Co-funded by the European Union

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**"Fostering Socially Distanced and Inclusive on Campus Education in Armenian HEIs"**

**NATIONAL POLYTECHNIC UNIVERSITY OF ARMENIA (NPUA)**

# NEEDS ANALYSIS REPORT

Results of the Surveys on Teaching Staff Digital Competence Needs Assessment and Students Digital Learning Needs Assessment

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# Content

# Introduction

The Teaching staff digital competence needs assessment and Student digital learning needs assessment surveys aimed at identifying the current levels of digital skills, competencies, and resources among faculty members and students at the university. These surveys sought to evaluate the gaps in digital teaching, learning, and assessment capabilities to inform targeted interventions and improvements. Specifically, they aimed to assess the extent of teachers' participation in digital training, the relevance and effectiveness of existing digital tools and platforms, and the students' satisfaction with digital learning materials and infrastructure. Furthermore, the surveys intended to gather insights into the necessary technologies, facilities, and teaching materials that require enhancement to support a modern, interactive, and practical educational environment. Ultimately, the goal was to develop evidence-based strategies for advancing digital competencies and infrastructure to align with global educational standards and meet the evolving needs of the university community.

# Section 1: General Information

The survey gathered responses from academic staff across a range of titles, age groups, and genders, offering a representative snapshot of the teaching personnel at the university.

## 1.1. Teachers' characteristics

The majority of respondents (48.15%) hold the title of Associate Professor, followed by 40.74% identified as Lecturers. Assistant Professors comprised 7.41% of the participants, while Professors made up 3.70%.

In terms of age distribution, the largest group of respondents falls within the 36–45 age range (29.63%). This is followed by participants aged 56–65 at 22.22%, and two groups—20–35 and 46–55 years—each representing 18.52% of the total. Respondents over 65 years of age account for 11.11%.

Regarding gender, 59.26% of the respondents were female, while 40.74% were male. This diverse demographic distribution provides a balanced foundation for analyzing the digital competencies, needs, and expectations of the university's academic community.

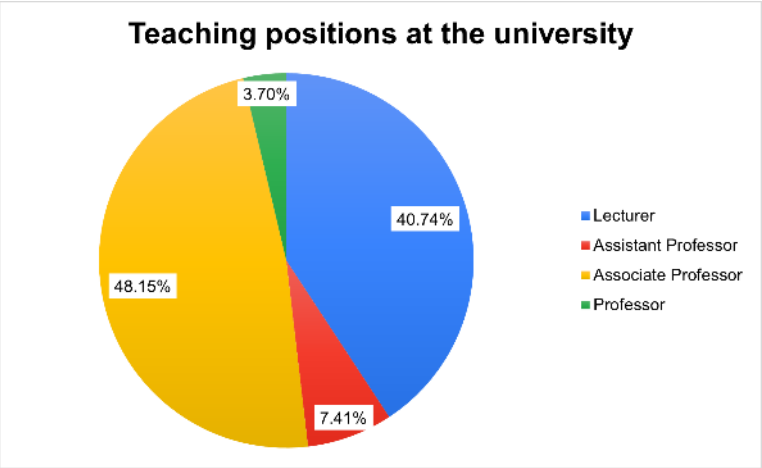


Image 1.1. Teaching positions at the university

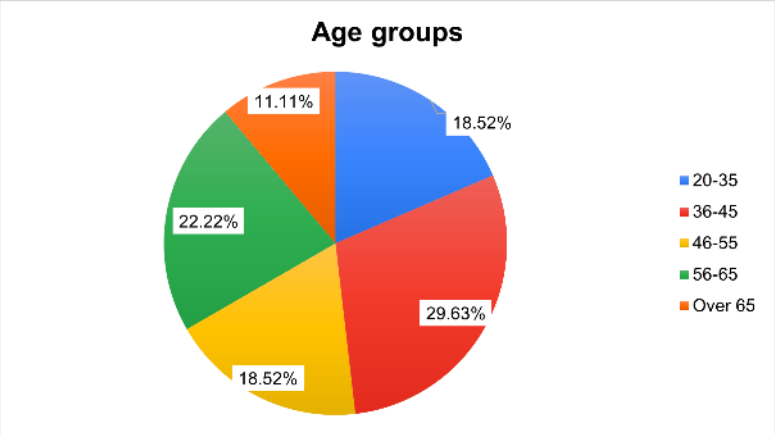


Image 1.2. Teachers age groups

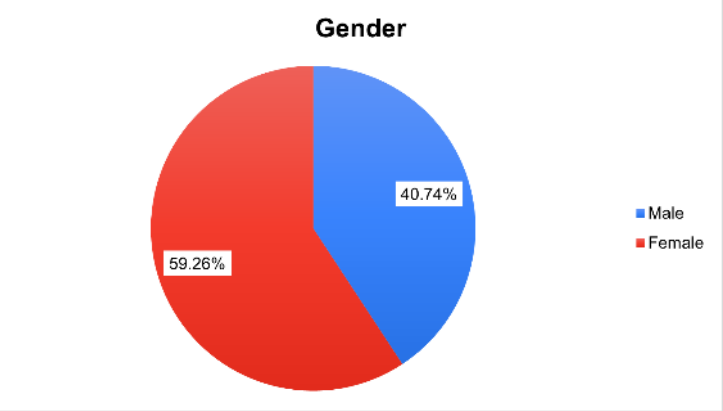


Image 1.3. Teaching staff gender

## 1.2. Students' characteristics

The majority of student respondents (93.40%) are enrolled in Bachelor's degree programs, with a small percentage pursuing postgraduate education—4.72% are Master's students, and 1.89% are enrolled in Doctoral programs. This distribution indicates that the survey data primarily reflect the experiences and perspectives of undergraduate students.

In terms of gender, 53.77% of the students identified as male, while 46.23% identified as female.

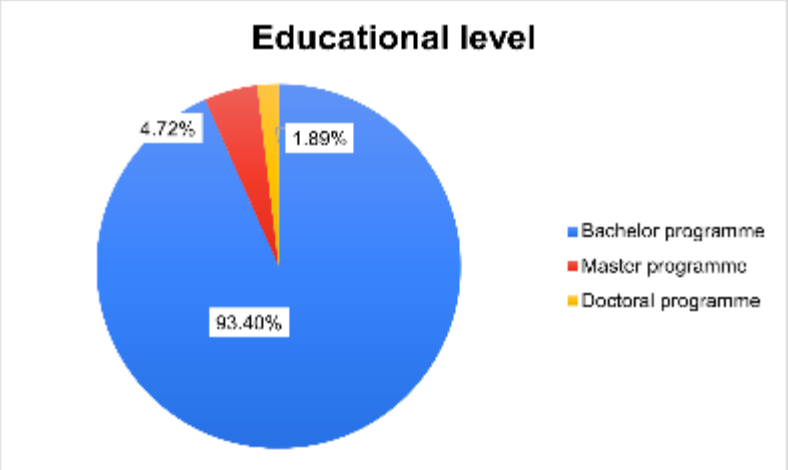


Image 1.4. Students' educational level

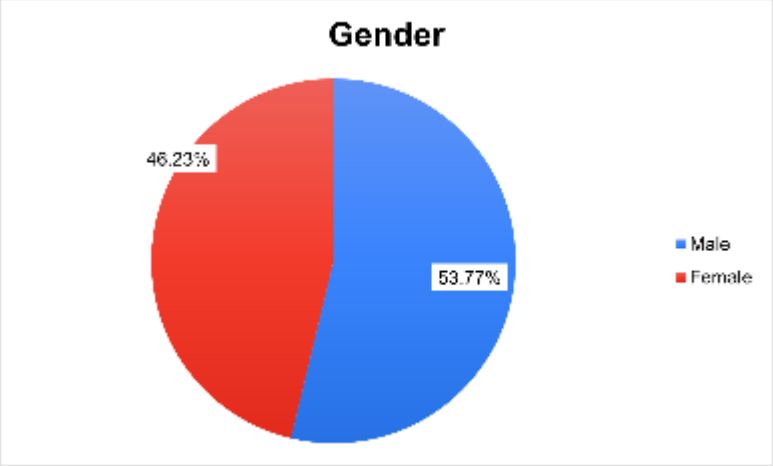


Image 1.5. Students' gender

## Section 2: Digital Competencies and Technologies in Teaching, Learning & Assessment (TLA)

At the **National Polytechnic University of Armenia (NPUA)**, a survey was conducted among **27 teachers** and **106 students** to understand how digital technologies and competencies are currently being used in teaching, learning, and assessment. The results show both shared views and some differences between teachers and students.

### 2.1. Digital competencies and technologies currently applied

Teachers reported that they most often use digital technologies to select appropriate resources for their teaching objectives (96.3%) and to enhance their teaching practices (88.9%). Many also use digital tools for their professional development (88.9%) and to communicate with students on organizational matters (85.2%). A large portion (81.5%) mentioned that they exchange knowledge and experiences with their colleagues using digital tools.

From the students' side, 72.6% noticed the use of digital tools for organizational communication. Just over half of them said that teachers use suitable digital resources (55.7%) and that digital tools support effective teaching (53.8%). These numbers are slightly lower than those shared by the teachers, which could suggest that students may not always fully see or feel the impact of these tools in the same way. Teachers also mentioned that they use digital tools to support students individually or in groups (70.4%) and to encourage self-learning (70.4%). However, fewer students confirmed experiencing these practices (37.7% and 36.8%, respectively), which may point to a difference in perception or understanding.

Creating digital learning content while following copyright rules was reported by 66.7% of teachers. This effort may not always be visible to students, which could explain why this area was not strongly highlighted in their responses.

Some areas appear to be less developed at this stage. For example, only 25.9% of teachers and 12.3% of students said they use or experience blended learning. Similarly, hybrid teaching formats are reported by just 14.8% of teachers and 9.4% of students. The use of digital technologies for assessment and feedback also appears to be limited (25.9% of teachers and 31.1% of students).

Regarding personalized learning and data usage, 40.7% of teachers said they use digital data to support student learning, while only 24.5% of students felt they receive such individualized attention.

