

# From Nervous to Noteworthy: Evaluating SPEAKS, An Educational Software for Speech Content

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**Abstract:** Public speaking is a critical competency for professionals, yet many higher education graduates lack sufficient training in this area. While educational institutions offer public speaking courses, these often cannot provide the level of individualized support students need as this would be too resource-intensive. Although various software tools exist to bridge this gap by supporting students with aspects such as non-verbal communication and slide design, there is a notable lack of tools that assist with the preparation of speech content—a key component of effective public speaking. To address this gap, we developed SPEAKS (Speech content Preparation for Effective and Authentic Knowledge Sharing), an educational application that guides students through preparing speech content while teaching them how to do so effectively. SPEAKS uses a scripted, chat-based interaction with a humorous and empathetic cockatoo character, who leads users step by step through seven stages of speech preparation. These include defining audience knowledge, setting learning goals for the audience, crafting engaging introductions, and ensuring coherence between the introduction and conclusion. The tool is grounded in public speaking pedagogy and expert interviews with 13 public speaking instructors, which informed both the instructional content and the design principles. We conducted a user study with 17 participants to evaluate SPEAKS in terms of perceived usability, perceived usefulness, perceived learning, and its impact on public speaking-related confidence. The results show that SPEAKS is easy to learn and use, and participants found its guidance-based support helpful for preparing speech content. Importantly, users reported a significant increase in their confidence to deliver a good speech after using the tool. Qualitative feedback further confirmed the tool's usability and highlighted its strengths in supporting structured content development. Participants also identified areas for improvement, which can inform future iterations of the application. Overall, the findings suggest that guidance-based software like SPEAKS can effectively supplement traditional public speaking training by addressing the often-overlooked aspect of content preparation, especially in contexts where in-person resources are limited.

**Keywords:** Public Speaking Competencies, Speech Content Preparation, Educational Technology

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## 1. Introduction

Communication competencies are considered one of the core competencies that higher education graduates should acquire (Morreale, 2015). However, many graduates lack communication competencies (Chan, 2011). To address this issue, higher education institutions mainly provide courses focused on public speaking (LeFebvre and LeFebvre, 2020). However, for courses to be successful at teaching public speaking competencies, students need to practice a lot while receiving guidance and feedback. This is quite time- and resource demanding, which is why students do not receive as much support as they would need (Barrett et al., 2022).

Software supporting students to increase their public speaking competencies could help. There has been a significant amount of research on such software systems. Many of these systems video- and audio-record the user while they train their speech and provide feedback on their non-verbal communication (Roque et al., 2019; Ochoa et al., 2018; Schneider et al., 2016). Some systems also give feedback on the design of slides, e.g. on the font size, amount of text or graphics (Echeverria et al., 2015; Luzardo et al., 2014). Additionally, some systems aim to audio-record the presentation and give feedback on verbal communication, e.g. on the used syntax or whether all topics the user planned to present have been mentioned (Chen et al., 2014; Trinh et al., 2017).

Another important aspect in public speaking is speech content. However, to the best of our knowledge, research on software supporting the preparation of the content is limited. Therefore, we developed SPEAKS ("Speech content Preparation for Effective and Authentic Knowledge Sharing"), an educational application with the aim to guide users through the process of preparing the content of a speech. SPEAKS was informed by expert interviews, public speaking literature, and prior work on software support. In this paper, we present the user

evaluation of the first version of SPEAKS. This paper presents a user evaluation with 17 participants, focusing on usability, perceived usefulness, confidence gains, and qualitative feedback on their experience and usage.

The contribution of this paper is to present how users use and perceive SPEAKS, a new tool that guides students through the preparation of speech content while educating them.

## 2. SPEAKS “Speech Content Preparation for Effective and Authentic Knowledge Sharing”

SPEAKS is an educational app for speech content preparation. It follows a guidance-based approach with a scripted chat-based interaction where a cockatoo takes users by the hand and leads them step by step through the process of preparing the content of their speech. The key objectives of SPEAKS are to help users structure their speeches effectively, to teach them important lessons related to speech content preparation and to mitigate public speaking anxiety (PSA) in this context. Screenshots of SPEAKS can be found in Figure 1.

