Online presentations for instruction: an overview

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Online presentations have become a cost-efficient and contemporary format for knowledge transfer. The associated competence is in demand at all levels of education and in many work contexts as presenting online contributes to educational and professional success. Despite its growing importance, it lacks a research-based overview regarding the definition, performance antecedents and recommendations how to foster online presentation competence. Based on an literature overview, a framework was developed to conceptualize online presentations and their underlying competence facets for instruction. According to this, presentation behavior and presentation performance in online settings is influenced by an interplay of the key factors consisting of (1) speaker's competence-constituting characteristics, (2) efforts to prepare and practice the presentation, (3) within-speaker processes, and (4) features of the setting. Future empirical studies should examine structure and validity of this framework in more detail. The educational focus on online presentations can be concluded that by deriving a research-based training approach that fit all levels of education and professional training. That intervention model can also serve as a starting point for more research on presentation training programs to promote online presentation competence to disseminate its application to diverse professional contexts such as business or healthcare.

KEYWORDS

online presentation, presentation competence, education, online setting, video conference

1 Introduction

The COVID-19 pandemic has accelerated and popularized the use of online presentations, usually with media support in the form of video conferencing (Kimani et al., 2021). To deliver knowledge in digital environments, online presentations have not only been used in the business context, for instance in international working group meetings (Zarb and BirtlesKelman, 2020), but also in education across different levels. For instance, they have become an important tool in primary, secondary, and tertiary education supporting teachers during online instructions and enabling students to conduct online group work (e.g., Leproni, 2021; Peimani and Kamalipour, 2021). More and more researchers, students, and teachers choose the format because of high flexibility and cost-friendliness, or as a simple solution to reach an audience in multiple locations (e.g., Braun, 2017).

The rising importance of presenting online already emerged before the onset of the COVID-19 pandemic (Campbell, 2015) facilitated by a digital era in which Internet and technology use have become an integral part of daily interactions in business and education. Being able to present online is as important as being able to present face-to-face (Wolverton and Tanner, 2019) because good presentation skills are related to greater success in (academic)

education (Campbell et al., 2001; De Grez et al., 2009; Kerby and Romine, 2009; Van Ginkel et al., 2015) and one's career (Su, 2015), better employability (Scheper and Spangenberg, 2008; Smith and Sodano, 2011; Van Ginkel et al., 2015) and more adaptive life-long learning (Boud and Falchikov, 2006; Dunbar et al., 2006; Chan, 2011).
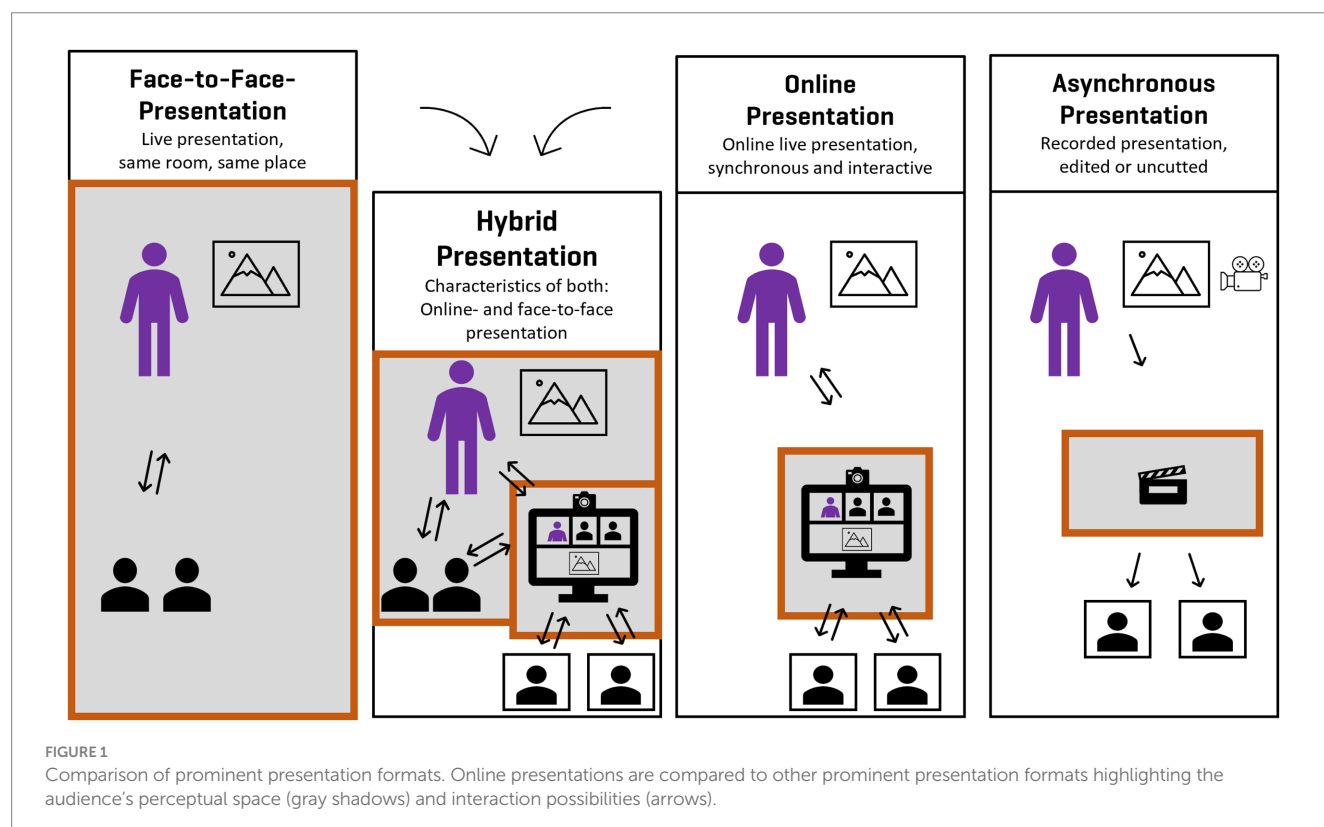
Despite the widespread use and relevance, presenting online has seldom been the focus of research in online learning and distance education yet (McDougall and Holden, 2017; Kleindienst and Raspor, 2020). This calls for a theoretical conceptualization of online presentations acknowledging the characteristics of the format and the setting as well as appropriate presentation behaviors and their antecedents. Based on a conceptualization of face-to-face presentations (Herbein et al., 2021), the current article thus develops a framework of online presentation and its competence facets, which integrate speaker's competence-constituting characteristics, preparation and practice of the presentation, within-speaker processes during the presentation, and the setting. This article synthesizes findings from rhetorical, psychological and educational research, providing an overview as a foundation for more research into this emerging hot topic. First, we define the term "online presentation" by contrasting it with face-to-face, hybrid, and asynchronous presentations. Second, based on the conditions and constraints of the online setting in the digital environment, we elaborate rhetorical consequences and focus on the antecedents of presentation performance. Consequently, we derive a model of online presentation performance including these antecedents. In conclusion, we develop an intervention model for training approaches to foster presentation competence in online settings and discuss the research gaps. This article focuses on online presentations in education as most of the publications are related to this context. However, the principles of developing training programs to promote online presentation competence may also be applied to diverse professional contexts.