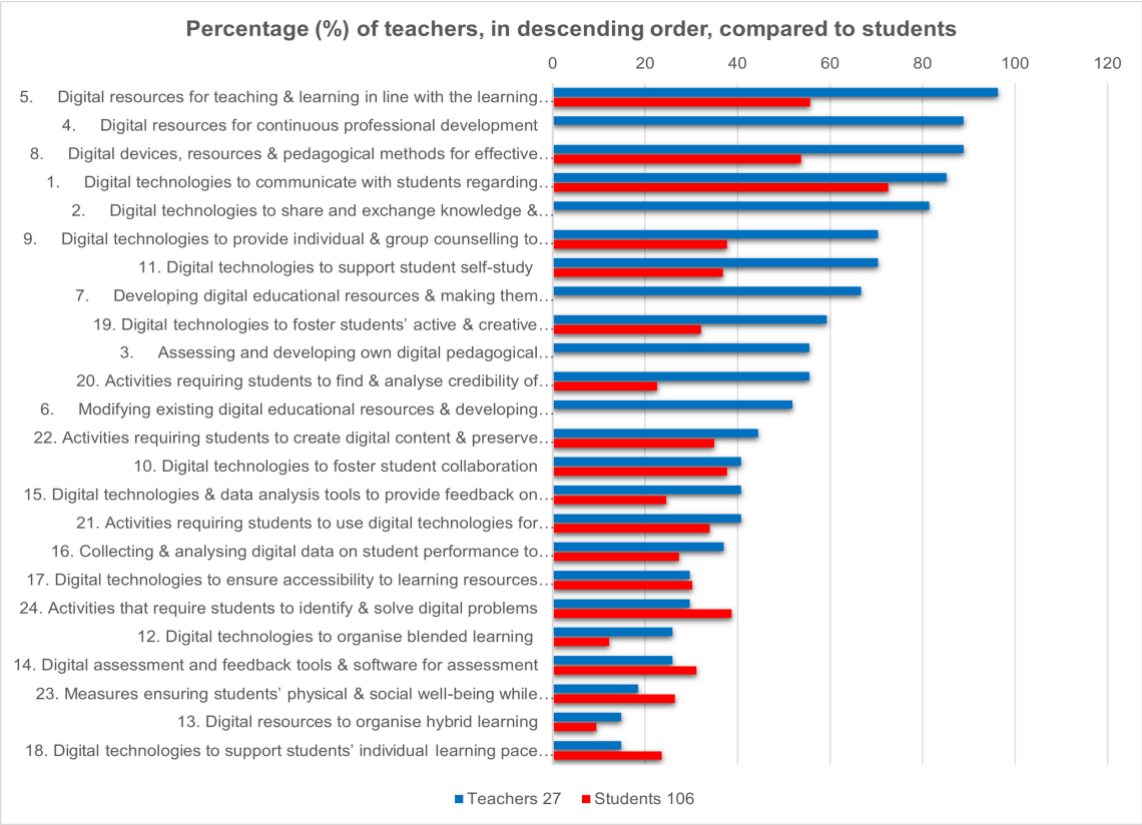


Image 2.1.1. Percentage (%) of teachers, in descending order, compared to students

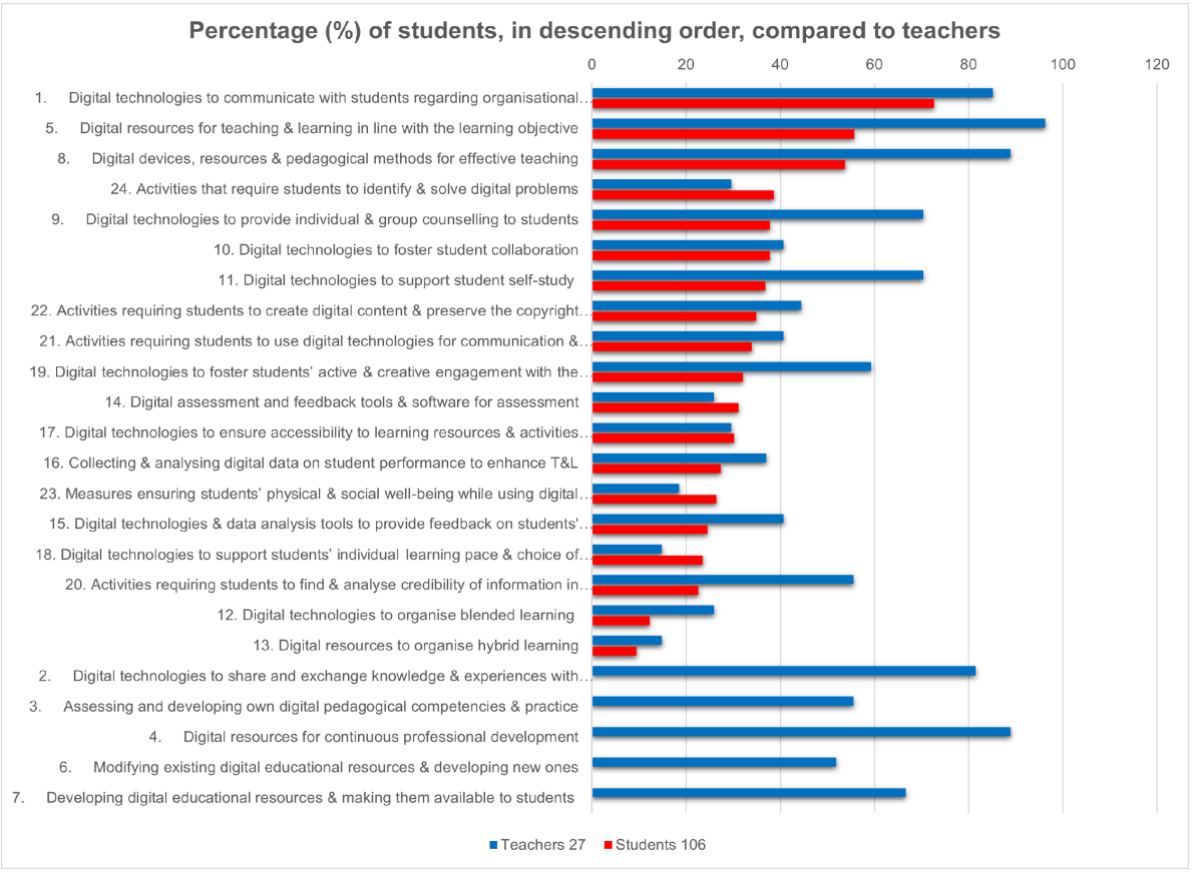


Image 2.1.2. Percentage (%) of students, in descending order, compared to teachers

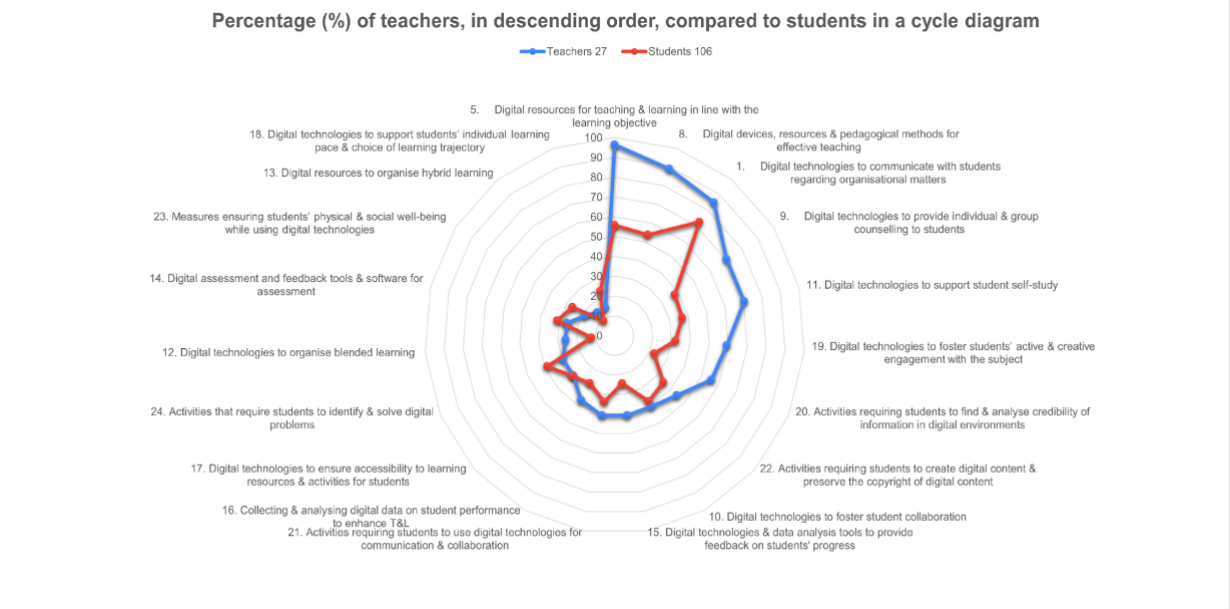


Image 2.1.3. Percentage (%) of teachers, in descending order, compared to students in a cycle diagram

## 2.2. Level of need for developing the digital competencies and technologies[1]

Both teachers and students indicated that there is still potential to improve the use of digital tools in areas such as inclusion, safety, and supporting diverse learning needs. These were generally rated lower, showing a shared understanding that further development is needed.

In summary, the feedback suggests that teachers are actively using digital tools in many areas, particularly for planning and communication. At the same time, there are opportunities to strengthen the connection between what is implemented and what students experience—ensuring that digital tools support all aspects of teaching and learning more effectively.

[1] This indicator (weighted average rating) is calculated by multiplying the number of people who gave ratings of 0, 1, 2, and 3 by the corresponding rating, summing these products, and dividing by the total number of respondents. For example: (0 x 10 people + 1 x 20 people + 2 x 30 people + 3 x 20 people) / (10+20+30+20) people = 140 / 80 people = 1.75 (out of a maximum of 3).


Image 2.2.1. Needs of teachers on a scale of (0, 1, 2, 3), in descending order, compared to students

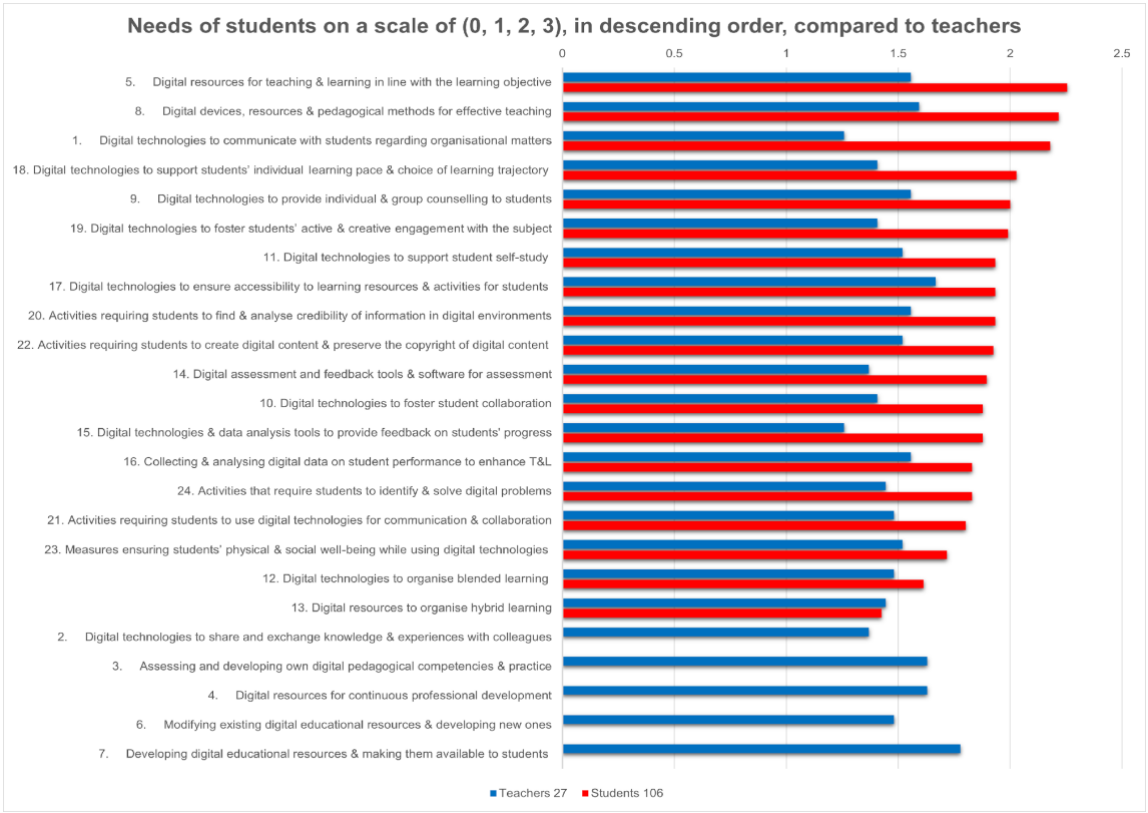


Image 2.2.2. Needs of students on a scale of (0, 1, 2, 3), in descending order, compared to teachers

