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Empowering teachers to educate critical online readers

Carita Kiili and Pirjo Kulju

The purposes of this chapter are to

- ✓ describe key features of critical online reading;
- ✓ define teacher self-efficacy and its sources;
- ✓ introduce design principles to support teachers' self-efficacy in educating critical online readers;
- ✓ illustrate how these design principles were implemented in two teacher education contexts;
- ✓ share teacher experiences of courses that implement these design principles.

5.1. Introduction

One widely pursued and highly regarded goal of education is to cultivate critical, digitally literate citizens (Grizzle et al., 2021). This includes educating online readers who can navigate online spaces purposefully, critically, and responsibly. Teachers play a key role in realizing this goal. However, constantly changing online spaces, the endless renewal of digital practices, and the broad proliferation of misinformation make educating critical online readers a challenging task. Undoubtedly, teacher education and professional development must support teachers in this arduous feat.

Teacher education and professional development courses can provide knowledge about skills, practices, and pedagogies related to critical online reading. However, teacher education should also address the motivational factors that play a pivotal role in teachers' willingness to develop as teachers. One well-established approach is to support teacher self-efficacy, which refers to a teacher's confidence in promoting their students' engagement and learning (Mok et al., 2023; Täschner et al., 2024). We adopted this approach in our efforts to empower teachers to educate critical online readers.

This chapter outlines the design principles that guided our decision making when we developed courses to support pre-service and in-service teachers' self-efficacy in educating critical online readers. To provide a context for our design, we will begin our chapter by describing the key features of critical online reading, followed by a

characterization of students as critical online readers and an overview of some of our thoughts on teaching critical online reading. To lay further ground for our design principles, we will conceptualize self-efficacy as a theoretical construct. Then, we will introduce five design principles and show how we implemented them in the two contexts of formal teacher education and teacher professional development. Finally, we will share pre- and in-service teachers' experiences with the implementation of this project to reflect on each design principle in practice.

5.2. Critical online reading

Critical online reading refers to the various evaluative practices through which readers engage with online information. Evaluative practices can be employed when students search for information, process single or multiple online texts, and synthesize information across online texts (Hämäläinen, 2023; Kiili et al., 2021). Such practices can concern the relevance and credibility of online information (Kiili et al., 2008). In this chapter, we focus on *online credibility evaluation*, which refers to the process of evaluating the quality of online information.

When searching for information, readers can consider which sources (e.g., researchers, news sites, and organizations) are likely to publish credible information about a particular topic (Kiili et al., 2021). Readers can then use these potential sources in their search queries (e.g., organization + topic). They can also examine the search results (i.e., title, web address, and example text) to determine whether the identified content may include credible information (Gerjets et al., 2011). However, search results provide a limited amount of information, and readers can only make initial predictions regarding the credibility of the information behind the links. Therefore, readers need to evaluate potentially relevant and credible texts by scrutinizing the accuracy of the text's content and the trustworthiness of the source, such as the author or the publisher (Barzilai et al., 2020; Forzani et al., 2022; Stadler & Bromme, 2014).

Readers can use several evaluation strategies to assess the content (i.e., ideas and arguments) presented in the text. First, if readers have solid prior knowledge of the topic, they can evaluate whether the ideas presented in the texts are aligned with what they already know (Stadler & Bromme, 2014). However, if their prior knowledge is inaccurate or superficial, this evaluation strategy may not be fruitful. In the worst case, it may only strengthen a reader's misconceptions. Second, readers can evaluate the quality of the author's argumentation by examining how well the author's reasons and evidence support their claims (Barzilai et al., 2020; Forzani et al., 2022). Finally, readers can engage in corroboration by comparing information across texts to understand the prevailing consensus among experts on a given topic (Osborne & Pimentel, 2022).

Another influential evaluation strategy is sourcing, which refers to attending to, evaluating, and using information about individuals and organizations that have written or published a particular online text (Bråten et al., 2018). When readers evaluate an author's or publisher's trustworthiness, it is important to reflect on both their expertise and intentions (Hendriks et al., 2016). Determining an author's expertise can entail

an investigation into their profession, education, and experiences (Bråten et al., 2018). Importantly, these indicators of expertise should always be evaluated in relation to the topic that the author is writing about.

When evaluating authors' *intentions*, readers should consider whether the source demonstrates goodwill and the intention to share accurate knowledge (Hendriks et al., 2016). The author's or publisher's intentions can sometimes be inferred from sponsors, advertisements, or the aims of affiliated organizations. Notably, the intentions of different types of organizations require prior knowledge of societal structures. Sometimes, intentions need to be inferred between the lines, which requires good reading comprehension skills.

In addition to the content and source, readers can take into account the context of the text in their evaluations (Forzani et al., 2022). Context refers to the sociopolitical setting in which the content and source appear. For example, readers may consider the historical setting of the text (Wineburg, 1991) or conventions associated with specific online genres (Corrigan & Slomp, 2021).

Theoretical considerations of credibility evaluation (Barzilai et al., 2020; Forzani et al., 2022) accentuate the fact that strategic evaluation processes are iterative. This means that such strategies are not used in isolation. For example, credibility judgments about the content affect judgments of the source. The relationship is bi-directional (Barzilai et al., 2020), so credibility judgments of the source also affect judgments of the content. In online contexts, credibility evaluation usually occurs across multiple texts. Thus, one's understanding of content and source credibility also evolves during reading. For example, readers may have initially considered the source very trustworthy, but after exposure to other texts, they may become more critical of the source (Svedholm-Häkkinen et al., under review).

