Participatory Design of an Application for Training Message Composition Skills for Public Speaking

Nina Mouhammad

DIPF | Leibniz Institute for Research and Information in Education, Rostocker Straße 6, Frankfurt am Main, 60323, Germany

Abstract

Effective presentation skills are crucial in today's world. However, students often lack these skills due to limited training. To address this gap, technology-enhanced learning applications can play a central role. While prior research has primarily focused on supporting students with presentation rehearsals and slide design, the critical aspect of composing presentation messages has received limited attention. This PhD project aims to investigate how computer-based tools can support students in developing the essential skills required for composing effective presentation messages. To achieve this goal, we will utilize participatory design within the context of a design-based research approach.

Keywords

presentation skills training, public speaking training, participatory design, message composition

1. Motivation

Communication knowledge and skills are essential for students' future personal and professional success[1]. One of the main reasons for this is that collaboration is getting more and more important in the work environment [2]. Engineers, for example, do collaborative work for around 60% - 80% of their time [3]. Specialists, in general, need to be able to communicate well in order to share their knowledge but also to gain new knowledge, to exchange, discuss and evaluate ideas and to solve problems collaboratively [4]. In order to make all this possible, it is crucial to be able to communicate with other experts from the same field as well as with people from other domains or society in general [5]. Consequentially, communication skills are considered one of the most essential skills to train in higher education [6, 7].

However, many students lack communication skills [8]. One reason for this is that they did not receive sufficient communication skills training [9, 8, 10]. Communication skills are still often overlooked, especially in engineering degrees [11]. And even if communication skills are trained, there are too few feedback opportunities for each of the students [9]. This is due to giving individual feedback to students being very time-consuming, especially in larger classes. Therefore, teachers do not have the resources to give a sufficient amount of feedback to all of their students [9, 8].

So we know that students need more training in presentation skills and that teachers can not provide more feedback because of resource and time constraints. How can we solve this problem? One possibility might be using technology-based learning systems to support personal communication skills training in higher education. The purpose of such a system should be that students could get additional individual feedback and guidance and that at the same time, teachers would be offloaded.

2. State of the Art

2.1. Communication Skills Training in Higher Education

There are many different approaches to how introductory communication classes in higher education are held. According to LeFebvre and LeFebvre [10], there is no standardized training for teachers on this. However, one thing most introductory communication classes have in common is that the main practical exercise is asking students to give a presentation. Consequently, nearly all computer-based tools helping with communication skills actually focus on presentation skills.

2.2. Computer-supported Presentation Skills Training

To master public speaking, one needs to master message composition and message delivery [12]. What does message composition and message delivery mean? In a presentation, the goal is to transmit a message to the audience. So first, one needs to compose this message in order to be able to deliver it. Composing a message means going from an unstructured mass of knowledge, ideas and arguments but also experiences, stories and emotions connected to a topic to having a clear plan of

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n.mouhammad@dipf.de (N. Mouhammad)

0000-0002-6250-9502 (N. Mouhammad)

which points to make in which order, with which examples, explanations, etc. in order to transmit the chosen message. To illustrate this further, we can compare the process of preparing a presentation with the preparation of a theater play. In a theater play the message composition would be the main task of the play's author. The message delivery, in contrast, would then be figured out by the actors and the director when actually performing the play. While the message composition, both in theater and in presentations, could be done without speaking or moving, mastering the delivery can only be done by actually performing the planned presentation or play. This is because the message delivery is about how to use non-verbal communication like body posture, gestures, and facial expressions as well as pauses, tone, volume etc. in synergy with the message to deliver.
When coming back to presentation skills training, this means that the message delivery part can only be evaluated and given feedback upon by watching the presenter perform the presentation. The message composition part, in contrast, could also be evaluated and given feedback upon based on a written outline of the presentation [12].

There are multiple existing approaches for computer-supported presentation skills training. Most of these systems focus on the message delivery and more specifically the non-verbal communication. Some also provide support for the design of slides (e.g. font size)[13]. Existing research for both kinds of approaches will be explained in more detail in the following.

