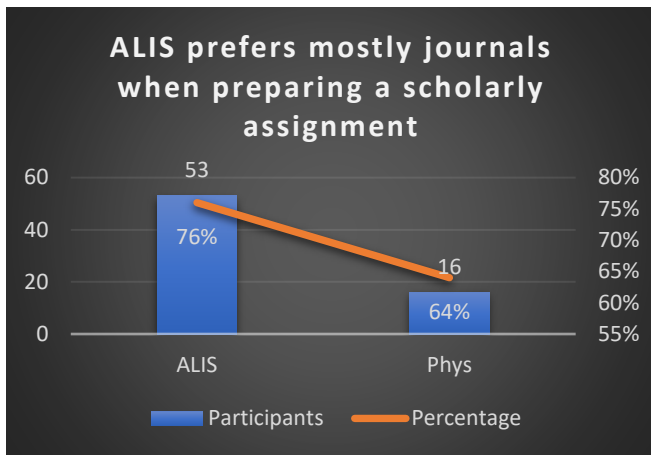
This is in line with the research of Thi & Thi [7], where Library Science students prefer advanced search techniques and, more specifically, they use "keyword" search techniques and search by the title of the source in question. In addition, students in the 2nd year and above use the search technique "Boolean operators". The results described above are similar to those of the Physiotherapy discipline since Stavrou's [10] research showed that the students preferred the search technique: "one or more keywords". However, according to the results of this research, it seems that Phys students largely preferred simple searches.

#### *D. Preferred health information sources and criteria of source evaluation and trust*

The fourth section of the questionnaire began with a question regarding the participants' preferred sources of health information when preparing an academic assignment. First, Phys students stated that they preferred mainly "books" (80%), whereas ALIS students preferred mainly "scientific articles" (76%) (see fig. 9 and 10). ALIS had a lower and/or no preference for "mass media (TV, radio, newspaper)" and "communication with librarians," with only 9% and 7%, respectively, while Phys did not choose such sources.



**Fig. 9.** Phys prefers mostly books when preparing a scholarly assignment

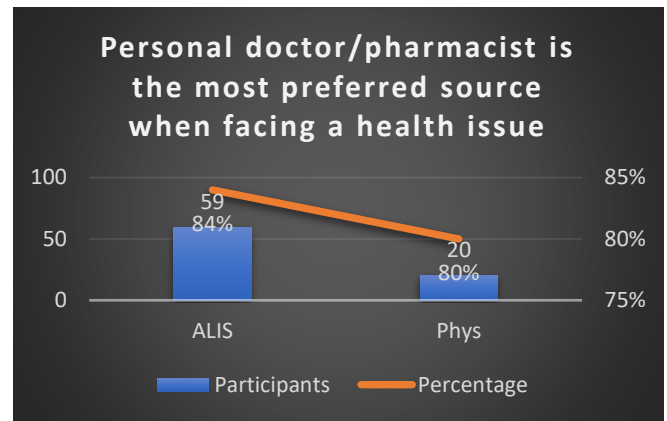


**Fig. 10.** ALIS prefers mostly journals when preparing a scholarly assignment

According to the relevant literature, the health sector appears to have heavily relied on library services in the past [8]. In contrast, Oluwaseye, Akanni, and Busuyi [12] discovered that students nowadays mostly trust the Internet and rarely the academic library. Furthermore, it is worth noting that librarians frequently assisted students in Stavrou's [10] research. However, in the present survey, librarians were not preferred at all.

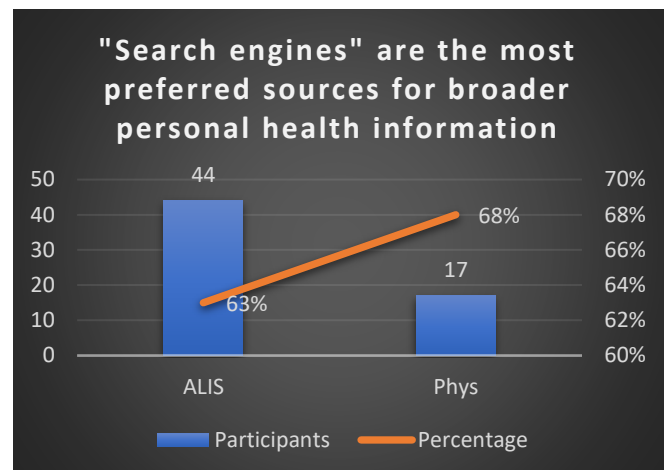
In the field of Library Science, as in the current survey, Okeji, Ilika and Baro's [6] survey reveals that journals are the primary source chosen by students in this field. In contrast, the survey conducted by Saunders et al. [3] discovered that search engines such as Google are employed more frequently. It is worth noting that theses and dissertations are ranked last as sources of information in both of the previous research. Furthermore, local newspapers are in low preference [6], and students do not choose to communicate with librarians [3].

In the following question, participants were asked about the health information sources they prefer when they or someone familiar faces a health issue. The answers showed that students of both departments had a greater preference for "personal doctor/pharmacist", with 84% in ALIS and 80% in Phys, respectively. It must be mentioned that "communication with librarians" is not a choice in both target groups (see fig. 11).



**Fig. 11.** Personal doctor/pharmacist is the most preferred source when facing a health issue

The third question in this section examined participants' sources of health information for their broader personal health information. Both target groups appeared to rely primarily on "search engines," with 63% in ALIS and 68% in Phys. As with the previous question in this section, "contacting librarians" is not a choice by the participants (see fig. 12).



**Fig. 12.** "Search engines" are the most preferred sources for broader personal health information

Stavrou [10] identified that consulting librarians was the first preferred source of information for health students, followed by the library's online services and medical databases. The survey by Kahouei et al. [11] presents an entirely different scenario: patient relatives seem to be the most trusted source of information. Students' personal experiences, conference proceedings, doctors, and the media follow this in descending order. On the other hand, students in Information Science prefer to use search engines, with Google outperforming Yahoo and Bing [5].

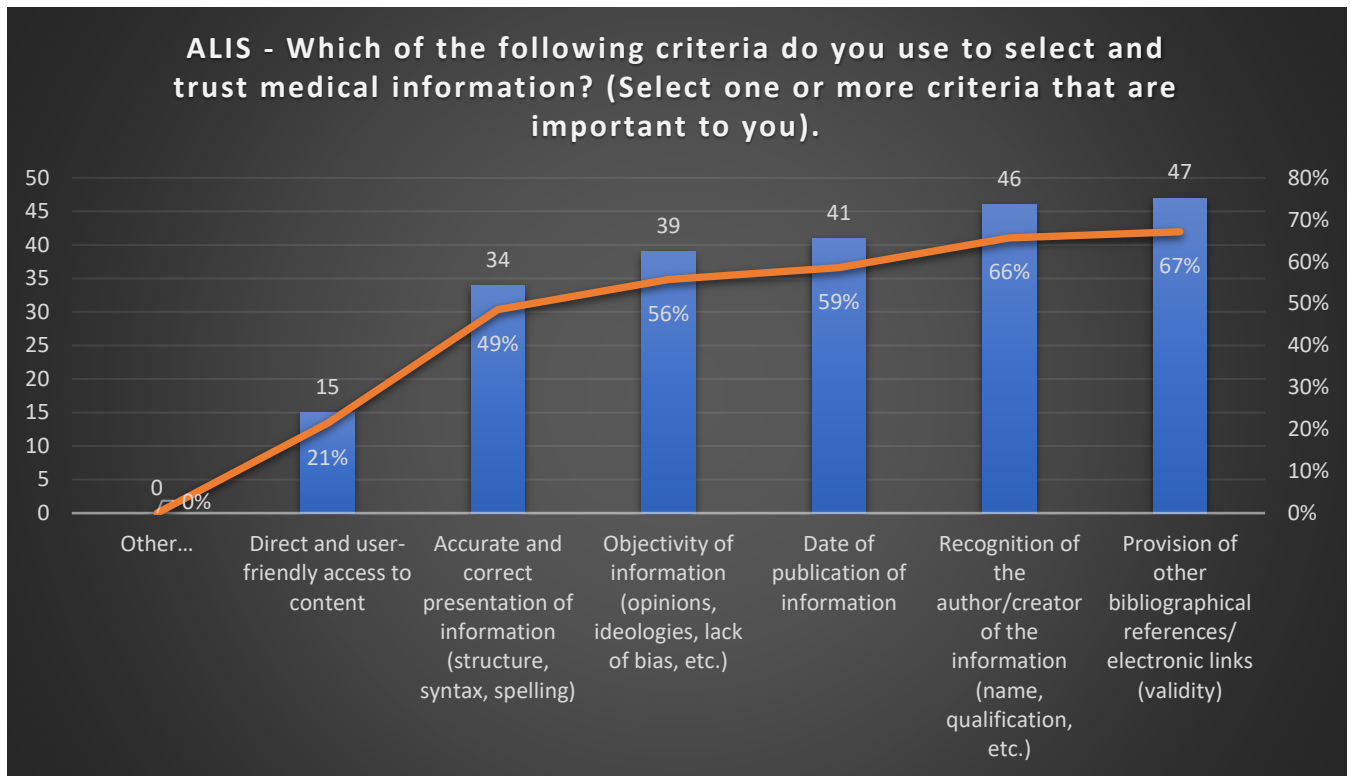
The last question in this section explored the criteria for which the two target groups evaluate health information. Respondents of both target groups chose "provision of other literature references/electronic links (validity<sup>1</sup>)" as a significant criterion of health information