Furthermore, evaluative practices are critical when readers synthesize information across multiple texts to build a coherent understanding of the topic they are examining online (Rouet, 2006). When synthesizing information, readers compare and contrast sources and their perspectives. Readers can consider, for example, the following: which sources share the same views, and which sources present conflicting views? Finally, readers can weigh different viewpoints by considering the strength of the argumentation and the trustworthiness of the sources when making their final conclusions regarding the topic (Vongkulluksn et al., 2023).

As depicted above, critical online reading is complex and requires flexibility in strategic processing. First, readers are expected to employ various evaluation strategies when navigating different types of texts. Second, readers need to regulate the depth of their evaluative processes. In some situations, readers can evaluate texts intuitively and quickly, whereas other situations demand slower, analytical, and reflective processing (Kahneman, 2003). Finally, readers face the challenge of remaining open to different views, especially when they encounter highly credible texts that contradict their prior beliefs (Svedholm-Häkkinen et al., under review).

The complexities inherent in critical reading challenge not only students but also their teachers. Teachers are best prepared when they are aware of the different strategies and their theoretical underpinnings, while also being able to explain how, when, and why to use them.

5.3. Students as critical online readers

Skilled critical online readers have a rich repertoire of evaluation strategies that they can employ when encountering different types of online texts. These students can differentiate more credible online texts from less credible ones. In addition, they can justify their evaluations from multiple perspectives. Our studies have observed skillful evaluation among students representing different grade levels (Kanniainen et al., 2022; Kiili et al., 2018, 2022). These students often have good comprehension skills that help them become skilled evaluators (Kanniainen et al., 2019). However, good reading comprehension skills do not automatically guarantee skillful, critical online reading.

Unfortunately, studies have also shown that many students struggle to judge the quality of online information (Coiro et al., 2015; Kiili et al., 2018, 2022; McGrew et al., 2018). For example, some students can hardly present any relevant justifications for why they trust or do not trust a specific online text. Furthermore, an International Computer and Information Literacy Study (ICILS) showed that 28% of Finnish eighth graders had limited skills in finding and using online information (Leino et al., 2019). Another important finding is that adolescent readers do better in confirming the credibility of more credible texts than in questioning the credibility of less credible texts (Kiili et al., 2023). However, even though students can confirm the credibility of the texts, they cannot necessarily justify why specific texts should be trusted (Kiili et al., 2022).

To conclude, evidence shows considerable interindividual differences among students that teachers may encounter in their classrooms. It is worth noting that students may be overconfident in their online credibility evaluation skills, when they need to question the credibility of online texts (Anttonen et al., 2023). This suggests that students are not necessarily aware of the complexities of online credibility evaluation. As questioning credibility is challenging for many students in comprehensive school, students need opportunities to critically analyze less credible and even misleading texts.

5.4. Teaching critical online reading

Although there is a clear need to teach critical online reading skills, not all students have equal opportunities to learn them. According to the ICILS, 63% of Finnish eighth-grade teachers participating in the study reported placing at least some emphasis on the credibility evaluation of information (Leino et al., 2021). Furthermore, a survey (Kulju et al., 2020) conducted among Finnish class teachers ($N = 593$) showed that only about a third of the class teachers reported that they had taught critical evaluation of texts (35% of the participating teachers) or reading online texts (31%) at least “quite a lot”. Even though the amount of teaching increased among first- to sixth-grade teachers, 15% of the sixth-grade teachers reported teaching reading of online texts very little or not at all.

There are various instructional practices that teachers can employ to promote students’ critical online reading skills, including modeling effective strategies, providing

cognitive and metacognitive supports, facilitating discussions, and presenting contrasting cases (e.g., Bråten et al., 2019; Hämäläinen et al., 2020; 2022; Pérez et al., 2018). As specifying various teaching practices is beyond the scope of this chapter, we focus on sharing a few overarching ideas that we perceive as important when designing instructional activities for promoting critical online reading.

As ever-younger children engage with online information, critical online reading should be taught early on. However, teaching should be adjusted to the students' developmental level, keeping in mind that readers' strategic processing develops throughout their lifespan in conjunction with increases in their world and domain knowledge (Alexander, 2005). Thus, particularly for younger students, teachers should offer emotionally safe and manageable learning spaces. For example, when discussing online misinformation with younger students, it is crucial to maintain their sense of safety. In addition, the complexities related to online information quality should be gradually revealed. For example, when considering the quality of evidence, research evidence can be less refined (e.g., different types of research evidence) for younger students than for older students.

Even though there are some general developmental underpinnings, students' strategic reading development does not go hand in hand with their age, as evidenced by considerable individual differences in critical online reading skills at different grade levels (e.g., Hämäläinen et al., 2023; Kanniainen et al., 2022; Kiili et al., 2022). Therefore, teachers should seek to address students' individual needs by differentiating instruction. Such differentiation can be accomplished by regulating the amount and complexities of texts and the difficulty of the guiding prompts, for example.

To help teachers select appropriate tasks for their students' needs, we have classified credibility evaluation task types according to their difficulty (see the list below), ranging from the easiest to the most challenging (Kiili & Kulju, 2024). The restricted tasks (I) are most suitable for elementary grades, and the most demanding tasks (IV) are most appropriate for secondary and upper secondary school students. However, as stated earlier, teachers can also use this classification flexibly according to their students' needs.