The approaches focusing on the message delivery mainly give feedback on body language (e.g. posture, gestures, gaze) and aural aspects of communication (e.g. speaking volume, pitch, filler sounds). They aim to support students with practising presentations since practising presentations generally leads to an increase in presentation skills and a decrease in presentation anxiety [14]. Furthermore, research has shown that the feedback given in these applications leads to better performance in the aspects that the feedback was given on (e.g. maintaining an open posture) [15]. However, technology support for deliberate practice needs to enable authentic practice in order for the learners to reach the goal of mastering the trained skill [16]. In the context of presentation skills training, authentic practice means that the communication between the presenter and the audience needs to happen in both directions. Therefore, in order to reach the goal of authentic practice, the communication of the audience towards the presenter needs to be simulated as authentic as possible. Multiple approaches for simulating the audience in presentation training software have been explored. Schneider et al. [17] and van Ginkel et al. [18] made use of Virtual Reality, Trinh et al. [19] created an application with a robotic head as an audience and Ochoa et al. [20] used a screen with a pre-recorded audience. However, in most cases, the audience was quite static, which has also been criticized by users (e.g. [20, 17, 21]) or consisted of only one person ([19]). An extensive review of the existing literature demonstrates that the most responsive audience has been implemented in [18]. There, the audience reacted to the start and end of a presentation as well as to the volume of the presenter's voice and to whether the presenter was turning their back towards the audience. This made the practising situation more authentic. However, the audience was still non-respondent to e.g. facial expressions, gestures, verbal aspects (e.g. appropriate language) and the actual content of the presentation (e.g. jokes, logical structure of the presentation, sufficient explanations).

As mentioned before, there is also research on supporting presenters with designing better slides. In these examples, the feedback is mainly based on strict computational measurements (e.g. [22, 19, 23]). These measurements provide feedback on the readability of slides (e.g. font family, font size, contrast) but also on the amount of content (e.g. number of slides, number of words). However, the actual content of the slides is, to the best of our knowledge, neglected in all of these approaches. As a result, they also do not provide support for the message composition.

Generally, content-related features are quite rare. To the best of our knowledge, the only approach aiming to provide content-related feedback is the approach of Trinh et al. [19]. They extract the most important keywords per presentation slide and check whether those keywords have been said by the presenter during the rehearsal. While this is somehow content-related, the approach, again, focuses on giving feedback related to the message delivery and not to the message composition. The scarcity of features related to message composition is confounding given that the appropriateness of e.g. non-verbal communication and therefore also the corresponding feedback is dependent on the content of the message [24].

Schneider et al. [25] developed a hybrid approach where learners could self-reflect on whether their non-verbal communication had meaning and fit what they wanted to communicate. However, while the approach of Schneider et al. [25] helps with aligning verbal and non-verbal communication and the approach of Trinh et al. [19] helps with not forgetting important topics, an important piece of the puzzle is still missing. This missing piece is the quality of the composed message. Aspects like the coherence of the presentation, logical structure or whether the message is composed in an interesting way are neglected.

Furthermore, Ochoa [13] pointed out that most presentation skills training applications were not adapted by users. Only one of these applications ([20]) has been used in real-world educational settings. This is puzzling since these applications were generally scoring well in user

evaluations [13]. However, in most cases, the questions in the user evaluations were about whether students thought the system was useful, whether they learned with it and whether they would use it again [13]. Having systems with good usability, but low actual usage might point to not having addressed the actual needs and problems of the user base so that the perceived usefulness is low. Key to addressing the users' needs and problems is to involve all relevant stakeholders already in the design phase [26]. However, to the best of our knowledge, none of the existing presentation training applications involved users already when designing their technology but only in the evaluation of their prototype.

3. Research Objectives

The most common way to train and assess communication skills is to train and assess presentation skills [10]. Therefore, this PhD project will focus on training presentation skills with computer-based tools in order to increase communication skills. However, presentation skills training is a relatively large field. As discussed in section 2, there is already research on computer-supported applications for training non-verbal communication in presentations as well as slide design. Nevertheless, the content is still neglected which is why the focus of this PhD project will be on training message composition skills for public speaking (MCSPS). In contrast to giving feedback on the message delivery, feedback on message composition should mainly be given before the rehearsal [12]. The reason for this is that giving feedback on the message composition before the rehearsal allows students to first focus on composing the message and then, when rehearsing, to focus mainly on how to deliver that message. Consequently, a focus on MCSPS also means focusing on the preparation phase happening before the rehearsal.

