# Using Microsoft Copilot Chat in the Work of IT Educators: Pilot Study

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**Abstract.** Artificial intelligence (AI) chatbots have recently emerged in nearly all aspects of life, including education, where educators are exploring their potential. However, achieving proficiency remains a challenge due to numerous hurdles. This article aims to identify the problems IT educators face when using AI chatbots and propose solutions. We used Scopus, Web of Science, and Scopus AI to explore how IT educators use AI chatbots and the problems they face. Additionally, we developed and implemented the Microsoft Copilot Chat user guide, and conducted a workshop at our institution on using Microsoft Copilot Chat for professional activities of IT educators. Findings from the literature and the pre- and post-workshop surveys provided firsthand insights into educators' knowledge, usage patterns, and the drawbacks of using Microsoft Copilot Chat. The literature review shows that educators mainly use AI to generate ideas, grade assignments, and automate tasks, while also valuing AI chatbots for personalized learning. However, problems include a lack of guidelines, identifying AI use in student work, and potential impacts on critical thinking. Additionally, a workshop on the use of Copilot for professional activities was conducted, accompanied by pre- and post-surveys with questions inspired by findings from the literature. One of the important findings of the surveys is that most educators use AI chatbots and are knowledgeable about their capabilities, except for areas like image quality assessment and emotion detection. Lastly, McNemar test was conducted to assess the workshop's impact, revealing significant improvements in participants' knowledge of AI chatbots capabilities and suggesting a positive influence on their future use of these tools. Conclusions were made regarding the improvement of the Copilot guide content and method of conducting the workshop for future research.

**Keywords:** IT Education · generative AI · Microsoft Copilot Chat · IT Educators · pilot study.

## 1 Introduction

People, driven by the desire to understand the world, have been developing new information technologies throughout history. From the invention of the telegraph,

telephone and radio, humanity has come to the creation of the first digital computer, the internet and generative AI technologies. The emergence of these technologies has constantly encouraged educators to use them in education, to find ways to improve teaching methods, increase learning efficiency and keep up with the current level of science and technology in order to increase students' interest, motivate them to learn, learn old knowledge and develop new knowledge.

This trend of educators searching for ways to use new information technologies in education can also be seen in the spread of generative AI technologies [1], [2]. The same trend can be observed in the field of IT education, where the interest of IT educators in generative AI technologies is fuelled by the existence of many routine processes performed during programming [3]. At the same time, we can observe the hesitancy of IT educators in using such generative AI technologies as chatbots [4]. M. Schönberger notes "The hype around AI tools in education has led to a sceptical attitude among many educators towards this technology" [5]. The reasons for the hesitancy in implementing AI chatbots in teaching practice primarily stem from doubts about the reliability of the generated results and the lack of guidance on how to use them effectively [6], [7].

It should also be noted that IT educators do not have enough time to study new technologies and determine whether they can use these technologies in their professional activities to improve IT education efficiency and automate routine tasks, among other things. Therefore, we believe it is appropriate to help IT educators understand how generative AI can be utilized, identify the purposes for which AI chatbots can be applied, and explore how generative AI tools can enhance their professional activities. This includes offering guidance on the effective use of AI chatbots in IT education. Based on that we formulate our research questions (RQ):

**RQ 1**. Do IT educators use AI chats in their professional activities, in particular Copilot, and in what ways?

**RQ 2**. What problems do IT educators face when using AI chats in their professional activities?

**RQ 3**. Can the workshop and the development and implementation of the Copilot usage guide help IT teachers to better understand the capabilities of Copilot in their professional activities?

To answer these questions, we set ourselves the following objectives:

1. To study the state of IT educators' use of AI chats, in particular Microsoft Copilot, in their professional activities through quantitative and qualitative analysis of publications in scientific databases.
2. To determine what problems educators face when using AI chats in their professional activities.
3. To propose ways to solve the problem of IT educators' doubts about the use of AI chats, particularly Copilot, in their professional activities: conducting a workshop and developing and implementing a guide to using Microsoft Copilot Chat.

4. Based on the analysis of two surveys, determine the impact of the workshop and information from the Copilot guide on IT educators' understanding of Copilot capabilities in their professional activities.

## 2 Methods

### 2.1 General design of the study

This study utilises the descriptive method and pre- and post-survey to collect the data. The descriptive method is used to describe and analyse the status of IT educators' use of AI chats (RQ1), as well as to identify the problems that educators face when using AI chats in their professional activities (RQ2), and ways to solve these problems. The surveys are used to answer the RQ3.

We present the research design, in which the main elements are:

1. Data collection:
   - Analysis of research about state usage of AI chats by IT educators in their professional activities, which results in the identification of the problems faced by educators when using AI chats in their professional activities;
   - Analysis of two surveys: pre- and post-survey;
     The study used the expert survey method [8], [9] to collect participants' views and opinions. The target experts were mainly IT teachers who worked in the Department of Computer Science, as well as PhD students or experts with various work experience in the field of AI. The expert survey method was used as a qualitative research method to gather experts' professional opinions on a certain issue (use of Copilot in professional activities) and collect data for inference. All participants were informed about the study and agreed to participate.
2. Means for learning Copilot capabilities (workshop and guide), which allow IT educators to get the necessary knowledge and skills to familiarise with Copilot possibilities.

For a more precise understanding of the research design, we present a diagram of the research (see Appendix G), which shows the stages and expected results of the study.