2 Defining online presentations

We define online presentation as primarily monological and media-supported speaking in a live video conference setting to address an audience with the goal to inform, and/or to entertain, persuade or emotionalize. Various terms exist to denote online presentations (Braun, 2017; Kleindienst and Raspor, 2020), including distant presentations, virtual presentations, webinar presentations (Campbell, 2015), web-based presentations (Marlow et al., 2017), synchronous distributed video-mediated presentations (Marlow et al., 2017), or synchronous online presentations (Wolverton and Tanner, 2019). Despite some agreements in meaning, the terms have been used inconsistently. Thus, to exemplify our definition in this article, we focus on the composite understanding of the terms "presenting" and "online". Thereby, we contrast online presentations with three prominent other presentation formats: face-to-face, hybrid, and asynchronous presentations (see Figure 1). In Figure 1, the gray shaded boxes in each presentation format represent the audience's perceptual space for the speaker's behavior. The arrows indicate the interaction possibilities between the speaker and the audience.

If the term *presenting* is to be defined, various components are emphasized. Across disciplines, presenting can be defined as primarily monological speaking that is media-supported, for instance, by using visual aids, and aims to address an audience with the goal to inform, and/or to entertain, persuade, or emotionalize. The audience consists of at least one person (Herbein et al., 2021);

FIGURE 1
Comparison of prominent presentation formats. Online presentations are compared to other prominent presentation formats highlighting the audience's perceptual space (gray shadows) and interaction possibilities (arrows).

acknowledging that presentations are often aimed at multiple addressees. While it is often the case that one-person audiences are embedded in a more interactive face-to-face conversation, primarily speaking in monologue remains a significant characteristic of presenting, even with one-person audiences.

The term *presenting* with the addition of *online* clarifies the digital environment in which the presentation takes place and/or is experienced by the audience. We elaborate the term digital environment because it represents a key term when distinguishing online presentations from other formats. In contrast to face-to-face environments in situ, digital environments refer to the global context of digitally mediated communication (Yao and Ling, 2020). The entire communication is mediated by digital technologies, such as video or other digital devices, software applications, and/or networks. Within that digital environment, the *setting* refers to a specific situation encompassing specific participants involved, a specific time, and a specific place. Places range from discussion forums (asynchronous digital communication) or mobile text messaging to virtual places where interlocutor's come together through audio-visual representation.

When comparing online with *face-to-face presentations*, the environment and the setting differ. In face-to-face presentations, the environment and setting are physical, referring to a concrete physical situation. The communication depends on the conditions and arrangement of the room. For instance, the size and position of a stage determine the speaker's possibilities to connect with the audience. In online presentations, the entire environment is digital, while the setting refers to a specific online situation. A key feature of this online setting is the virtual presentation room, where the speaker and the audience come together through an audio-visual representation despite the physical distance between them. The virtual presentation room, displayed on the audience's screen (e.g., the interface of the video conference software), has its own communicative meaning and offers further communication possibilities. For instance, the speaker may use virtual backgrounds, chat options, filter options, or reaction possibilities with emoticons. This results, for instance, in complex, multi-layered visual communication signals which emerge concurrently: Text and images on slides, emoticons, and video images of the speaker and the audience have to be perceived, processed, and understood simultaneously. Since emoticons or video images have their own language and meaning—representing different semiotic resources—the visual mode in the online presentation is interwoven with different communicative possibilities than in face-to-face presentations. Despite these differences, both formats have in common that they are multimodal presentations. They consist of an interplay of spoken language mode, visual mode, and performance mode, such as body language and voice (e.g., Herbein et al., 2021).

When comparing online presentations with *hybrid presentations*, the difference lies in the representation of the audience and the technical setup (Raes et al., 2020). In hybrid presentations, a relatively new format in education, the speaker must address two audiences simultaneously: an online audience displayed on a screen and an audience that is in the same room as the speaker. In contrast, in online presentations, the speaker faces the audience exclusively online. Hybrid presentations place higher demands on the speaker and require different technical equipment than online presentations. Cameras and microphones must transmit all interactions in the presentation room to the virtual presentation room. Both presentation formats are characterized by a live audience.