<sup>1</sup> It has to be mentioned that researchers of the present survey consider a health source to be valid when it provides the users with other literature

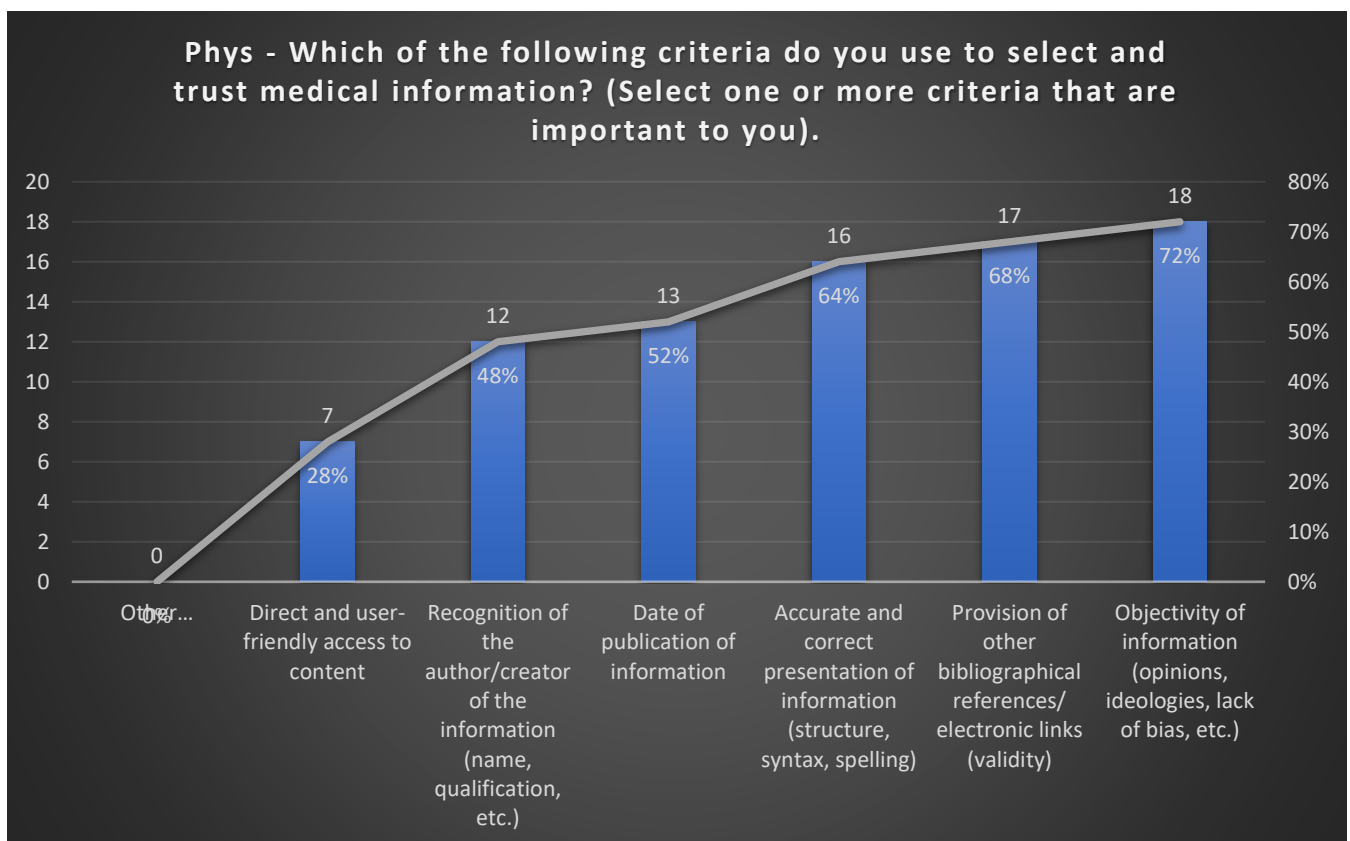
references/electronic links and thus enabling them to check and decide on the degree of the validity of the source based on the referenced sources.

evaluation, with almost the same percentage, 67% in ALIS and 68% in Phys. However, "direct and user-friendly access to content" was used by both target groups to a lesser degree, namely 21% of ALIS students and 48% of Phys

students. Quite a difference was found between the two target groups using the criterion of objectivity of information, which came first with 72% in Phys and fourth with 56% in ALIS (see fig. 13 and 14).



**Fig. 13.** ALIS Criteria to select and trust health information



**Fig. 14.** Phys Criteria to select and trust health information

Although this research identified the validity and objectivity of information among the most preferred criteria for evaluating health sources, the literature review expresses different views. More specifically, in the research by Stavrou [10] and by Okeji, Ilika and Baro [6], information objectivity comes last as an evaluation criterion by students in both disciplines. The above studies unanimously cite free access to the content of the information and the date of publication as the main criteria for evaluating sources.

#### E. Evaluation of the content of health information sources

The fifth section of the questionnaire consisted of a single question that examined, in more depth, the participants' main criterion to evaluate the content of health information sources. With 73% in ALIS and 60% in Phys, the two target groups almost agreed that the main criterion was verifying the validity of the content of health information sources (see fig. 15).

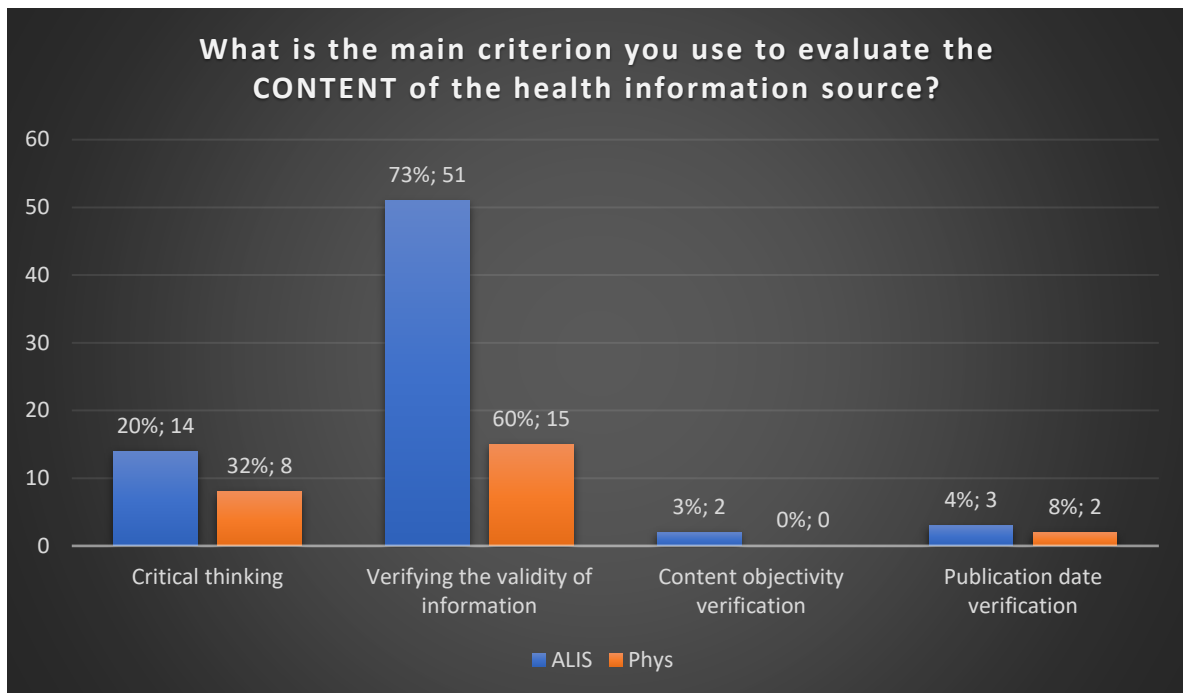


Fig. 15. Main criterion for evaluating information sources

#### F. Perceptions on Information Literacy

The first question in section six asked whether participants were familiar with the term "information literacy." In this case, the results were as expected, with 70% of students in ALIS answering that they were aware of the term since information literacy is a compulsory topic in the Department's curriculum. However, most students in Phys (80%) responded negatively. This clearly underlines that academic libraries in Greece have not so far promoted effectively information literacy programmes that would give students of various departments, other than information science, a chance to further develop their skills in information literacy (see fig. 16).

