

Survey of recent research topics on effective use of communication tools in higher education

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Abstract—Effective communication is crucial for the success and well being of students and faculty members in higher education. Communication can improve student’s learning outcomes by clarifying the expectations and learning objectives on both curriculum and course levels. Further inclusive communication can enable creating a sense of community and belonging among students and the faculty. In this article, we present the results of a literary survey conducted on recent research discussing communication practices and software communication tools in higher education. Both linear and interactive communication occur in variable contexts and between different participating roles. During campus lock downs caused by COVID-19 pandemic, teaching and related communication were moved into fully distance mode. For teaching and learning higher education institutions needed to rely on existing and newly created software platforms. Synchronous teaching and communication could be conducted using video and voice conferencing tools, like Zoom or Teams. Similarly asynchronous communication could use tools including forums or emails. The tools adopted during the pandemic largely remain in use after the comeback of blended learning. For future research one goal could be the creation of communication models that can integrate the roles, practices, and tools currently interacting in higher education.

Keywords—higher education, communication, communication tools, COVID-19

I. INTRODUCTION

Global studies conducted by the International Association of Universities (IAU) reveal how the COVID-19 pandemic had a strong impact on teaching and learning in higher education institutions (HEIs). [1] [2] The pandemic effectively forced most universities and other HEIs to extensively adapt online distance teaching methods and tools, supplanting the more traditional contact teaching on campuses. The comparison of results of these two global surveys shows that the move to online distance teaching was intensified with as the pandemic wore on. The number of surveyed institutions offering online distance teaching increasing from 67% in 2020 to 89% in 2022, while even as of 2022 11% of these institutions did not offer remote teaching.

The move towards distance teaching and learning implies that appropriate modifications were required in both the teaching methods and also in the online teaching and communication tools that the faculty and students use, or that even new methods or tools needed be utilized. In this study the modifications HEIs undertook especially in their

use of teaching related communication tools are reviewed, guided by the following two research questions:

- 1) Were there changes in the use of communication tools in distance teaching and learning in higher education as the result of COVID-19? What were these changes?
- 2) How did the students and faculty experience these possible changes?

The method applied in seeking answers to these research questions was the literary survey method. [3] Literary survey method was used to discover if the recently published scientific literary covered matters related to the research questions.

The hypothesis of this work is that COVID-19 pandemic’s effects were so severe also to higher education, that the literature survey will reveal distinct ways in which higher education institutions chose to cope with these effects. It is also hypothesized that the survey enables exploring the various ways students and faculty of these institutions experienced these changes, even though these experiences could be somewhat intermixed with their experiences during the outset years of the pandemic.

The structure of this paper is as follows: In Section II, we review the related research about communication in higher education. In Section III, we present systematic mapping survey research method. Section IV introduces the findings of the survey. In discussion Section V we expand on the findings of the survey and the study is summarized in Section VI.

II. BACKGROUND

The increased use of ICT technology in higher education distance learning and teaching has been an on-going trend worldwide, aided by the goals set by governing bodies, like EU’s Digital Education Action Plans [4], and higher education institutions themselves, with COVID-19 pandemic giving urgency to this trend. [5] While distance learning must occur online, the teaching methods, communication tools and communication modes (synchronous and/or asynchronous) need to be carefully considered to ensure positive learning outcomes and technically efficient teaching. Xie et al. [6] analyzed synchronous and asynchronous online distance learning environments and their communication tools. Synchronous tools offer opportunities for real-time communication, which for example

enables students cooperatively work on their group work. Asynchronous communication implies course implementations where the students and teachers send messages, to which their recipient will answer at the time of their own choosing. [7] In the theoretical framework by Xie et al. asynchronous communication tools include discussion forums, blogs, emails and social media messages improve students reading and writing skills. Teachers give feedback for student's activities using asynchronous tools, and provide materials as pre-recorded lecture videos, material as files (PDFs, PowerPoint presentations, etc.). Asynchronous learning demands more rigorous self-regulation from the learner. These are contrasted with synchronous e-learning tools for communication and feedback, and instruction material distribution. In synchronous e-learning communication tools video, audio and/or web conferencing, live chats, white boarding, and application sharing. Students receive immediate direct input and feedback from the teachers. Surveyed students felt more comfortable using asynchronous communication tools, for they can be easily accessed offline. Students preferred to have an instructor present to promptly receive feedback and thus improve their learning. Doubtful and shy students preferred asynchronous mode. Asynchronous mode might be uncomfortable when engaging in computer mediated discussions. As both synchronous and asynchronous e-learning and communication tools are shown to have advantages not available in the other mode, Xie et al. come to conclusion, that best mode is a blended mode where synchronous and asynchronous modes are applied when appropriate.

Santos et al. presented a taxonomy for online based communication technologies [8], which is applied when we categorize the communication tools discovered in the mapping study presented in this article. The taxonomy is shown in Table I.