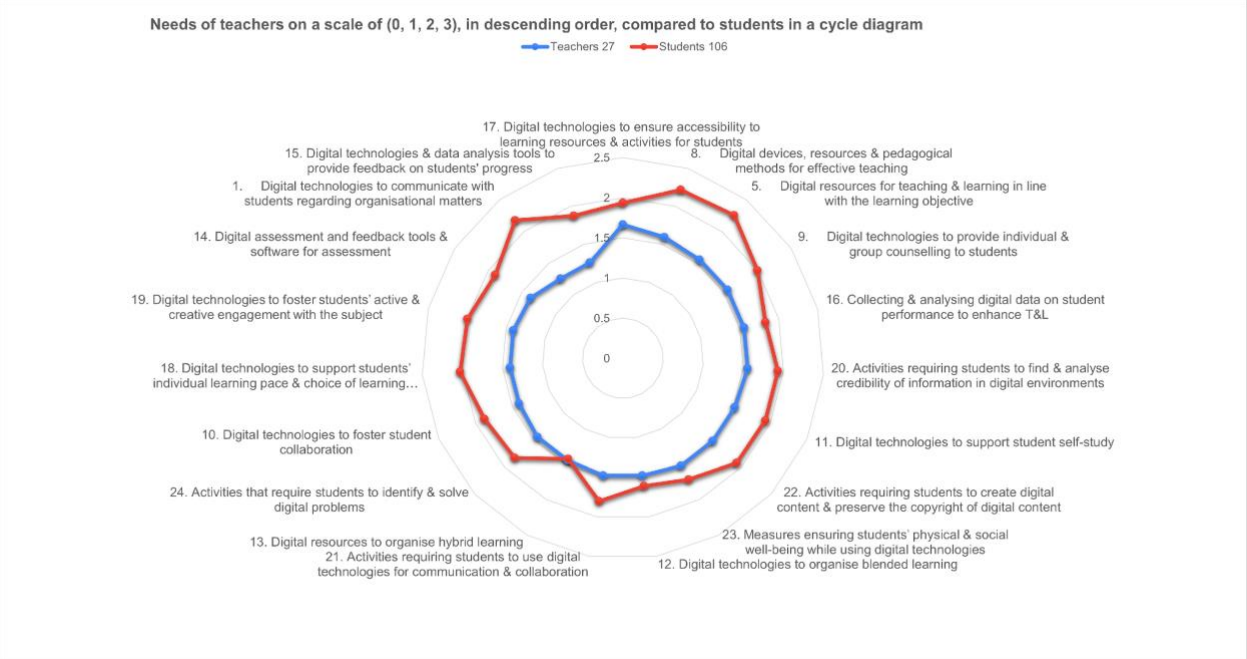


Image 2.2.3. Needs of teachers on a scale of (0, 1, 2, 3), in descending order, compared to students in a cycle diagram

## Section 3: Technologies and Facilities Supporting Digital TLA

The integration of digital technologies into the educational process has become an essential and inseparable part of both teaching and learning. Below is a comprehensive analysis based on the survey results regarding the use of digital tools and platforms by teachers and students, comparing both the frequency of use and the perceived effectiveness of the technologies

### 3.1. Technologies and facilities currently applied to support digital TLA

**Most Widely Used Tools and Platforms**

● Learning Management Systems (LMS) are widely used by both groups: 66.7% of teachers (18 individuals) and 59.4% of students (63 individuals) reported using them. This indicates the significant role of LMS platforms in organizing and managing the educational process for both teaching and learning sides.

● Virtual Classrooms (VCR) are actively used by 70.4% of teachers (19 individuals), while only 32.1% of students (34 individuals) reported using them. This gap might be explained by the teachers' leading role in organizing and managing the sessions.

● Chat sessions, which support educational communication, are relatively equally used: 63% of teachers (17 individuals) and 41.5% of students (44 individuals), showing that these platforms are commonly accepted as a means of interaction.

● Personal computers and smartphones are the most common devices: among both sides.

● Printers/copiers/scanners are heavily used by 88.9% of teachers (24 individuals), but only 35.8% of students (38 individuals). This highlights a greater need for printed materials among educators.

**Moderately Used Tools**

● Audience response systems (such as Kahoot!, Mentimeter, etc.) are used by 37% of teachers (10 individuals) and 29.2% of students (31 individuals), suggesting their growing popularity for interactive learning.

● Multimedia content creation tools are used by 37% of teachers (10 individuals) and 30.2% of students (32 individuals), indicating creative presentation of educational content is becoming a norm.

● Interactive whiteboards and panels are used by 59.3% of teachers (16 individuals) and 30.2% of students (32 individuals). This shows they are primarily applied by teachers in course delivery.

● AI tools for education and lesson planning are increasingly adopted: 51.9% of teachers (14 individuals) and 44.3% of students (47 individuals), reflecting the expanding role of AI in education.

**Less Common but Promising Tools**

● VR/AR games and simulations are used by 18.5% of teachers (5 individuals) and 10.4% of students. Although the figures are low, these technologies have strong future potential in immersive learning.

● Web 3.0 tools (e.g., Khanmigo, Socratic, etc.) are still in early adoption: 3.7% of teachers (1 individual) and 8.5% of students.

● AI feedback tools integrated into LMS platforms are also low in usage—14.8% of teachers (4 individuals) and 14.2% of students (15 individuals).

● Braille devices, speech recognition systems, and text-to-speech tools, along with Web 2.0 tools, remain less utilized, which shows inclusive technologies are still limited in reach.

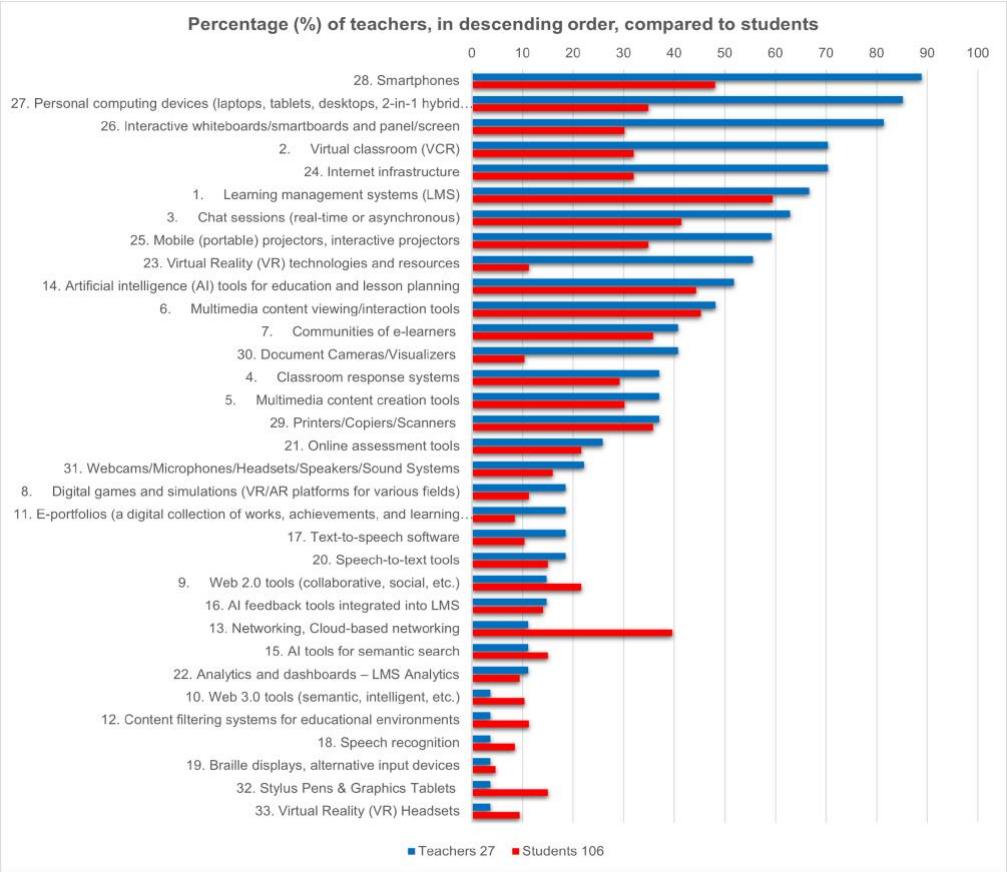


Image 3.1.1. Percentage (%) of teachers, in descending order, compared to students

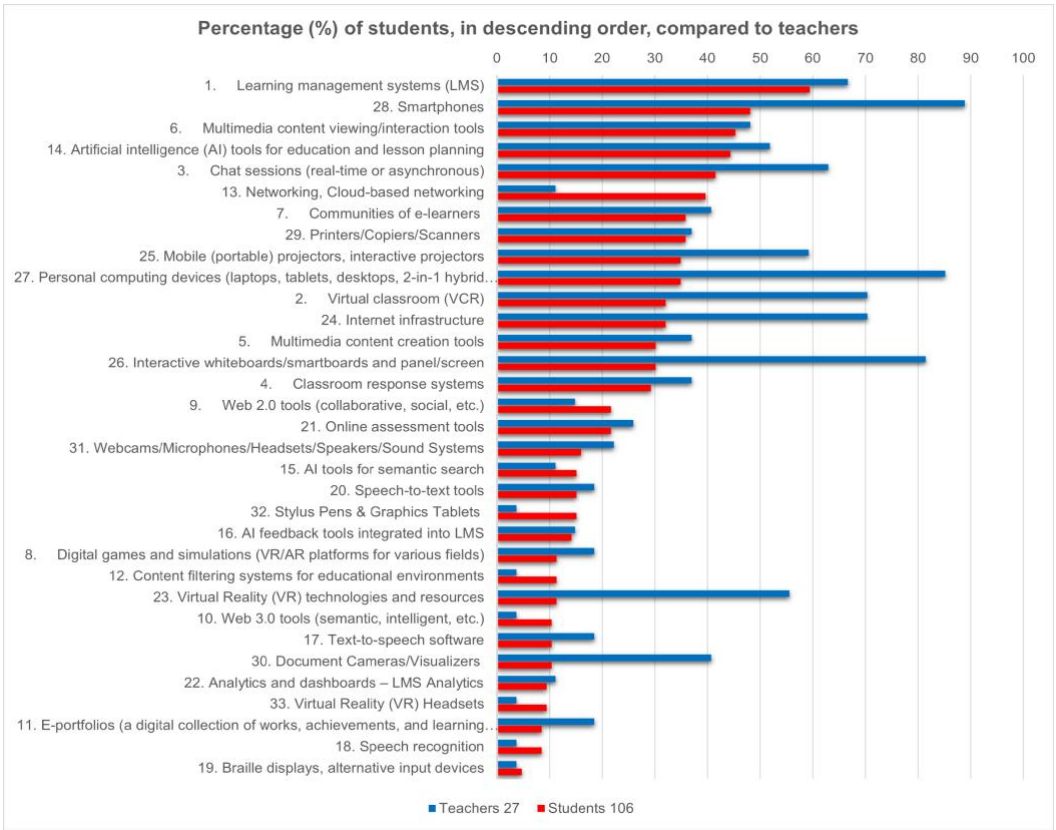


Image 3.1.2. Percentage (%) of students, in descending order, compared to teachers

