

The Influence of Online Education on Students' Attention and Safe Teaching

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Abstract

This article examines the relationships among online education, students' attention, and safe teaching in vocational and technical subjects. Online education has become an established component of the educational process and has fundamentally transformed both knowledge acquisition and the organisation of technical and vocational instruction. The main question addressed is how the digital environment affects students' attention and what prerequisites are required to ensure that online teaching remains both safe and effective. The article analyses the benefits and risks of online education, attention-supporting techniques, and the didactic strategies employed by teachers of vocational subjects. Attention is conceptualised as a variable cognitive function that can be intentionally developed through pedagogical approaches, the regulation of digital technologies, and the creation of a safe learning environment. In line with current trends, the article highlights the importance of high-quality preparation for vocational teachers in digital instruction, their technological proficiency, and their role in shaping safe and structured learning practices.

Keywords: Online Education, Attention, Safe Teaching, Vocational Subjects, Digital

1 Introduction

Online education has, within just a few years, become an integral part of school practice and is no longer perceived as a temporary solution but rather as a stable model of the educational

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process. The COVID-19 pandemic significantly accelerated this transformation and simultaneously exposed limitations in the preparedness of schools, teachers, and students for changes in instructional modes (Adnan & Anwar, 2020). Research has shown that simply transferring traditional teaching methods to an online environment is insufficient, as the nature of cognitive processes, interaction patterns, and feedback mechanisms fundamentally changes (Mahyoob, 2020). Conversely, online education has also provided opportunities for flexibility, individualisation, and multimodal learning, all of which can offer considerable added value in vocational education.

The literature on safe educational environments consistently emphasises that learning is effective only when it takes place within a didactically safe and well-structured framework in which students clearly understand learning objectives and are able to orient themselves within tasks (Hanuliaková & Porubčanová, 2024). This requirement is even more pressing in the online environment, where students lose the natural anchor points of the physical classroom and their attention is exposed to a far greater number of competing stimuli. The teacher thus becomes not only a facilitator of content but also a regulator of the digital environment and a guarantor of safe instruction.

Particular demands are placed on teachers of vocational subjects, who must ensure the acquisition of complex technical procedures and practical skills in a digital environment. Research in technical and vocational education indicates that these teachers function as both interpretative and safety nodes: they transform technical concepts and technological processes into forms that students can understand, visualise, and apply safely (Bočková et al., 2023). At the same time, their workload increases, as they must adapt practical tasks to the online environment while maintaining safe and transparent learning conditions.

The social and organisational dimensions of education also come to the fore. Studies on the safety of school environments point to the importance of certainty, predictability, and relational stability as prerequisites for effective learning (Sirotová, 2025; Emmerová, 2025).

In the context of formative education at secondary schools, Tamášová and Zapletal (2022) demonstrate that an environment characterised by a positive climate, clear expectations, and transparent pedagogical communication is essential for the development of student responsibility and focus. These findings are fully applicable to online instruction, in which students need sufficient information not only about content but also about procedures and assessment criteria.

A crucial aspect of a safe environment is the management of attention, which in the digital environment becomes one of the most heavily taxed cognitive functions. Digital tools offer abundant resources and rapid feedback but simultaneously demand greater stimulus selection and more advanced metacognitive skills from students (Robinson & Cook, 2018; Mrázek et al., 2022). Maintaining attention cannot be left to chance or individual predispositions but must be an intentional part of pedagogical design.

2 Online Education and Its Didactic Specifics Headings

Online education is not merely a technical shift to a different platform but an intervention in the very structure of teaching. Several empirical studies confirm that online instruction must be conceived as a distinct pedagogical system that considers the different nature of interaction, motivation, and students' attention (Baticulon, 2020; Adnan & Anwar, 2020).

A fundamental prerequisite is a clear architecture of the learning process: explicit objectives, a transparent task schedule, and unambiguous communication of requirements. Without these elements, students experience increased cognitive overload, lose orientation in the curriculum, and their ability to focus on key components of the learning situation declines (Mahyoob, 2020).