When contrasting online presentations with *asynchronous presentations*, the difference lies in the live character within the digital environment. Online presentations require a live, i.e., a synchronous online setting (same time and virtual room for speaker and audience) as opposed to asynchronous presentations. These presentations are recorded and can be modified in the post-production phase (Chorianopoulos, 2018). When publishing asynchronous presentations, the speaker cannot respond directly to audience reactions because of the asynchronous setting. Most instructional videos can be classified as asynchronous presentations. Recorded online presentations mark the transition between online presentations and asynchronous presentations. Both formats require video technology and can be assigned to video-mediated communication in the digital environment (see Figure 1).

To sum up, online presentations are digitally mediated communication. The speaker and audience meet exclusively online and live in the virtual presentation room, i.e., the video conference setting. In this digital environment, digital tools provide audio-visual presence for the speaker and audio- or audio-visual or written presence for the audience. This allows live interactions through technological communication features such as chat, audio, video, camera filters, emoticons, and surveys. These features make online presentations distinct, regarding their framework and characteristics.

3 Rhetorical consequences for the speaker in online presentation settings

The above-presented framework of online presentations has rhetorical consequences for the speaker affecting almost all facets of presentation behavior. The facets are deduced from rhetorical principles and established in rhetorical research (Ruth, 2020). It goes beyond the scope of this overview to cover all rhetorical strategies in each of these facets. Thus, we focus on facets that are particularly important in online presentations, such as addressing the audience, language use, body language and voice, or visual aids.

3.1 Addressing the audience

Addressing the audience occupies a special position due to the physical distance between speaker and audience. It's about engaging the audience as well as creating a social and personal connection between participants, the latter is called social presence in education (Garrison et al., 1999; Whiteside et al., 2017). In online presentations, the speaker's view of the audience is constrained due to limitations in screen size and video software that hinders the display of large audiences. Additionally, the dominance of slides on the monitor further restricts the audience's view. This partial view, combined with the fact that the speaker in online presentations can only see the audience through the eyes of the camera – which includes both an incomplete picture of the audience rooms and an incomplete picture of nonverbal body language – further reduces the small clues he/she can detect and analyze. Interpreting these small clues is challenging: Angry faces of the audience could be due to the content of the presentation, but could also indicate a technical problem or cognitive overload in the sense of zoom fatigue (Nadler, 2020). Technical

tracking tools to monitor the audiovisual presence of the entire audience (Kimani et al., 2021) could support the speaker, but these tools are critically discussed due to privacy concerns (Marlow et al., 2017).

A basic strategy to address the audience may be to anticipate and explicitly communicate the perception of the audience's mood at various points in the online presentation. In cases where it is uncertain to interpret the audience's emotional and cognitive presence, it may also be helpful to make this uncertainty explicit to them, rather than assuming or guessing. In addition, the speaker can create situations within the virtual presentation room that support the social relationship, e.g., illuminating the speaker's stage or using personal items such as hometown photos as a virtual background to get to know the speaker. Furthermore, the speaker can actively invite the audience to provide feedback and show reactions by using technological communication options, such as emoticons, visual pop-up questions, or chat postings. Using these digital rhetorical means in a strategic manner can engage the audience in a visual way, reinforce a sense of relatedness, and form a group identity. They also make it possible to keep the addressees' attention in the presentation situation and help to activate the audience (Du et al., 2018).

3.2 Language use

To present online has further consequences for the use of language. Since body language signals cannot be addressed directly to specific audience members, the speaker must make rules of communicative exchange more explicit. This includes, for example, turn-taking processes in dialogic passages of the presentation, dealing with questions, using the chat function, or referring to spoken words with visual aids. Verbal references, such as "look at the bottom of this slide", are rhetorically called deixis and serve to direct attention. In an online presentation, these verbal references gain weight due to the inability to link spoken language and visuals through gestures (e.g., Lindenberg, 2023b). Besides verbal references, Lindenberg (2023b) also showed in a small dataset of students' online presentations that linking of spoken language and visuals is often realized by reading aloud words written on the slide. The extent to which this is appropriate in online presentations, given that it contradicts findings in face-to-face presentations, requires further research. In addition, Lindenberg (2023a) identified a deficit in students' language ability to relate spoken words to visuals in online presentations in terms of extending (i.e., adding new information) or enhancing visuals (i.e., providing circumstantial details regarding place, time, cause, or condition).

3.3 Visual aids

In online presentations, visualization plays an even more crucial role because it helps to anchor the audience's attention. The lack of real presence and the camera's limited perspective can result in a loss of non-verbal visual cues, making visualization even more important in online presentations. Based on research in educational psychology, there is evidence of general design strategies for visual aids that help the audience to process information (e.g., Mayer, 2021; Mayer and Fiorella, 2021; Sepp et al., 2022). Some of these strategies include placing text in close proximity to graphics or using visual cues, such as arrows or highlighting, to draw the audience's attention to important information placement of text within a figure. These design principles can be transferred to online settings. Additional design principles specific to online presentations can be deduced from the characteristics of the online setting. Usually, the audience can use both laptops and smartphones to attend presentations. When designing visual aids, taking into account the small screens of the audience, it is necessary to reduce the amount of information per slide and distribute it over several slides.

3.4 Body language and voice

Delivering an online presentation requires adapted rhetorical strategies in terms of nonverbal and paraverbal communication. In online presentations, only certain aspects of body language are visible depending on the camera angle and perspective. Conventionally, in web conferences, the speaker's body language is often reduced to the rhetorical means of the enlarged face visible in the camera (e.g., Echigo et al., 2022). To avoid ambiguity, professional speakers (i.e., teachers) reported that they exaggerated their nonverbal communication or emphasized their facial expressions, even with real-time camera filters such as eyebrow filters (McArthur, 2021). Leong et al. (2021) investigated the potential of further real-time camera filters in video conferences. Making eye contact works only indirectly by looking at the camera instead of looking at the audience's faces in the frame (Shi et al., 2024). Although there are some technical solutions to correct eye-position (Hsu et al., 2019), they are not widely implemented. Other digitally adapted strategies are needed, for example, in the use of gestures. Gestures that point to a specific object on a separate slide window require additional explicit linguistic markers, such as "As you can see on the top left…". In addition, the use of voice is of utmost importance in online presentations (Kleindienst and Raspor, 2020). In this context, the speaker must pay attention to the quality of the microphone. Poor or distorted audio quality transmitted from the computer (e.g., due to a poor microphone or a poor online connection) is even more distracting than poor camera quality of the speaker. Speaking slowly and clearly may be even more important in online than in face-to-face presentations because certain nonverbal visual behaviors may not be conveyed.