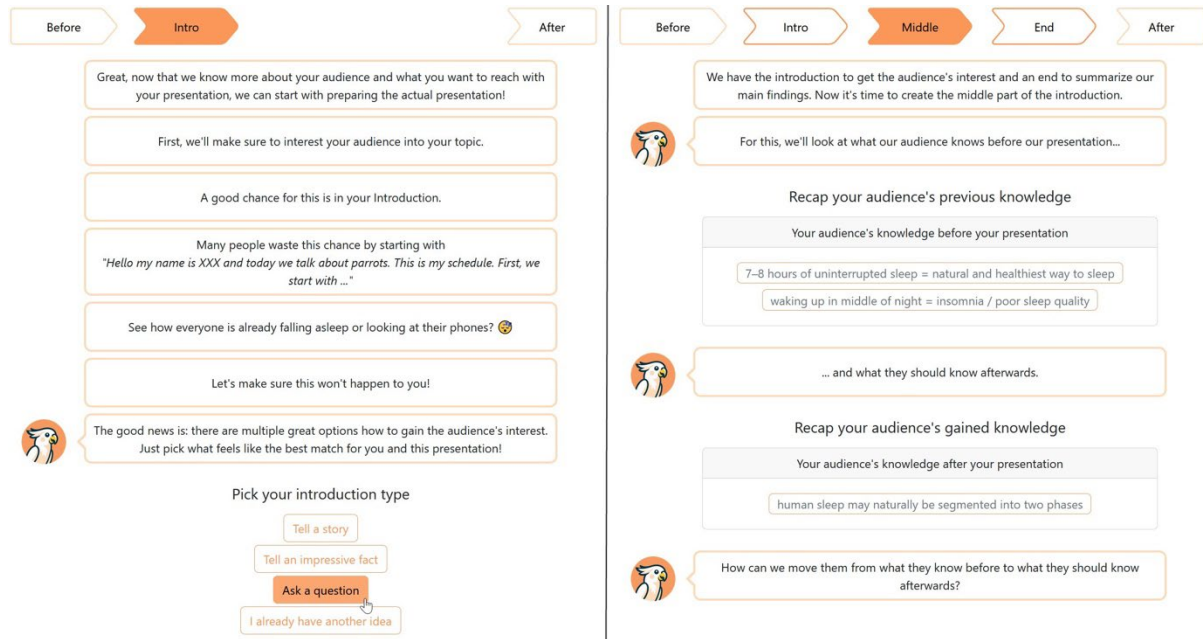


Figure 1: Screenshots of the software SPEAKS: steps 4) Introduction and 6) Middle.

### 2.1 Design Principles and Pedagogical Approach

SPEAKS is designed based on existing research in public speaking education, as well as a preliminary research in which we interviewed 13 public speaking teachers. In these interviews, we extracted information on speech preparation, public speaking best practices, and teachers' ideas and concerns regarding software intended to support students to become better at public speaking. The interviews allowed us to extract lessons SPEAKS should teach, and design principles to foster effective learning in the unique context of public speaking. Those will be explained in the following.

#### 2.1.1 Speech Content Preparation Lessons Taught

While SPEAKS guides the user through the preparation of the presentation content, its objective is to teach the following three aspects. First, an effective speech should be adapted to the audience's previous knowledge, allowing the speaker to connect with what they already know and guide them toward new insights. Second speakers should use the introduction to gain the audience's attention. SPEAKS offers strategies on how to do that effectively. Finally, SPEAKS aims to teach that the conclusion of the presentation should match the introduction and reinforce the main points of the speech. These lessons are based on expert interviews as well as on common elements of public speaking evaluation rubrics (Van Ginkel et al., 2017; Schreiber et al., 2012; Morreale et al., 2007).