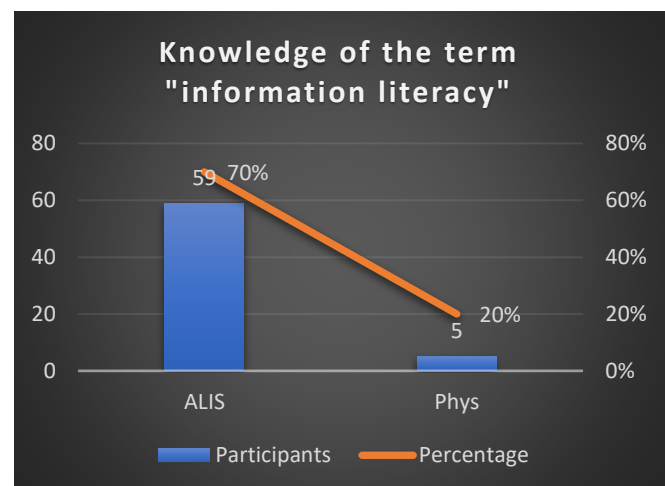


Fig. 16. Knowledge of the term "information literacy"

According to Okeji, Ilika and Baro's [6] survey, students of Library Science consider themselves to have moderate knowledge of skills in information literacy. It is worth noting that in that research, the student population was in their final year of study, while in the present research, most participants were in their 1st-2nd academic year. Unlike the results of Phys in this paper, the survey by

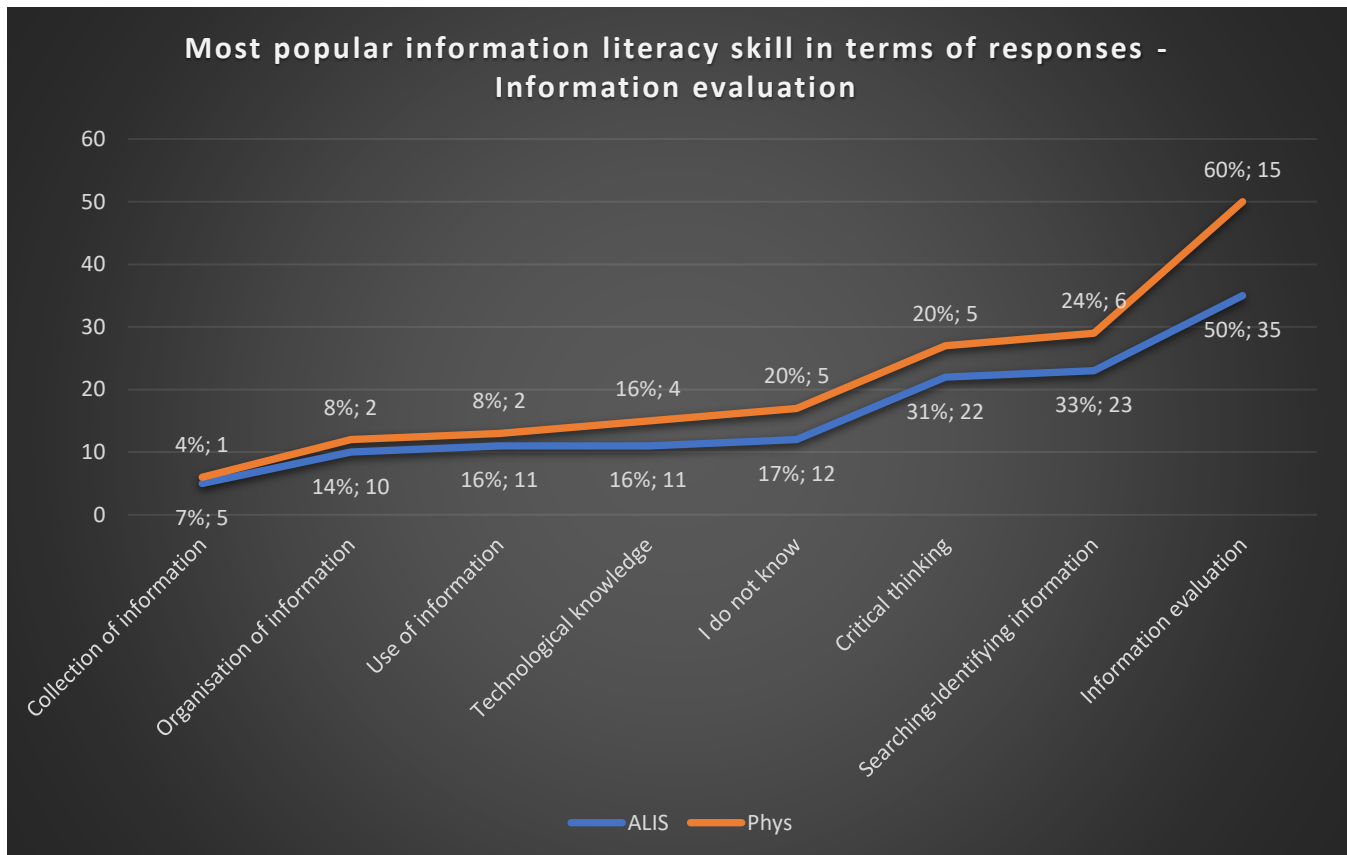


Oluwaseye, Akanni and Busuyi [12] shows that students exhibit some basic information literacy skills.

Furthermore, Okeji, Ilika, and Baro's [6] research in Information Science shows that students have acquired the skills of organizing, integrating, and utilizing information. They feel, however, that the ability to generate new information is still underdeveloped. The outcomes of researchers such as Iordanou et al. [8] and Oluwaseye,

Akanni, and Busuyi [12] in Health Science showed that participants had trouble correctly searching and accessing the needed information.

Finally, when participants were asked to choose the skills information literacy fosters, 50% in ALIS and 60% in Phys selected "information evaluation". The least common response was "collection of information", with 7% in ALIS students and 4% in Phys students (see fig. 17).



**Fig. 17.** Most popular information literacy skill is information evaluation

## V. DISCUSSION

According to the present survey findings, students in both disciplines state that they possess an adequate level of computer knowledge. Consequently, it can be assumed that this competence allows them to satisfactorily search for information and use it in the digital era. Related studies reinforce this assertion [7, 11]. As a result, students can use numerous tools and services provided by the ICT and the Internet. Regarding English language competency, ALIS students appear to have a slightly lower level than Phys students. This may make it difficult for future Information Scientists to become competent in information literacy, as a vast amount of information is nowadays published in English.

Furthermore, the search and retrieval of health information appear to take place mostly in the digital environment, particularly among ALIS students. Nonetheless, a sizable number of Phys students trust both digital and print information. The relevant literature also

confirmed the conclusions described above. For example, even in the study by Iordanou et al. [8], concerning the medical sector, students used both formats of information sources.

Regarding the search approach, it has been found that Phys students favour simple searches and prefer to look for information using "one or more keywords." The conflicting fact that they perform advanced searches with multiple keywords while describing them as simple searches leads to the conclusion that they are, at the very least, unaware of theoretical concepts of information behaviour and literacy. This could be attributed to the fact that most students are freshmen and sophomores, and thus they have little experience with information behaviour.

ALIS students, on the other hand, prefer advanced searches, which is also supported by their use of the "one or more keywords" strategy, according to Thi & Thi's [7] research. Because they are still in their first and second years of study, it is understandable that they are more familiar with the aforementioned search technique and less so with



the "Boolean operators" technique, which is reported to be used by sophomore or senior library science students in the study of Thi & Thi [7].

Phys students choose books as a source of information when preparing a course assignment, although Oluwaseye, Akanni, and Busuyi [12] found that the Internet was the primary source for the research participants. Students' lack of trust/preference for mass media and librarians in their University is also significant. This could be related to their belief that the scientific books of medicine contain thorough information and knowledge, leading over time to the predicted confirmation of what has been recorded. According to Okeji, Ilika, and Baro's [6] study, students choose scientific journals as a source of knowledge in library science.

According to the survey results, the personal doctor/pharmacist is the source that both groups of respondents choose to consult when they or someone familiar face a health problem. Moreover, they do not consult their University librarians at all. The previous data could be considered reasonable because librarians working at the University library do not specialize in health information, but they can only direct the user to the desired information. On the contrary, the doctor/pharmacist is the one who, due to his/her field of expertise, can directly transmit the correct information to the interested person or even solve the issue that has arisen for the latter.

Both target groups rely heavily on search engines for their broader health information. However, it should be noted that neither response group has chosen librarians. In contrast, Stavrou's [10] study found that librarians were the leading source of information for health students, whereas Kahouei et al. [11] found that patients' families were the primary source of information. The survey results in Information Science are completely consistent with the findings of Kurniasih et al. [5].

Continuing with the topic of the preferred criteria for evaluating health information, ALIS students believe in validity, while Phys students think that objectivity of information is the most essential factor to trust sources of health information. The research by Stavrou [10] and Okeji, Ilika, and Baro [6] take a different stance, pointing to unrestricted access to the information's content and publication date as the most important criteria. This is entirely consistent with the movement's demands for open access to knowledge.

Concerning the criteria used to evaluate the content of health information sources, students from both disciplines unanimously answered, "verifying the validity of the information." According to information literacy, performing an information validity check is one of the most critical skills every user should develop. It is worth noting that the participants in this survey chose to use the aforementioned criterion despite being mainly in their first and second years of study.

Finally, based on the participants' statements, it can be concluded that most ALIS students are familiar with the

term "information literacy," which is to be expected given the nature of this Department's curriculum. However, in Okeji, Ilika, and Baro's [6] survey, senior students reported that their knowledge of information literacy skills needed to be improved. Phys students, unlike ALIS students, are unfamiliar with the term "information literacy". Even in Oluwaseye, Akanni, and Busuyi's [12] study, health students lacked information literacy skills.

## VI. CONCLUSIONS AND FUTURE WORK

The current survey's primary result is that comparing the two target groups' health information behaviour does not provide a clear answer to the question of which group has developed information literacy skills better. However, a more thorough look at the results reveals that ALIS students answer the survey questions in a logical sequence and appear to comprehend them better.

Phys students, on the other hand, appear to have some information literacy skills but lack others, such as search techniques. For example, while they state that they prefer simple searches, they also respond that the search technique they employ is "one or more keywords." This demonstrates that they are unaware that this strategy is just one of many in the advanced search method. Furthermore, when asked if they knew what the term "information literacy" meant, most of them answered that they did not. Some of their responses to the open question also indicate that they consider information literacy more relevant to computer science. Three indicative answers are: *"Adopting behaviour and ways of learning and using information technology for personal education purposes etc."*; *"Knowledge of using computers, mobile phones, etc."*; and *"Using computers and navigating the Internet"*.