### 2.2 Methods for Analysing the State of the Art in the Use of AI Chats by IT Teachers in Their Professional Activities

To analyse the research on the state of IT educators' use of AI chats in their professional activities, we searched for scientific papers in the Scopus and Web of Science scientific metric databases. The Scopus database was searched by Article title, Abstract, Keywords using the following search phrase: "using AND of AND artificial AND intelligence AND chats AND by AND information AND technology AND educators". Since the search was carried out on a very narrow

topic, we eventually received a list of 4 publications (2 - 2023, 2 - 2024). Using the following search phrase "using AND of AND artificial AND intelligence AND chats AND by AND computer AND science AND educators" in the Scopus database, we received 2 more documents (1 - 2014, 1 - 2023). The Web of Science database was searched by title, abstract, keyword plus, and author keywords for two search phrases as well: "using of artificial intelligence chats by information technology educators", "using of artificial intelligence chats by computer science educators". As a result, we received 2 publications, one for each query. Thus, the search in Scopus and Web of Science resulted in 8 scientific publications: 6 and 2 respectively. One publication on relationships between humans and machines, and the transformational potential of AI in the classroom [10] was excluded from the analysis. One of the scientific papers is duplicated in two databases, 2 out of 7 are related to IT education, but only one of them discusses several concrete and research-based opportunities of large language models (LLM) and ChatGPT for computing educators [11]. At the same time, this article does not mention the problems faced by educators when using AI chats in their professional activities.

Given the insufficient sample of scientific publications to analyse the problem, we searched for more general queries: "artificial AND intelligence AND chats AND by AND information AND technology AND education", "artificial AND intelligence AND chats AND computer AND science AND education". The data was obtained by searching the Scopus and Web of Science databases. The search included a request only for peer-reviewed articles written in English and published in 2022 and 2023 with restrictions on the subject area. The search resulted in 60 possible studies (see Appendix A) for inclusion in the analysis. From the 60 studies, 7 duplicates were removed.

The remaining articles were checked for compliance with the inclusion (peer-reviewed scientific publications, involves Higher IT education, includes the use of AI Chats in IT teaching and/or learning, literature published between $30^{th}$ November 2022 – $31^{st}$ June 2024, published in English) and exclusion (scientific works not related to higher IT education, duplicates) criteria.

After applying the inclusion and exclusion criteria, 53 studies were removed. The remaining 7 studies were analysed to determine the ways in which IT educators use AI chats in their professional activities and the problems faced by educators when using AI chats in their professional activities.

Later, the research was conducted using Scopus AI, an AI-based tool designed to navigate the rich academic landscape of the Scopus platform. Scopus AI uses the Scopus content to ask a question and provide an answer in several forms: Summary, Expanded summary, Concept map, Topic experts (3 key studies on the question), "Go deeper" (suggestions for additional questions on the question asked).

Based on the question posed; How do educators of information technologies (computer science) use AI chats in their professional activities? We received answers in the form of generated texts and references to scientific sources. For further analysis, we used the references, which were reviewed in accordance with the inclusion/exclusion criteria and resulted in the inclusion of 2 more articles. In

addition, the tool provided a concept map that identify the connections between concepts (see Appendix B). Thus, the main topics in the use of AI chats by educators are *student support* and AI-based *learning and teaching*.

Next we asked Scopus AI the following question: "What problems do information technology/computer science educators have when using AI chats in their professional activities?" For further analysis, we used the references, as a result of their review, according to the inclusion and exclusion criteria, 2 more articles were given for analysis. As a result, we also received a conceptual map showing the hierarchy of problems (see Appendix C). Thus, the main ones are *technical issues* and *pedagogical challenges*.

### 2.3 Methods of conducting surveys

The pre- and post-surveys were conducted during a one-day workshop, in which participants joined both in-person and online via Teams. Surveys were conducted with IT educators to find out whether the tools we developed for learning Copilot capabilities had an impact on the perceived professional competence of IT educators. Nettskjema (https://nettskjema.no), was used as a tool for designing and managing data collection. Using web forms with anonymity settings allowed us not to collect personal data.

The pre-survey consists of 9 questions (see Appendix D), one of which (the eighth) is divided into 5 groups, according to the areas of application of the software (Coding, Working with information, Working with text and voice, Working with images, Planning and communication). The purpose of this survey is to get knowledge about the level of awareness of IT educators with the possibilities of Copilot in their professional activities. We investigated whether IT educators are aware of the various capabilities of Copilot in text creation, drawing, image and voice recognition, etc., whether they use Copilot or other AI chatbots for their professional activities, and what they see as the advantages and disadvantages of such usage.

The post-survey consists of 6 questions (see Appendix E), one of which (the second one) is duplicated from the pre-survey and allows us to obtain data on whether the IT educators' knowledge of the 5 areas of the prompts (Coding, Working with information, Working with text and voice, Working with images, Planning and communication) has changed. The purpose of this survey was to find out whether the educators' understanding of Copilot for their professional activities improved after the workshop and Copilot guide. We investigated whether participating in the workshop helped educators to better use the tips for various professional tasks. We wanted to find out what IT educators think about using generative AI in their professional activities.

Two questions in this survey used a Likert scale to assess the degree of agreement or disagreement with each statement, ranging from "strongly agree" to "strongly disagree" [12].

The surveys were conducted in May 2024 among computer science experts from the Department of Computer Science of the Norwegian University of Science and Technology. 18 experts took part in the pre-survey and 14 in the post-

survey. The results of surveys and their analysis are presented in subsection 3.2.

### 2.4 Description of the tools for IT educators to study Microsoft Copilot Chat features

The "Guide to using Microsoft Copilot Chat" was developed for the study, which consists of 2 main sections. One describes the Copilot Chat interface in Microsoft Edge and mobile. Another section describes examples of Copilot Chat prompts and responses. In the guide, the tips are divided according to different areas of use, such as administrative tasks, assessment, communication, Lesson Planning, Professional Development, Study and others (see Appendix F).

To familiarize participants with Copilot's capabilities, we created a "Sample prompts" form in Microsoft Forms. Participants read the instructions and used the prompts to make inquiries in Copilot. They then copied and pasted the responses into the form and submitted it, rating the responses on a five-point scale (1 star - very bad to 5 stars - very good). The results, focusing on Copilot's answer quality and IT teachers' satisfaction, will not be presented in this study as they are outside the scope of the RQs.