### 2.1.2 *Observational Learning*

Experts emphasized the importance of observational learning in public speaking education, expressing concerns that it might be lost in software-based approaches. Therefore, the whole interaction with the cockatoo is designed to follow the principles of effective presentations drawn from expert interviews and public speaking rubrics (Schreiber et al., 2012; Van Ginkel et al., 2017; Morreale et al., 2007; Broeckelman-Post et al., 2020). A running example in which the cockatoo appears to plan a speech alongside the user further supports observational learning

### 2.1.3 *Encouraging Authenticity and Individuality*

Beyond observational learning, interviews with public speaking teachers highlighted the importance of authenticity and individuality. Teachers were concerned that software supporting students during the speech preparation might lead to all students having a similar “robot-like” speaking style. To counter this, SPEAKS explicitly encourages authenticity and individuality by offering varied introduction options and encouraging users to choose what best suits their style and context. The cockatoo’s running example is then also adapted based on the user's choice.

### 2.1.4 *Mitigating Public Speaking Anxiety*

Public speaking anxiety (PSA) is common (Richmond et al., 2013; Barrett et al., 2022). While some applications focus on PSA reduction (Valls-Ratés et al., 2023; Wang et al., 2020; Schneider et al., 2018; Bubel et al., 2016), and research offers elaborate procedures for its mitigation (Richmond et al., 2013; Bodie, 2010), SPEAKS is not specifically designed for PSA reduction. However, given its significance, we integrated subtle elements that may help alleviate PSA during speech preparation. To counter negative self-focused thoughts which are key contributors to PSA (Schulz et al., 2008; Višlā et al., 2013), SPEAKS utilizes humour, praise and positive reinforcement. It also emphasizes that public speaking skills are learnable, which is linked to lower PSA and better performance (Nordin and Broeckelman-Post, 2019). Lastly, the cockatoo’s humorous, empathetic personality aims to increase user comfort, reflecting findings that sociable virtual coaches improve user satisfaction (Wang et al., 2020).

### 2.1.5 *Cognitive Load Management*

As multiple experts described speech preparation as cognitively demanding, SPEAKS aims to reduce cognitive load by breaking speech preparation down into a step-by-step process. At each stage, only the information relevant to that step is shown to prevent overload.

## 2.2 **Technical Implementation**

SPEAKS was built using Vue.js and deployed via GitLab Pages, allowing participants to access it through their browsers on personal devices. The chatbot interaction was fully scripted, users could only enter their presentation topic, select an introduction type, and provide bullet-point plans for each section of their presentation and for the initial reflection on their audience and presentation goals.

We intentionally kept the technical design simple, as the interviewed presentation teachers preferred straightforward, interactive guidance over technically complex solutions. This study also aimed to test whether users would find such a technically simple yet carefully designed tool useful.

SPEAKS stores all data only locally on the user's device. This approach was chosen both for ease of implementation and to support a privacy-first design philosophy, where users retain full control over their data. In this study, participants were asked to download their presentation and usage data and upload it during the survey. However, in general use, SPEAKS can function without an internet connection, and no data is collected unless users choose to share it.

## 2.3 **Speech Preparation Steps in SPEAKS**

Overall, SPEAKS consists of seven different steps: 1) *Welcome*, 2) *Audience Before*, 3) *Audience Afterwards*, 4) *Introduction*, 5) *End*, 6) *Middle*, 7) *Summary*. These steps will be explained in more detail in the following.

In 1) *Welcome*, the cockatoo starts the interaction with a question, explains the source of the app’s knowledge to build credibility, and asks for the user’s topic. In 2) *Audience Before* users reflect on their audience’s prior