As a result, a wise suggestion would be to incorporate information literacy as a course in the Department of Phys, if not in all departments of the University. Since the last decade has been characterized as an era of information production and consumption, it is critical for every aspiring scientist, let alone an expert in the health sector, to be a competent information literate individual.

In conclusion, this research introduces to the literature a comparative survey in information literacy between Information Science and Health Sciences students. Since the audience was limited to the students of the Phys department, as far as the Health Sciences are concerned, it would be quite interesting to make this comparison with other Health departments in the future. This way, a more in-depth understanding of the information behaviour between the two academic communities could be yielded.

Finally, a qualitative survey with interviews of potential participants is suggested, which could then be compared to the quantitative data gathered by the present survey.

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# Study of the Causes of Teacher Burnout from the Use of Information and Communication Technologies, During the Period of Covid-19

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### Abstract:

**Purpose** – The pandemic due to Covid-19 created an unprecedented situation worldwide and radically changed the social situation in people's life and work conditions. For education to function, the use of Information and Communication Technologies and new practices were adopted to build a new basis of communication between teachers and students. During the pandemic and in the phase of exclusion, teachers kept the educational process "alive and active" in the values of learning and school. Nevertheless, their huge effort also caused negative consequences for them. This specific study is a part of a work that concerns teachers' practical reports about their negative experiences using Information and Communication Technologies during the Covid-19 period.

**Design/methodology/approach** – The study captures the causes of teachers' mental and physical Burnout due to the use of Information Systems, E-Learning, and Teleconferencing. Active teachers carried out the research, and its results concern public school teachers. The research methodology is part of the field of educational research and the analysis of the results through a structured online questionnaire.

**Findings** - From the development of the research and the analysis of its results, it emerged that teachers during the period of confinement due to Covid-19 presented symptoms of work burnout with different symptoms according to categories of teachers.

**Originality/value** – The findings of this research are unique in the Greek educational system and should improve the mechanisms to support teachers in performing their duties.

**Index Terms** – Covid-19, Burnout and Work Stress, Distance Education, Digital Educational Material, Information Systems, Electronic Classes – Teleconferencing.

## I. INTRODUCTION

The sudden, violent, massive, and compulsory use of Information and Communication Technologies (ICT) through Distance Learning (DL) for all educational levels has become a new reality for both students and their

guardians, as well as for Greek teachers [1]. By redefining the use of ICT in the pandemic phases, we find that the implementation of Distance Learning is supported through Internet services. In these virtual learning environments, students have online access to educational material and communicate with their teachers and peers through identified formats [2]. These environments, synchronous or asynchronous, were related to teaching and learning during the pandemic and functioned in a personalised way [3]. Teaching and pedagogical learning models (inside and outside the classroom), group practice, and group action principles moved to a new channel of knowledge transfer and communication [4]. In addition, teachers had to transfer online all their cognitive activities and assessments for Secondary Education like Gymnasium, General Lyceum, and Vocational Lyceum and First Level Education like Primary and Elementary Schools [5]. All acquired experiential educational activities, all models of learning performance, all evaluative learning tools, whether analogue or digital [6], and all provided school knowledge, together with curricula, were integrated into the context of online and technologically mediated learning [7].

Reflecting on the 2019-2020 and 2020-2021 school years (taking measures to address Covid- 19), no one can claim that the educational community, whether practising teachers (teachers, tutors, kindergarten teachers) or students, were prepared for this sudden change [8]. On the other hand, no one had anticipated the closure of schools, the complete individual isolation, and its psycho-spiritual consequences [9]. Nevertheless, the teachers' efforts to keep education "alive" were a catalyst for the whole society and for keeping hope alive. Throughout the pandemic, teachers willingly gave their best to promote the values of learning and schooling. They tried, without compromise and illusions, to synchronise themselves with the new situation, confirming the dictum of educational theorists, psychologists, and sociologists, who argue that "in gloomy times, thinking should keep us alive".

Considering the above, the present research was organised by teachers and referred to teachers. It focuses on the causes of mental and physical teachers' Burnout

due to the use of ICT (Information Systems, Electronic Classrooms, Teleconferencing, etc.) during the Covid-19 pandemic. The study results are relevant to all teachers, and the methodology is in the field of structured observations through a sampling of mental and physical burnout events.

The following parts of the article present an exposition of the principles of the survey design, a presentation of the instruments, a presentation of the results, and an interpretation of the data.

## II. THE ORGANIZATION OF THE SURVEY

### A. Aim and Objectives of the Research

This study aimed to investigate the causes that contributed to Burnout Symptoms (BS) among Greek teachers of primary and secondary education during the period of Covid-19. The research was oriented toward Burnout Symptoms due to the violent and forced transition from face-to-face to Distance Learning.

The research aims to investigate the following:

1) If the Greek educational system provided the mechanisms to support teachers in the performance of their duties during the pandemic and especially, to what extent did the state mechanism, contribute by providing the technological means and resources to support Distance Learning by supporting teachers' educational and administrative tasks through the use of ICT.

2) The degree of readiness and the possible difficulties the teachers had during the organisation of their distance teaching process.

3) How much did the abrupt, violent and forced implementation of Distance Learning affect teachers emotionally, psychologically, and physically?

### B. Research Sample

The survey sample consisted of 194 Teachers, regardless of the employment relationship (permanent-substitute) and speciality, who work in public Pre-Primary and Primary Schools, Secondary Schools such as Junior High Schools and High Schools (General and Professional Education). The sample was collected in Athens and Piraeus area by sending anonymous questionnaires via an online cloud to the school directors. Some school directors, in turn, forwarded the link to the online cloud through the Panhellenic School Network (PSN) email and sent it to their school teachers' email addresses. Due to the restrictive measures against the spread of the Covid-19 virus, it was impossible to request formal permission to conduct the survey, resulting in difficulties approaching the sample of substitute teachers. For this reason, the

questionnaire was also sent to teachers via social networking services.

### C. Research Methodology

This specific research is part of the general field of educational research [10], but it also associates reports and contexts of other social fields. Beyond the particular situation's overview, the intended goals are the description of the context and causes of a social phenomenon (teachers' Burnout) and its interpretation. The approach of the fields is made through polls and sampling, which was organised based on the weighting and distribution of questionnaires. This method is accepted in the international literature on similar topics [11]. The sampling and collection of empirical research material were done with a specially designed, anonymous, online, and self-completed questionnaire. Despite the use of statistical tools, the main aim was not only the recording of statistical relationships but the attempt to interpret the data collected and the generalisation or formulation of the laws governing the specific research work case [12], [13].

The questionnaire includes two parts. The first part focuses on the social profile of the study sample, while the second part focuses on the causes of teachers' Burnout through ICT use during the Covid-19 period.

In more detail, the second part of the questionnaire contained **sixteen (16)** questions, which were composed based on the causes of the appearance of the teachers' burnout phenomenon as a result (causes – deficiencies) of the following:

- technological infrastructure,
- available networking,
- lack of digital learning resources,
- teacher-student support during the Distance Learning period,
- administrative support for teachers,
- e-services support,
- teacher-parent communication.

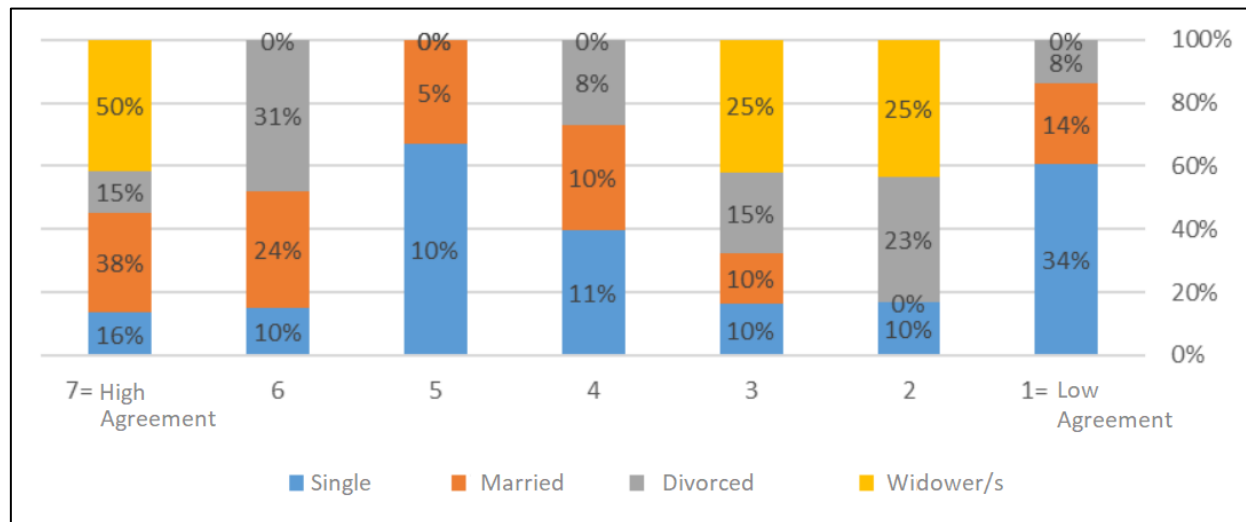
## III. RESULTS

According to Figure 1, we observe that most divorced people agree to a large extent (31%), while widowers agree positively and at a rate of 50% that there is a private space in their home so that Distance Learning classes can be held. Married people also agreed in a large percentage (total 62%). In comparison, unmarried people in a large percentage (54%) expressed a low agreement that there is a particular space in their home to realise Distance Learning courses (Table I).