## 3 Studying the attitude of IT educators to the use of AI chats in professional activities

### 3.1 Analysis of researches

Based on the analysis of the 11 studies described in subsection 2.2, we have identified the ways in which IT educators use AI chats in their professional activities. We divided them into 6 groups (see Tab. 1).

In general, based on the analysed studies, it can be concluded that educators are positive about using AI Chat in teaching, citing benefits such as instant feedback and reduced workload. However, concerns have also been raised about accuracy, loss of personal interaction, privacy, and data security. Also, there are ethical implications and concerns about the use of AI chatbots in education, including issues of acceptability, fair use, and privacy.

Based on the analysis of the 11 studies described in subsection 2.2, we have identified the problems faced by IT educators when using AI chats in their professional activities. In our opinion, they can be divided into 7 groups, as shown in Table 2.

In our opinion, all these problems can be overcome, or their impact reduced, by improving the skills and practice of using AI technology in teachers and students with an emphasis on critical thinking. Educators need to be well-versed in the best practices for effective AI implementation, potential pitfalls, and ethical implications. As R. Srishti notes, "It is crucial to strike a balance between leveraging AI capabilities and preserving human factors in education. It is recommended that educators use AI chatbots responsibly to enhance, rather than

**Table 1.** Ways in which IT educators use AI Chat.

| **Category** | **Ways in which chat is used** |
|---|---|
| Improvement of teaching practices | Utilizing Explainable Artificial Intelligence in classroom [13] |
| | Extra help in teaching students who have some knowledge to write the correct prompt for finding the right answer [14] |
| | Adopting AI Chat to augment instruction for students, to create an adaptive learning experience for students, and to effectively contribute to adaptive learning [16] |
| | Improving efficiency of education by automating repetitive tasks [19] |
| Supporting personalized and relevant learning | Enabling personalized learning experiences catered to the requirements and learning approaches of individual students that can increase students' self-efficacy and sense of accomplishment, resulting in a more favourable view of CS and IT [20] |
| | Improvement of the learning experience of students, preparation of them for using AI in professional settings [17] |
| | Bridging the gap in CS and IT education by providing resources and guidance to students who lack access to traditional educational opportunities [20] |
| Utilizing chat for learning programming | Initiating ideas for assignment, finding, and fixing code mistakes and completing tasks where one can verify its accuracy [14] |
| | Assistance students with programming tasks in a manner tailored to their individual needs without jeopardizing the integrity of their learning [15] |
| | Development critical thinking through real-world programming examples [19] |
| Designing lesson plans | Assisting in the creation of teaching materials and providing opportunities for innovative approaches and diverse teaching methods [19] |
| Supporting assessment and feedback | Marking assignments and exams to both expedite the process and provide more detailed feedback to the learners [14] |
| | Enhancing student engagement and motivation through personalized feedback [19] |
| Fostering collaboration and communication | Enhancing the educational digital dialogue for each learner, as it helps to activate the mutual digital dialogue between the student and the machine [18] |
| | Increasing accessibility with 24/7 support, enabling students to seek help beyond class time [19] |
| | Enhancing student engagement and motivation through personalized feedback [19] |

**Table 2.** What problems IT educators face.

| **Category** | **Problems that educators face** |
|---|---|
| Technological limitations and shortcomings | Errors or inaccuracies in producing language or understanding questions, for example, there may be maths problems and even incorrect answers to simple calculations may be given [19] |
| | Insufficient functionality of AI chats to implement coding functions [23] |
| Failure to foster critical and computational thinking | Possible interference with critical thinking, hands-on practice, and communication with instructors when using AI Chat, potentially leading to reduced learning progress and a negative impact on job preparedness [14] |
| | Hindering the teaching and learning of basic concepts and techniques in programming - a correct and efficient answer of AI chats is not always in line with the pedagogy of learning and understanding the basics of programming [23] |
| Additional workload | Increased workload for teachers due to potential misuse of AI by students (such as plagiarism), and the requirement for teachers to report the use of AI chat in assessments [14] |
| | Need for additional evaluation of the usability and user experiences of AI Chat when used by university students [22] |
| Prejudice and anxiety among educators | Panic among educators due to potential AI chats to facilitate cheating in online assignments and tests [19] |
| Lack of guidelines and insufficient teacher training | Lack of specific guidelines for assessing work involving AI [14] |
| | The lack of developed training programmes for teachers on the creation of chatbots and the introduction of AI technologies in education [18] |
| | Insufficiency of teaching practices to effectively leverage the benefits of AI chats [19] |
| | Not understanding how to write correct, detailed, and clear prompts [23] |
| Problem to catch up with new technologies | Constant development of new open source and commercial tools [21] that can be utilized |
| Need to update teaching practices | The need to reassess teaching styles and curriculum design through the integration of AI technology [19] |
| | The need for further promotion and education on the potential benefits and responsible use of AI chats in the field [19] |
| | Supervision and support by educators of students' use of the AI tool [20] |

dehumanize, education, and to create a learning environment combining technology and human interaction" [24].

### 3.2 Results of surveys

The pre- and post-surveys aimed at 1) understanding the IT educators' familiarity with Copilot capabilities, and 2) the impact of the workshop and Copilot guide on the understanding of the capabilities of Copilot in their professional activities. Our pre-survey was conducted with a small sample of n = 18 and post-survey with n = 14 participants. Therefore, these findings should be interpreted with caution and viewed as indicative rather than definitive. While the sample size is limited, the data provides valuable preliminary insights into the studied topic.

**Results of pre-survey** Based on pre-survey (questions $1-7$, 9 Appendix D) responses a significant 72% of the survey participants use AI chatbots in their professional activities, from which almost 70% use Copilot. The results show an equal split, with 50% of participants using a corporate (NTNU) account and 50% using a private one. We were interested in this aspect as the quality of Copilot responses differs depending on whether one is using a corporate or private account.