Consequently, the rhetorical means are closely linked to and determined by the specific virtual presentation rooms and its technical features. In any case, rhetorical strategies must function in the context of digitally mediated communication. When comparing it to face-to-face presentation, they can be grouped into three categories: (1) extended in some respects, e.g., technical features, such as virtual backgrounds or video filters, (2) limited in some respects and need to be compensated for, e.g., overcoming physical distance by calling for audience's action via chats or reaction emoticons, and (3) similar in some, e.g., design principles for visual aids. Therefore, online presentations require more preparation and coordination of the speaker during the presentation than face-to-face presentations (Barrett et al., 2022). However, a successful presentation in the online setting is not limited to the speaker's use of these rhetorical means and strategies but requires considerations of other factors.

4 Influencing factors on presentation performance in online settings

A broad array of research identified the determinants of presentation performance in face-to-face interaction (e.g., Van Ginkel et al., 2015; Herbein et al., 2021). In terms of a narrow understanding, presentation performance may be defined as the execution of appropriate verbal and nonverbal behaviors by means of which a speaker introduces contents to an audience in a structured way with the intention to inform, convince, or trigger emotions (De Grez et al., 2009). Thus, the speaker's implementation of rhetorical means and strategies in presentations translates into presentation behavior. Research primarily identified non- and paraverbal behaviors of the speaker to determine the performance as perceived by a panel/ the audience, both for face-to-face presentations (Sieverding, 2009; Hall et al., 2011; Naim et al., 2015; Ruben et al., 2015; Feiler and Powell, 2016) and for online presentations (Beege et al., 2017; Hietanen et al., 2020). The speaker's performance is rated better if they smile and/or shows warmth to the audience at the beginning (but less during the presentation), continuously maintain eye contact with the audience while turning towards the audience, demonstrate self-assertive behavior and posture throughout the presentation, and directly address the audience at the end by smiling, showing warmth, and/or personally thanking the audience.

In a broader understanding, other factors can influence and/or modulate these presentation behaviors. Therefore, presentation performance as indicated by the speaker's behavior may be conceptualized as a transaction of (1) *speaker's competence-constituting characteristics* such as knowledge, traits, and behavioral potential, (2) *efforts to prepare and practice the presentation*, and factors that are relevant during the presentation, which comprise (3) *within-speaker processes* such as accompanying cognitive-affective states, and (4) *features of the setting* such as the specific presentation situation (e.g., Crook and Schofield, 2017; Herbein et al., 2021).

In Figure 2, we depict the antecedents of online presentation performance. In the following, we synthesize relevant research findings and provide examples to elaborate the influencing key factors of presentation performance online within Figure 2. In recent years, catalyzed by the COVID-19 pandemic, first studies have aimed at identifying the factors that determine performance during online presentations (e.g., Kimani et al., 2021; Peimani and Kamalipour, 2021). Our framework focuses on online presentations but comprises the same components, which determine performance during face-to-face presentations. Here, it is the digital environment that puts all the components of the framework in a newly reflected light.

(1) Speaker's competence-constituting characteristics: Based on the extensive educational research on the importance of speaker characteristics in face-to-face presentations for presentation competence, we synthesize these findings in the next Speaker's Competence-Constituting section in this article, much of which can be applied to online presentations (e.g., Van Ginkel et al., 2015; Barrett and Liu, 2019).

(2) Efforts to prepare and practice the presentation: Practicing upfront enhances performance (e.g., Jurin et al., 2010; Herbein et al., 2021). For instance, students in higher education benefit from practicing presentation skills face-to-face during training and
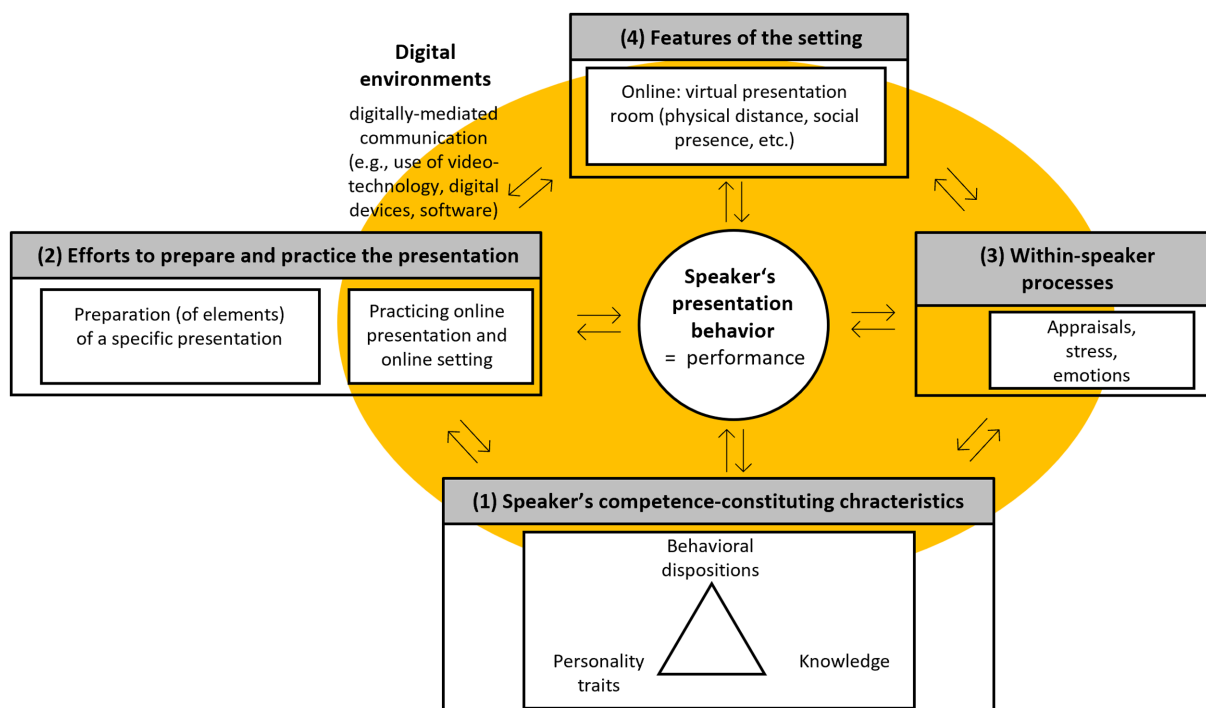