- i. Restricted tasks practicing the evaluation of one credibility aspect.
- ii. Evaluating credibility with online texts designed for teaching purposes.
- iii. Evaluating the credibility of authentic online texts selected by the teacher.
- iv. Evaluating the credibility of self-selected online texts and composing a synthesis based on multiple texts.

Teachers can use the task types to gradually increase the complexity of online credibility evaluations. The first task type is the most restricted, as it focuses on one credibility aspect at a time (e.g., the author's expertise or the quality of the evidence). In the second task type, students practice credibility evaluation with online texts designed for teaching purposes. These texts can be manipulated regarding credibility aspects, topics, and length to suit a specific grade level.

After practicing credibility evaluation with restricted texts, students can then proceed to practicing credibility evaluation with authentic online texts. In the third task

type, students evaluate texts selected by the teacher. Teachers can choose texts on specific topics that are relevant for teaching purposes (e.g., to focus on a specific credibility aspect or taught subject). The selected texts can vary in credibility; also, misleading texts can be analyzed critically through this task type. Finally, in the most demanding task type, students evaluate multiple online texts that they have selected to be part of a larger learning assignment. They may also synthesize information from these texts into written or multimodal products (i.e., composing an essay or video).

In the classification of these tasks, we used the credibility evaluation of online texts as an example. It should be noted that this classification can also be applied to other online reading practices, such as searching for information with search engines.

5.5. Teacher self-efficacy

Self-efficacy beliefs refer to one's confidence in accomplishing a specific task or goal (Bandura, 1997). Self-efficacy beliefs influence an individual's selection of activities, the effort they invest in the task, and their persistence in overcoming obstacles (Schunk, 2012). One area of self-efficacy that remains critical to the teaching profession is teacher self-efficacy, which concerns a teacher's beliefs in their ability to support their students' engagement and learning (Skaalvik & Skaalvik, 2010). It has been shown that high teacher self-efficacy is positively associated with the quality of classroom practices and students' motivation (Zee & Koomen, 2016). Furthermore, teachers who feel confident in their role as teachers are more open to new pedagogical ideas and may be more willing to try new methods than their counterparts with lower levels of confidence (Runhaar, 2010).

As with any other area of self-efficacy, teacher self-efficacy is situation specific (Bandura, 1997). Thus, even if a class teacher may be confident in teaching reading comprehension, the same individual may not necessarily be as confident in teaching new competencies, such as critical online reading. Therefore, even experienced teachers may need support to become self-efficacious in teaching critical online reading skills.

5.5.1. Sources of self-efficacy

Bandura (1997) differentiates four sources that can foster self-efficacy: 1) mastery experiences, 2) vicarious experiences, 3) social or verbal persuasion, and 4) physiological and emotional states. In teacher education, *mastery experiences* refer to previous successful teaching experiences that serve as indicators of one's capabilities. According to Bandura (1997), mastery experiences are regarded as the most influential source of self-efficacy because they provide direct feedback on one's capabilities. Teachers who view their past teaching efforts as successful will likely feel confident in similar future situations. On the contrary, if teachers have experienced failures, they are more likely to question their capabilities in similar circumstances. Mastery experiences in tasks that individuals perceive as challenging may be particularly impactful (Bandura, 1997).

In teacher education, opportunities for mastery experiences can be offered through teaching practicums or shorter teaching experiments (Täschner et al., 2024). To ensure

positive teaching experiences, especially among pre-service teachers, such opportunities should be sufficiently supported. Notably, in-service teachers may benefit from experiences that are not part of their daily routines (Täschner et al., 2024).

Vicarious experiences, namely learning from observing others' performances or demonstrations, can also inform teachers of their capabilities (Bandura, 1997). In teacher education, vicarious experiences can be offered through modeling, observing peers, or using vignettes (Täschner et al., 2024). One effective way to facilitate vicarious experiences is to model planning or teaching practices, which could be accompanied by reasoning about the pedagogical ideas behind them (Mok et al., 2023). In addition, co-teaching can lead to mutual learning and confidence building (Hawkman et al., 2019). Specifically, offering vicarious experiences has been shown to be an effective means of promoting teacher self-efficacy, which may on some occasions even exceed the usefulness of mastery experiences (Täschner et al., 2024).

Verbal and social persuasion related to a specific activity are also essential sources of self-efficacy, which can be provided in several ways (Bandura, 1997). Teachers can discuss teaching experiences with colleagues and peers, receive feedback from different sources, and provide mutual support during teacher collaboration (Täschner et al., 2024). These interactions may encourage individuals to overcome self-doubt or personal deficiencies (Hawkman et al., 2019), and they can be especially powerful for pre-service teachers who still have little experience in the field (Morris et al., 2017). For instance, receiving feedback on lesson plans has been shown to have a high potential to increase teacher self-efficacy (Mok et al., 2023). However, if teachers receive mostly negative feedback, this may lead to decreased self-efficacy (Tschannen-Moran et al., 1998). Thus, teacher educators should pay attention to how critical feedback is given and ensure that it remains constructive, specific, and delivered in an emphatic manner.

Finally, individuals' *physiological and emotional states* (e.g., anxiety, mood, bodily arousal, and enjoyment) can also serve as sources of self-efficacy (Bandura, 1997). While positive emotions, such as teaching enjoyment, are likely to support instruction, emotional support to reduce the stress related to new experiences is essential, particularly at the beginning of teachers' careers (Hascher & Hagenauer, 2016). When designing professional development for pre- and in-service teachers, physiological and emotional states are seldom addressed compared to other sources of self-efficacy (Täschner et al., 2024).