Over half (56%) of participants reported being unfamiliar with the Guide to Using Copilot created by Excited SFU. The guide was known to 22% and partially known to 22% of respondents. However, none of the participants were fully familiar with the guide. Four out of ten respondents reported familiarity with other guides, blog posts, guidelines etc. and nearly 80% reported the use of other guides about Copilot use for professional activities. The data reveal a balanced distribution, with half of the respondents participating in events dedicated to the use of AI chatbots in pedagogical activities, while the other half did not.

In addition to the capabilities we mentioned in the survey, respondents reported using Copilot for language learning, brainstorming, proofreading and an easy search engine, annotating mathematical language variables in academic papers, making recipes, developing lesson plans, and designing fitness plans. These diverse capabilities demonstrate Copilot's versatility in supporting various tasks and projects.

Further, we investigated the correlation between questions about the usability of AI chatbots, Microsoft Copilot, knowledge about different types of guides available, and whether they had participated in any workshop or event dedicated to the use of AI chatbots in pedagogical activities. For our correlation matrix (see Appendix H), we included questions 1, 2, 4, 5, 6 and 7 (Appendix A).

From the above matrix, it can be inferred that there is moderate correlation between question 4 with question 5 and 6, inferring that a significant number of participants who are familiar with guide to using Copilot which is designed by Excited SFU also knows about other guides and post about Copilot and they also

use these guides in their professional work. A weak correlation is found between participant using other AI chatbots in their professional activities (question 1) and using Copilot in their professional activities (question 2). Another weak correlation is between participant using Copilot in professional activities (question 2) with their familiarity with guide to using Copilot (question 4) and using other guides, blog posts and official guides on using Copilot in professional activities (question 6). Note that, we have considered weak correlation to be in range of $(0.4 \sim 0.5)$, while a correlation greater than 0.5 is assumed to be moderate.

**Results of post-survey** The post-survey aimed at gathering insights on participants' thoughts about the workshop (questions $1, 3-6$, Appendix E).

Respondents rated the workshop's positive impact on professional competencies on a scale from 1 (strongly agree) to 5 (strongly disagree). The results revealed that 21% of participants strongly agreed and 43% agreed with the statement. Together, this indicates that a total of 64% of participants believe in the positive impact of the workshop on their professional competencies. However, 14% of respondents were neutral and 21% strongly disagreed highlighting potential areas for improvement. The survey findings indicate that 57% of respondents either "strongly agreed" or "agreed" that the workshop met their expectations. Meanwhile, 14% remained neutral, and 29% either "disagreed" or "strongly disagreed." When asked about using the knowledge and skills gained during the workshop in professional activities 29% of respondents stated that they are already using them, 43% said that they will use them 29% said that they partially will use them. Notably, none of the participants indicated that they would not use the knowledge and skills gained.

The following open-ended question concerned the survey participants' thoughts on the advantages of using Microsoft Copilot for professional activities. Most experts pointed out that Microsoft Copilot enhances productivity and efficiency, speeds up work, and saves time by synthesizing information faster and reducing repetitive tasks. Moreover, many see the Copilot as a support in creative processes as this tool can help generate ideas, provide new perspectives on various topics, facilitate brainstorming, boost creativity, clarify problems, and assist in starting a new task. Practically, the Copilot can, for example, support educators in preparing a lesson plan or show the potential of generative AI, i.e. to understand how the students may be using them. Additionally, the positive aspect of chat integration with Microsoft 365, corporate account privacy, and some level of reliability was mentioned.

When asked about the disadvantages of using Copilot for professional activities, the most frequently mentioned issues were AI hallucinations, such as lack of accuracy, over-generalization, and bias. Furthermore, while AI-supported solutions offer speed, they often sacrifice quality and a deeper understanding. These problems can undermine the quality of teachers' results and hinder students' learning. Experts also highlighted concerns about increased dependency on AI tools and the inequity in crediting work done individually versus with AI assistance. Additional criticisms included Copilot's tendency to provide overly

rigid responses, its inability to analyze links or upload PDFs, and its focus on testing prompts rather than evaluating their value or response quality. Finally, potential GDPR issues and plagiarism concerns were also noted.

**Analysis of the effect of the intervention on the understanding of Microsoft Copilot Chat capabilities** We analysed and compared experts' answers to the $8^{th}$ question of pre-survey and the $2^{nd}$ question of post-survey. This was done in order to find an answer to RQ 3 regarding the impact of the workshop and the information from the Copilot guide on IT educators' understanding of the capabilities of Copilot in their professional activities.

To evaluate the effectiveness of the workshop in enhancing participants' knowledge of Copilot and assess whether they will use this AI chatbot in future or not, we performed statistical analysis of the pre- and post-workshop surveys. The surveys consisted of 31 questions divided into five different segments, namely coding, work with information, work with text and voice, work with image, and planning and communication. In the pre-workshop survey, there were two options to select, namely whether the participant have knowledge about that specific capability, or if they use it regularly. The participant also had the choice to leave the question blank, which we can safely assume that the participant does not know that specific capability of the Copilot. In the post-workshop survey, we again asked the same questions. The assumption here is that a participant, who may have left a question blank in pre-workshop may change it to "I Know", if the participant gains sufficient understanding of that capability. Note that, we have also included participant responses in "I Know" category who have only selected "I Use" category, as the participant who uses the Copilot for that capability must know or have a good understanding of it.

Now given the nature of the survey, in which the responses in both "I Know" and "I Use" categories can be easily interpreted as *yes/no* type of questions and we have a paired structure of the data, we applied McNema's test [25]. McNemar test is specifically designed for comparing paired proportions using a 2x2 contingency table. The usage of McNemar test is further justified by small sample size of the study (18 pre- and 14 post-workshop participants). We further removed reliance on chi-square approximation to ensure precise probability calculations. We selected the $p$ value of McNemar test to be 0.05, which implies that the probability of having impact of workshop for specific capability can only be selected if its probability is greater than 95%.