Based on these initial considerations the main research question will be as following:

Main RQ How to train students' MCSPS by means of computer-based tools?

This main research question is then further divided into four sub research questions:

RQ1 Which aspects of students' MCSPS are most suited to be trained by means of computer-based tools in order to increase students' MCSPS?

RQ2 What has been done by related work to support training the aspect of students' MCSPS identified in RQ1 with computer-based tools?

RQ3 What can a design and implementation of a usable application for training the aspect of students' MCSPS identified in RQ1 look like?

RQ4 What are the effects of using the application proposed in RQ3 on students' MCSPS?

These questions will be tackled by using design-based research (DBR) [27] following the structure proposed by Di Mitri et al. [16]. The planned procedure will be explained in detail in the next section.

4. PhD plan

The main objective of this work is to find out how to train students' MCSPS by means of computer-based tools. An overview of the context, the tackled research gap, the main research question, objectives, planned explorations, planned contributions and planned evaluations can be found in figure 1. Furthermore, a timeline overview is given in figure 2. The planned steps are described in more detail in the following.

4.1. Collecting requirements - What do teachers and students expect, want and need from an application for training MCSPS?

In contrast to existing research in computer-supported presentation skills training, we will follow a participatory design process and incorporate presentation teachers as well as students in higher education already before starting to design or implement a solution. The first part of the participatory design process aims to work out the requirements for the application based on best practices and recommendations of the presentation teachers as well as the needs and the everyday lives of the users. Based on this, requirements for an application for training MCSPS will be retrieved.

For incorporating the perspective of presentation teachers, expert interviews will be conducted. The focus of these semi-structured interviews will be on the preparation of a presentation in order to find out which steps are needed to prepare an effective presentation, how these steps should be done and where students struggle with, according to the teachers.

To incorporate the perspective of students, we will conduct semi-structured interviews with students in higher education as well. The focus of these interviews should be on their experiences with presentations and especially message composition. It is important to find out where an MCSPS training application might help to solve actual problems the students have. Furthermore, the perceived relevance of those problems needs to be determined. This is important, in order to be able to better evaluate for which problems they actually would take the additional effort of using a special training application. Apart from