In addition to the four sources mentioned above, some scholars consider *knowledge* to be an additional source of self-efficacy (see Morris et al., 2017). According to Palmer (2006), experiencing an increase in content knowledge (i.e., knowledge of the taught subject) or subject-specific pedagogical knowledge can also enhance teachers' confidence in teaching. This was confirmed in Palmer's study, in which pre-service teachers were prompted to consider sources of self-efficacy during a science methods course. Palmer called these knowledge-related experiences cognitive content mastery and cognitive pedagogical mastery. In addition, Lauermaun and König (2016) found that the more pedagogical knowledge that in-service teachers had, the higher their teacher self-efficacy was.

It should be noted that the sources of self-efficacy do not operate in isolation, but are rather intertwined. Consequently, many interventions targeted at supporting

pre-service teachers' self-efficacy combine different sources of self-efficacy (Täschner et al., 2024). Finally, Tschannen-Moran et al. (1998) have highlighted that sources of self-efficacy do not directly affect the evolution of teachers' self-efficacy beliefs. Instead, it is crucial for teachers to interpret the information they are exposed to and their own experiences. Therefore, teachers would benefit from opportunities to *reflect* on their experiences during their professional development (Täschner et al., 2024).

5.6. Design principles to support teachers' self-efficacy in educating critical online readers

Drawing on the literature on self-efficacy, we formulated five intertwined design principles to foster teachers' self-efficacy in educating critical online readers (see Figure 5.1). Teacher educators can employ these design principles in teacher education or professional development courses.

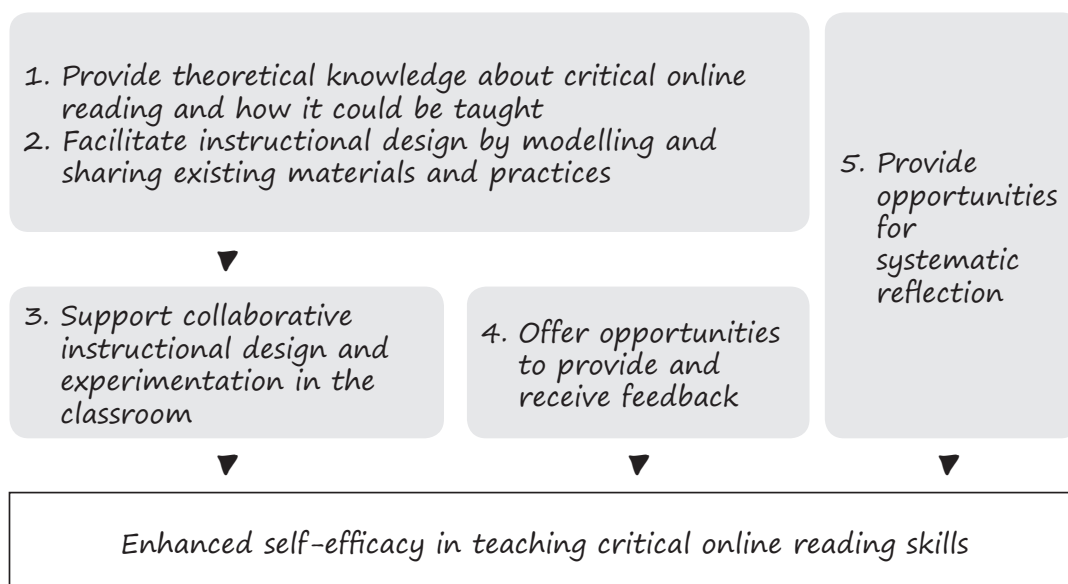


Figure 5.1. Design principles to support teachers' self-efficacy in educating critical online readers

Design Principle 1 encourages teacher educators to assist pre- and in-service teachers in building a solid knowledge base on critical online reading. Providing theoretical knowledge about critical online reading and teaching allows teachers to construct relevant knowledge and to experience cognitive and pedagogical mastery (Palmer, 2006).

Design Principle 2 motivates teacher educators to model and share existing learning materials and practices that teachers can use, apply, or modify when designing their instruction. The models demonstrate how theoretical knowledge of critical online reading can be applied in instructional design. Regarding learning materials, teacher educators can exemplify how theoretical knowledge is used to design materials that

specifically support critical online reading skills. This kind of reasoning may provide vicarious experiences that support teacher self-efficacy (Bandura, 1997).

The first two design principles lay the groundwork for *Design Principle 3*, which advises that teacher educators support pre- and in-service teachers' collaborative instructional design and experimentation. When designing and implementing a teaching experiment, teachers can consider and utilize the knowledge, models, and materials shared with them. For example, utilizing materials designed by experts may encourage teachers to design similar tasks and materials for their own subjects or purposes. Alternatively, using existing materials or instructional design ideas allows teachers to focus more on interactions with their students. These opportunities may offer a solid foundation for a successful teaching experiment that can, in turn, support teacher self-efficacy. Finally, collaboration provides opportunities for vicarious experiences through encouragement, feedback, and mutual support.

Design Principle 4 highlights the importance of feedback as a source of self-efficacy. Thus, teacher educators should ensure that teachers have opportunities to provide and receive feedback on their instructional design ideas and on their implementation of teaching experiments.