FIGURE 2
Conceptual framework of online presentation performance.

seminars (e.g., Van Ginkel et al., 2015; Ringeisen et al., 2019a; Schickel and Ringeisen, 2022). Practicing presentation in online settings adds benefits irrespective of modulating personality traits such as speaking-anxiety (Van Ginkel et al., 2019; Boetje and Van Ginkel, 2021). However, it is crucial to consider the format of online presentations to be practiced and tools which are used for practice. They shall be equivalent to the online presentation setting (Ave et al., 2020). As part of the preparation, it is crucial to familiarize students with a rubric that depicts and describes critical online presentation behaviors for performance evaluations (for an overview see, e.g., Herbein et al., 2021).

(3) Within-speaker processes: Aside from the mere presentation behaviors, current cognitive-emotional processes such as emotional intensity, and higher cognitive processes, such as retrieval of presentation-related knowledge, may attenuate the speaker's presentation behavior and thus presentation performance (e.g., De Grez et al., 2009; O'Connor et al., 2010). For instance, many adults experience presentations as highly stressful (e.g., Preuß et al., 2010; Dwyer and Davidson, 2012). A worse performance is predicted by higher gradients of rising stress in the sense of threat and anxiety (Ringeisen et al., 2019a), decreasing enjoyment, and intensifying cardio-vascular or hormonal responses such as cortisol release (e.g., Merz and Wolf, 2015). The stress responses are maximized if the synchronous live presentation is recorded (e.g., Biondi and Picardi, 1999; Narvaez Linares et al., 2020).

Behaviors of the speaker may also have affective-cognitive effects on the audience, especially if online presentations are used for educational purposes. Direct eye contact of the speaker induces positive affective reactions in the audience watchers during online and asynchronous presentations while increasing autonomic arousal of the audience only occurs during the former (Hietanen et al., 2020). Addressing the watching audience by direct eye contact, thereby inducing arousal and/or specific emotions, may therefore foster learning and competence development of students in educational videos and live teaching (Beege et al., 2017).

(4) Features of the setting: The characteristic features of the specific online presentation situation include the speaker, the audience, and the virtual presentation room where both meet at a given time in a digital environment. One of the main influencing factors is the audience; responses and interaction with the audience greatly affects the emotional state/engagement of the speaker, both in face-to-face presentations (for an overview see, e.g., Von Dawans et al., 2011; Buchanan et al., 2014; Goodman et al., 2017; Labuschagne et al., 2019; Narvaez Linares et al., 2020), and online presentations (Brame, 2016; Crook and Schofield, 2017; Marlow et al., 2017), which in turn, may be related to presentation performance.

During face-to-face presentations, the speaker experiences greater stress if the audience does not respond, both verbally and nonverbally, even if there is only one listener and/or if the audience gives no feedback. Both positive and negative are better than lack of feedback (e.g., Goodman et al., 2017) because non-responses increase uncertainty and uncontrollability. The stress induction takes place regardless of whether the observers are gender-matched, cross-gender-matched, or randomly assigned.

During online presentations, both speaker and attendees need nonverbal cues from the audience to feel connected and understood and to be able to infer that the audience is engaged (Brame, 2016; Crook and Schofield, 2017; Marlow et al., 2017). Therefore, it is important to understand how speaker and attendees use available cues to interpret behavior, in particular in online presentations. In order to enable the mutual detection of performance-enhancing nonverbal cues, it is therefore useful for the speaker to use webcams to increase audience visibility and encourage attention. Vice versa, however, audience members do not necessarily benefit from seeing others' webcams. A chat, which accompanies an online presentation, may engage both speaker and audience.

In addition, other factors that influence the presentation situation include the use of virtual backgrounds, which have been discussed so far in relation to increasing attention, minimizing distraction, or improving the relationship with the audience (De Maurissensa and Barbutib, 2021; Goethe et al., 2022). Furthermore, features of the setting also enable the visual presence of the speaker to be designed. Video conference and slide software tools allow the speaker to be embedded into the slides (Katai and Iclanzan, 2023). Moreover, the inclusion of live transcripts can also impact the knowledge transfer (Qiao and Yijun, 2023).

To complete the overview of the influencing factors, we elaborate the competence-constituting characteristics of the speaker in the following section.