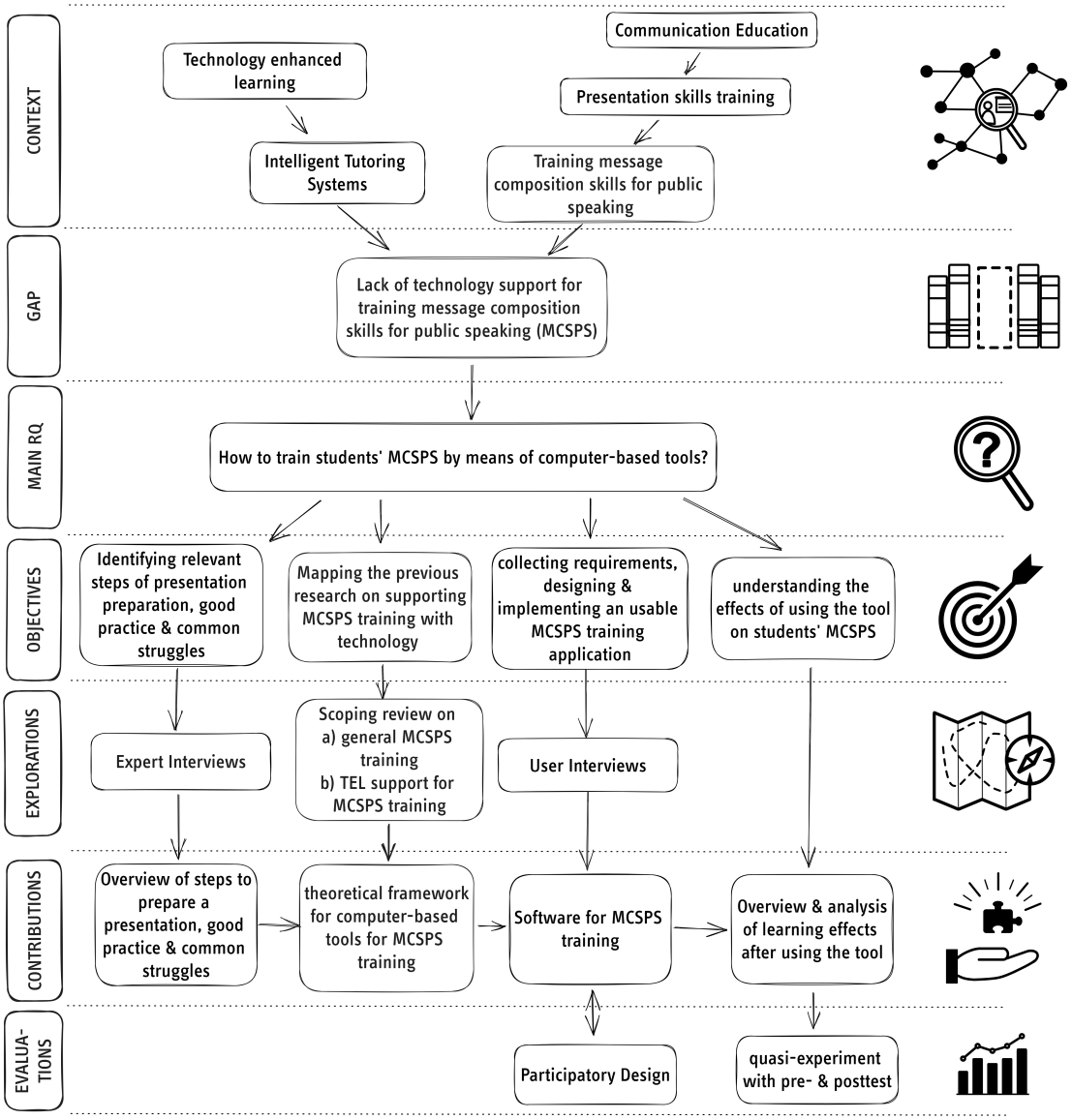

Figure 1: Overview of the context, research gap, main research question, objectives, planned explorations, planned contributions and planned evaluations. MCSPS stands for "message composition skills for public speaking."

this, it should be identified how students prepare a presentation normally, especially in contrast to how the experts suggest preparing a presentation.

4.2. Scoping Literature Review - What has been done previously?

To evaluate what has been done previously, a scoping review is planned to be conducted. Scoping reviews are a kind of literature review suited to create a map of the existing research of a broad topic [28]. Similarly as in systematic literature reviews, the literature is searched systematically, however, the scope is broader and the goal is different [29]. A systematic literature review intends to answer very specific research questions by aggregating the results of existing studies while a scoping review primarily intends to give an overview of the existing literature in a broader research area. In our case, we want to examine what research has been previously done in the intersection of MCSPS training and technology-