Finally, *Design Principle 5* encourages teacher educators to provide opportunities for systematic reflection. Systematic reflection allows teachers to process and interpret their experiences, models, and verbal persuasion (e.g., feedback and discussions) so that they have the potential to promote self-efficacy beliefs.

5.7. Implementing design principles and teachers' experiences

We implemented these design principles in two contexts, which consisted of formal teacher education and professional development courses (see Table 5.1). In the teacher education, we designed a course of five ECTS (The European Credit Transfer and Accumulation System) for pre-service teachers who studied at the advanced level of their class-teacher program. The optional course was organized several times at two Finnish universities, and 58 pre-service teachers completed the course. The course included 13 hours of contact teaching, a short teaching experiment at schools, further refinement of the instructional design, and independent work. Both courses focused on online credibility evaluation, a key component of critical online reading.

We utilized the experiences of the pre-service teacher course to design a professional development course for in-service teachers. As in-service teachers' time for professional development is limited, this course was shorter than the one we organized for pre-service teachers, consisting of two four-hour face-to-face sessions. Between the sessions, the in-service teachers implemented a short teaching experiment in their classrooms. Altogether, 13 in-service teachers participated in the course.

We next describe how we implemented the design principles in the courses for the pre-service and in-service teachers. Table 1, at the end of this section, summarizes the implementation of the design principles in these two contexts. We will also share some of the teachers' insights about their experiences with the courses and relate them to the design principles. In this section, we will rely on guided reflections collected during

the formal teacher education course and in-service teacher interviews conducted after the professional teacher course.

The pre-service teachers wrote three reflections at critical points in the course: at the beginning, after the teacher experiment, and at the end of the course. The extracts presented are drawn from the final reflections ($N = 57$), in which the pre-service teachers were asked to reflect on their own thoughts and feelings about critical online reading and teaching practices (Kulju & Mäkinen, 2022).

The extracts from the in-service teachers were drawn from semi-structured interviews ($N = 6$), which lasted approximately 25 minutes each. In these interviews, the in-service teachers were asked about which aspects they felt were meaningful in the course. They were also asked to share their thoughts about the different course elements, such as the role of collaboration.

5.7.1. Design principle 1: Provide theoretical knowledge about critical online reading and how it could be taught

Teacher knowledge is considered one of the key elements that guides everyday teaching activities (Shulman, 1987; Allas et al., 2020). Our course design was informed by Shulman's (1987) conceptualization of teacher knowledge. Shulman divides teacher knowledge into research-based content knowledge, pedagogical knowledge, and pedagogical content knowledge.

Content knowledge refers to the subject being taught. In our course designs, content knowledge concerned critical online reading, especially online credibility evaluation. *Pedagogical knowledge* concerns the general classroom management principles that transcend the subject matter (Shulman, 1987). Finally, *pedagogical content knowledge* combines the rich conceptual knowledge of the taught subject with the knowledge of teaching practices that best promote students' learning of the relevant content and skills (see also Loughran et al., 2012).

Pedagogical content knowledge highlights how particular topics are adapted to the diverse interests and abilities of learners and presented for instruction (Shulman, 1987). Similarly, teaching specific skills, such as critical online reading skills, has unique requirements and features that differentiate it from teaching basic reading skills. Knowledge about pedagogical approaches to support critical online reading skills facilitates teachers in developing their teaching practices in a pedagogically sound way.

To support teachers' knowledge of students, we provided empirical evidence of students' online credibility evaluation skills across different grade levels. We consider this important, as it provides an understanding of what students can and cannot do, especially for pre-service teachers. It also illustrates considerable individual differences among students. In addition, having a realistic view of students as critical readers may help teachers calibrate their learning supports to more effectively meet their students' needs.

In the course designed for the pre-service teachers, we used expert videos, readings, and interactive lectures to support their theoretical knowledge about critical online reading. The five educational experts created a total of seven 15-minute-long videos. The first four videos covered a) theoretical knowledge about online credibility

evaluation, b) empirical evidence about students' online credibility evaluation skills, and c) pedagogical content knowledge about instructional methods that can support students' online credibility evaluation skills. The last three videos included knowledge about motivating learners, gamified instruction, and teaching critical online reading to diverse learners.

Aside from the expert videos, pedagogical content knowledge was supported by course readings, which included pedagogical conceptualizations about teaching online reading and materials for teaching critical online reading. In addition, interactive lectures outlined the current educational practices of online reading and related challenges.

Pre-service teachers considered the knowledge provided valuable in designing the teaching experiment and beyond. Extract 1 illustrates how the theoretical knowledge helped a pre-service teacher broaden her understanding of critical online reading and apply this knowledge in classrooms.

Extract 1

I particularly needed a theoretical background on the subject. The new knowledge gained during the course has enabled me to think broadly about the different aspects of critical online reading and the application of this theoretical basis in practice.

Pre-service teacher

For the in-service teachers' professional development, we scripted three videos that were professionally produced. The videos were five to twelve minutes long and covered the following topics: What is critical reading? How well can students evaluate the credibility of online texts? How can critical online reading be taught? The videos were watched and discussed in the first of the two sessions. In the discussions, the in-service teachers reflected on their knowledge and experiences of teaching online credibility evaluation in relation to the content of the videos.

Extract 2 illustrates how the pedagogical content knowledge helped a teacher understand how critical online reading instruction could be included as an integral part of yearly teaching, so that students' skills would accumulate during their secondary schooling. This is an important insight, as complex skills, such as critical online reading, require regular attention.