**Table I. Family situation × My home has a private place to hold Distance Learning courses**

	Low Agreement				High Agreement			TOTAL
	1	2	3	4	5	6	7	
<b>Single</b>	34%	10%	10%	11%	10%	10%	16%	100%

<b>Married</b>	14%	0%	10%	10%	5%	33%	38%	100%
<b>Divorced</b>	8%	23%	15%	8%	0%	27%	15%	100%
<b>Widower/s</b>	0%	25%	25%	0%	0%	0%	50%	100%



**Fig. 1. The family situation concerning conditions at home**

It can be said that the conditions under which Distance Learning courses take place at home do not depend on the teachers' family status (Table II).

**Table II. Chi-Square Tests**

<b>X-Square test:</b>	<b>Price</b>	<b>BE</b>	<b>Asymptote. (2-booth)</b>
<b>Pearson X-Square</b>	24,48	18	0,140
<b>Likelihood ratio</b>	28,00	18	0,062
<b>Linear/on-linear correlation</b>	4,10	1	0,043

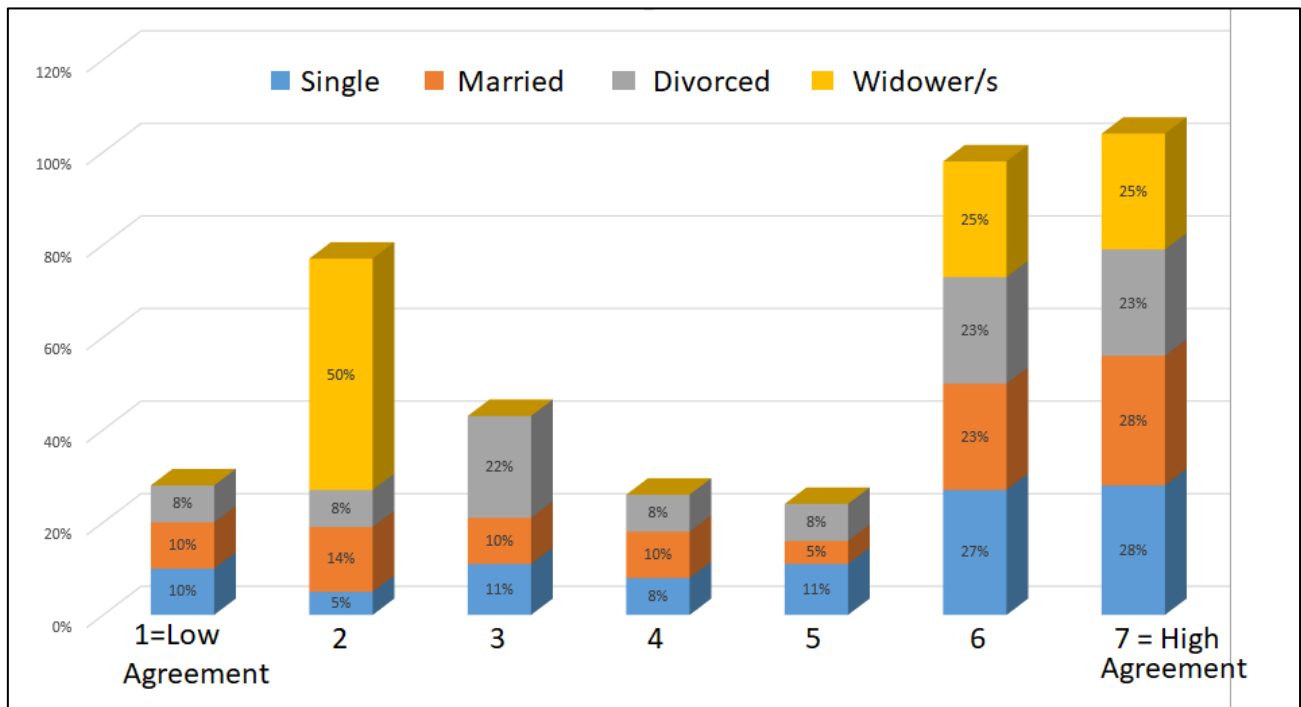
According to Figure 2, half of the widows/ widowers (50%) agree positively that their home has the necessary equipment (machines and connection) for the coverage of Distance Learning. In contrast, the other half agree little

or not at all with this fact. Less than half of singles (44%) do not agree that there is necessary equipment for Distance Learning in their home. On the contrary, more than half of married people, 52%, answered this question largely positively (Table III).

**Table III. Family situation X in my home, I have the necessary equipment (machines and connection) to cover the Distance Learning courses**

	Low Agreement				High Agreement			TOTAL
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	
Single	10%	5%	11%	8%	11%	27%	28%	100%
Married	10%	14%	10%	10%	5%	23%	28%	100%
Divorced	8%	8%	22%	8%	8%	23%	23%	100%
Widower/s	0%	50%	0%	0%	0%	25%	25%	100%





**Fig. 2. Family status and digital equipment to cover Distance Learning courses**

In addition, the equipment used to cover Distance Learning does not depend on the marital status of teachers (Table IV).

**Table IV. Chi-Square Tests**

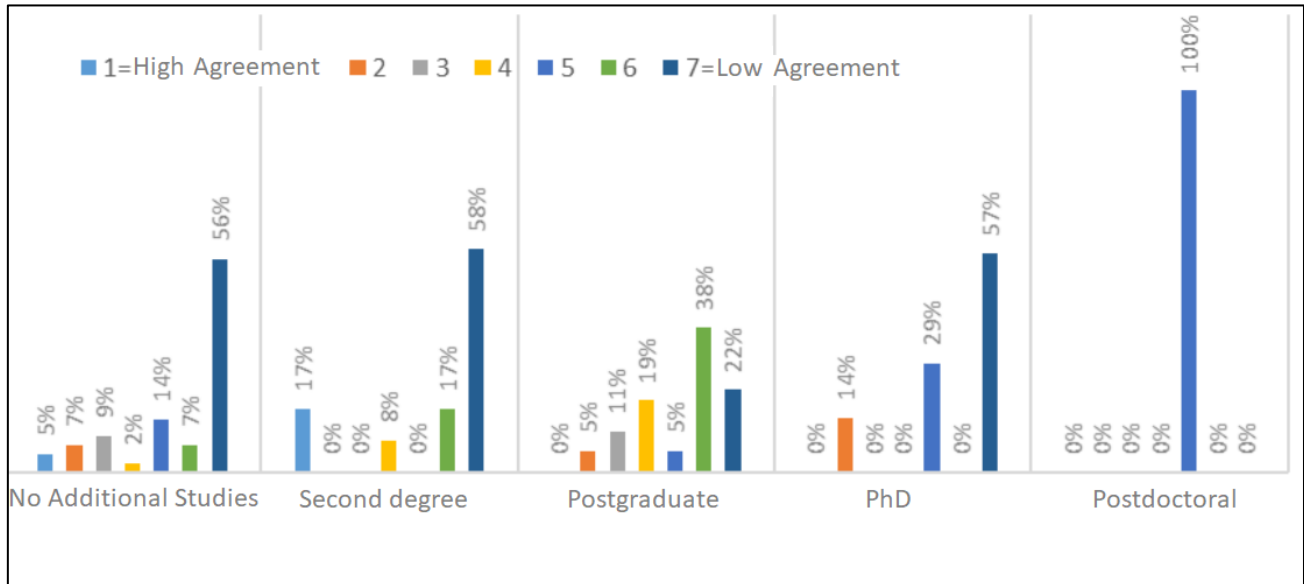
X-Square test:	Price	BE	Asymptote. (2-booth)
Pearson X-Square	13,49	18	0,762
Likelihood ratio	11,05	18	0,892
Linear/off-linear correlation	,84	1	0,358

From Figure 3, we observe that holders of a second degree agree much more than the rest (at a percentage of 75%) with the Burnout caused by the compilation of digital material in their course preparation. They are

followed by teachers who did not continue their studies (at a rate of 63%). Masters or PhD holders are much less in agreement (at a rate of 57-59%), while for post-doctorates, there is moderate agreement (Table V).

**Table V. Extra Studies × Compiling digital material for my Distance Learning course brought me to the brink of Burnout as I had to consume many hours**

	minor agreement					great deal		TOTAL
	1	2	3	4	5	6	7	
No								
Additional Studies	5%	7%	9%	2%	14%	7%	56%	100%
Second degree	17%	0%	0%	8%	0%	17%	58%	100%
Postgraduate	0%	5%	11%	19%	5%	38%	22%	100%
PhD	0%	14%	0%	0%	29%	0%	57%	100%
Postdoctoral	0%	0%	0%	0%	100%	0%	0%	100%



**Fig. 3. Extra studies and Burnout from creating digital material**

From the Pearson table, we can say that the level of teachers' education is related to the amount of Burnout

from assembling the digital material necessary for Distance Learning (Table VI).

**Table VI. Results of Chi-Square Tests**

X-Square test:	Price	BE	Asymptote. (2-booth)
Pearson X-Square	47,89	24	0,003
Likelihood ratio	48,75	24	0,002
Linear/off-linear correlation	,32	1	0,573

According to Figure 3, we observe that the majority of teachers (over 60%) reported Burnout caused by the assembly of digital materials while they prepare their distance courses. Teachers who did not have ICT

certification agreed greatly on this Burnout (47%). Teachers with B-level ICT certification also reported Burnout to a great extent at 42% and A-level ICT holders at 40% (Table VII).