Taxonomy includes both synchronous and asynchronous tools, divided into categories based on their communication capabilities. In the Publishing and sharing technologies category are synchronous tools which enable users to publish instructions or other materials to other students or teachers. These tools often have communication capabilities beyond publishing and sharing, like the discussion forums in Moodle or viewer comments in Youtube. Whether these communication capabilities are utilized is up to the teachers to decide. Tools in the Collaborative technologies category provide platforms for collaboration where discussions and files can be shared with others. Collaborative tools are mostly synchronous, with the exception of tools like Slack, which provides instant messaging. Interpersonal communication technologies category has three sub-categories: email, instant messaging, and video conferencing and voice systems. With the tools in Social networks category, Interpersonal communication technologies which students can use in the on and off their studies. Social media usage in education has been extensively researched, with some studies showing that teachers use social media concentrating in teaching, while students, especially younger university students, use social

media to build communities. [9] [10]

III. LITERARY SURVEY

Systematic mapping study was selected as the research method for the conducted research. In their article Petersen et al. [3] describe the process involved in this method and contrast it with systematic literary review. The goal of a systematic mapping study is to "give an overview of a research area through classification and counting contributions in relation to the categories of that classification".

Searching from knowledge databases is the most common way of finding the articles for survey in systematic mapping studies, and our research followed this path, too. We used the ACM Digital Library service, which provides a web page for searching and accessing the publisher's article database. The selection of the search terms to scope the materials for our systematic mapping study was straight-forward and framed by the research questions. After evaluating some search terms and their combinations, search terms that produced relevant search results were "higher education", "distance learning", and "communication tools". Suitable combination of search terms was required, as for example the search for research articles published between 2020 and 2023 using combination of search terms "higher education", "covid-19", and "communication" yielded 704 results, excessive amount to evaluate. However, the need to find a narrower result set left out some potentially interesting articles that didn't match the search terms, such as [11] whose findings remind that some students or educators prefer face-to-face teaching due the benefits it provides to the students with certain learning styles.

The final selection criteria for a publication to be included in the mapping study were the following:

- 1) The search string we used combined the search terms: "higher education" AND "communication tools" AND "distance learning". ACM Digital Library search with this search string yielded 79 results, which various content types (peer-reviewed research articles, abstracts, etc.).
- 2) Other content types than research articles were removed from the result set, reducing it to 51 entries.
- 3) As the effects of COVID-19 were of interest to us, article published prior to 2020 were filtered from the results, which produced 23 results.
- 4) These 23 research articles were evaluated, and if they held no information related to our research questions, they were removed from the mapping study. However, if education related communication methods or practices, or communication tools was mentioned in the study, that study was included in the mapping study.

Studies that were excluded from the mapping study included [12], which focused on Learning Analytics, [13] about university opening its technical support to local community, and [14] which describes technologies applicable for project-based approach training teachers, study

TABLE I: Taxonomy of online based communication technologies (from [8])

Categories	Sub-categories	Examples
Publishing and sharing technologies		Youtube, Moodle, Flickr, Blogs, etc.
Collaborative technologies		Google Drive, Slack, Wiki, etc
Interpersonal communication technologies	Electronic mail	Gmail, Hotmail, etc.
	Instant messaging	Messenger, WhatsApp, SMS, etc.
	Videoconferencing and voice systems	Skype, Google Hangouts, et
Social networks		Facebook, Twitter, LinkedIn, etc

of applying blended synchronous and asynchronous online learning in Indonesia [15] , a study comparing two LMSes [16], and a study of adoption of a student mobility program [17].

IV. RESULTS OF SURVEY

Table II shows the articles that were included in the mapping study. Where an X is entered on the row of an article for any of the categories on the columns, the article was evaluated to include descriptions or discussion related to that category.

Depending on the article, the communication and communication tools were examined in various contexts. In some articles the tools were discussed in the context of course development and teaching, mentioning specific tools and practices. [19] [23] In contrast to those, some studies examined the evolution and properties of distance teaching and related communication tool use on more general level, like in [26], [21], [20] and [22]. The most closely scoped study examined Remote Pair Programming tasks as part of distance learning, highlighting how communication capabilities must be integrated to any online environment for it to be usable. [25]

Our first research question was: "Were there changes in the use of communication methods and tools in distance teaching and learning in higher education as the result of COVID-19? What were these changes?" When we look at the articles, we can see that there were changes, but changes in communication were linked to holistic move to distance learning pedagogical methods, whether it was e-learning [18], blended learning [30], or even "emergency remote teaching" [31].

[25] suggested that providing guidance to teachers and students on how they can best to use existing communication tools was preferable, instead of deploying or developing new tools. Other articles gave more weight to this suggestion, as most communication tools were already publicly available before the pandemic. These tools include Teams [31] [25], Zoom [18] [25] and tools used in Chinese higher education institutions, including QQ and WeChat [23] [24].