The results indicate varying degrees of impact across different AI capabilities. Table 3 (see Appendix I) summarizes the $p$ value of all the questions asked to participants in both "I Know" and "I Use" categories. We also included a column to show which responses are significant, and which are not in both categories. For "I Know" category, 22 questions came under the significant category, stating that the workshop had significant impact on the knowledge of 22 capabilities on the participants. In "I Use" category, the analysis showed that 18 questions came under significant category implying that for these 18 capabilities of AI

chatbot, the workshop had an impact that the participants may start using these capabilities.

From Table 3 (see Appendix I), we can also infer that in the knowledge ("I Know") category, work with information and planning and communication segment has been impacted most, with all its question come under significant category, followed by coding and work with voice and text. The least impacted segment in this category is work with image. For "I Use" category the most impacted segment is surprisingly work with image, which may suggest while the workshop has very limited impact on knowledge of using AI chatbot to work with images but for those participants, who had knowledge about working with images changes their opinion to using it in future. For other segments, such as planning and communication, Coding, the impact is in accordance with knowledge category. Another surprising finding of our analysis is the limited impact on work with information category, which can be understood as the workshop may have impacted knowledge of the participants to work with information, but they might not be ready to use it.

## 4 Conclusions

Taking into account the wide spread of new technologies like generative AI in IT education, a legitimate question arises; How can AI chatbots be used appropriately and effectively in the professional activities of IT educators?

(**RQ1**) Based on the analysis of scientific publications and surveys results, we found that IT educators use AI chats in their professional activities, in particular Copilot. A significant number of the respondents use AI chat in their professional activities, from which majority use Copilot. IT educators use AI chats for the improvement of teaching practices, supporting personalized and relevant learning, learning programming, designing lesson plans, supporting assessment and feedback, fostering collaboration and communication.

(**RQ2**) Based on data from Scopus, Web of Science, and the Scopus AI tool, we have identified several problems faced by IT educators when using AI chats in their professional activities. These are problems associated with technological limitations and shortcomings, failure to foster critical and computational thinking, the additional workload of educators, prejudice and anxiety among educators, lack of guidelines and insufficient teacher training, catching up with new technologies and the need to update teaching practices.

(**RQ3**) We offered ways to solve the problems of IT educators in using AI chats, in particular Copilot, in their professional activities. The article presents the structure and content of the Copilot guideline for educators and a workshop on the same topic. Based on the analysis of pre- and post-workshop surveys, it was concluded that conducting a workshop, developing and implementing a guide on the use of Copilot can help IT educators better understand the possibilities of Copilot in their professional activities.

To study the impact of workshop on the participants statistical analysis of the surveys was conducted using the McNemar test. The results indicated varying

degrees of impact across different AI capabilities. In the knowledge ("I Know") category work with information and planning and communication segment has been impacted most, followed by coding and work with voice and text. The least impacted segment in this category is work with image. For "I Use" category the most impacted segment is work with image. For segments planning and communication, coding, the impact is in accordance with knowledge category. We also determined that there is a limited impact on work with information category.

However, it should be noted that conducting this study was also an educational experience for us. In future workshops, we plan to ask educators to create their own prompts on given topics. This approach will avoid limiting their creativity and allow us to benefit from their expertise. We also observed that the workshop was too long, leading to participant fatigue. As a result, fewer educators participated in the later stages, which was reflected in a lower survey response rate. Therefore, we believe it would be more effective not to conduct a pre- and post-survey in future workshops and to focus solely on working with prompts.

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# A Tabular presentation of the results of searching for scientific publications in Scopus and Web of Science.

**Table 3.** Search results for scientific publications in Scopus and Web of Science

| Databases | Query | Subject area | Number of articles in subject area | Number of articles |
|---|---|---|---|---|
| Scopus | "artificial AND intelligence AND chats AND information AND technology AND education" | Computer science | 19 | 29 |
| | | Sciences | 12 | |
| | | Engineering | 12 | |
| | | Decision sciences | 7 | |
| | | Mathematics | 5 | |
| | "artificial AND intelligence AND chats AND computer AND science AND education" | Computer science | 6 | 7 |
| | | Sciences | 5 | |
| | | Engineering | 2 | |
| | | Decision sciences | 1 | |
| | | Mathematics | 1 | |
| Web of science | "artificial AND intelligence AND chats AND information AND technology AND education" | Education Educational Research | 10 | 20 |
| | | Surgery | 5 | |
| | | Computer science | 4 | |
| | | Medical informatics | 1 | |
| | "artificial AND intelligence AND chats AND computer AND science AND education" | Education Educational Research | 4 | 4 |
| | | Computer science | 4 | |
| | | Engineering | 1 | |
| Total articles | | | | 60 |

## B Schematic presentation of Scopus AI concept map based on the question asked about educators' use of AI chats.

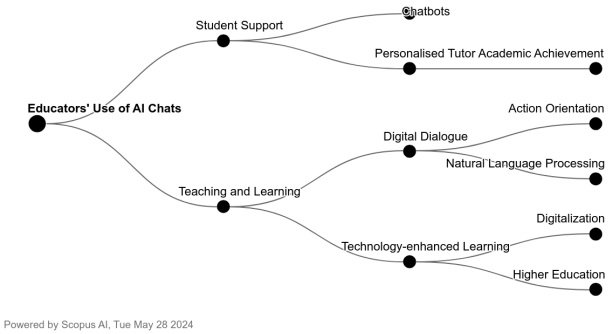


**Fig. 1.** Scopus AI concept map based on the question asked about educators' use of AI chats.

## C Schematic presentation of Scopus AI concept map based on the question asked about problems in the use of AI-chats by IT educators.