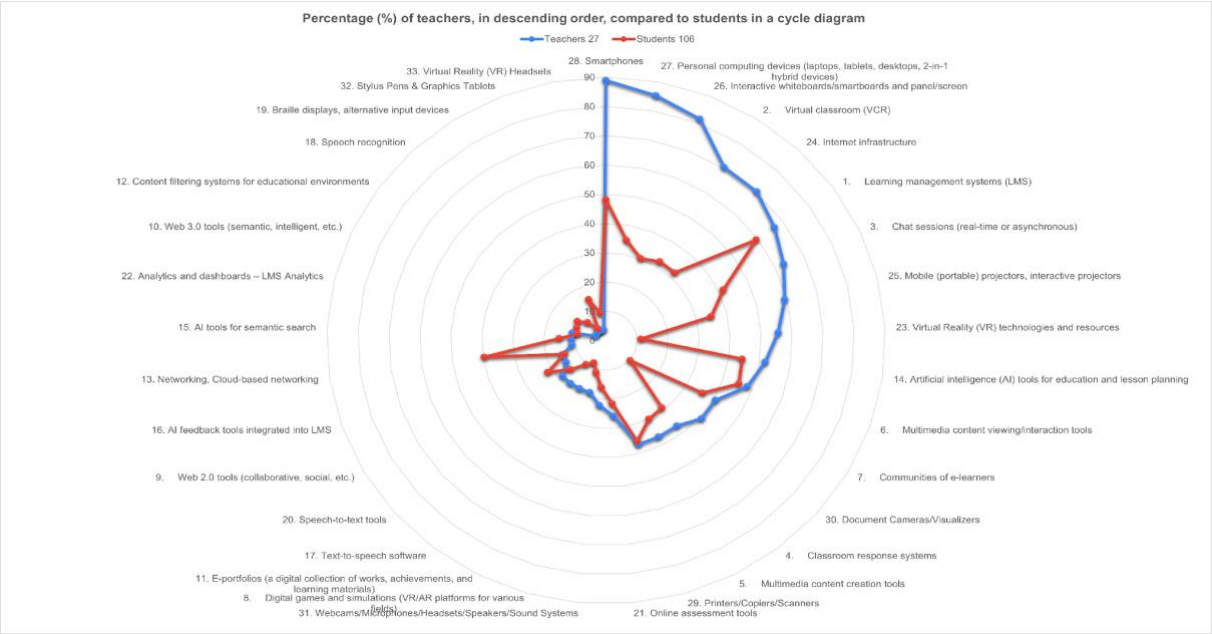


Image 3.1.3. Percentage (%) of teachers, in descending order, compared to students in a cycle diagram

## 3.2. Usefulness of the technologies and facilities supporting digital TLA

**Moderately Used Tools**

● Multimedia content creation tools are used by 37% of teachers (10 individuals) and 30.2% of students (32 individuals), indicating creative presentation of educational content is becoming a norm.

● Interactive whiteboards and panels are used by 59.3% of teachers (16 individuals) and 30.2% of students (32 individuals). This shows they are primarily applied by teachers in course delivery.

● AI tools for education and lesson planning are increasingly adopted: 51.9% of teachers (14 individuals) and 44.3% of students (47 individuals), reflecting the expanding role of AI in education.

**Less Common but Promising Tools**

● VR/AR games and simulations are used by 18.5% of teachers (5 individuals) and 11.3% of students (12 individuals). Although the figures are low, these technologies have strong future potential in immersive learning.

● Web 3.0 tools (e.g., Khanmigo, Socratic, etc.) are still in early adoption: 3.7% of teachers (1 individual) and 10.4% of students (11 individuals).

● Braille devices, speech recognition systems, and text-to-speech tools, along with Web 2.0 tools, remain less utilized, which shows inclusive technologies are still limited in reach.

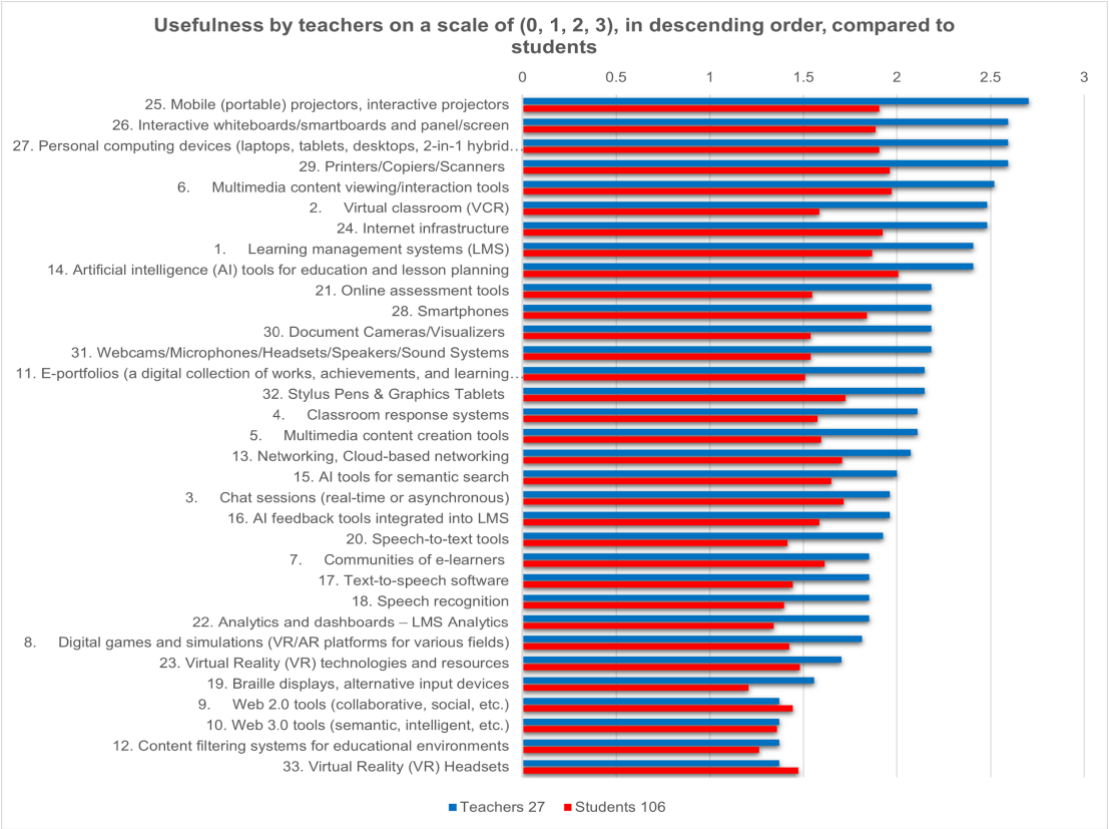


Image 3.2.1. Usefulness by teachers on a scale of (0, 1, 2, 3), in descending order, compared to students

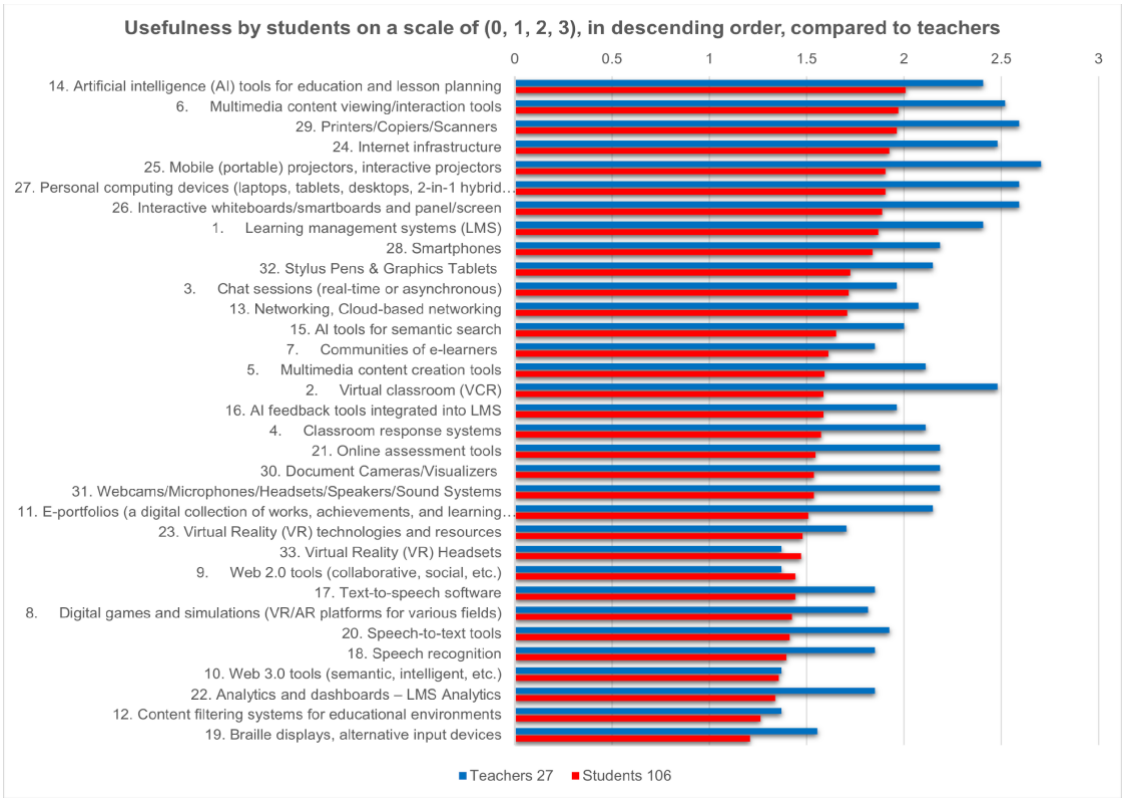


Image 3.2.2. Usefulness by students on a scale of (0, 1, 2, 3), in descending order, compared to teachers

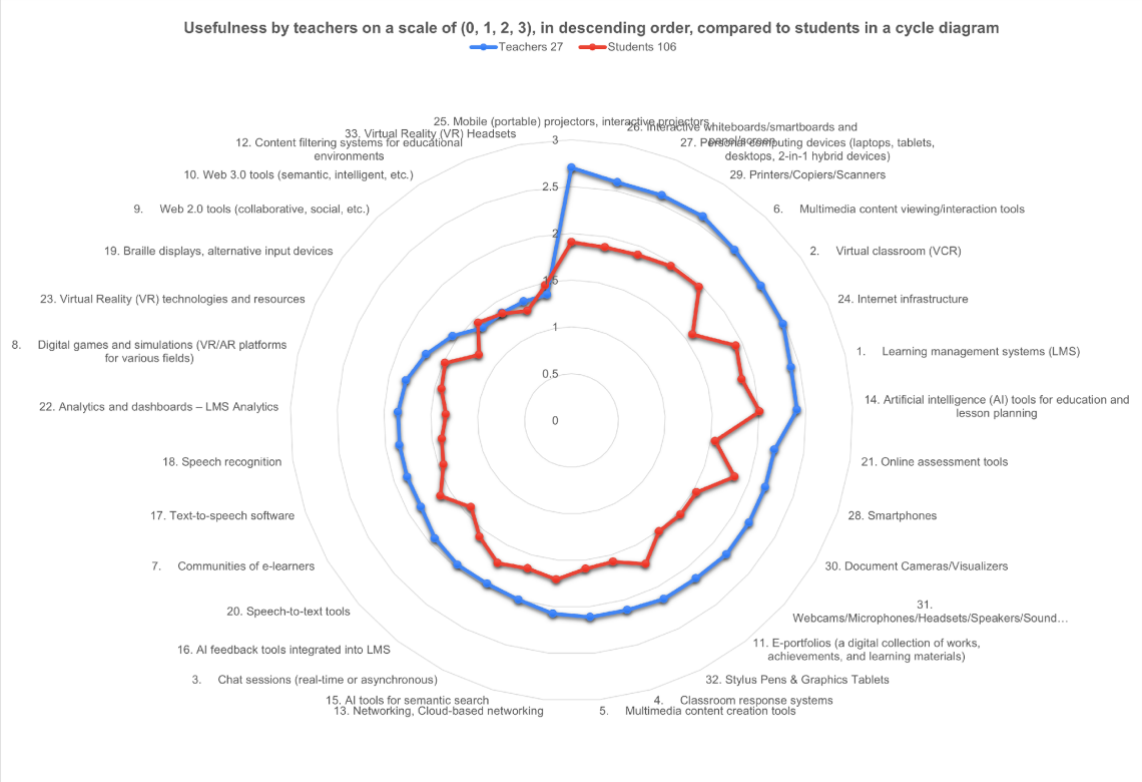


Image 3.2.3. Usefulness by teachers on a scale of (0, 1, 2, 3), in descending order, compared to students in a cycle diagram

## Section 4: Teaching and Learning (Study) Materials

The analysis of the current use of teaching and learning (study) materials at the institution, according to the feedback provided by both students and teachers, reveals both areas of convergence and divergence in their preferences and evaluations.