knowledge and record it. Afterwards, in 3) *Audience Afterwards*, they define what their audience should learn. By this, the user is setting the goals for their presentation in a practical way. Next, users begin content planning. In 4) *Introduction*, the purpose of the introduction (getting the audience's attention) is explained in an interesting way. Multiple ways to start the speech (e.g. telling a story, starting with an impressive fact, or asking a question) are offered, each with examples and guidance. Users are encouraged to choose the one that best matches them and their presentation and then outline their introduction in bullet points. In 5) *End*, users plan their conclusion. The purpose of this order is to ensure that the introduction and end of the speech are connected and to ensure coherence. SPEAKS displays the introduction the user created previously and asks them to close the loop to their introduction. It also shows the intended audience takeaways from 3) *Audience Afterwards*, emphasizing these as the main points of the speech to be briefly repeated in the conclusion. In 6) *Middle*, users prepare the middle part of their presentation. In this step, the user is asked to recap what they previously wrote about the audiences' previous knowledge and the knowledge gained through the speech. Then, they should design the middle part as a bridge between both. Finally, in 7) *Summary* SPEAKS presents a overview of the whole presentation the user created (the bullet points entered in 4) *Introduction*, 6) *Middle* and 5) *End*).

### 3. Method

#### 3.1 Purpose

The purpose of this study is to evaluate how users use and perceive SPEAKS, an educational tool designed to support students in preparing more efficient content for their speeches. By guiding users through the content preparation process, the tool aims to enhance the effectiveness of students' speeches and their public speaking competencies. To evaluate SPEAKS, we defined the following research questions:

*RQ1: What is the perceived general user experience of SPEAKS?*

*RQ1a: What is the perceived usability of SPEAKS?*

*RQ1b: What is the perceived usefulness of SPEAKS?*

*RQ1c: What is the perceived learning when using SPEAKS?*

*RQ2: How does using SPEAKS affect users' confidence in delivering an elevator pitch?*

For RQ1, the intention is to look at user experience as a key factor to create a good technological intervention which at one point can support presentation competencies training. Additionally, as confidence is crucial for public speaking but at the same time public speaking anxiety is a common problem, RQ2 focuses on the effects of SPEAKS on users' confidence.

#### 3.2 Participants

The study involved 17 participants who were attending a summer school for researchers in the field of educational technology. All participants voluntarily chose to participate in a workshop on presentation competencies during which the newly developed educational tool was introduced and evaluated. The participants ranged in age from 26 to 54 years ( $M = 34.2$ ,  $SD = 8.4$ ) with self-reported gender distribution of 3 male and 14 female.

#### 3.3 Procedure

The study took place during a workshop on presentation competencies. Participants were welcomed, introduced to the research project behind SPEAKS, and informed about the study procedure. Participants could ask questions and signed an informed consent. Afterwards, they filled out the pre-test questionnaire (see Section Apparatus and Material). Next, participants used SPEAKS to create a three to five minute elevator pitch about their research topic with other participants of the summer school as their target audience. After completing preparing their speech content with SPEAKS, the participants filled out the post-test questionnaire. An overview of this procedure can be found in Figure 2.



Figure 2: Overview of the procedure of the experiment

### 3.4 Apparatus and Material

Participants accessed SPEAKS via a website on their own laptops.

In the pre-test questionnaire, we collected demographic information (age, gender) and asked them to rate their agreement with the statement “I feel confident that I can do a great elevator pitch” on a scale from 0 (extremely disagree) to 100 (extremely agree).

In the post-test questionnaire, we again asked about their confidence in doing a great elevator pitch. Additionally, we used the Technology Acceptance Model (TAM) (Davis, 1989) questionnaire with a 7-point Likert scale to assess the perceived usefulness and the perceived ease of use of SPEAKS. To gain deeper insights, participants answered four open-ended questions about three things they liked, three things they would improve, what they learned, and where they needed more support.

Researchers also took notes on participant questions and issues during the session, and usage data was logged to analyse how users interacted with SPEAKS.

## 4. Results

To analyse how a guidance-based approach to support students with preparing the content of a speech is used and perceived by users, we used a mixed-methods approach to test SPEAKS by collecting insights via a TAM questionnaire, log data and results from open-ended qualitative questions, as well as observations by the researchers during the experiment.

### 4.1 TAM

We used the post-test questionnaire to assess the perceived ease of use and the perceived usefulness of SPEAKS.

Regarding the perceived ease of use, most participants agreed at least slightly that SPEAKS was easy to learn, easy to become skilful at and easy to use. However, regarding “easy to do what I want”, “clear and understandable” and “flexible” the responses were slightly less positive. The overall ease of use mean was 5.23 (SD = 1.41).