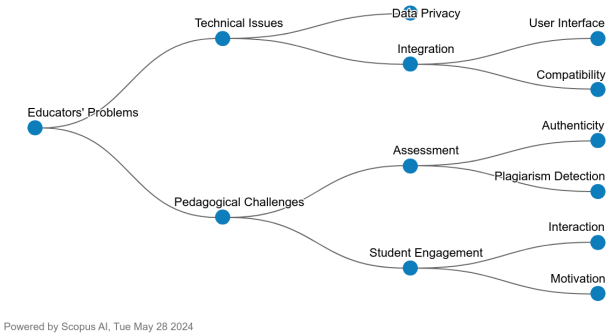


**Fig. 2.** Scopus AI concept map based on the question asked about problems in the use of AI-chats by IT educators.

## D A list of pre-survey questions

1. Do you use AI chatbots in your professional activities?
yes / no
2. Do you use Microsoft Copilot Chat in your professional activities?
yes / no
3. If you use Microsoft Copilot Chat, are you using a corporate (NTNU) or personal account?
Corporate account
Personal account
4. Are you familiar with the "Guide to using Microsoft Copilot Chat" from Excited SFU?
yes
in full
partially
no
5. Are you familiar with other guides, blog posts, Microsoft official guides, etc. about using Microsoft Copilot Chat?
yes / no
6. Do you use other guides, blog posts, Microsoft official guides, etc. about using Microsoft Copilot Chat in your professional activities?
yes / no
7. Have you participated in events dedicated to the use of AI chatbots in pedagogical activities?
yes / no
8. What Microsoft Copilot Chat capabilities do you know or/and use in your professional activities?

8.1. Coding

| | I know | I use |
|---|---|---|
| Code Generation: Copilot can generate code snippets in various programming languages. | | |
| Code Explanation: Copilot can explain the functionality of a given piece of code. | | |
| Bug Detection in code: Copilot can identify potential bugs in your code. | | |
| Code Optimization: Copilot can suggest more efficient ways to write your code. | | |
| Code Refactoring: Copilot can suggest ways to refactor and improve your code. | | |
| Unit Test Generation: Copilot can generate unit tests for your code. | | |
| Documentation: Copilot can help in writing documentation for your code. | | |

8.2. Work with information

| | I know | I use |
|---|---|---|
| Learning Aid: Copilot can serve as a learning tool for new things. | | |
| Information Retrieval: Copilot can provide information on a wide range of topics. | | |
| Information Summarization: Copilot can summarize latest news, articles, texts, or events. | | |
| Data Analysis: Copilot can help analyse data and provide insights. | | |
| Book, Movie and Music Recommendations: Copilot can suggest books, movies, TV shows, songs or artists based on user's preferences. | | |

8.3. Work with text and voice

| | I know | I use |
|---|---|---|
| Translation: Copilot can translate text between various languages. | | |
| Creative Writing: Copilot can assist with creative writing tasks, such as generating poems, stories, or song lyrics. | | |
| Voice-Based Query: Copilot can answer questions based on voice inputs from the user. | | |
| Voice Command Interpretation: Copilot can interpret and execute voice commands given by the user. | | |
| Speech-to-Text: Copilot can convert spoken language into written text. | | |
| Text-to-Speech: Copilot can convert written text into spoken language. | | |
| Language Translation: Copilot can translate spoken language into another language. | | |

8.4. Work with image

| | I know | I use |
|---|---|---|
| Image Description: Copilot can describe the content of an image. | | |
| Object Identification: Copilot can identify objects present in an image. | | |
| Colour Analysis: Copilot can analyse the dominant colours in an image. | | |
| Text Extraction: If there's text in an image, Copilot can extract and interpret it. | | |
| Emotion Detection: It can detect emotions in faces present in an image. | | |
| Activity Recognition: It can recognize activities or actions taking place in an image. | | |
| Location Identification: If the image is of a notable location, Copilot might be able to identify it. | | |
| Image-Based Query: You can ask questions based on the content of an image. | | |
| Image Quality Assessment: Copilot can provide a basic assessment of an image's quality. | | |

8.5. Planning and communication

| | I know | I use |
|---|---|---|
| Email Drafting: Copilot can assist in drafting emails or other forms of written communication. | | |
| Travel Planning: Copilot can provide information related to travel, like flight details, hotel bookings, etc. | | |
| Event Planning: Copilot can assist in planning events, like parties or meetings. | | |

9. What other Microsoft Copilot Chat capabilities do you know that were not listed in the previous question?

## E A list of post-survey questions

1. Do you believe the workshop contributed to enhancing your professional competencies? *Answer in Likert scale: 1 = strongly agree, 2 = agree, 3 = neutral, 4 = disagree, and 5 = strongly disagree*

2. What capabilities of Microsoft Copilot Chat do you currently know and/or use in your professional activities?

2.1. Coding

| | I know | I use |
|---|---|---|
| Code Generation: Copilot can generate code snippets in various programming languages. | | |
| Code Explanation: Copilot can explain the functionality of a given piece of code. | | |
| Bug Detection in code: Copilot can identify potential bugs in your code. | | |
| Code Optimization: Copilot can suggest more efficient ways to write your code. | | |
| Code Refactoring: Copilot can suggest ways to refactor and improve your code. | | |
| Unit Test Generation: Copilot can generate unit tests for your code. | | |
| Documentation: Copilot can help in writing documentation for your code. | | |

2.2. Work with information

| | I know | I use |
|---|---|---|
| Learning Aid: Copilot can serve as a learning tool for new things. | | |
| Information Retrieval: Copilot can provide information on a wide range of topics. | | |
| Information Summarization: Copilot can summarize latest news, articles, texts, or events. | | |
| Data Analysis: Copilot can help analyse data and provide insights. | | |
| Book, Movie and Music Recommendations: Copilot can suggest books, movies, TV shows, songs or artists based on user's preferences. | | |