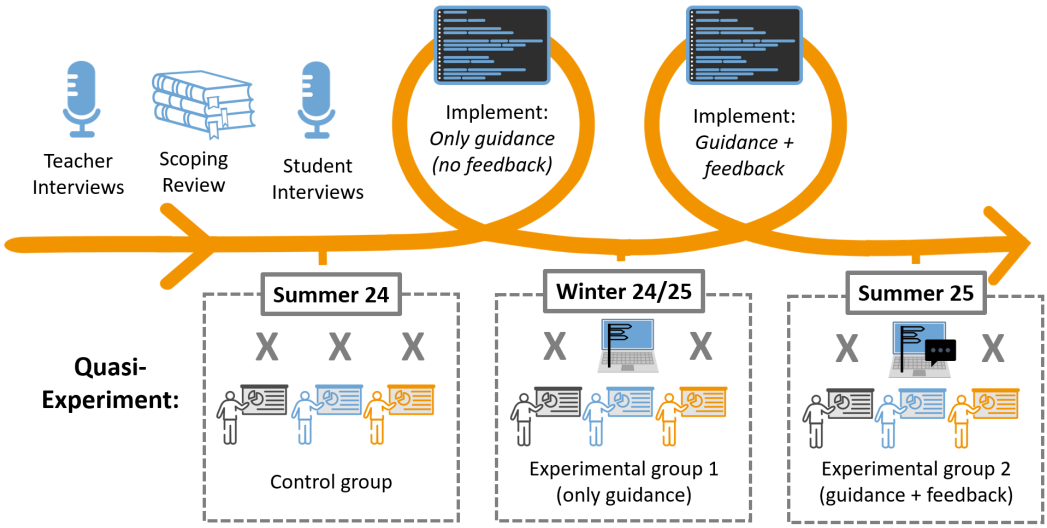

Figure 2: Timeline overview of the planned iterations and research tasks. For the quasi-experiment, the black presentation symbols represent the first presentation (pretest), the blue presentation symbols the second presentation (prepared with the software) and the orange presentation symbol represents the third presentation of the semester (posttest).

enhanced learning. Therefore, we plan to do a scoping review. This scoping review will be executed following the PRISMA checklist [30]. In order to include the existing knowledge in MCSPS training in general as well as the existing knowledge on how to support this process with technology, the scoping review will consist of two parts.

In the first part, existing knowledge on presentation skills training, with a special focus on message composition, will be reviewed. Based on this, a conceptual model will be developed.

Afterwards, based on this conceptual model, a review of existing technology-enhanced learning applications will be conducted. This part of the review will give an overview of which parts of the conceptual model have been addressed with computer-based tools and how.

4.3. Designing and implementing a prototype - How to design and implement a software for training oral communication content preparation skills?

When the requirements are clear, a design for a first prototype should be created. In the first iteration, the prototype will only provide guidance on composing a message for a presentation and will not provide automatic feedback. This prototype will then be implemented and tested with students. Based on the results of these tests as well as the results of the teacher and student interviews we will determine which aspects the software should give feedback upon.

In the second iteration, we will augment the prototype with automatic feedback on the chosen aspect. However, it's important to note that traditional feedback is not applicable in the context of presentations [24], as there is no clear "right or wrong". The reasons for this are on the one hand that there are numerous effective approaches to delivering a message and on the other hand that the effectiveness of specific presentation behaviors depends on various factors (e.g. the content, the audience, the presenter). As a result, we must find an alternative approach to inform students about behaviors that are frequently ineffective for message delivery, while also clearly communicating that these behaviors can be valid when used intentionally and with a specific purpose in mind. This second prototype will then also be tested with users.

4.4. Evaluating the effect of training with the prototype on presentation content preparation skills - How is using this presentation content preparation skills training application affecting the skills of users?

The primary objective of the proposed application is to facilitate the training of students' MCSPS. Consequently, it is important to evaluate how using this application affects students' MCSPS. Ideally, such an evaluation should

be a randomized controlled trial. However, for ethical reasons, we can not split up students of the same class into two groups and provide an intervention potentially influencing their grades in only one of the groups. As a result, we will do a quasi-experiment.

The quasi-experiment will be conducted within the same course, with different groups of students in three distinct semesters. This will result in the following three groups: one control group and two experimental groups. The course structure will remain consistent across all three semesters. In each semester, every student will be required to deliver three presentations. The first and third presentations will serve as pre- and posttests, prepared without the use of our tool. For the second presentation, students in the experimental groups will use our tool. One experimental group will use the version of the tool providing only guidance, while the other will use the version offering guidance and individual feedback. The plan for the quasi-experiment is also visualized in figure 2.

5. Conclusion

This paper presented an overview of a PhD project on exploring how students could be supported in training message composition skills for public speaking (MCSPS) by means of computer-based tools. To accomplish this goal, the project will use participatory design within the context of design-based research.

The research process starts with interviews with presentation teachers as well as students in order to collect requirements for such a tool. In parallel, a scoping review on MCSPS training as well as the support of this training by means of computer-based tools will be conducted. After the requirements are formalized, two versions of a prototype will be designed, implemented and tested. The first version will provide only guidance on composing the message of a presentation, while the second one will provide guidance and additionally give individual automatic feedback. Finally, the effect of using these variants of the tool on students' MCSPS will be evaluated in a quasi-experiment.

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