Regarding perceived usefulness, most users rated SPEAKS positively, with a mean of 5.46 (SD = 1.04).

The combined mean across all TAM items (ease of use and usefulness) was 5.34 (SD = 1.25). The detailed results can be found in Figure 3.

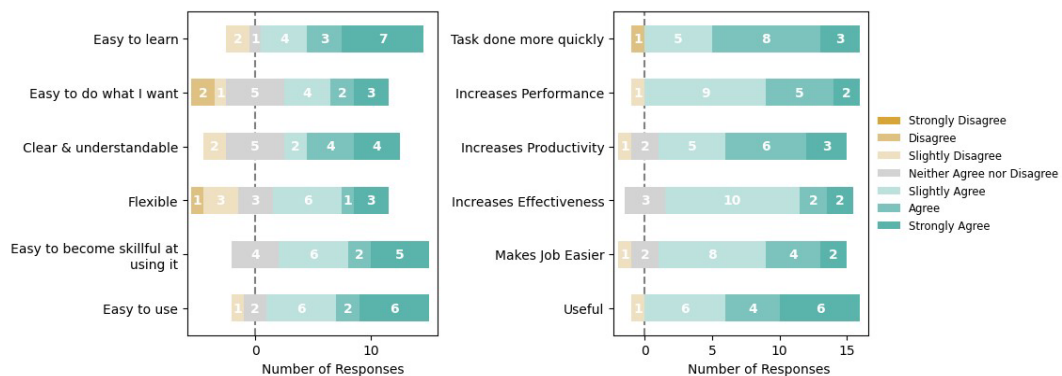
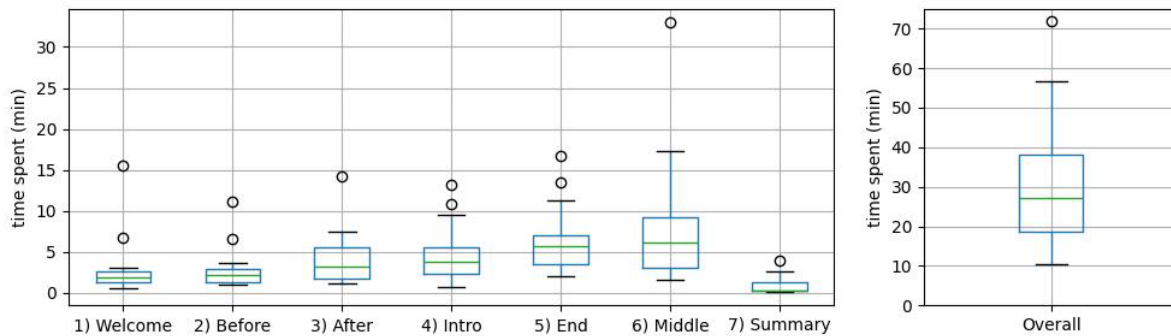


Figure 3: Reported results regarding perceived ease of use (left) and perceived usefulness (right)

## 4.2 Usage of SPEAKS

To analyse participants' usage of SPEAKS, we tracked participants' interactions with SPEAKS. One participant who entered no data was excluded from the analysis.

On average, participants spent 30.5 min (SD: 16.5 min, median: 27.2 min) preparing their speech. Completion times ranged from 10.4 to 71.9 minutes. Most participants (13) completed the process without revisiting previous steps. Two returned to 5) *End*, and one to 6) *Middle*. An overview of how much time participants spent per step can be found in Figure 4.



**Figure 4: Overview of the time participants spent per step of SPEAKS and overall. "2) Before" stands for step "2) Audience Before", "3) After" for "3) Audience Afterwards" and "4) Intro" for "4) Introduction".**

SPEAKS offers users to choose from different introduction types ("story", "question", "fact" and "other"). Eleven users decided to start with a question, five chose to start with a story, one with a fact and none came up with another idea.

## 4.3 Qualitative Feedback

To gain more insights beyond pure number-ratings, we asked participants about three things they would improve, where they needed more support, three things they liked and what they learned.