Digital platforms such as Microsoft Teams or Google Classroom provide an appropriate framework for managing tasks, archiving materials, and offering feedback; however, their didactic potential depends on how the teacher structures and moderates the learning process. Research on safe environments indicates that students benefit from a stable, repeatable lesson structure that alternates between the exposition of new content, active engagement, and reflection (WHO, 2023; Hanuliaková & Porubčanová, 2024; Emmerová, 2025). In online learning, this structure often serves as the main guide, replacing the natural organisation present in a physical classroom.

In vocational subjects, the situation is even more complex because students must integrate theoretical knowledge with specific work procedures. The State Institute of Vocational Education (ŠPÚ, 2022) highlights that digitalised vocational education cannot rely solely on theoretical presentations but must also include tasks stimulating applied and problem-based thinking. Teachers are thus compelled to redesign traditional practical exercises into formats suitable for online learning—such as video demonstrations, simulations, case studies, or virtual laboratories. Although each of these solutions has limitations, when implemented well, they can support sustained attention and help students understand the sequence of steps in technical processes.

A further significant shift involves changes in interaction patterns. In face-to-face instruction, teachers can immediately react to non-verbal cues, address misunderstandings, and adjust the pace of the lesson. Online environments weaken these mechanisms—reactions may be delayed, visual feedback is limited, and monitoring each student's activity in larger groups becomes challenging. Research in technical subjects shows that delays or disruptions in feedback can lead to errors in mastering procedures and to a decline in focus (Bočková et al., 2023). Teachers must therefore purposefully plan checkpoints for verifying understanding and use varied forms of interaction—short questions, quizzes, chat responses, and reflective comments.

Online learning also shifts more responsibility for structuring the learning process to students. Whereas in face-to-face instruction teachers manage much of the organisational structure for students, online environments require learners to self-regulate their time, plan their activities,

and evaluate their progress. This benefits students with strong self-regulation but poses risks for others, particularly at the secondary level (Mrázek et al., 2022).

Teachers of vocational subjects must therefore explicitly develop students' metacognitive skills—for instance, through reflective tasks, planning work steps, or maintaining learning journals.

A synthesis of these findings shows that online vocational education cannot be reduced to a simple technological shift. Instead, it requires a comprehensive redesign of didactic approaches. The teacher becomes the architect of the online learning environment, responsible for ensuring clear objectives, appropriate cognitive load, transparent organisation, and meaningful use of technology. Without a well-developed didactic concept, online teaching risks undermining attention, compromising safety, and reducing the overall quality of vocational education.

3 Safe Teaching in the Online Environment

A safe educational environment is currently conceptualised as a multidimensional framework encompassing physical, psychological, social, and didactic safety. Research on school safety emphasises fundamental prerequisites such as transparent organisation, clear behavioural rules, and consistent responses to risk situations (Emmerová, 2025; Kozubík, 2025).

In online learning environments, these principles are transferred into digital form: platform stability, clear working rules, civil communication, and data protection.

It is important to distinguish between technical and didactic safety. Technical safety includes secure access credentials, protection against inappropriate content, and reliable software. Didactic safety refers to a framework in which students understand expectations, have clear instructions, and receive sufficient support to complete tasks. Research on safe educational environments repeatedly shows that without clear structure and explanation of rules, students' uncertainty increases, leading to diminished attention and more risk-prone behaviours (Porubčanová, 2025; Hanuliaková, 2023).

These findings align with international studies demonstrating that the quality of distance education is determined more by organisation and communication than by technology itself (Adnan & Anwar, 2020).

In vocational education, safety has traditionally had a strong physical dimension—students work with tools, machinery, or materials, governed by clear safety protocols. Although this physical component may seem less prominent online, it takes on new forms. Vocational teachers must ensure that students understand risks even when viewing demonstrations through video or simulation. Moreover, teachers must guarantee the ethical and professional quality of digital materials and ensure that online tasks do not require students to perform unsafe interventions at home (Bočková et al., 2024).

The social dimension of safety is particularly fragile online. Studies on school climate demonstrate that feelings of acceptance, fairness, and predictable teacher responses

significantly influence students' willingness to collaborate and communicate openly (Michvocíková, Malichová-Oříšková, 2025; Tamášová & Zapletal, 2022).

In digital environments, these bonds can weaken as communication becomes more concise and less personal. Teachers must therefore intentionally create opportunities for interaction, questioning, and constructive feedback, ensuring that students perceive online lessons as safe spaces for learning and expressing uncertainty.