2.3. Work with text and voice

| | I know | I use |
|---|---|---|
| Translation: Copilot can translate text between various languages. | | |
| Creative Writing: Copilot can assist with creative writing tasks, such as generating poems, stories, or song lyrics. | | |
| Voice-Based Query: Copilot can answer questions based on voice inputs from the user. | | |
| Voice Command Interpretation: Copilot can interpret and execute voice commands given by the user. | | |
| Speech-to-Text: Copilot can convert spoken language into written text. | | |
| Text-to-Speech: Copilot can convert written text into spoken language. | | |
| Language Translation: Copilot can translate spoken language into another language. | | |

2.4. Work with image

| | I know | I use |
|---|---|---|
| Image Description: Copilot can describe the content of an image. | | |
| Object Identification: Copilot can identify objects present in an image. | | |
| Colour Analysis: Copilot can analyse the dominant colours in an image. | | |
| Text Extraction: If there's text in an image, Copilot can extract and interpret it. | | |
| Emotion Detection: It can detect emotions in faces present in an image. | | |
| Activity Recognition: It can recognize activities or actions taking place in an image. | | |
| Location Identification: If the image is of a notable location, Copilot might be able to identify it. | | |
| Image-Based Query: You can ask questions based on the content of an image. | | |
| Image Quality Assessment: Copilot can provide a basic assessment of an image's quality. | | |

2.5. Planning and communication

| | I know | I use |
|---|---|---|
| Email Drafting: Copilot can assist in drafting emails or other forms of written communication. | | |
| Travel Planning: Copilot can provide information related to travel, like flight details, hotel bookings, etc. | | |
| Event Planning: Copilot can assist in planning events, like parties or meetings. | | |

3. Did the workshop meet your expectations? *Answer in Likert scale: 1 = strongly agree, 2 = agree, 3 = neutral, 4 = disagree, and 5 = strongly disagree*

4. Will you use the knowledge and skills gained during the workshop in your professional activities? *(already using / yes / partially /no)*