The main critical points were the navigation, the lack of editing options for the entered bullet points and some specific instructions being unclear to some participants. For the navigation, eight participants reported aspects to improve. Four would have needed an explanation in the beginning on how to go to the next message from the cockatoo (via clicking or using the right arrow). Additionally, four people criticized that it was not possible to jump between sections directly (e.g. from 7) *Summary* to 4) *Introduction*), but users had to navigate back step by step through each message. Three participants wished for a start screen explaining the task and/or SPEAKS further. Additionally, eight participants wanted to edit their content in 7) *Summary* instead of being only able to view it. Last, three participants found some instructions unclear, mainly the one about "closing open brackets from the introduction."

When asked about where they would have needed more support, most participants (8) said none, while two mentioned the "closing open brackets" instruction. The rest of the wishes for more support were only mentioned by one participant each, with no common themes.

The most reported learnings were about creating an engaging introduction and creating the intro and the end of the presentation before creating the middle of the presentation, each mentioned by four participants. Other learnings were mentioned only once with no shared patterns.

Regarding what participants liked, the most mentioned aspect was the guidance (10 mentions), directly followed by SPEAKS being easy and intuitive to use (9). Other frequently mentioned aspects were the UI (6), the running example (6), interactivity (2) and the summary of their presentation plan in step 7) *Summary* (2).

## 4.4 Observations During the Experiment

During the experiment, we documented participant questions and issues. Some software-related issues were observed, where content occasionally disappeared following page reloads or backward navigation. F participants asked about the instruction to "close open brackets" as the analogy was unclear to them, two were confused by the navigation, and one expected AI-generated pitch content and was surprised it wasn't provided.

#### 4.5 Confidence Changes

Users rated their agreement with the statement “I feel confident that I can do a great elevator pitch.” before and after using SPEAKS. After using SPEAKS, all participants reported confidence levels equal to or higher than before. At the start, the average confidence was 50.12 (SD: 22.32), at the end it increased to 63.65 (SD: 18.63).

To test for statistical significance, we used a Wilcoxon signed-rank test due to non-normal data (verified via Shapiro-Wilk test). The resulting p-value was below 0.01, indicating a statistically significant increase in self-reported confidence at the 1% level.

### 5. Discussion

To evaluate the usage and users' perception of SPEAKS, a software designed to support users in preparing effective speech content by guiding them through the content preparation process, we conducted a user test.

RQ1 focused on the general user experience of SPEAKS. Participants used SPEAKS for an average of 30.5 minutes, indicating substantial engagement. However, the wide range in usage time (10.4 to 71.9 minutes) indicates considerable variation in user behaviour. This may be related to differences in how much information users looked up, how much detail they included in their pitch plans, and whether they used bullet points or full sentences.

Most users chose “question” as their introduction type though other options were also selected. This suggests that the approach to increase diversity in introductions was partially successful.

RQ 1a explored the perceived usability of SPEAKS. Three main patterns emerged from both the TAM and qualitative data. First, SPEAKS was described as easy to use in the TAM (items: “Easy to learn”, “Easy to become skilful at using it”, “Easy to use”). This was also reflected in the qualitative data: the second most liked aspect was that SPEAKS was easy and intuitive to use, while the third most liked aspect was the UI (together with the running example). Additionally, most users reported not needing additional support and those who did typically mentioned a single unclear phrase.

Second, minor issues regarding clarity and understandability have been reported. The TAM item “clear and understandable” received slightly lower ratings, even though most users still at least slightly agreed that SPEAKS was clear and easy to use. When looking at the qualitative data, this seems to mainly have been due to unclear instructions, namely the missing explanation on how to go to the next speech bubble and the term “closing open brackets”.

Third, issues regarding flexibility were reported. In the TAM questionnaire, multiple people disagreed that SPEAKS is “Flexible” and makes it “Easy to do what I want”, even though the majority still at least slightly agreed with these statements. In the qualitative data, nearly half of the users wished for the option to edit their input later or move more freely between preparation steps (e.g. from 7) *Summary* directly to 3) *Introduction*).