**Table VII. ICT training x Creating digital material for my course brought me to the brink of Burnout as I had to consume many hours**

	minor agreement				great deal			TOTAL
	1	2	3	4	5	6	7	
Without ICT	7%	10%	3%	13%	7%	13%	47%	100%
Level A	8%	0%	12%	12%	8%	20%	40%	100%
Level B	0%	7%	9%	4%	16%	22%	42%	100%



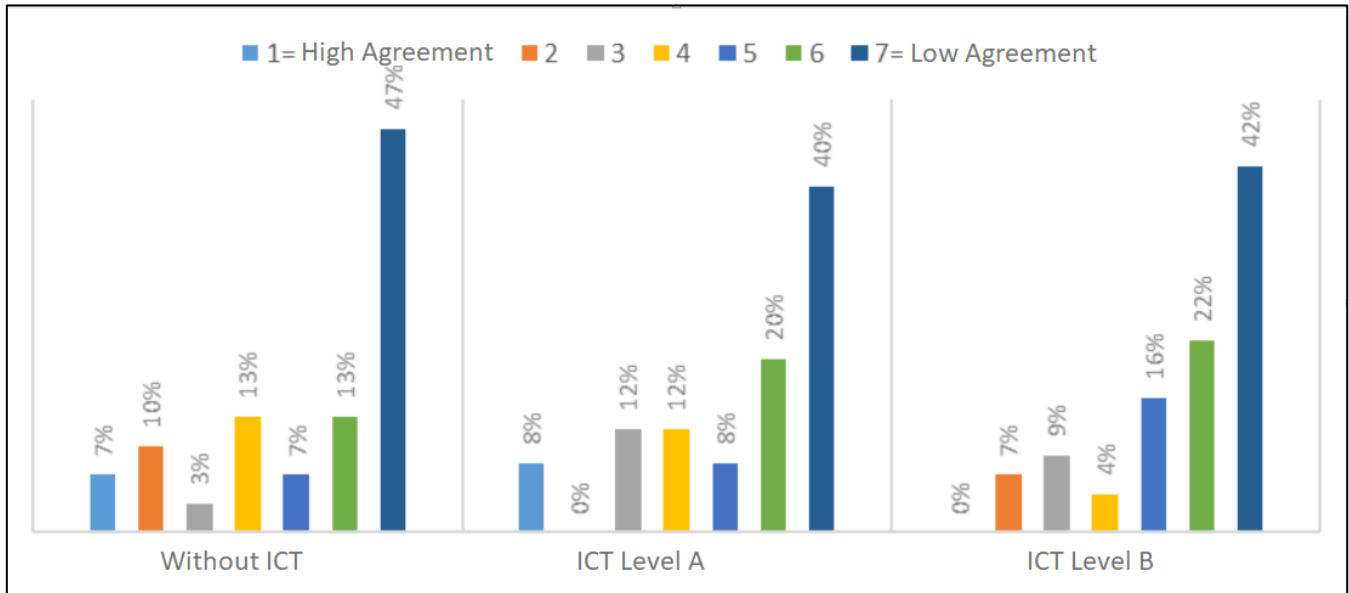


Fig. 4. ICT training and Burnout from creating digital material for Distance Learning courses

Moreover, we can say that the additional work teachers have done is not related to their Burnout from

long hours of computer and digital application use (Table VIII).

Table VIII. Chi-Square Tests

X-Square test:	Price	BE	Asymptote. (2-booth)
Pearson X-Square	36,20	24	0,053
Likelihood ratio	27,24	24	0,293
Linear/off-linear correlation	1,40	1	0,238

According to Figure 4, we observe that all teachers, regardless of whether they have certification or not, agree to a very large extent (a percentage greater than 60%) that they found themselves at the limits of their endurance due to long hours of computer use. A small percentage of 13-14% without B level ICT certification report that they did not reach the limits of their endurance from long hours of computer use, while

holders of B Level ICT certification in a double percentage (24-26%) also report that they have not reached the limits of their endurance from long hours of PC use (Table IX). Moreover, teachers' ICT training is not related to their Burnout from long hours of computer use (Table X).

Table IX. ICT training × I feel that I am at the limits of my endurance from the long hours of computer use

	minor agreement				great deal			TOTAL
	1	2	3		5	6	7	
Without ICT	10%	0%	3%	17%	7%	13%	50%	100%
ICT Level A	0%	4%	8%	20%	8%	28%	32%	100%
ICT Level B	0%	13%	11%	2%	9%	22%	42%	100%

Table X. Chi-Square Tests

X-Square test:	Price	BE	Asymptote. (2-booth)
Pearson X-Square	21,85	12	0,039
Likelihood ratio	25,02	12	0,015
Linear/off-linear correlation	0,03	1	0,858

From Figure 5, we observe that more than half of the teachers with less than 10 years of experience take 2-4 hours on average to prepare for their Distance Learning courses. 29% of early-employed teachers need 4- 6 hours of preparation, while 22% of older teachers (with 6-10 years of experience) need 3-4 hours of preparation for their Distance Learning courses. More

than 10 years experienced, teachers need less preparation - as reported - than the rest (half of them require less than 3 hours of preparation), while 12% of teachers with more than 16 years of experience said that they get prepared in less than 1 hour for their Distance Learning courses (Table XI).

Table XI. Years of service × To be able to prepare for Distance Learning courses, I dedicated every day over

	HOURS OF PREPARATION						TOTAL
	0-1 time	1-2 hours	2-3 hours	3-4 hours	4-6 hours	> 6 hours	
1 -5 years	7%	7%	50%	7%	29%	0%	100%
6 -10 years	11%	11%	56%	22%	0%	0%	100%
11 – 15 years	0%	21%	39%	21%	14%	4%	100%
16 and	12%	12%	39%	25%	10%	2%	100%

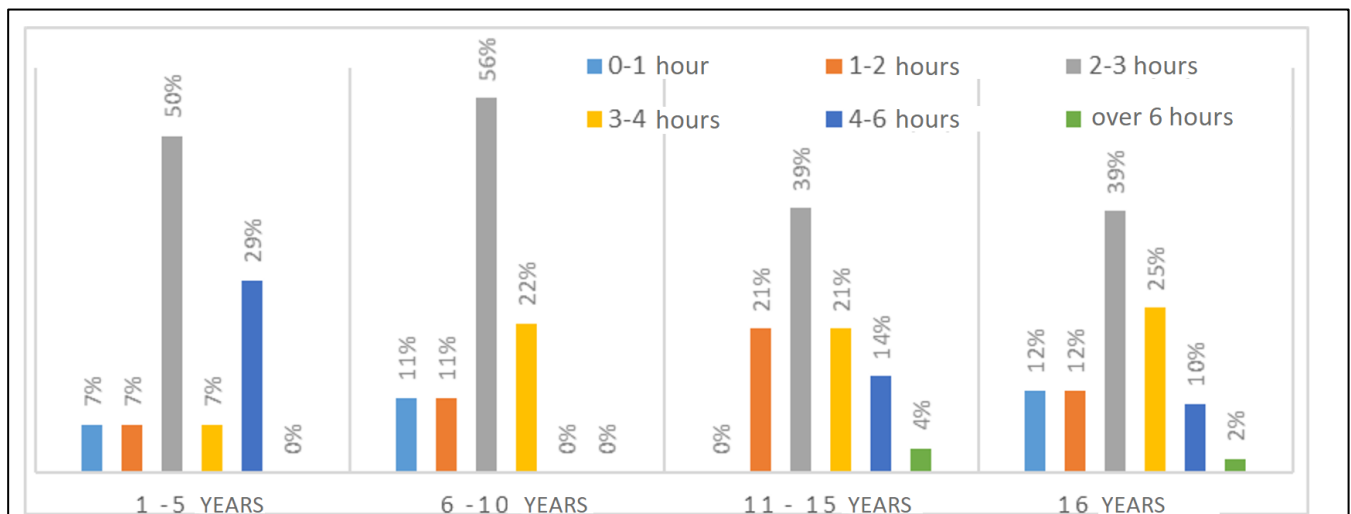


Fig. 5. Years of service and Burnout from daily preparation for Distance Learning courses

From the Pearson table, we can conclude that the

teachers' seniority time is not related to their Burnout from daily preparation for DE lessons (Table XII).