5. What do you think is the advantage of using Microsoft Copilot Chat for your professional activities?

6. What are the disadvantages of using Microsoft Copilot Chat for your professional activities?

## F Schematic representation of the usage areas of prompts in the "Microsoft Copilot Chat User's Guide"

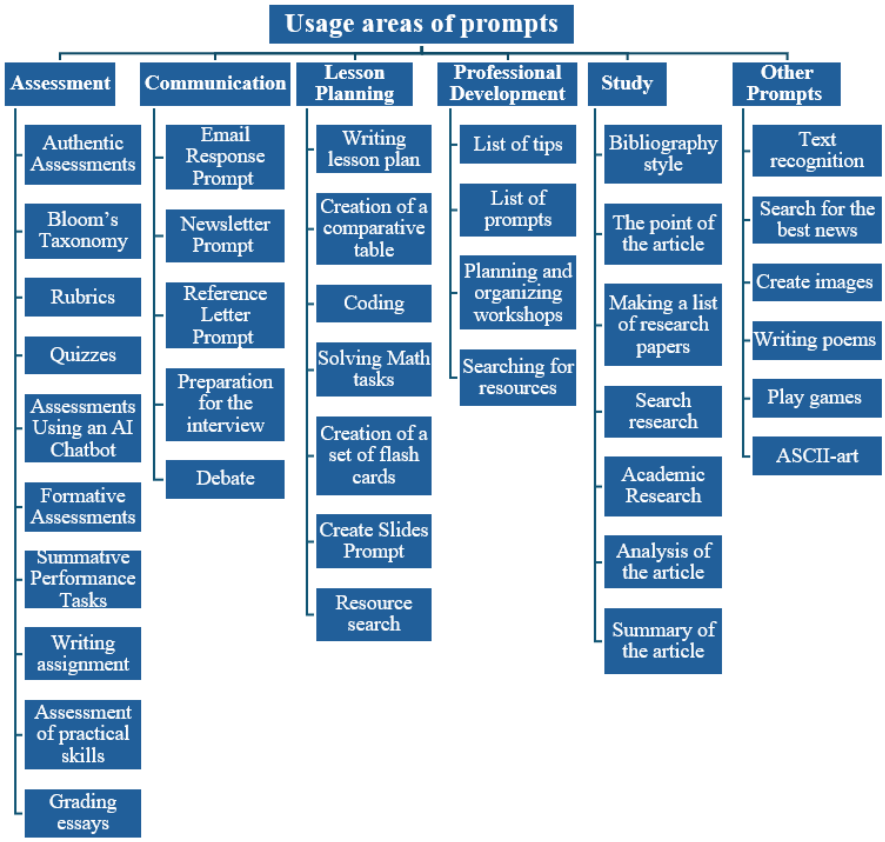


**Fig. 3.** Usage areas of prompts in "Guide to using Microsoft Copilot Chat."

## G Schematic representation of design of the study

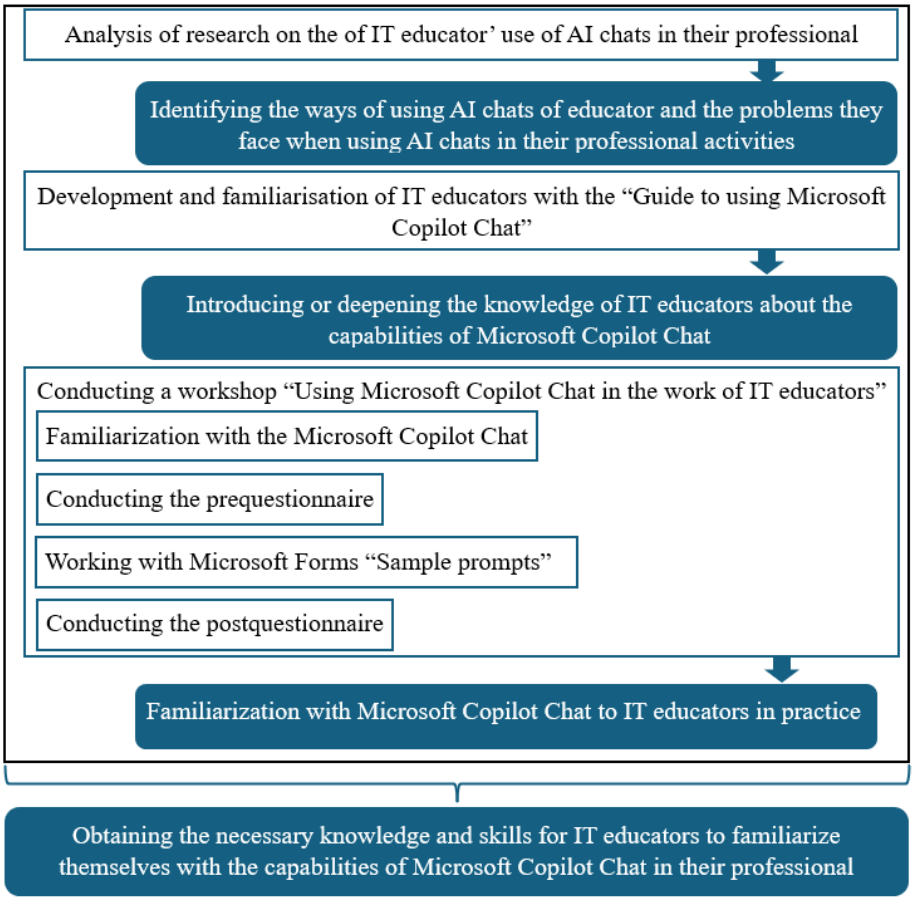


**Fig. 4.** Design of the study

## H Correlation analysis of questions

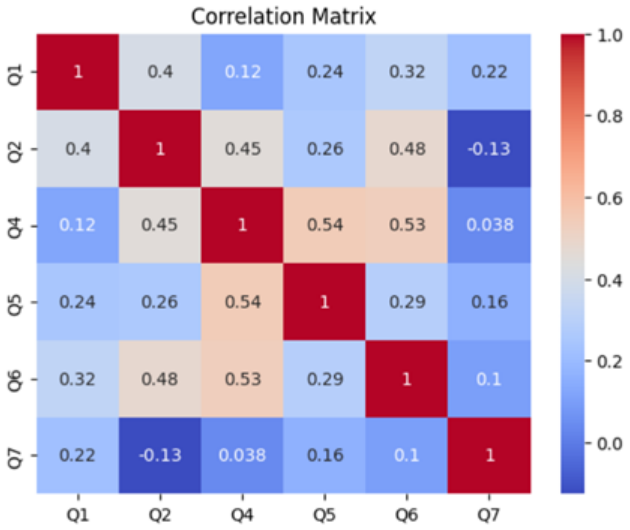


**Fig. 5.** Correlation analysis of questions 1, 2, 4, 5, 6, and 7 (pre-survey)

# I List of survey question

**Table 4.** List of survey questions with their $p$ value and significance

| Question | I Know | | I Use | |
|---|---|---|---|---|
| | *p value* | Significance | *p value* | Significance |
| **Coding** | | | | |
| Code Generation | 0.0005 | Yes | 0.0573 | No |
| Code Explanation | 0.0073 | Yes | 0.0573 | No |
| Bug Detection | 0.0490 | Yes | 0.0073 | Yes |
| Code Optimization | 0.0212 | Yes | 0.03515 | Yes |
| Code Refactoring | 0.0962 | No | 0.0073 | Yes |
| Unit Test Generation | 0.9228 | No | 0.0004 | Yes |
| Documentation | 0.0351 | Yes | 0.0063 | Yes |
| **Work with Information** | | | | |
| Learning Aid | 0.0002 | Yes | 0.7744 | No |
| Information Retrieval | 0.0002 | Yes | 0.7744 | No |
| Information Summarization | 0.0002 | Yes | 1.0 | No |
| Data Analysis | 0.0073 | Yes | 0.5810 | No |
| Book, Movie and Music Recommendations | 0.0009 | Yes | 0.0063 | Yes |
| **Work with text and voice** | | | | |
| Translation | 0.0023 | Yes | 0.5810 | No |
| Creative Writing | 0.0002 | Yes | 0.2668 | No |
| Voice-Based Query | 0.0127 | Yes | 0.0922 | No |
| Voice Command Interpretation | 0.0212 | Yes | 0.0351 | Yes |
| Speech-to-Text | 0.0075 | Yes | 0.0922 | |
| Text-to-Speech | 0.0768 | No | 0.0063 | Yes |
| Language Translation | 0.1184 | No | 0.1795 | No |
| **Work with Image** | | | | |
| Image Description | 0.0212 | Yes | 0.0922 | No |
| Object Identification | 0.0308 | Yes | 0.0129 | Yes |
| Colour Analysis | 0.5810 | No | 0.0018 | Yes |
| Text Extraction | 0.1795 | No | 0.0573 | |
| Emotion Detection | 1.0 | No | 0.0004 | Yes |
| Activity Recognition | 0.6072 | No | 0.0004 | Yes |
| Location Identification | 1.0 | No | 0.0002 | Yes |
| Image-Based Query | 0.3017 | No | 0.0129 | Yes |
| Image Quality Assessment | 0.7905 | No | 0.0034 | Yes |
| **Planning and Communication** | | | | |
| Email Drafting | 0.0212 | Yes | 0.3323 | Yes |
| Travel Planning | 0.0351 | Yes | 0.0063 | Yes |
| Event Planning | 0.0212 | Yes | 0.0063 | Yes |