A particularly relevant risk is student overload. Research on online teaching reports that numerous tasks, multiple platforms, unclear deadlines, and inconsistent requirements across subjects often lead to feelings of chaos, weakening attention and motivation (Mahyoob, 2020). Authors focusing on safe environments stress that students learn effectively when expectations, deadlines, and assessment methods are transparent (Emmerová, 2025). For vocational teachers—whose tasks are often more complex and time-consuming—rigorous adherence to these principles is essential.

Comparisons of Slovak and international research (Porubčanová et al., 2025, 2023; Olejníková, 2025) indicate that a safe online environment results from the interplay of multiple factors: clear organisational structure, adequate technical support, civil communication, and professional teacher guidance. Without such coordination, online instruction risks fragmenting attention, weakening relationships, and reducing the quality of vocational education. In this context, the vocational teacher becomes the decisive actor whose approach can stabilise or destabilise the entire process of safe learning.

4 Students' Attention in Online Education and Pedagogical Strategies for Its Support

In psychological literature, attention is defined as a selective and sustained orientation toward relevant stimuli, which enables deeper information processing. In online education, this cognitive function is particularly strained because students are simultaneously exposed to learning content, technical interfaces, and numerous potential distractions. Robinson and Cook (2018) introduce the concept of "*stickiness*", referring to the degree to which a student can remain engaged with a learning activity without shifting attention to other stimuli. Their research shows that the duration and quality of sustained attention are closely linked to task design, clarity of instructions, and the teacher's moderating strategies.

Mrázek et al. (2022) and Zelina (2018) empirically demonstrate that attention can be trained through techniques that explicitly develop students' self-regulation and metacognitive awareness. In the online environment, this translates into teaching students how to manage digital distractions, divide work into shorter blocks, monitor levels of fatigue, and intentionally schedule breaks. Without such support, students tend to fall into passive observation—formally attending the lesson while dividing their attention across multiple activities.

In vocational and technical subjects, attention is essential not only for understanding theoretical content but also for following sequential procedures in practical tasks. Bočková et al. (2023) and Olejníková (2025) point out that teachers in technical disciplines must manage complex instructional processes that are demanding for students even in face-to-face settings. Online, these demands intensify: students must monitor screens, interpret verbal instructions, and mentally visualise processes that would typically be supported by multisensory experiences in a workshop or laboratory. Without appropriate scaffolding, attention declines rapidly, leading to superficial learning.

Digital distractions belong to the most significant challenges of online learning. According to Mahyooob (2020), notifications, parallel applications, and attempts at multitasking result in fragmented attention and reduced task performance—especially among students who lack advanced self-regulation skills. Although the digital environment often creates the illusion that multitasking is efficient, research (Magdadiová, 2025) consistently shows that task-switching reduces processing depth and increases error rates.

Pedagogical strategies designed to support attention must respond to these specific demands. Based on analyses of teaching practice, Impero (2023) recommends structuring lessons into shorter, clearly defined segments with frequent checkpoints and varied activities. Consistent with the recommendations of Mrázek et al. (2022), it is effective for teachers to explicitly teach planning routines, identification of personal distractors, and reflection on moments when attention lapses. In vocational subjects, these strategies can be integrated into content delivery—for example, planning the steps of a technical task serves both as attention training and as a professional skill-building activity.

Assessment also plays a key role. Robles and Braathen (2002) distinguish among traditional, alternative, and performance-based assessments. In vocational education, it is crucial to balance these forms in online contexts. Alternating tests, project assignments, practical demonstrations, and reflective activities increases variety and prevents monotony—one of the primary contributors to attention decline. For example, vocational teachers may combine short theory quizzes with video analyses of technical procedures and individual student reflections on the most challenging steps.

A synthesis of psychological and pedagogical perspectives demonstrates that attention cannot be viewed merely as an individual trait. It emerges from the interplay of personality predispositions, learning habits, and the quality of the learning environment. In a safe, well-structured online environment—where the teacher clearly defines objectives, processes, and working rules—students with weaker self-regulation abilities have far better chances of sustaining attention (Emmerová, 2025; Hanuliaková & Porubčanová, 2024).