Extract 2

The course clarified what to do with seventh graders, starting from small pieces and gradually increasing the challenge. Somehow, it is now clearer how [teaching critical online reading] can be part of the yearly plan, and how teaching progresses through different grade levels.

In-service teacher

5.7.2. Design principle 2: Facilitate instructional design by modeling and sharing existing materials and practices

Learning through modeling, defined as the purposeful demonstration of the skills

needed to perform tasks, is considered a valuable mean of supporting pre-service and in-service teachers' learning about teaching (e.g., Jansen et al., 2023; Lunenberg et al., 2007). However, comparatively few models may be available for teachers, especially in specific areas, such as critical online reading. Therefore, we found it essential to support teachers' pedagogical content knowledge through modeling.

There are various ways to use modeling in teacher education. For example, Montenegro (2020) has identified that teacher educators think of modeling as a means of 1) teaching pedagogical strategies, 2) recreating teacher-student relationships, 3) enacting a congruent teaching approach, and 4) developing teaching linked to the school classroom. Our design utilized the first and fourth of these means.

In our courses, we *modeled pedagogical strategies* to demonstrate specific instructional practices for teaching critical online reading skills. In the pre-service teachers' course, the teacher educator modeled, for example, how evaluation practices could occur during online reading. For in-service teachers, we demonstrated how they could model effective critical online reading practices by thinking aloud.

We also demonstrated how research-based learning materials could be used to teach online credibility evaluation strategies. We unpacked how theoretical knowledge has been utilized in designing learning materials to encourage teachers to adopt or develop theory-informed learning materials and tasks to serve their subjects. As shown in Extract 3, one pre-service teacher experienced that demonstrations gave her new insights into how to teach critical online reading skills.

Extract 3

The lectures and learning materials have given me various aha experiences: I can actually teach this way, too.

Pre-service teacher

With the in-service teachers, we had less time for instructional design during the course. Thus, we presented a package of research-based materials to inspire their design. We also modeled task types for teaching credibility evaluation (see Table 1). In-service teachers used the materials as such or applied the task types in their own teaching experiments. One of the in-service teachers described how she gained the confidence to create materials by herself.

Extract 4

You [teacher educators] have designed texts for the assignments yourself. I haven't done that myself because I thought the texts should be authentic. It was a relief to find that I could create texts myself to teach critical reading in my subject.

In-service teacher

Modeling can also be seen as a means of *connecting teaching to the complexities of school classrooms* (Montenegro, 2020). Making these complexities explicit facilitates pre-service teachers' understanding of the challenges of teaching critical online reading skills. In our design, we discussed the potential challenges that might have been encountered before the teaching experiments. Sometimes, pre-service teachers verified

facing these complexities in their own teaching experiments. For instance, they noticed that it would be wise to teach only one aspect of credibility at a time (Kulju & Mäkinen, 2020).

As professionals, the in-service teachers had a strong level of understanding of the classroom reality. However, they still shared their own experiences of the possible challenges or successes they encountered in applying the learning materials in their classrooms (e.g., the difficulty level of the teaching materials).

5.7.3. Design principle 3: Support collaborative instructional design and experimentation in the classroom

To provide authentic experiences for teaching critical online reading skills, the teachers designed a short teaching experiment. As sharing ideas, materials, and experiences may help teachers become aware of best practices in teaching challenging topics, we preferred collaboration in designing and implementing the experiment. Collaborative activities can range from teachers' spontaneous conversations about challenges in teaching to structured co-learning opportunities in formal teacher education (Avalos, 2011; Isac, 2022).

The pre-service teachers designed and implemented a 90-minute teaching experiment in pairs. Designing the teaching experiment proceeded in several phases. In the first phase, the pre-service teacher pairs wrote a concept paper that included initial design ideas for the teaching experiment. The creation of the concept paper was facilitated by expert videos and learning materials that the pre-service teachers could use or modify as they wished. The lesson plan template of the teacher training school served as a concrete tool for the concept paper. It included learning objectives, assessment practices, key concepts, facilities and materials, and a progress plan. In the second phase, the pairs presented their concepts to others in the class, and ideas were discussed by the peers and the teacher educator. In the third phase, the pairs submitted their completed teaching plans before implementing their experiments.

The pre-service teachers implemented their teaching experiments in the teacher training school. The advantage of teacher training schools lies in the experienced class teachers, who guide the pre-service teachers' teaching practices. In our case, however, the pre-service teachers co-taught the planned lessons independently, even though both the class teacher and the teacher educator were present. They supported the pairs only sporadically, if needed.

The co-design process continued as the pre-service teachers planned an improved and refined version of their instructional design. These improved versions were presented to others. Again, the designs were discussed. Extract 5 illustrates the benefits of sharing instructional designs and teaching experiences with others.

Extract 5

I found the presentations by other groups particularly useful. They have also given me further ideas that I am sure I will be able to use in the future.

Pre-service teacher

The in-service teachers also designed and implemented short teaching experiments in their classrooms. They were encouraged to co-design the instruction with a colleague. The instructional design was supported by expert videos, related discussions, and existing learning materials. There was also an opportunity for joint brainstorming and planning at the first meeting.

After implementing the teaching experiment, the in-service teachers shared their experiences. These discussions served as a means of sharing good practices and providing feedback to colleagues. The teachers seemed to value these joint discussions, as illustrated in Extract 6.