### 4.1. Study materials currently in use

**Most frequently used and highly rated materials:**
According to student feedback, the top three most widely used and preferred study materials are:

1. Lecture/course materials – selected by 96 students (90.6%),
2. Electronic books – chosen by 84 students (79.2%),
3. Textbooks – used by 73 students (68.9%).

These same types of materials are also consistently preferred by teachers, with 100% of teachers (27 respondents) reporting use of both lecture/course materials and electronic books, and 25 teachers (96.2%) using textbooks. This indicates a strong alignment between the two groups regarding the foundational teaching materials.

**Additional commonly used resources:**
Both groups also value:

- PowerPoint/presentations (used by 64 students – 60.4%, and 24 teachers – 88.9%),
- Handouts and worksheets (used by 36 students – 34%, and 19 teachers – 70.4%),

- User guides/manuals (49 students – 46.2%, 22 teachers – 81.5%),
- Academic articles/journals (24 students – 22.6%, 20 teachers – 74.1%),
- Study guides (52 students – 49.1%, 22 teachers – 81.5%).

**Less frequently used or lower-rated materials:**
Students reported comparatively lower usage of:
- MOOCs – 7 students (6.6%),
- Wikis and collaborative documents – 7 students (6.6%),
- Audio lectures/podcasts/audiobooks – 13 students (12.3%),
- Infographics – 11 students (10.4%).

Teachers' responses show a similar trend in underutilization of:
- Wikis and collaborative documents – only 2 teachers (7.4%),
- MOOCs – 4 teachers (14.8%),
- Online modules/lessons – 5 teachers (18.5%),
- Audio materials – 6 teachers (22.2%).

**Multimedia and digital resources:**
There is moderate use of digital media, including:
- Multimedia books (students: 20 – 18.9%, teachers: 13 – 48.1%),
- Infographics (students: 11 – 10.4%, teachers: 6 – 22.2%),
- Video lectures/tutorials and explanatory animation videos (students: 21 – 19.8% and 29 – 27.4% respectively; teachers: 14 – 51.9% and 13 – 48.1% respectively),
- Online platforms (e.g., Moodle, Google Classroom) (students: 24 – 22.6%; teachers: 9 – 33.3%).

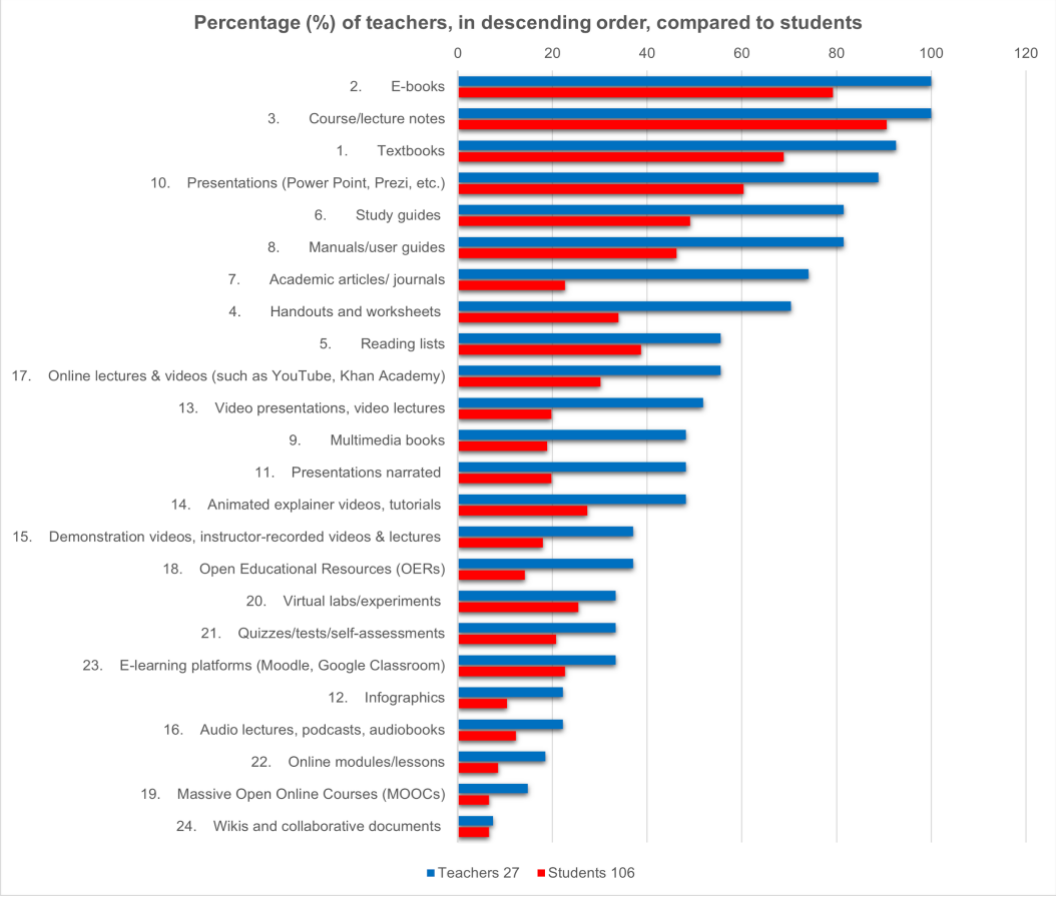

Image 4.1.1. Percentage (%) of teachers, in descending order, compared to students

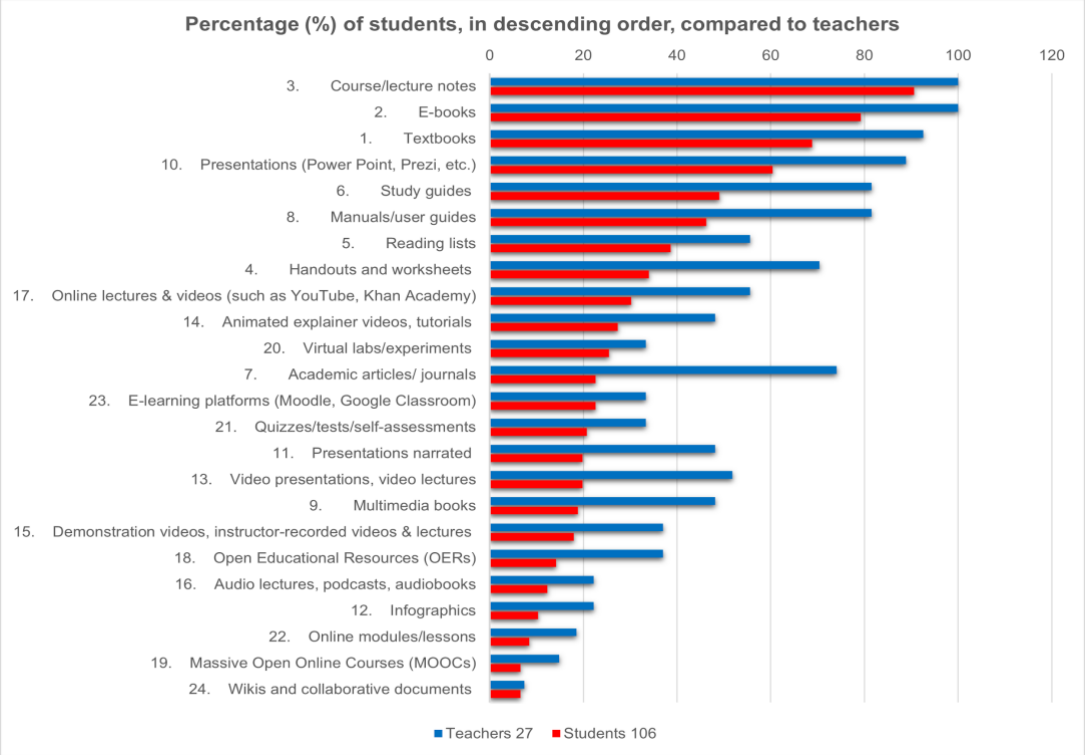


Image 4.1.2. Percentage (%) of students, in descending order, compared to teachers

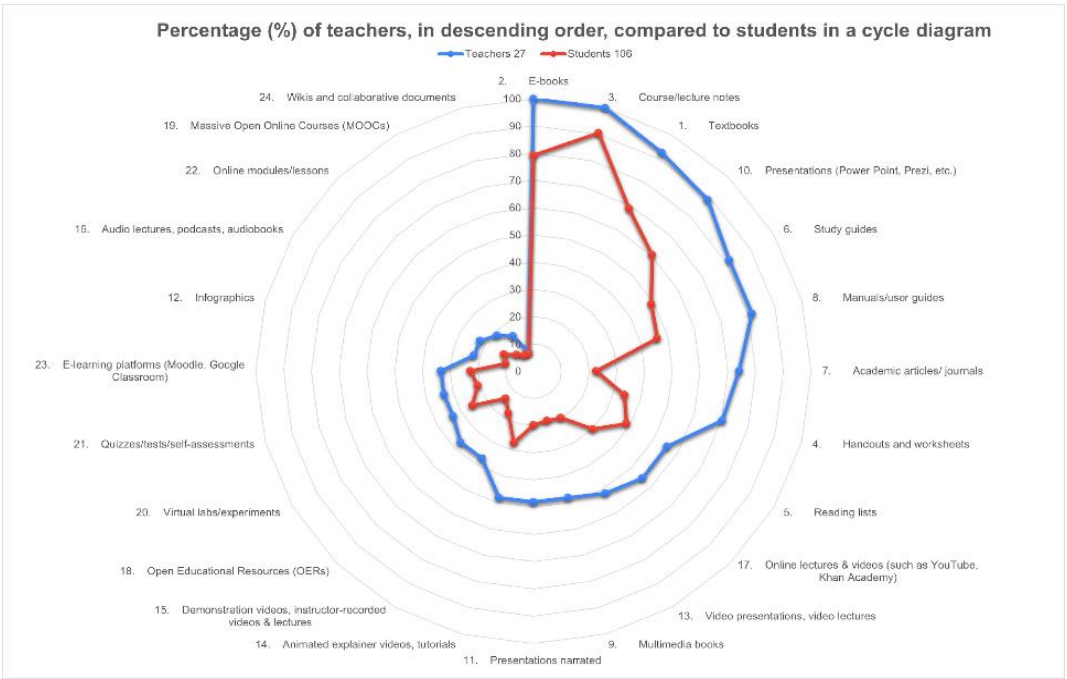


Image 4.1.3. Percentage (%) of teachers, in descending order, compared to students in a cycle diagram

## 4.2. Usefulness of the study materials for TLA

Teachers appear more inclined to incorporate such digital tools into their teaching practices, compared to students' reported usage levels. This might reflect either a gap in accessibility or engagement from the student side, or possibly a need for improved integration of these tools into the learning process.