5 Speaker's competence-constituting characteristics for online presentations

Competence-constituting characteristics of the speaker are identified as crucial determinants in order to build up presentation competence and consequently enhance one's online presentation performance (De Grez et al., 2009; Kang, 2016; Barrett and Liu, 2019; Van Ginkel, 2021). However, research in the specific context of online presentations and its associations with personal characteristics of the speaker are lacking. Hence, findings of presentation research of face-to-face presentations can be applied quite well to the online context due to the following similarities. Both settings are based, for example, on a live interaction scenario between speaker and audience. This means that the speaker must perform in this particular situation without the possibility of changing the performance afterward. However, differences that accompany communication in the digital environment between these two presentation forms should also be taken into account to ensure an adequate application of existing research. A future investigation into these differences could provide a more nuanced and differentiated perspective on speaking in online presentations and provide answers to the question of whether online presentations require different rhetorical actions compared to face-to-face presentations. Research on video mediated communication has demonstrated the existence of specific communication patterns that diverge from those observed in face-to-face interactions (e.g., Mlynář et al., 2018; Siitonen et al., 2022); these include, for example, the frequent use of verbal greetings accompanied by a wave of the hand to establish co-presence in video-conference openings (see also the Rhetorical Consequences section in this article).

In the field of educational psychology, three person-related competence-constituting dimensions of characteristics can

be distinguished – knowledge (e.g., regarding preparing and practicing, the course of a presentation, visual aids), personality traits including motivational constructs (e.g., self-efficacy, goal orientation, extraversion), and behavioral dispositions (e.g., verbal and nonverbal presentation behaviors; e.g., Van Ginkel et al., 2015; Herbein et al., 2021). Their interplay lead to the development of presentation competence, the behavioral potential to act competently during presentations, and influences one's presentation preparation, practicing, and shown behavior in the given (online) setting (e.g., Van Ginkel et al., 2015; Liang and Kelsen, 2018; Ringeisen et al., 2019b; Schickel and Ringeisen, 2022; Herbein et al., 2021).

In terms of the *knowledge characteristic*, several aspects can be transferred from face-to-face presentations to online presentations. Thus, a person's general knowledge is required for appropriate presentation, as how a presentation has to be structured and how it has to be prepared. In addition, knowledge is relevant regarding verbal and nonverbal behaviors which should be shown and what or how those behaviors are conveyed. Also, professional knowledge about the content being presented represents a relevant factor in this respect (e.g., Morreale, 2007; Cavanagh et al., 2014; Herbein et al., 2021). Differences to face-to-face presentation refer to additional necessary technical knowledge, such as which online and conference tools are applicable and how to use, handle, and apply these tools; e.g., camera, interface and sound settings, chat options, and filter options (Kleindienst and Raspor, 2020). Furthermore, in addition to knowledge of the technical functions (video conferencing tool, presentation software), knowledge of the rhetorical and communicative strategies is also required in order to be able to use all of these technical functions in a targeted manner.

According to *personality traits and motivational aspects*, a growing body of research identified self-efficacy as a crucial variable in the context of presenting, showing that self-efficacy beliefs are positively associated with presentation performance (e.g., Brown and Morrissey, 2004; Cavanagh et al., 2019; Schickel and Ringeisen, 2022). Hence, to build up one's self-efficacy beliefs regarding presenting, it may be helpful to refer to specific types of Bandura's sources of self-efficacy (e.g., Bandura, 1997), such as enactive mastery experiences or vicarious experiences. Some current research in the context of online presentations suggested that extra online practice sessions in the digital environment (in terms of enactive mastery experiences), observing virtual models which are relevant and similar to the speaker (in terms of vicarious experiences), and/or immediate digital feedback to presentation performance may affect one's presentation self-efficacy (e.g., Kang, 2016; Van Ginkel et al., 2019; Boetje and Van Ginkel, 2021). Moreover, since one major difference to face-to-face presentations is that communication is only mediated by computer and video technology and the Internet, self-directed competence beliefs or self-efficacy not just for presenting but also for media use and digital competence may thus be conducive to foster the respective learning in the virtual environment (e.g., Compeau and Higgins, 1995; Shakarami et al., 2013). Further, other motivational constructs, such as achievement goals, are also relevant in order to obtain the respective skills and thus perform better at presentations (e.g., De Grez et al., 2009; Van Ginkel et al., 2015). According to personality traits, research in the context of presenting and speech performance could show that extraversion and openness are positively associated with presentation and speech performance (e.g., Kim et al., 2005; Liang and Kelsen, 2018).

Finally, *behavioral dispositions,* refer to a repertoire of verbal and nonverbal presentation behaviors that the speaker requires in order to present. The *behavioral dispositions* can be classified into different facets (Herbein et al., 2021) and be applied well to the context of online presentations. Further, these facets, such as non-verbal-visual behaviors (e.g., eye contact), para-verbal-auditory behaviors (e.g., intonation, voice, speaking tempo), or further behaviors such as the use of language, structure, time management, or visualization, are still relevant in online presentations. However, a different term or usage is required to demonstrate appropriateness. For example, eye contact, which establishes a relationship between the speaker and the audience, is implemented differently in online presentations. Instead of looking at the faces of the audience in the room, the speaker has to look into the webcam. Speakers should be aware of the rhetorical behaviors specific to online presentations, including audience-addressing communication strategies such as anticipating and explicitly communicating the audience's emotional and cognitive state. In addition, the announcement of the speaker's location (e.g., Häusermann, 2022; Mlynář et al., 2018) or the speaker's reassurance that everyone is seeing his/her slides at the beginning of online presentations could be considered genre-specific rhetorical actions. These explanatory or justifying actions could be used to overcome the limitations of online presentations (see further adaptations of presentation behaviors in the Rhetorical Consequences section in this article).

Overall, although existing research already gives promising indications regarding the associations between personal characteristics and online presentation performance, there is a need for future research that examines those relations empirically. Based on these considerations of competence-constituting characteristics as well as the other influencing factors on presentation online, summarized in the framework of online presentation and its competence (see Figure 2), implications for a research-based promotion will be considered in the next section.