Extract 6

It was particularly interesting to hear how the students responded to the given tasks in practice, what kinds of outputs they produced, and what kinds of challenges came up. I found it the most rewarding.

In-service teacher

5.7.4. Design principle 4: Offer opportunities to provide and receive feedback

In our design, we considered that feedback sessions could include both instructional and emotional support (Mok et al., 2023; Ellis et al., 2020). As feedback, especially on lesson plans, has been shown to be beneficial for pre-service teachers (Mok et al., 2023), we emphasized opportunities to provide and receive feedback during the instructional design process. Consequently, the pre-service teachers received oral feedback from their peers and the teacher educator at several key points. These opportunities were not explicitly framed as feedback, but rather as shared discussions.

First, feedback was provided on the concept papers for the teaching experiments. The pre-service teachers presented their concepts in class, where they were thoroughly discussed. As expert feedback may be more specific than that of pre-service teachers (Prilop et al., 2021), we also found it important for the teacher educator to offer personal guidance and feedback to pairs. In these discussions, the teacher educator's role as a pedagogical co-designer (cf. Bovill et al., 2015) was to pay attention to specific instructional aspects, such as the key idea of the instructional design, the suggested difficulty level of the text materials, and the use of classroom time. The purpose was to give room for pre-service teachers' ideas and gently guide them to identify potential challenges in applying the designed tasks and materials.

Second, the pre-service teachers received feedback when they presented their teaching experiences to others in the class. Both their peers and the teacher educator commented on the shared experiences and provided feedback. Third, feedback was provided in the final meeting, when pre-service teachers presented their ideas for further refinements of their instructional designs in the class.

Overall, the emphasis was on positive feedback, which has been recommended to assure teachers about their abilities, thereby resulting in higher goals and commitment (e.g., Prilop et al., 2021). Even though the teacher educator made suggestions on how to improve and develop the designed tasks and materials, an underlying aim was to encourage the pre-service teachers to teach critical online reading. In general,

encouragement and emotional support are needed, especially after actual teaching experiments at school, as they can be rather revealing, for instance, in terms of task difficulty or task management.

Based on the teacher educators' experiences, most of the feedback pre-service teachers gave to each other was positive and encouraging. The pre-service teachers also found the peer feedback meaningful, as the following extract illustrates.

Extract 7

I think it was good that the lessons were discussed together afterwards so that everyone was able to share their experiences and get suggestions for improvement and positive comments from others.

Pre-service teacher

Since the pre-service teachers were at an advanced level of their teacher education, they had experience in providing and receiving feedback. That being said, it is important to provide opportunities to practice providing and receiving feedback during teacher education (Prilop et al., 2021).

For the in-service teachers in the professional context, we emphasized collegial feedback sessions, which have been shown to be fruitful at later stages of one's career (Täschner et al., 2024; von Suchodoletz et al., 2018). The in-service teachers shared their teaching experiences with others, including rich commentaries and feedback. The teacher educator's role was to facilitate the discussions, and again, substantial effort was put into providing positive feedback. It seems that the in-service teachers especially valued the collegial support and encouragement they received through this process (see Extract 8).

Extract 8

Having done different things, it is interesting to hear how they went for others. When you have colleagues working on the same topic, collegial communication is very important. I think it's important to be able to talk to people in the same field.

In-service teacher

5.7.5. Design Principle 5: Provide opportunities for systematic reflection

For teachers, reflection is pivotal in identifying, analyzing, and solving the complex problems that characterize their classroom work (Toom et al., 2015). However, as teaching is a multi-layered process, identifying underlying beliefs and knowledge may be challenging (Allas et al., 2020). Thus, our design was informed by two critical practices that support teachers' reflection. First, the reflection process was systematic and guided. We used specific prompts and questions to guide the reflections, as novice teachers in particular may need extra support to direct their attention to meaningful aspects, such as student learning (Husu et al., 2008; Allas et al., 2020). Second, we considered that reflection could be conducted individually and interactively with others. We believed that both the pre- and in-service teachers would benefit from reflective discussions that enabled them to share their experiences and learn from others (see Allas et al., 2020).

The pre-service teachers wrote individual reflections at three time points: at the beginning of the course, in the middle after the teaching experiment, and at the end of the course. The three reflections were guided in slightly different ways, but each time, the pre-service teachers were asked to reflect on their thoughts and feelings about critical online reading and how it could be taught (Kulju & Mäkinen, 2022).

The first reflection was supported by a short self-efficacy questionnaire, including questions related to the credibility evaluation of online texts and teaching this skill in classrooms. The first reflection was prompted by the initial discussion on teaching critical online reading skills.

The key input of the second reflection was the teaching experiment and the subsequent shared discussions and feedback on this phase. An example of a guided question was, “What did you learn about teaching critical online reading?”

The third reflection was prompted by a short self-efficacy questionnaire, like the first, which was filled out for the second time at the end of the course. In addition, the pre-service teachers were encouraged to consider the whole course and shared discussions in their reflections. In Extract 9, one of the pre-service teachers described the benefits of such reflection.

Extract 9

When reflecting on my own teaching, I became more aware of my areas for development, which I should consider when planning and delivering my next lessons on online reading.

Pre-service teacher

For the in-service teachers, the reflection process was not as systematic. However, a short self-efficacy questionnaire (the same as the pre-service teachers' questionnaire) was assigned at the beginning of the course to trigger the reflection process. The teacher educator collected the questionnaires and returned them at the end of the course. The teachers were encouraged to reflect on their answers and compare them with their current thoughts. Extract 10 illustrates how the short questionnaire supported reflection in this regard.