In this context, the teacher of vocational subjects is a key agent whose didactic design determines whether the online environment becomes a support or an obstacle to students' attention and the development of vocational competencies.

5 Research Section

The research section is based on a partially modified design of the study by Bočková, Porubčanová, Procházka, and Gawrych (2023), which examined the workload and didactic challenges faced by technical subject teachers. In our study, the focus was placed on the relationship among online lesson organisation, students' attention, and vocational teachers' perceptions of educational safety.

Research Objectives:

1. To examine how vocational subject teachers assess students' attention during online instruction.
2. To ascertain how they perceive the safety of the educational environment in a digital context.
3. To identify which didactic strategies teachers consider most effective for maintaining student attention and ensuring safe learning processes.
4. To analyse the extent to which students' attention is associated with the clarity and organisation of online teaching.

The research involved 89 vocational subject teachers from Slovak secondary vocational schools, representing three disciplinary groups:

- Technical fields (46%)
- Gastronomy and hotel services (32%)
- Arts and crafts (22%)

The average length of teaching experience was 14.2 years.

A questionnaire was developed comprising three sections:

1. Online lesson organisation – clarity of instructions, transparency of tasks, and lesson structure ($\alpha = 0.87$).
2. Students' attention – perceived focus, responsiveness, and susceptibility to distraction ($\alpha = 0.81$).
3. Safe educational environment – clarity of rules, teacher availability, predictability, and communication culture ($\alpha = 0.84$).

All items were measured using a 1–5 Likert scale.

Key Findings

- a) Students' attention in online lessons is highly variable.

Up to 72% of teachers reported that students were easily distracted during online instruction and required more frequent changes of activity. This aligns with Robinson and Cook (2018), who emphasise the short-term stability of attention in digital environments.

b) Clear lesson organisation predicts attention.

Regression analysis ($R^2 = 0.41$) showed that task transparency and clear instructions explain 41% of the variance in students' attention. These findings support claims by safety theorists (Emmerová, 2025; Zahoranská, 2025) that didactic certainty is fundamental to effective learning.

c) Sense of safety correlates with attention and orientation.

Teachers who reported higher availability to students also rated students' attention more positively ($r = 0.46$). This confirms the argument by Tamášová and Zapletal (2022) that clearly communicated expectations enhance student orientation and reduce stress.

Unlike face-to-face instruction, where teachers have natural control over the classroom environment, digital instruction shifts part of this responsibility to students, many of whom may lack metacognitive skills required for maintaining attention. The research shows that teachers most frequently adopt strategies such as:

- predictable and stable lesson structure,
- frequent comprehension checks,
- alternating shorter activity blocks,
- explicit articulation of each activity's purpose.

These practices were also identified as effective in the previous research by Bočková et al. (2023), forming the foundation of successful vocational pedagogy under challenging teaching conditions.

6 Discussion

The findings of this study confirm several conclusions from previous research on online education, educational safety, and attention in digital contexts. Clear lesson organisation emerged as the most significant factor influencing students' attention. This is consistent with international evidence indicating that transparency and clarity of tasks are among the strongest predictors of learning success in online settings (Adnan & Anwar, 2020; Mahyoob, 2020).

The correlation between a safe learning environment and attention is equally important. Authors writing on school safety (Porubčanová, 2025; Emmerová, 2025) emphasise that safe learning takes place in environments characterised by clear rules, predictable teacher responses, and civil communication. Our study confirms that these factors are essential for sustaining students' attention in online lessons.

The finding that frequent teacher interaction supports attention further reinforces the results of Bočková et al. (2023), who demonstrated that teacher availability helps reduce feelings of chaos and stabilises the learning process under demanding conditions. Interaction therefore functions as a protective factor against attention breakdown in digital environments.

From a pedagogical perspective, the results suggest that students' attention in online education is not primarily an individual predisposition but rather a systematic outcome of clear organisation, structured processes, and safe communication. Teachers of vocational subjects, who work with complex technical procedures, play a decisive role in shaping these conditions.

A well-designed online environment—characterised by clear expectations, transparent tasks, balanced cognitive load, and ongoing interaction—can significantly enhance students' ability to maintain attention, even when their self-regulation skills are underdeveloped. Conversely, when these didactic elements are weak, online instruction becomes fragmented, unsafe, and less effective in promoting vocational competencies.

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