Table XII. Chi-square test

X-Square test:	Price	BE	Asymptote. (2-booth)
Pearson X-Square	12,47	15	,643
Likelihood ratio	15,80	15	,396
Linear/off-linear correlation	31	1	,581

According to Figure 6, we observe that regardless of their level of study, 40% of teachers (except for postdocs)

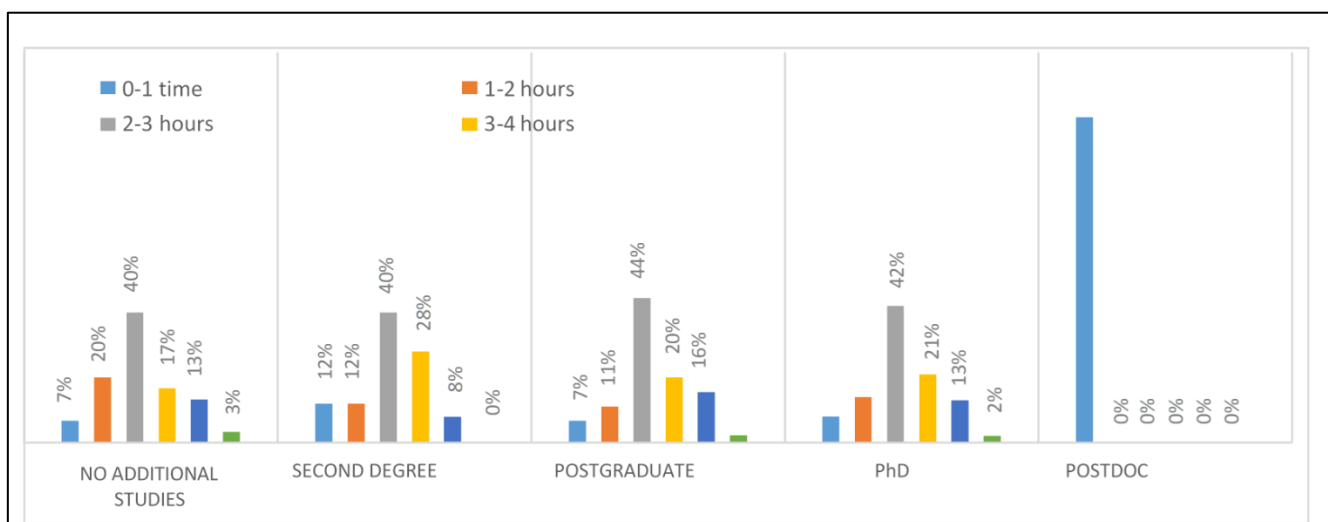
agree that Distance Learning courses need 2 to 3 hours of preparation. 17%-28% of teachers report that they agree

on a Distance Learning preparation of 3 to 4 hours, and a percentage of 18%-27% of teachers, regardless of their level of study, agree on a Distance Learning preparation in less than 2 hours. Among teachers with a postgraduate

degree, a percentage of 13% seem to agree that it takes 4-6 hours to prepare for a Distance Learning course (Table XIII).

**Table XIII Extra Studies × To be able to prepare for the Distance Learning courses, I dedicated every day**

	HOURS OF PREPARATION						TOTAL
	0-1 time	1-2 hours	2-3 hours	3-4 hours	4-6 hours	> 6 hours	
<b>No Additional Studies</b>	5%	19%	35%	28%	14%	0%	100%
<b>Second degree</b>	8%	8%	50%	25%	8%	0%	100%
<b>Postgraduate</b>	11%	11%	51%	14%	8%	5%	100%
<b>PhD</b>	0%	14%	29%	14%	43%	0%	100%
<b>Postdoctoral</b>	100%	0%	0%	0%	0%	0%	100%



**Fig. 6. Extra studies and Burnout from the daily Distance Learning preparation**

We can say that the extra studies that teachers have

done and their Burnout from the daily Distance Learning preparation are not dependent (Table XIV).

**Table XIV. Chi-square test**

X-Square test:	Price	BE	Asymptote. (2-booth)
<b>Pearson X-Square</b>	27,30	20	0,127
<b>Likelihood ratio</b>	20,43	20	0,431
<b>Linear/off-linear correlation</b>	0,08	1	0,776

#### IV. CONCLUSION

The importance of the research lies in the fact that it highlights the causes and the problems that Greek teachers faced for the first time due to Distance Learning during the Covid-19 quarantine period. It captures the phenomena of professional Burnout in teachers of all levels but also in education executives such as Principals, Vice-Principals, and Supervisors, where, in addition to planning their Distance Learning courses, they shouldered the burden of the administrative tasks of closed schools.

Based on the survey, it was found that teachers in Greece not only did not have the skills but were not sufficiently trained to cope with the demands of Distance Learning, apart from the last months of the 2020 – 2021 school terms (<https://t4e.sch.gr/>), through a rapid online training.

According to the results of the questionnaire, Greek teachers consider that overall, the Greek educational system was not prepared, nor did it have mechanisms to support the educational process. The state did not properly prepare the infrastructure or those mechanisms

that would help teachers to cope with their teaching and service tasks. Apart from the electronic classrooms and the compulsory modern teaching system, the Greek educational system has not structured the necessary technological-digital resources to support E-Learning. Furthermore, the digital infrastructure of education has not been further upgraded except for the purchase of a limited period of software or web platform for the implementation of E-Learning. The above resulted in transferring all responsibilities and organisational obligations of the educational process during the Covid-19 quarantine period to Greek teachers.

In addition, most teachers stated that they were led to Burnout due to the long hours of computer use to respond to the multifaceted tasks of preparing their e-learning materials for their Distance Learning courses and administrative duties.

During the quarantine, teachers rose to the occasion and took full responsibility for the organisation of Distance Learning. They fully covered the equipment cost for their e-courses, and finally, carried out their distance teaching and administrative duties as efficiently as possible. A significant finding was that teachers supported their students and their families in every possible way during the pandemic. This specific finding demonstrates the extent of the empathy of the teachers who helped practically and essentially in social cohesion, setting a valuable legacy for the educational future of their country.

The involvement of teachers in all the aforementioned processes, namely the continuous ICT use and E-Learning, as well as their repeated administrative reassignments due to the new working data that emerged, resulted in their Burnout. The specific findings concerning the imposition of Distance Learning as the only means of education during the pandemic period make this study even more important. The reason is that these findings will be used in future research to measure whether Greek teachers will continue, even after the end of the Covid-19 pandemic, to implement digital media and the operation of electronic classrooms in lifelong education.

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# Digital Public History and Archives in Greece

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### Abstract:

**Purpose** - In the current online context, the work of historians and archivists crosses multiple levels. Archival institutions, digital public history research projects, and broader activity in cultural heritage management have shaped many new archival digital repositories. The purpose of this article is to review this kind of online activity in Greece and highlight relevant concerns for managing historical archives online.

**Design/methodology/approach** - This article presents digital archival repositories of archival institutions, cultural and information organisations and history research projects. It highlights the need for classification by the creator to improve the evaluation of the content and architecture of digital repositories.

**Findings** - A core point from the review is the need for more collaboration between scientists, as new technologies, media, and the web have created fluid boundaries between disciplines

**Originality/value** - A convergence between research and academic institutions and memory institutions and the development of joint scientific projects is in the interest of the preservation of historical archives but also of the community to which the stakeholders involved in such projects are addressed.

**Index Terms** — Digital Public History, Digital Archives, Archives, Archival Studies, Greece

## I. INTRODUCTION

The web is filled more and more with digitised historical archives. Archival and scientific institutions, associations and individuals interested in the study of the past are digitising and making historical sources available online. Digital Public History refers to a research methodology and practices focusing on using digital technologies, media and internet to engage the public with historical content and enhance the historiography. This can include using websites, online databases, social media, virtual reality, and other digital tools to make historical information and resources more accessible to a broader audience [1, p. 127-130; 2, p. 120]. Digital historians typically need access to large amounts of digital data, such as text, images, audio, and video. They also require tools for analysing and interpreting this data, such as text-mining software, image and audio analysis software,

and GIS software.

Additionally, they may need to use databases and other information management systems to organise and store their data. Archival sources remain at the heart of historiographical research, and the creation of digital repositories is requested. This was emphatically noted during the period of the covid-19 pandemic when archival institutions were closed for a long period, and even today, appointments for archival research are limited. On the other hand, today's archivists have the knowledge and tools to respond to these needs. At the heart of digital history stands, among other things, the digital archive concept, with historians and archivists often understanding various things differently.

In the 1990s, the development of the World Wide Web changed the presentation of historical information and access to primary sources. In this context, the memory institutions (libraries, archives and museums) have a primary relationship, as they collect a significant part of the historical sources. At the same time, these institutions are interested in offering their collections and activities to the community. So public digital history seems to be an ideal arena for the intersection between academic history and research and memory institutions, with both focused on the public. But is this the reality? What methodological and epistemological issues emerge from this relationship? The current article aims to present and highlight the various aspects of this coexistence as they are formed in the Greek-language case. Although geospatial boundaries do not match the study of online information, the issue of language enables us to study non-English national paradigms separately.

Especially in the digital environment, Archival Studies seems to have lost the privilege of defining the "archive" [3]. Suppose the convergence of Computer Science and Archival Science has disconnected the second one from history. In that case, the new framework for producing and publishing historiography reconfigures the needs of archivists and historians. This relationship is formed through common work in the mixed analogue and digital environment.

## II. GREEK ARCHIVAL COLLECTIONS ONLINE: TYPICAL CASES

A great entry point for exploring the online Greek-language world of digital archives -or rather digitised historical archives- is the General State Archives. In 2009, they published their digital collection called *@ρχαιομνήμων* [*@rcheiomnimon*] [4]. This collection includes selected



digitised items from the collections of the national archives, mainly 19th-20th century archives. The General State Archives are structured into local – Regional Archives, and each Archives has followed a different usage and storage pattern in the digital collection. For example, some Archives use the repository to present their collections as an online index. Ten years later, in 2019, the *National Archives Index* [5] was launched to monitor the overall collections of the Greek archives and assist researchers. This year, in the context of the commemoration of the 100th anniversary of the Asia Minor Catastrophe, have launched *The Digital Archive Portal for 1922* [6], which maps and presents all the available archival sources of the Greek Archives related to the theme and the efforts of the Greek State for the rehabilitation and assimilation of its refugees.