The communication methods and tools introduced during the pandemic seem to have had favorable effects on teaching and learning, as teachers reportedly are going to persist in using them after the pandemic, too. According to

[31] 82% of the teachers had used formal communication tools during the pandemic and 78% will continue with them. These formal communication tools included forums, Piazza, and Teams.

The second research question was: "How did the students and faculty experience these possible changes [in communication methods and tools]?" [18] findings included that students were negatively impacted by the limitations and incorrect choices of communication tools in e-learning courses. These partly led to weaker learning results. The shift from on campus face-to-face teaching to fully online classes caused stress and adjustment difficulties for some students. [19]. [30] found that on a course which used blended learning students were overall satisfied interaction during the course, be it student-student interaction, student-lecturer interaction, student-blended learning system.

[14] survey findings included that teachers' digital competencies before pandemic correlated with their experience in e-learning, and teacher's implemented their online teaching. Inexperienced teachers had more negative attitudes towards e-learning, and they could fail to see how quality e-learning can benefit students. When teacher's opinions about increased use of ICT and moving to online teaching were studied in [20], practical problems surfaced, such as unspecific guidance in application of ICT, financial burdens brought on by acquiring the needed hardware and software, inadequate support staff, and lacking supervision and inspection of the application of ICT in teaching. These challenges could hinder effective communication in many countries and HEIs.

V. DISCUSSION

This article's goal was to evaluate how COVID-19 affected higher education communication in teaching and how participants of academic life experienced those effects. A survey of recent research articles was used to gather findings from globally diverse authors covering local and global aspects of the changes.

The effects presented in the surveyed papers were comparable to the changes explored in larger scale reports, such as [5] and [31]. Increase in innovative online teaching practices and tools and their impacts on students are seen to have longer term implications on teaching. As [5] states it, COVID-19 worked as a catalyst for these changes.

TABLE II: Articles included in the mapping study and categories they discussed

Cited article	Communication tool(s)	Communication method(s) or practice(s)	Student perceptions	Faculty perceptions
[18]	X	X	X	
[19]	X	X	X	X
[20]				X
[21]	X	X	X	
[22]	X	X	X	X
[23]	X		X	X
[24]		X		X
[25]	X			X
[26]		X	X	X
[27]	X	X		
[28]		X		X
[29]	X			X
[30]	X		X	
[31]		X		X
[14]				X

Both [21] and [22] discuss Massive Open Online Course (MOOC) providers, which offer their online courses and materials to everyone, often at no cost to their students. Of MOOC providers Coursera, EdX, Khan academy, Udemy, and Open Yale courses were mentioned in the articles. These MOOCs are sometimes seen as direct competitor to traditional higher education, the quality and availability of the MOOCs has increased in last ten years. [32] However, established, traditional education is seen as having advantages for career advancement and rigorous study structures.

A noteworthy matter is the implicit requirement of integrating communication capabilities to MOOCs and LMS's. These online learning systems do not merely offer students material and exercise feedback and results, but also a wide range of peer-to-peer and student-teacher communication and feedback needs occur for the course to successfully proceed. Moodle LMS was discussed in [23] and [27]. It is also noteworthy from the viewpoint of communications that Neto et al. describe the creation of a new "Planning and Developing Courses in Distance Learning Environments" course, with communication taking place on Moodle's general and module-specific forums. This combined with the number of articles where Moodle is mentioned as the learning platform in use or being deployed indicate that Moodle's communication affordances are adequate for higher education courses. However, in the writers' experience, we find that Moodle's forums are somewhat cumbersome, and only lend themselves to asynchronous communication. Therefore, if synchronous communication is required in the teaching, another communication tool should be used to complement discussion forums.

Future work could be undertaken to formulate a communication model for higher education. This model would present the roles and tools involved in communication and could provide a clear structure for designing communication.

VI. CONCLUSION

This paper presented a survey of recent research on communication in higher education. The focus of the

survey was the pandemic-related changes in the use of communication tools and methods, and the experiences students and faculty had with these changes. Based on the survey, communication tools used have changed globally to be in line with distance and blended learning models, and online communication tools that were already in use prior to the pandemic saw increased usage. As some of the published research highlighted, the changes in communication tool use could be sustained as long-term solutions, as teachers indicated they were satisfied with their tools and the communication they enabled. However, in surveyed articles, the teachers' and students' experiences with this "new normal" of communication and teaching methods varied. While some students felt stress in adapting to the new education landscape, overall students were at least somewhat positive about the opportunities for learning provided. In this new landscape, teachers were required to mix modes in their online courses, for example, by requiring asynchronous self-paced learning from students while applying synchronous teaching, such as live-streamed lectures. In conclusion, teachers have adapted or launched new innovative ways of teaching and learning as a result of the pandemic, and this innovative development is likely to endure into the future.

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