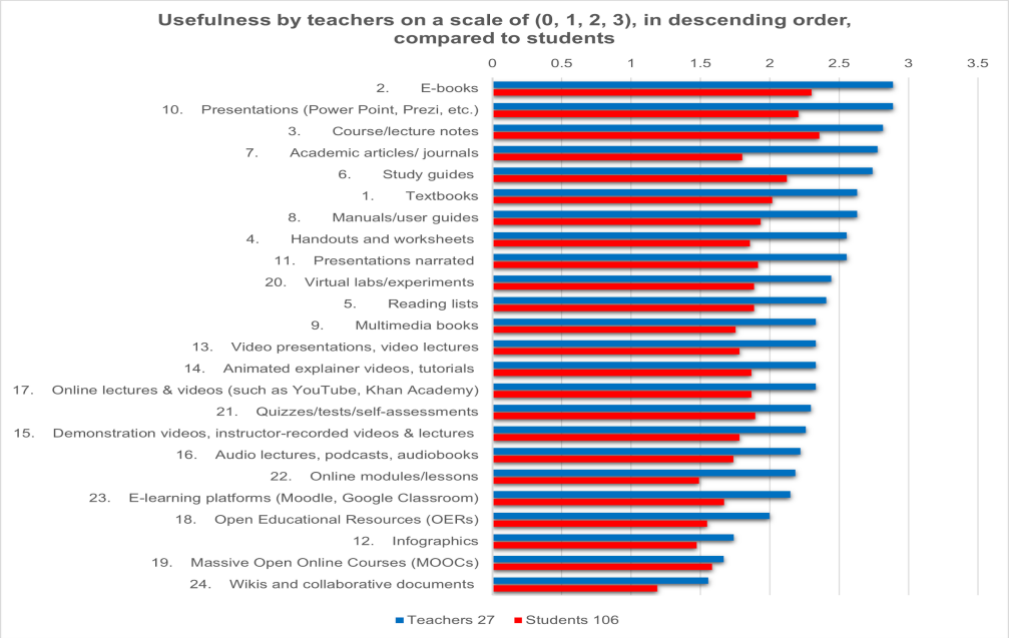


Image 4.2.1. Usefulness by teachers on a scale of (0, 1, 2, 3), in descending order, compared to students

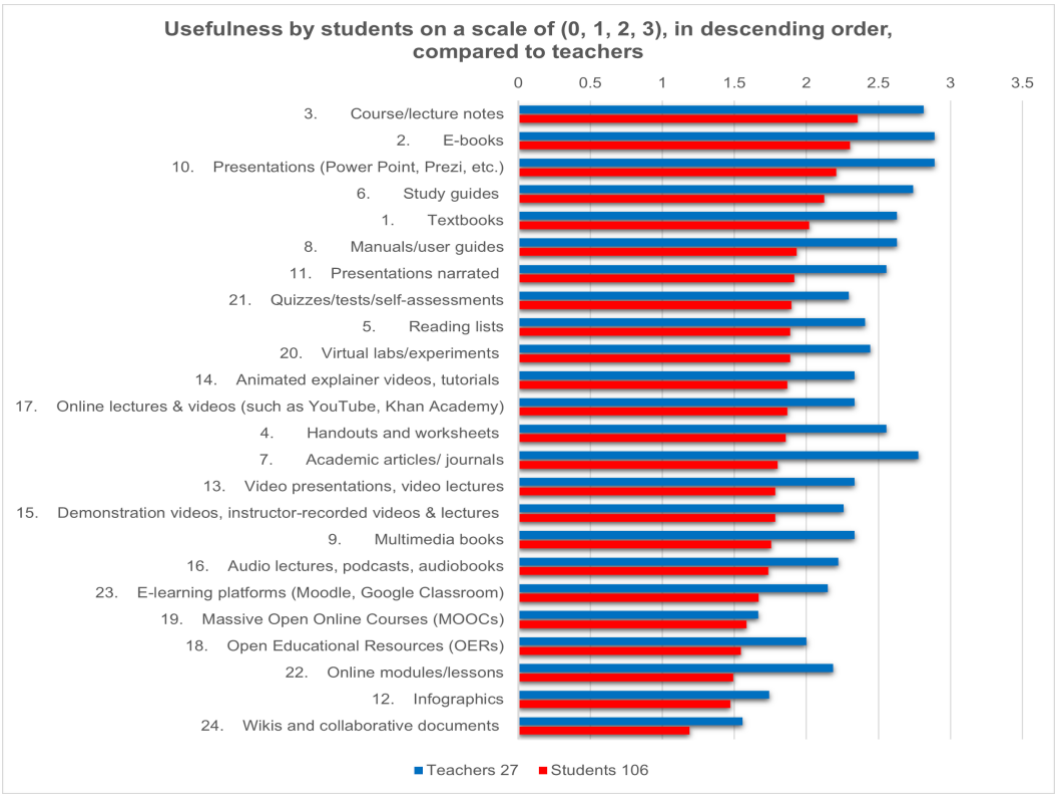

Image 4.2.2. Usefulness by students on a scale of (0, 1, 2, 3), in descending order, compared to teachers

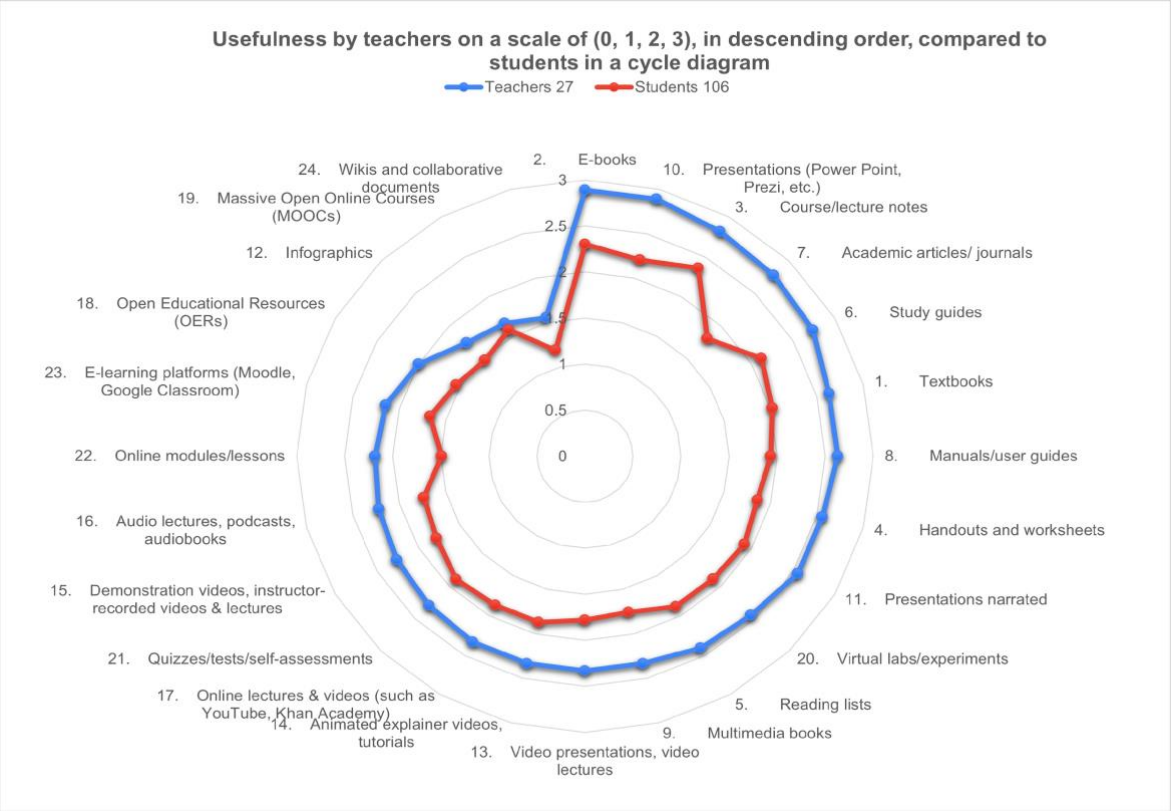


Image 4.2.3. Usefulness by teachers on a scale of (0, 1, 2, 3), in descending order, compared to students in a cycle diagram

### Conclusion

Overall, both students and teachers demonstrate a clear preference for traditional core materials such as textbooks, electronic books, and course/lecture materials. However, teachers more frequently engage with a broader array of supplementary materials, including academic journals, study guides, and user manuals.

## Section 5. Main Obstacles to Digital TLA

Section 5 included 3 questions:

5.1. Main obstacles to digital TLA in HEIs

5.2. Teachers' previous participation in the training on digital TLA; and

5.3. Main topics of the Teachers' previous training

According to the feedback collected from both teachers and students, several key obstacles currently hinder the effective use of digital teaching, learning, and assessment (TLA) tools and technologies at the institution.

The most frequently cited issue among **teachers** is the **underdeveloped digital infrastructure and lack of necessary equipment**, reported by **77.8% (21 respondents)**. This concern is also shared by **56.6% (60 respondents)** of the **students**, indicating that insufficient infrastructure is a common challenge for both groups, though it is significantly more pronounced among teachers.

A notable difference arises in the perceived **lack of digital skills**. **51.9% (14) of teachers** acknowledged having insufficient digital skills themselves, whereas only **36.8% (39) of students** identified this as an issue with the teaching staff. Conversely, **55.6% (15) of teachers** noted **students' inadequate digital competencies**, while only **20.8% (22) of students** admitted to lacking digital skills. This discrepancy suggests a difference in perception between the two groups regarding digital readiness, with teachers showing greater concern over students' skills than students themselves do.

Another shared concern is the **lack of Armenian-language digital resources**, noted by **66.7% (18) of teachers** and **41.5% (44) of students**. This indicates a widespread recognition of the need for more localized, accessible content to support digital education.

Interestingly, **only 3.7% (1) of teachers** chose not to answer the question, while **31.1% (33) of students** selected "Cannot answer." This gap may reflect a lower level of awareness or engagement with institutional digital issues among students.

In summary, while both groups agree on the critical need to improve digital infrastructure and resources in Armenian, teachers tend to emphasize skill-related challenges more heavily—both their own and those of their students. Meanwhile, students are less likely to acknowledge skill deficits and more likely to be uncertain about the obstacles altogether.