National and general historical anniversaries are an opportunity to develop projects to digitise cultural heritage. On the bicentenary of the 1821 Revolution, the Research Centre for the Humanities (RCH) designed and launched *The Greek Revolution of 1821: Digital Archive* [7] with the collaboration of 22 information, education and research institution. Published on this repository more than 13,500 documentation cards (documents, arts, music, books) and over 45,000 digitised archival items (documents, images, audio material). The research team of the project developed before this project *The Ioannis Kapodistrias Digital Archive* [8] for the Kapodistrias Museum or Kapodistrias Museum-Centre of Kapodistrian Studies. The double anniversary of 2021 for the 200th anniversary of the birth of the Greek Revolution and 2022 for the 100th anniversary of the Asia Minor Catastrophe offered many opportunities for the collaboration of memory institutions with the research and academic community through digital public history projects.

The Hellenic Literary and Historical Archive Society (ELIA)-National Bank of Greece Cultural Foundation digitised and published online more than 100,000 archival items from its collections in the framework of the European Union's "Information Society" program [9]. Like the General State Archives, many information institutions used the "Information Society" program, which on a large scale, created digital archival collections and formed the culture of digitisation in Greece. The following are the digital results of this funding. The Contemporary Social History Archives (ASKI), taking advantage of the financing from the same operational program, digitised over 11,000 items from their collections [10]. The *Digital Archive* of the National Research Foundation "Eleftherios K. Venizelos" consists of manuscripts, graphic material (postal cards and lithographs-posters), photographic and cartographic material to achieve its primary goal: the research and study of the era and work of the great Greek statesman (starting at the mid-19th century until the end of the 1960s) [11]. The digitised collections of these institutions are included in the *SearchCulture.gr*, which was developed by the National Documentation Centre (EKT) [12]. This repository is the Greek aggregator for cultural content and the national provider for Europeana. The *Digital Library* of the American

School of Classical Studies at Athens, as called, includes the archaeological photographic collection, the Dorothy's Burr Thompson photographic collection, photographs from the historical archives and a database of Ion Dragoumis' Correspondence [13].

In addition to archives, libraries and research centres, several cultural organisations and public benefit foundations have launched repositories of digital archives. The Digital Collection of the Cavafy Archive by the Onassis Foundation consists of manuscripts of poems, hand-compiled printed editions, prose literary works, articles, studies and notes, photographs by the poet and the Singopoulos's archive [14]. *The Aikaterini Laskaridis Foundation Archives* provided online access to the archive of Eleni Antoniadis-Bimbikou with 30,000 items, the archive of Stelios Mayopoulos and the archive of the Istanbul Brotherhood "Agapate allilous" via its archival repository [15].

Apart from repositories of digital archival collections, many research projects have produced websites presenting digitised historical documents from archives relevant to the projects' historiographical questions. Previously mentioned are the major research projects for the 1821 digital archive and Ioannis Kapodistrias archive. *The digital collection of the research program "Refugees: their reception in Greece (1821-1989) - Research-Documentation-Dissemination"* of the Research Centre for Modern History (KENI – Panteion University) and the Institute of Historical Research (National Hellenic Research Foundation) [16] attempts to include a wide range of cases of refugee settlement in Greece and at the same time to form a picture of the many different historical sources in which relevant information material can be found. Another kind of digital public history project uses available historical archives and creates new collections through oral history. The project "*Memories of the Occupation of Greece*" of the Free University of Berlin Center for Digital Systems launched an online archive repository of a total of 93 interviews of contemporary Greek witnesses of the German occupation of Greece under the Nazis [17].

Based on these representative examples of digital archival repositories/digital archives, their development can be classified into three main categories: (a) archival and broader information and cultural organisations developing independent digital repositories, (b) joint projects to create thematic digital collections between information organisations and the university and research community, and finally, (c) research projects of universities or research institutes developing digital thematic collections. Interoperability is not the norm in the above cases. In many different ways, web users have access to historical archival sources. Historical archives leave their physical context behind and move into a different world that creates new terms and problems in their use and interpretation.

### III. ARCHIVES AND ARCHIVAL PRACTICE IN MOTION

The idea of the "archives in motion" refers that archives are not static and unchanging but constantly evolving and adapting to new technologies and ways of understanding

the past. This concept emphasises archives' dynamic and fluid nature and the importance of actively engaging with and reinterpreting the materials they contain. In practice, this idea can involve digitising and making historical materials available online, creating new archival collections that reflect diverse perspectives and experiences, and using digital tools to analyse and interpret historical data in new ways. It also involves collaboration and working with communities to co-create, preserve and share their history and cultures. By recognising the importance of constantly reevaluating and updating the materials and methods used in archives, this perception can help ensure that historical records remain relevant and accessible to future generations. A concept that has been shaped mainly through the use of archives in museum exhibitions and has its background in the broader field of cultural heritage preservation [18].

The above mobility reveals a complex digital archive collection/repository creation world. For example, a classification of the cultural heritage providers indexed in SearchCulture.gr under the category "historical collection/archive" includes: regional and local authorities, cultural and public benefit foundations, educational and research institutions, museums, archives, libraries, political parties et al. [Table 1.]. In the contemporary digital context, there are displacements through these projects that can create distortions in the archive. The transition from producer to provider, the common and misused use of the terms item, collection, repository, database, library record and archives, and the often incomplete description, moves the practice away from archival theory and methodology. The use of General International Standard for Archival Description seems to be limited exclusively to archival institutions, and many archival description fields are created depending on the needs of digitisation projects. At the same time, in such a wide repository, different kinds of descriptions are created (incomplete or surface descriptions together with detailed and documented descriptions). At this point, archivists have the important role of peer reviewers of such projects [19].

<b>Cultural and Public Benefit Foundations</b>	Aikaterini Laskaridis Foundation Baron Michael Tossizza Foundation Chamber Of Fine Arts of Greece (EETE) Committee for Pontic Studies (EPM) Constantinos Simitis Foundation Greek Biotope/Wetland Centre (EKBY) Greek National Opera Hellenic Olympic Committee Hellenic Book Club Konstantinos K. Mitsotakis Foundation Macedonian Art Society TECHN Michael Cacoyannis Foundation National Bank of Greece Cultural Foundation National Research Foundation "Eleftherios K. Venizelos" Onassis Foundation Parnassos Literary Society Thessaloniki International Film Festival Thessaloniki State Symphony Orchestra YMCA of Thessaloniki The European Cultural Centre of Delphi (ECCD)
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<b>Museums</b>	"V. Papantoniou" Peloponnesian Folklore Foundation Benaki Museum Folklife and Ethnological Museum of Macedonia-Thrace Historical and Ethnological Society of Greece Jewish Museum of Greece Nikos Kazantzakis Museum Foundation OTE Group Telecommunications Museum Science Center and Technology Museum (NOESIS) Thessaloniki Olympic Museum
<b>Educational and Research Institutions</b>	Academy of Athens American Farm School Anatolia College National Documentation Centre National Hellenic Research Institution University of Crete University of Patras American School of Classical Studies at Athens
<b>Regional and Local Authorities</b>	Association of Friends of Stefanos Kotsianos Institutions (Municipality of Polygyros) Charity Company of the Municipality of Mandra-Eidyllia Local Development Company of Lesvos Municipality of Haidari Municipality of Komotini Municipality of Platanias Public Benefit Organisation of Kavala "DIMOFELIA"
<b>Libraries</b>	Kalambaka Library for the Rousanou Holy Monastery Levadia Central Public Library Public library of Serres Veria Central Public Library
<b>Archives</b>	Contemporary Social History Archives Hellenic Literary and Historical Archive-Cultural Foundation of the National Bank Of Greece
<b>Other</b>	Acropolis Restoration Service (YSMA) Sotiris Kakisis Archive Union of the Democratic Centre (EDIK)

**Table 1.** Providers of "historical collection/archive" content in SearchCulture.gr

Producing content and metadata in English is necessary, as online repositories are accessible globally. The repositories that have translated content provide services and make their operations visible in the international context.

The variety in the types of institutions that are interested and engaged in the disposal of their archival collections is a positive sign for archival awareness. However, the precarious economic situation and the high costs of digitisation projects make it necessary to form a common discussion around the development of digital archival repositories. The need to formulate a common scientific discussion for evaluating the projects that have been implemented and formulating relevant policies is a matter of fact and essential for digital curation and preservation.

#### IV. CONCLUSIONS

Digital Public History and, more widely, Digital Humanities have made it more difficult to define the boundaries between disciplines within the Social Sciences and Humanities and other fields such as Archival Science, Museum Studies, Information Science and Cultural Heritage Management. But coexistence remains an opportunity for the evolution of all scientific fields. Over

the last twenty years, the development of research projects in historical studies has increasingly been linked to the digital domain. Many of the scholarly projects are completed with deliverables that have a strong digital footprint - websites, digital publications, databases, ontologies, etc. Digital outputs are not systematically peer-reviewed/critiqued, as is traditionally the case with monographs or collective scientific papers. Through the collection, description and indexing of digital outputs of scholarly works, many new questions arise, such as what criteria would be used to evaluate digital public history projects, what is their content, and how would they be classified? The boundaries between scholarly activities in the digital world are fluid and by no means one-dimensional.

Archives, museums, libraries, universities, research institutions, and independent research groups engaged in researching the past produce online publications that could be considered part of the research field under consideration, "Digital Public History". It could be argued that the ongoing activity around this field represents a point of convergence between the various cultural/information institutions (archives, museums, libraries), academic institutions (universities and research institutions) and professional, scientific collections (scientific societies, informal research groups).

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