6 Promotion of presentation performance and competence in online settings

The development of training implications is a highly relevant and essential topic within the field of online presentation research. This section provides a comprehensive overview of the current state of training and research with regard to the promotion of online presentation competence.

Competent online presentation performance can be fostered through online training programs or programs that incorporate a sufficient number of online modules. Respective online training programs are on the rise (e.g., McDougall and Holden, 2017; Broeckelman-Post et al., 2019). They vary in implementation, ranging from fully asynchronous or fully synchronous online courses to blended learning courses. Training effects of online training programs are comparable to those of face-to-face programs (e.g., Broeckelman-Post et al., 2019). However, these online training programs hardly target online presentation performance as a learning outcome.

Although these programs take place online, the final presentation assignment includes tasks such as presenting to a face-to-face audience or uploading a videotaped face-to-face presentation to a learning platform, in order to receive asynchronous feedback (e.g., Westwick et al., 2016; Broeckelman-Post et al., 2019). Thus, the call for effectiveness studies for presentation training programs that promote presenting online is evident (Broeckelman-Post et al., 2019).

In order to develop a training concept that incorporates the framework described above, we evolved a basic intervention model that combines logical progression as well as mechanisms of action to foster online presentation performance. Based on Herbein (2017) we applied this intervention model to the context of online presentations (see Figure 3). It outlines the steps that need to be considered in the process of development: (i) analyzing the *situational needs* of the target group as well as the resources that will be used, (ii) identifying relevant core components as basis for the development of the *training program,* as well as (iii) defining the *intended outcome.* Therewith, the intervention model provides an overview of key aspects of a presentation training and offers insights into recent research findings and trends regarding the promotion of competent online presentation performance. Because the intended outcomes are the central reference point for designing a training program, we describe the outlined steps from back to front.

(iii) The development of a training program starts with the goal and the definition of the *outcomes.* Based on our framework, our primary outcome is the speaker's presentation behavior (= performance in the online setting). Secondary outcomes include factors that are closely related to and support this presentation performance. These factors can be divided into speaker's competence-constituting characteristics (e.g., self-efficacy in the online setting, knowledge how to present online) and within-speaker processes (e.g., speech anxiety in the online setting or online stress). In order to define appropriate training objectives for different target groups, the specific

competence levels have to be identified first. Since existing instruments mainly focus on face-to-face presentation (see review, e.g., Broeckelman-Post et al., 2020), research needs to further develop and test adapted instruments for the online setting. Based on this, the instruments would have the goal of supporting the instructor in diagnosis. Knowledge of the learner's status serves as the basis for providing formative and summative feedback.

(ii) A t*raining program* can be said to be effective if the intended promotion goals are achieved. A training program is composed of the training activities and the content of the training. Training activities are based on core components, such as feedback or practice (Van Ginkel et al., 2015; Herbein, 2017). These core components are derived from theory or represent empirically tested principles that are assumed to be essential for the promotion of online presentation performance. However, theory and tested practice have so far focused mainly on face-to-face presentations. There are good reasons why these core components can be applied to training programs targeting online presentation performance, for example, because both presentation formats are socially interactive situations, and both involve the same definition of presenting (see the Definition section in this article). Future research, however, needs to empirically verify these core components in the context of online presentations.

Training activities are practical implementations of the core components. Derived from our framework of online presentation performance, the supporting influencing factor *efforts to prepare and practice the presentation* (see Figure 3) can be assigned to the training activities. This includes, for example, practicing online presentations through presentation tasks in the online setting, which is a concrete realization of the core component "opportunity to practice". Most often, a training is based on a mix of core components. An example with multiple components is Youth Presents' Presentation Academy, which promotes secondary students' presentation skills for both

FIGURE 3
Intervention model focusing on training online presentation performance.
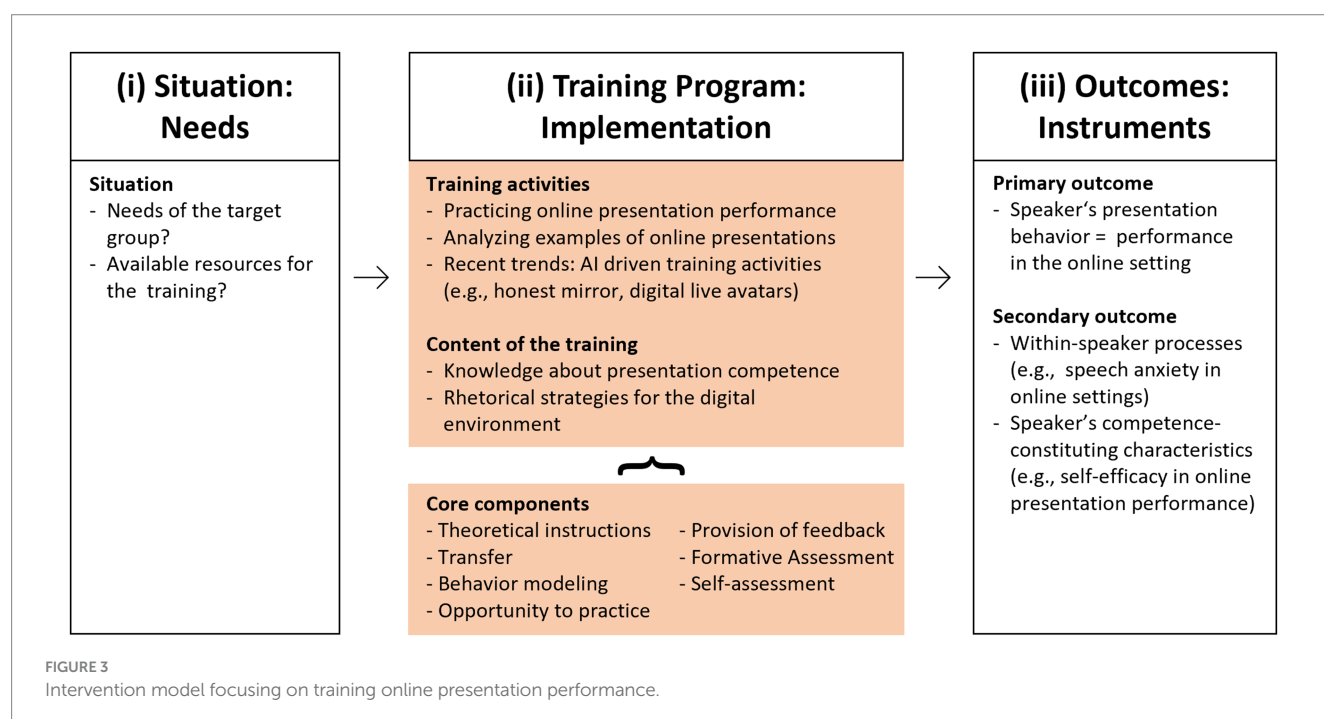
face-to-face and online presentations (Kramer and Malaka, 2014, https://www.jugend-praesentiert.de). In higher education, an example of a training program is an online course that uses online presentations for learning (Kleindienst and Raspor, 2020). The greatest improvements of the 134 students, based on pre- and post-course self-assessments, were found in ease of use of online presentation software, confidence in online presentations, and familiarity with the camera. These results are promising but require further research.