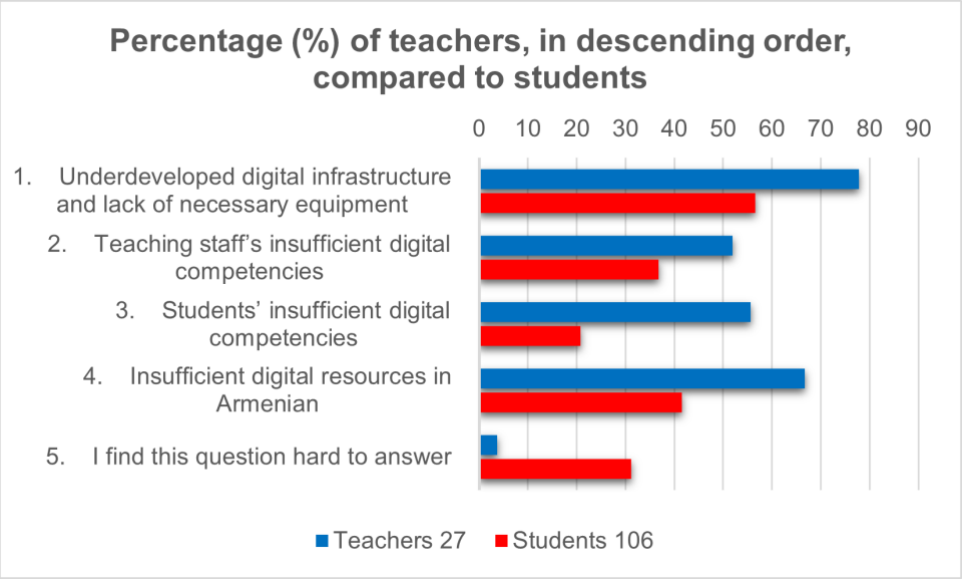


Image 5.1. Percentage (%) of teachers, in descending order, compared to students

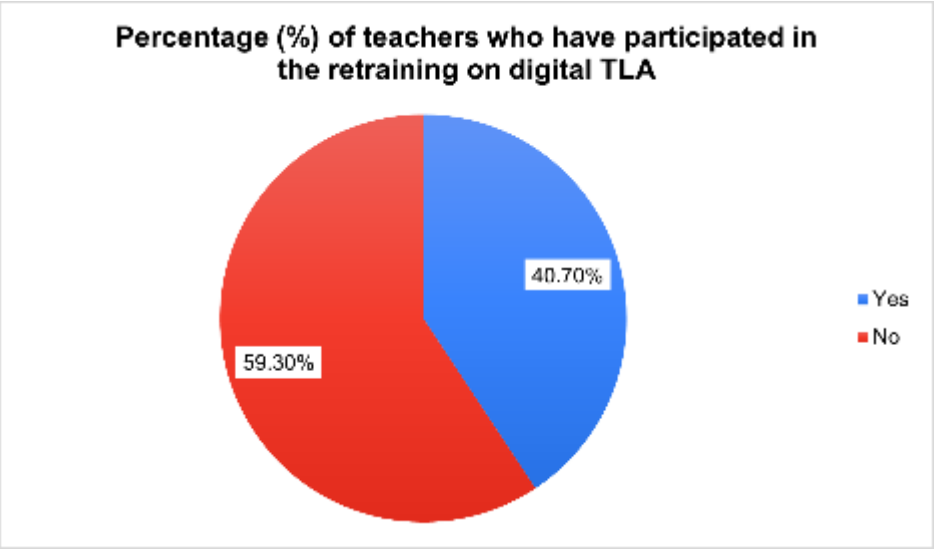


Image 5.2. Percentage (%) of teachers who have participated in the retraining on digital TLA

## Section 6: Additional Information Provided by Teachers and Students

### 6.1. Teachers' responses

According to the survey results, 40.7% of teachers have participated in digital teaching training within the last four years, while 59.3% have not. Among those who attended training, the main topics covered included the use of interactive platforms and learning management systems such as Quizizz, Kahoot, Moodle, Google Classroom. Other areas addressed included audience response systems, AI tools, presentation techniques, innovative teaching technologies, digital teaching tools, digital marketing, technological management, learning analytics, and digital finance management. In terms of suggestions for improving digital competencies, teachers highlighted the importance of regularly organizing training sessions to ensure lecturers are up to date with modern technologies. They proposed integrating a digital tools section into every course and conducting mandatory certified training every two or three years for mid-career faculty members. These trainings should result in pilot courses tailored for digital learning. Additionally, it was recommended to establish focus groups of students and faculty to test and provide feedback on these pilot courses. Further suggestions included equipping all classrooms with projectors, unlimited internet access, and providing individual computers for all lecturers. Teachers also emphasized the creation of a shared digital resource system to allow for exchange of ready-made materials and best practices. Finally, they noted the importance of including practical workshops in digital upskilling programs, affirming that the skills addressed in the survey reflect the competencies necessary for effectively educating today's students.

### 6.2. Students' responses

Based entirely on the students' responses collected through the Google form, the analysis reveals a clear and detailed picture of their views on digital skills, supporting

technologies, and learning materials at the university. Students expressed considerable dissatisfaction with the current curriculum, noting that many subjects feel irrelevant or unengaging, which leads to poor understanding and rapid forgetting of the material. Some even described a sense that their minds reject the content because it does not interest them. This highlights the urgent need for curriculum reform to make learning more meaningful and motivating. A strong desire was voiced for modernizing the educational program through international collaboration. Students suggested introducing online courses in partnership with universities specializing in technology, economics, and mining. They emphasized aligning the curriculum with world-renowned institutions such as Columbia University, Harvard, and MIT, which would facilitate cooperation and academic development. Furthermore, students hope that their university—the Armenian National Polytechnic University—will gain wider recognition both domestically and internationally by attracting foreign students and opening branches abroad. This global outlook is seen as key to elevating the university's status among the world's leading technical and engineering schools. Students also stressed the importance of practical training starting from the first year and ongoing retraining with modern technologies throughout their studies. They expressed a need for upgraded infrastructure and equipment, including replacing outdated computers with higher-quality devices, acquiring smartboards, and equipping classrooms with innovative digital technologies. Such improvements are especially desired in regional campuses like Gyumri and Vanadzor. Regarding teaching staff, students called for the recruitment of younger professionals and for continuous professional development, especially in digital literacy and modern pedagogical methods. This would enhance the effectiveness of teaching and better integrate digital tools into the learning process. Many students prefer that lessons remain offline but be enhanced with new, interactive approaches rather than solely relying on online formats. They want classes to move beyond traditional lectures and homework towards more engaging and varied educational experiences. Additionally, the creation of a comprehensive digital platform where all course materials are accessible was recommended. Such a platform would allow students unlimited opportunities to review, progress at their own pace, and prepare for upcoming topics, ultimately improving their academic outcomes. In summary, students' feedback highlights a strong need for modernization, practical experience, enhanced digital infrastructure, and qualified teaching staff development. Their vision is for the university to become a globally recognized, technologically advanced institution comparable to the best universities worldwide, providing an engaging, relevant, and practical education supported by innovative digital solutions.

## Conclusions and Recommendations

***1. Identify specific digital competences in teaching, learning, and assessment that need to be developed within your university.***

Based on the survey findings from the National Polytechnic University of Armenia, several digital competences in teaching, learning, and assessment have been identified as needing development. One of the most critical gaps concerns the limited use of digital tools for assessment and feedback. Only 25.9% of teachers and 31.1% of students reported the use of such tools, indicating a clear need for improved competences in applying online testing systems, providing digital feedback, and using learning analytics

to monitor student progress. Another underdeveloped area is the use of blended and hybrid teaching approaches. The data shows that only 25.9% of teachers use blended learning and just 14.8% apply hybrid formats, while student exposure is even lower. This points to a lack of ability to integrate digital and in-person instruction effectively. Additionally, there is a noticeable gap in the use of data to personalize learning experiences. While 40.7% of teachers claim to use student data for this purpose, only 24.5% of students feel they receive any form of individualized learning, which reflects insufficient competence in data-driven instruction.

Inclusion and accessibility also remain limited, as tools such as Braille displays, speech recognition systems, and text-to-speech technologies are rarely used, suggesting a need to build digital competences in inclusive education. The use of advanced and emerging technologies is similarly low. For instance, only 18.5% of teachers and 11.3% of students use VR or AR tools, and the use of Web 3.0 tools remains at the early adoption stage. This shows that competences in immersive content creation, interactive media, and next-generation digital education tools require strengthening. Furthermore, while 66.7% of teachers report creating digital content with respect to copyright, the remaining group lacks demonstrable skills in developing original educational resources or properly using open educational materials. Despite frequent use of digital communication tools by teachers, student responses reveal a weaker perception of support, especially regarding individual attention, indicating that communication and engagement strategies using digital means need improvement.

AI tools are beginning to be used—teachers and students mention applying them for lesson planning—but this still reflects an emerging skill set that should be further developed through targeted training. A fundamental issue highlighted in the data is the limited participation of teachers in digital upskilling opportunities. According to the survey, 59.3% of faculty have not taken part in any training on digital teaching methods in the past four years. Additionally, 51.9% acknowledge their own lack of digital skills, while also identifying student skill gaps. Finally, students voiced dissatisfaction with outdated learning formats and expressed a strong desire for more interactive, relevant, and technology-supported education. Their feedback emphasizes the importance of modern digital pedagogical competences among teachers that can increase engagement and bring innovation to the classroom.

In conclusion, the findings reveal clear areas where digital competences must be strengthened across the institution—particularly in digital assessment, blended learning, personalization, accessibility, multimedia content creation, AI integration, and pedagogical innovation—through systematic training and strategic curriculum updates.

***2. Outline the technologies and facilities that require enhancement to better support teaching and learning.***

According to the survey data collected from both teachers and students, several specific technologies and facilities at the National Polytechnic University of Armenia (NPUA) require significant enhancement to better support teaching and learning. The most frequently reported issue by both groups is the **underdeveloped digital infrastructure and lack of necessary equipment**. As noted in Section 5, **77.8% of teachers** and **56.6% of students** identified this as a major obstacle, making it the most urgent area for improvement. Teachers specifically emphasized the need for **projectors in all classrooms**,

**unlimited internet access**, and **individual computers for each lecturer** (Section 6.1), pointing to basic infrastructural needs that are not yet universally met.

The use of **learning management systems (LMS)** and **virtual classrooms** is relatively widespread but still insufficient. As reported in Section 3, only **66.7% of teachers** and **59.4% of students** use LMS platforms, while **70.4% of teachers** use virtual classrooms compared to just **32.1% of students**. This disparity highlights the need to enhance not only access to these platforms but also their integration and usability from the student side. Moreover, the use of **audience response systems** and **multimedia content creation tools** is moderate, with **only 37% of teachers** and around **30% of students** using them, which suggests a need for expanding access to interactive technologies and training in their use.

From the perspective of physical infrastructure, students stressed the importance of **upgrading outdated computers**, **introducing smartboards**, and **equipping classrooms with innovative digital technologies**, particularly in regional branches such as Gyumri and Vanadzor (Section 6.2). These requests highlight inequities in infrastructure quality between central and regional campuses that require targeted investment. Furthermore, both teachers and students identified a **lack of Armenian-language digital resources** as a key limitation (Section 5), **teachers** and **students** calling attention to this issue. This shows the necessity of developing localized content and platforms that better support instruction in the native language.

Students also emphasized the need for a **comprehensive digital platform** where all course materials would be stored and easily accessible. This platform would support flexible learning, allow students to study at their own pace, and help them prepare for upcoming topics. The current absence of such a centralized system reflects a broader gap in digital organization and content management that affects the learning process.

In conclusion, the data reveals that to better support teaching and learning, the university must enhance both **technical infrastructure** (classroom equipment, internet, personal devices) and **digital platforms** (LMS, communication tools, AI, accessibility technologies), while also addressing the **lack of localized educational resources** and ensuring equitable upgrades across all campuses.

***3. Specify the types of digital teaching and learning materials that should be developed to improve educational delivery.***

Based on the survey findings, several types of digital teaching and learning materials should be developed and expanded at the National Polytechnic University of Armenia to improve the quality and effectiveness of educational delivery. Both students and teachers show a strong reliance on traditional materials, such as **lecture/course materials**, **electronic books**, and **textbooks**, which are used by **over 90% of students** and **100% of teachers**, as noted in Section 4. While these resources form the foundation of instruction, the limited use of more modern and interactive digital materials reveals clear opportunities for development.

First, there is a need to increase the availability and use of **multimedia content**, including **video lectures**, **explanatory animations**, and **multimedia books**. According to Section 4, only **19.8% of students** and **51.9% of teachers** use video lectures, while **27.4% of students** and **48.1% of teachers** use animated explanatory content. The moderate to low engagement with such resources suggests that expanding these materials could

significantly enhance instructional clarity and engagement. Likewise, **multimedia books** are used by only **18.9% of students**, compared to **48.1% of teachers**, indicating room for growth in visually enriched, interactive learning content.

Another area requiring development is the creation and adoption of **interactive materials** such as **infographics**, **audio content** (lectures, podcasts, audiobooks), and **online modules**. There is also a clear need for increased development of **collaborative and open-source digital materials**, such as **wikis**, **shared documents**, and **student-authored content**. Section 4 shows that **students** and **teachers** reported using wikis or collaborative tools, pointing to a lack of materials that support group learning and knowledge co-construction. Encouraging the use of such tools would support more active and student-centered learning experiences.