RQ1b addressed the perceived usefulness of SPEAKS. Results indicate that SPEAKS has been perceived as useful for supporting users to prepare the content of a speech. The TAM results were positive and additionally the most liked feature was the guidance-based approach. Therefore, we can conclude that a guidance-based approach can be useful for supporting users to prepare the content of their speeches. Additionally, the usefulness of SPEAKS specifically might be increased even more when adding the possibility to edit the content entered by the user.

RQ 1c explored perceived learning. SPEAKS aimed to teach the following lessons: to think about your audience's previous knowledge and your goals (“what your audience should learn”) before starting to create the speech, that the introduction should be used to gain the audience's attention and that the end of the speech should be connected to the introduction and summarize the main point(s) of the speech. While SPEAKS was able to transfer the lesson on the introduction catching the audience's attention, the other lessons have not been reported as learnings. This might be due to either SPEAKS not teaching these lessons well, users not being aware that they learned these lessons, or them already knowing them before using SPEAKS.

In this study, SPEAKS was used as an example of a software with a guidance-based approach intended to support students with the preparation of content for their speeches as well as teaching them relevant aspects related to speech content preparation. We can see that in general, such an approach is useful for and appreciated by the users and succeeded in teaching them new lessons about speech content preparation. The current

implementation is easy to use, but could benefit from improvements in flexibility, navigation, and clarity in specific areas.

RQ2 examined the impact of SPEAKS on users' confidence in delivering an elevator pitch. We observed a significant increase in this confidence, which can be understood as an increase in skill execution confidence. Given the established link between skill execution confidence and actual skill development (Hays et al., 2007) this increase may point to skill improvement supported by SPEAKS.

### 5.1 Limitations and Future Work

The main limitation of the study concerns the participant sample, which consisted of only 17 individuals, mainly female, all researchers in educational technologies and voluntarily attending a workshop on presentation competencies. These characteristics make it difficult to generalize our findings due to the small sample size and the population being skewed towards participants interested in learning about presentations and using educational technologies. However, we consider that the results obtained are good enough to provide a general positive outlook about SPEAKS together with important insights on how to improve it.

This study did not aim to rigorously test for learning effects, as its primary goal was to explore initial perceptions and usage patterns of SPEAKS. To evaluate whether SPEAKS effectively teaches audience adaptation, creating engaging introductions, and coherent conclusions, future research should conduct a randomized controlled trial. A full description of the proposed randomized controlled trial can be found in Mouhammad (2023).

While this approach offers strong internal validity, it is resource-intensive and may be challenging to implement at scale. As a more feasible alternative, future studies could assess students' conceptual understanding of the targeted skills through pre- and post-tests before and after using SPEAKS.

## 6. Conclusion

This paper presented and evaluated SPEAKS, an educational application designed to teach and support students in preparing effective speech content.

The main findings of the presented study were:

- *Usefulness*: Participants found the guidance-based support useful for speech content preparation
- *Confidence gains*: Using SPEAKS significantly increased users' confidence in their ability to give a good speech
- *Usability*: Participants found SPEAKS easy to learn and use, with positive feedback on its usability and interface design

Moreover, the study identified several areas for improvement which can further enhance the user experience of SPEAKS.

Importantly, SPEAKS illustrates that a technically simple yet thoughtfully designed tool can be perceived by learners as a valuable aid in preparing presentation content, suggesting potential for supporting public speaking skill development

Overall, guidance-based software support for speech content preparation, as provided by SPEAKS, shows great promise in bridging the gap between the need for more support in public speaking training regarding the aspect of speech content preparation and the limited availability of in-person training resources.

### Ethics Declaration

An application for ethical approval was submitted to the "Ethikkommission" of DIPF | Leibniz Institute for Research and Information in Education, and approval was granted under number DIPF\_EK\_2024\_08.

### AI Declaration

Microsoft Copilot was used to assist with text refinement, structural improvements, and clarity throughout the manuscript. All content was reviewed and finalized by the author.

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