Recent training trends include systems of automated feedback for oral presentations (e.g., Ochoa, 2022) or artificial intelligence (AI) driven training activities. One example is the smartphone application "honest mirror" (Sakkali et al., 2021), which provides instant, personalized, and automated feedback on effective and ineffective postures and gestures. These AI-driven training activities also need to be adapted and tested for presentation performance in the online setting. An example of a training activity that already focuses on online presentations and uses AI-driven activities is the use of live digital avatars. Having a conversational agent as a co-speaker has been shown to reduce the speaker's anxiety about public speaking while improving perceived performance (Kimani et al., 2021).

Another factor that contributes to the success of the training is the *content of the training*. This includes knowledge of how to present and knowledge of rhetorical strategies specific to the digital environment and the online setting (see also the Rhetorical Consequences section in this article), such as how to create social presence in a virtual presentation room or how to look at the camera to make eye contact. Future research is needed to develop more evidence-based presentation training programs that focus on online presentations.

(i) From a didactic point of view, the initial *situation* prior to the development of an educational program is crucial. This includes a specific needs analysis of the target group as well as an analysis of the available resources for training. In particular, the needs analysis of the different target groups (primary, secondary, or higher education students) provides information about the level of experience in terms of presentation both in face-to-face classes and online. However, there is still a lack of research on a specific development or competency model for online presentation performance.

7 Discussion and conclusion

In this article, we have developed a research-based framework of the performance antecedents for online presentations. We understand competent online presentation performance as the appropriate and effective implementation of presentation behaviors in the digital environment of a virtual presentation room. Thereby, the digital environment and its including technical features have both a constricting and an expanding effect on rhetorical strategies. Presentation performance is influenced by an interplay of various antecedents: (1) the speaker' competence-constituting characteristics, such as his/her knowledge, traits, and behavioral potential, (2) efforts to prepare and practice the online presentation, and factors that are relevant during the presentation, including (3) within-speaker processes such as cognitive-affective states, and (4) features of the online setting, such as the specific online presentation situation.

This framework for online presentations performance and its competence is the first overview of this new emerging research area. It synthesizes existing knowledge from an educational perspective. This conceptual framework is also relevant for other contexts. The results can be transferred to contexts, such as the business (e.g., Standaert et al., 2022), healthcare (e.g., Panagides et al., 2022), or other professional fields (e.g., Susskind, 2019) because all of them are confronted with the same digital transformation. Consequently, all professionals within their respective fields must be able to communicate effectively in virtual rooms. Despite different terminologies and understandings, we define online presentations as a live, interactive, video-supported presentation with visual aids in a virtual presentation room. We found that online presentation assessment instruments rarely reflect the online setting. Moreover, influential supporting and hindering factors, such as self-efficacy (related to speaker's competence-constituting characteristics) or speaking anxiety (within-speaker processes) have not yet been adapted to the online setting. Although the recent training trend includes digitized training tools, there are few examples and descriptions of presentation training programs targeting online presentation performance as an outcome. Implications for promoting the online presentation performance show initial approaches for designing training programs. Based on our research-based intervention model, future research could plan studies on the effectiveness of training programs not only in education context but also in different areas of applications, such as business, healthcare, and other professional contexts.

This overview, however, is not exhaustive. In accordance with the purpose of this paper, we derived basic areas of existing research and listed exemplary studies in each area. We elaborate on fundamental areas that are critical to online presentations and its competence. From an educational and professional perspective, our conceptual overview helps teachers or employers in selecting relevant assessment tools for diagnosing students' and employees' presentation competence in an online setting. It also provides a framework for instructors with influential supporting factors that could be used for designing or reflecting a training program. Future empirical studies should examine structure and validity of this framework in more detail. The overview of our developed intervention model can also serve as a starting point for more empirical research focusing on presentation training programs to promote online presentations. The results can help to accurately describe the relationships between the individual elements. Future studies should also consider different target groups, such as elementary school students, secondary school students, university students, and professionals as speakers in online presentations. This might result in a promotion that is better adjusted.

Author contributions

FR: Writing – original draft, Writing – review & editing, Conceptualization, Investigation, Visualization, Funding acquisition, Methodology, Project administration, Resources. CL: Conceptualization, Investigation, Writing – original draft,

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

The authors declared that they were an editorial board member of Frontiers, at the time of submission. This had no impact on the peer review process and the final decision.

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