Extract 10

The self-efficacy questionnaire helped me reflect on what has changed. I gained the confidence to teach the subject [critical online reading].

In-service teacher

The main activity supporting the in-service teachers' reflections was the shared reflective discussions. In the first meeting, experiences of teaching critical online reading were shared. The most important shared discussion took place in the second meeting when the teachers shared their experiences of their teaching experiments. In Extract 11, one of the teachers describes the perceived benefits of reflective discussion with colleagues.

Extract 11

It is good to hear different kinds of experiences. They may confirm which parts work out

and which may not, and how you could further develop. It is easier when you have another colleague with whom to engage in a dialogue.

In-service teacher

Table 5.1. Implementation of design principles for supporting teachers' self-efficacy in teaching critical online reading in teacher education and teacher professional development courses

Design principle	Teacher education (pre-service teachers)	Teacher professional development (in-service teachers)
1. Provide theoretical knowledge about critical online reading and how it could be taught	Building a theoretical foundation through expert videos, readings, and interactive lectures	Deepening theoretical foundation through watching expert videos and discussing them
2. Facilitate instructional design by modeling existing materials and practices	Modeling pedagogical strategies Sharing learning materials	Modeling pedagogical strategies Modeling task types Sharing learning materials
3. Support collaborative instructional design and experimentation in the classroom	Designing and implementing a short teaching experiment in pairs in a teacher training school's classroom Sharing the experiences of the teaching experiment with other pre-service teachers Planning a further version of a teaching experiment and sharing the ideas with others	Designing and implementing a short teaching experiment in the teachers' own class (in collaboration, if possible) Sharing the experiences of the teaching experiment with other in-service teachers
4. Offer opportunities to provide and receive feedback	Teacher educator's encouragement and feedback on instructional design, lessons taught, and further refinement of the instructional design Peer feedback on instructional design, lessons taught, and further refinement of the instructional design	Sharing and discussing experiences of the teaching experiment
5. Provide opportunities for systematic reflection	Guided, systematic written reflections at three key junctures of the course Shared discussions	Shared collegial discussions

5.8. Concluding remarks and future directions

Critical online reading skills are pivotal to survival in a society in which a substantial amount of information is communicated in digital spaces. Throughout their professional lives, teachers need to feel confident in their teaching practices and willing to develop new skills to support their students in becoming critical online readers in rapidly changing digital reading environments.

In this chapter, we proposed five design principles to support teachers' self-efficacy in teaching critical online reading. We also demonstrated how we applied these principles in two teacher education contexts. The pre-service teachers' written reflections and in-service teachers' interviews suggest that applying these design principles in a coordinated way is a promising practice to support teachers' self-efficacy.

Even short teaching experiments explicitly focusing on critical online reading may provide mastery experiences for teachers and nurture new pedagogical ideas. In this regard, the in-service teachers found learning materials designed for teaching critical online reading and collegial support especially meaningful. As these were initial observations, further systematic research is needed to determine the broader utility of the design principles.

Supporting teachers' self-efficacy should not be reliant solely on individual courses. Educational and school policies should encourage teachers to co-design meaningful learning experiences for their students, co-create new pedagogical knowledge, and co-teach to meet students' diverse needs (cf. Ellis et al., 2020). Furthermore, practices that enable collaboration between novice and experienced teachers would also provide an opportunity to enhance teacher's self-efficacy, especially at the beginning of their careers.

Summary

Educating critical online readers who can navigate purposefully, critically, and responsibly in online spaces is a fundamental goal of education. However, constantly changing online environments, evolving digital reading practices, and widespread misinformation pose significant challenges to achieving this goal. Therefore, teacher education should support teachers in this endeavor. This chapter presents five design principles to support teachers' confidence in promoting students' engagement in and learning of critical online reading. The principles include 1) providing theoretical knowledge about critical online reading and how it could be taught, 2) facilitating instructional design by modeling and sharing existing materials and practices, 3) supporting collaborative instructional design and experimentation in the classroom, 4) offering opportunities to provide and receive feedback, and 5) providing opportunities for systematic reflection. In addition, we illustrate how the design principles were implemented in formal teacher education and teacher professional development courses. The pre- and in-service teachers' experiences of the courses suggest that applying the design principles in coordinated way is a promising practice to support teachers' self-efficacy.

Glossary

CRITICAL ONLINE READING. Evaluating credibility and relevance of information when searching for, processing, and synthesizing online information.

MASTERY EXPERIENCE. Previous successful experiences that indicate one's capability to accomplish a specific task.

ONLINE CREDIBILITY EVALUATION. Evaluating the quality of online information by considering the accuracy of content and the trustworthiness of the source.

PEDAGOGICAL CONTENT KNOWLEDGE. Teacher's knowledge of teaching specific content.

REFLECTION. Processing and interpreting experiences, beliefs, and emotions.

SELF-EFFICACY. An individual's confidence in accomplishing a specific task or goal.

SOURCING. Attending, evaluating, and using information about individuals and organizations that have written or published online text.

TEACHER SELF-EFFICACY. Teachers' confidence in supporting their students' engagement and learning.

VERBAL AND SOCIAL PERSUASION. Comments, feedback, and encouragement that individuals receive on their performance.

VICARIOUS EXPERIENCE. Learning through observing others successfully perform a specific task.

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Conclusions

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