Additionally, the limited presence of **Armenian-language digital resources**, highlighted in Section 5, underscores the need to develop localized versions of digital materials. This includes not only translating or adapting existing content but also creating original digital resources specifically aligned with the Armenian academic context.

Students also proposed the development of a **unified digital platform** that would store all course materials in an accessible and organized format (Section 6.2). Such a platform would support continuous learning by giving students the ability to review materials at their own pace, revisit complex topics, and prepare for upcoming lessons.

In conclusion, to improve educational delivery, the university should focus on developing a wider range of digital teaching and learning materials, including multimedia content, interactive modules, localized resources in Armenian, collaborative tools, and centralized digital repositories. These enhancements would diversify learning formats, increase student engagement, and better align with modern educational practices.

***4. Propose strategies for addressing the barriers and obstacles that hinder the advancement of digital teaching, learning, and assessment in your university.*** The survey results clearly identify several key obstacles impeding the effective advancement of digital teaching, learning, and assessment (TLA) at the National Polytechnic University of Armenia. To overcome these barriers, a multifaceted strategy addressing infrastructure, digital skills, resource availability, and institutional support is essential.

The foremost barrier is the **underdeveloped digital infrastructure and lack of necessary equipment**, cited by **77.8% of teachers** and **56.6% of students** (Section 5). To address this, the university must prioritize substantial investment in upgrading the physical and technological environment. This includes equipping all classrooms with modern projectors, smartboards, unlimited high-speed internet access, and individual computers for lecturers, as recommended by teachers in Section 6.1. Special attention should be paid to regional campuses such as Gyumri and Vanadzor, where infrastructure is currently especially lacking (Section 6.2). A reliable, accessible digital infrastructure will form the foundation that enables all other digital initiatives to succeed.

Another critical obstacle is the **digital skills gap**. Over half of teachers (**51.9%**) acknowledge insufficient digital competencies, and they are also concerned about students' digital readiness (**55.6%**), although fewer students admit their own skill gaps (Section 5). To overcome this, the university should implement a continuous professional development program focused on digital literacy and pedagogical use of technology.

Regular, mandatory, certified training sessions every two to three years should be organized for faculty members, covering interactive platforms, LMS tools, AI applications, and emerging digital teaching technologies (Section 6.1). These sessions should incorporate practical workshops and be aligned with pilot courses developed for digital learning. For students, introductory and ongoing digital skills courses integrated into the curriculum can build foundational competencies.

Addressing the **lack of Armenian-language digital resources**, noted by two-thirds of teachers and over 40% of students (Section 5), requires a focused content development strategy. The university should foster the creation and adaptation of localized digital teaching materials, including textbooks, multimedia resources, and interactive modules, ensuring cultural and linguistic relevance. Establishing collaborative focus groups involving faculty and students can help tailor resources effectively (Section 6.1).

Moreover, the gap between teachers' use of digital tools and students' experience highlights the need to improve **communication and alignment**. Teachers use digital tools extensively for planning, resource selection, and communication (Section 2), but students often report lower levels of engagement or support from these tools. To bridge this gap, the university should enhance transparency and integration by creating a comprehensive digital platform where all materials and communications are centralized and accessible to students (Section 6.2). This would also support personalized learning and data-driven approaches, which currently are underutilized (Section 2).

Finally, fostering a culture of innovation and openness towards digital transformation is essential. This can be achieved through incentives for faculty who pioneer digital teaching methods, recognition of best practices, and creating a shared digital resource repository for materials and experiences (Section 6.1). Encouraging partnerships with international institutions and integrating global best practices, as suggested by students, will also promote modernization and raise the university's profile (Section 6.2).

In summary, the strategies to overcome digital advancement barriers include upgrading infrastructure, providing ongoing digital skills training for teachers and students, developing localized digital content, improving digital communication and platforms, and cultivating an innovative, collaborative institutional culture. These combined efforts will enable the university to fully harness the potential of digital technologies in teaching, learning, and assessment.

## Appendix: Temperature Map Analysis of Response Patterns

*Analysis of Teacher and Student Responses*

For questions 2.2, 3.2, and 4.2, temperature maps have been generated and analyzed to reveal deeper insights into the response patterns of both teaching staff and students. This visualization approach reveals nuanced patterns that might otherwise remain hidden in conventional data analysis.

*Response Reliability Assessment*

The analytical methodology includes calculation of relative response reliability for each participant group. This metric accounts for response bias by adjusting for instances where respondents selected identical options across multiple items - a pattern that may indicate disengagement rather than authentic responses.

*Comparative Results*

The reliability findings for both respondent groups appear in Figures 2.2, 3.2, and 4.2. The table below summarizes these results, presenting the percentage of responses deemed reliable after applying the uniform-response adjustment algorithm.

These percentages reflect the proportion of responses that demonstrate meaningful engagement with the questions, after filtering out potentially automated or disengaged response patterns.

| Question ID | Teaching Staff | Students |
|---|---|---|
| 2.2 | 81.5 % | 84.9 % |
| 3.2 | 85.2 % | 78.3% |
| 4.2 | 92.6 % | 86.8 % |

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## 2.2. Level of need for developing the digital competencies and technologies

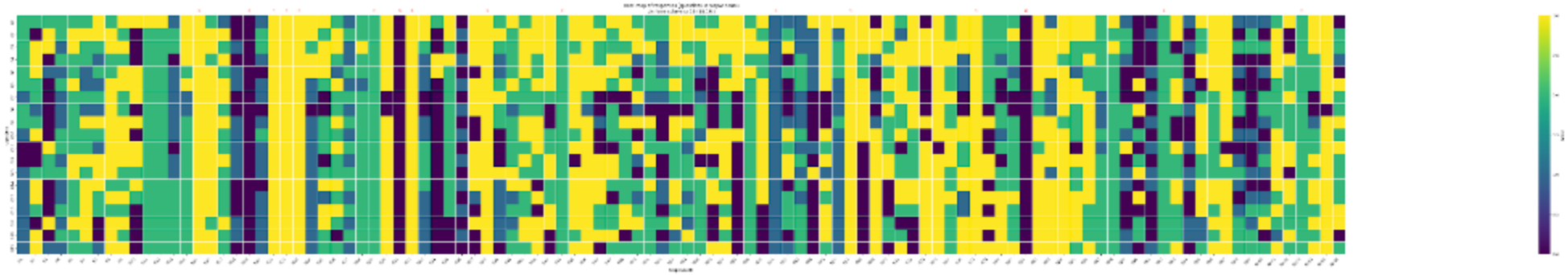

Fig. 2.2.1: Students responses

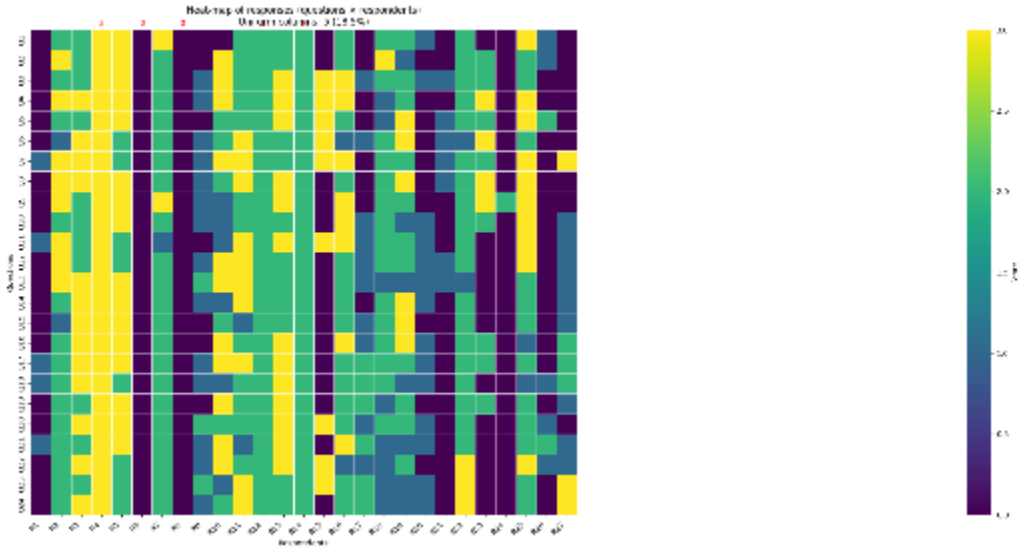

Fig. 2.2.2: Teachers responses

3.2. Usefulness of the technologies & facilities supporting digital TLA

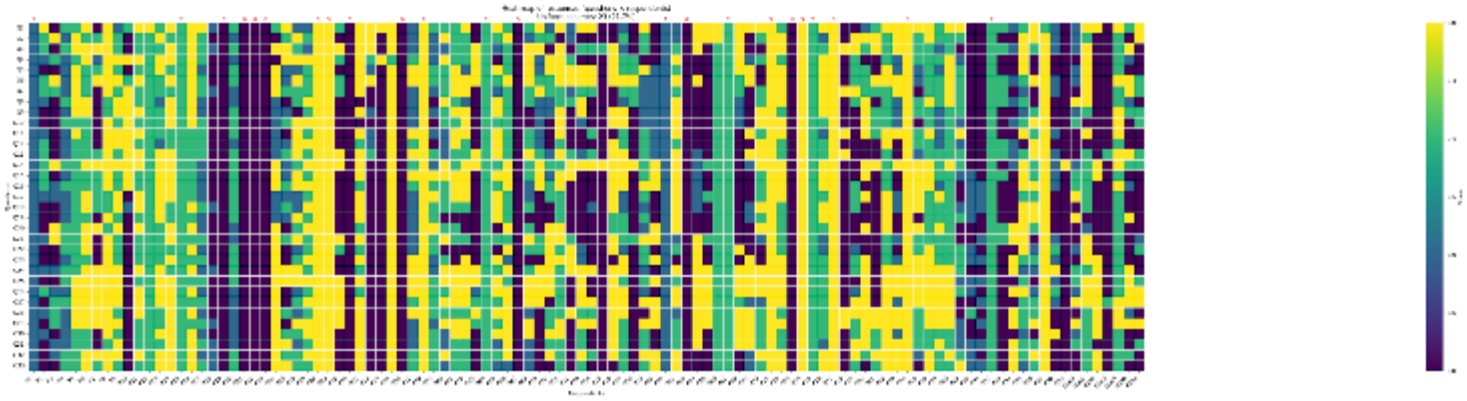

Fig. 3.2.1: Students responses

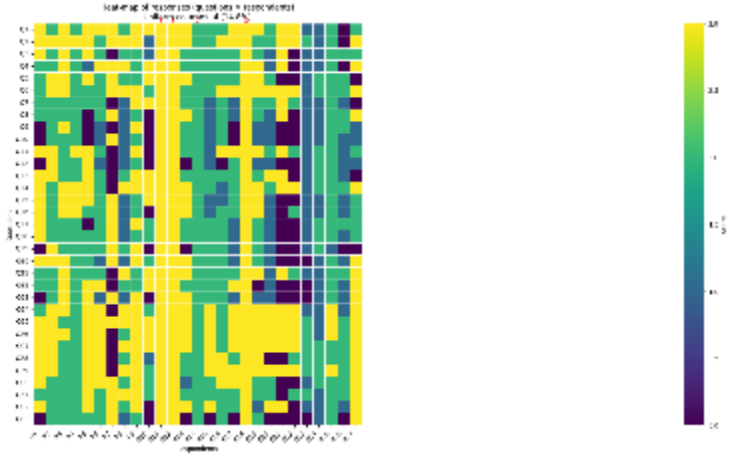

Fig. 3.2.2: Teachers response

4.2. Usefulness of the study materials for TLA

Fig 4.2.1: Students responses

Fig 4.2.2: Teachers responses

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