SUPPORTING STUDENT WELLBEING
in a digital learning environment

Evidence-based opportunities for innovation in learning and teaching during school closures related to the COVID-19 pandemic and beyond

Dr Magdalena Balica
Senior Policy Research Manager
Research Department
International Baccalaureate Organization

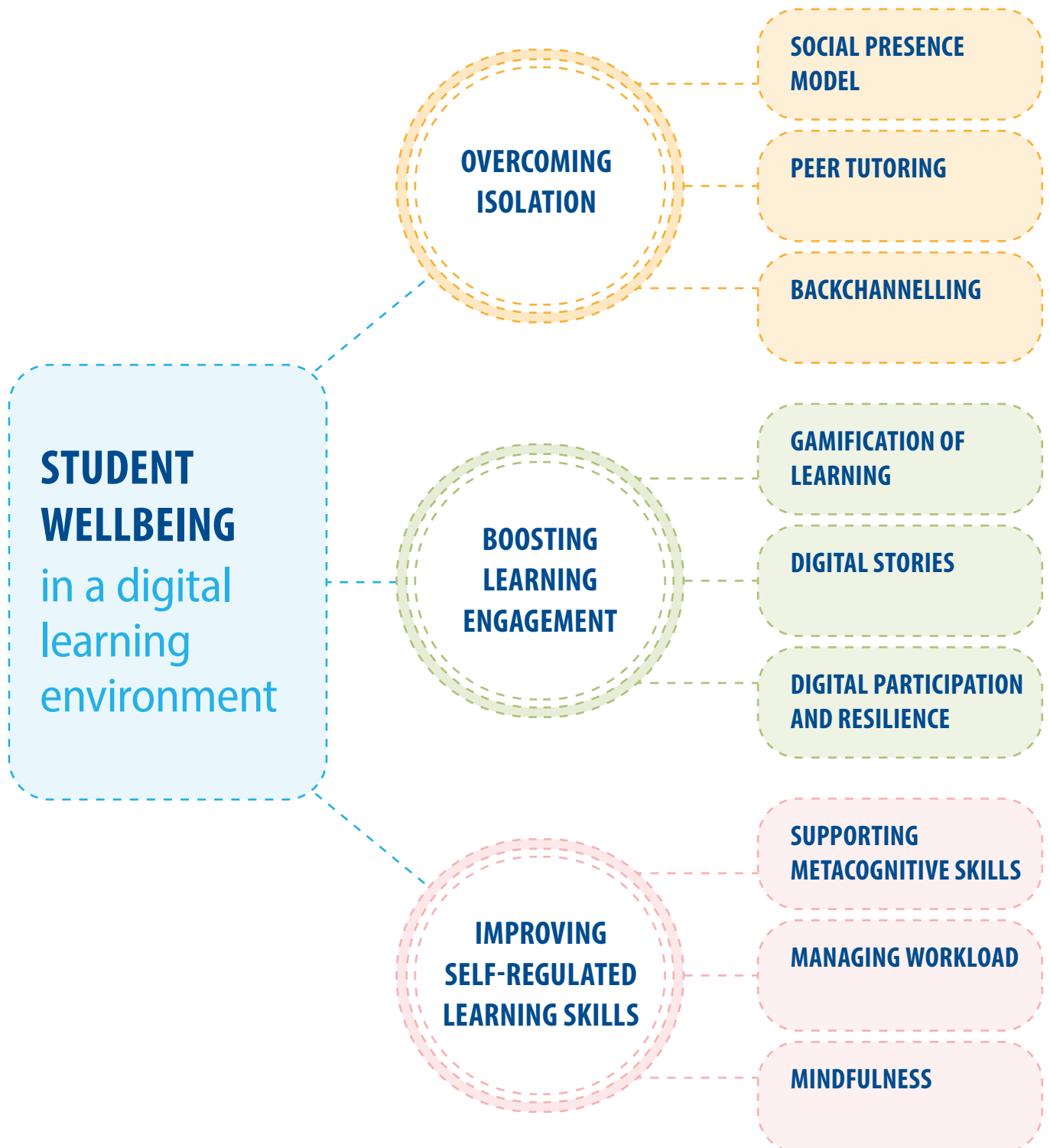# NINE TEACHING AND LEARNING STRATEGIES TO SUPPORT STUDENT WELLBEING in a digital environment

STUDENT WELLBEING in a digital learning environment

OVERCOMING ISOLATION

- SOCIAL PRESENCE MODEL
- PEER TUTORING
- BACKCHANNELLING

BOOSTING LEARNING ENGAGEMENT

- GAMIFICATION OF LEARNING
- DIGITAL STORIES
- DIGITAL PARTICIPATION AND RESILIENCE

IMPROVING SELF-REGULATED LEARNING SKILLS

- SUPPORTING METACOGNITIVE SKILLS
- MANAGING WORKLOAD
- MINDFULNESS

TABLE OF CONTENTS

INTRODUCTION

This paper aims to provide IB stakeholders with an evidence-based overview of the main challenges, opportunities and strategies for supporting student wellbeing in a digital learning environment. While clearly relevant to schools extending their digital learning due to the COVID-19 pandemic, many of the research-informed insights presented here will be of relevance far beyond the current situation. The paper focuses on three key wellbeing-related areas that should be considered for students' learning in a digital environment:

- **overcoming isolation**
- **boosting learning engagement**
- **improving self-regulated learning skills.**

For each challenge, a set of evidence-based strategies is presented. We also summarize the definitions of the terms used, the available evidence, and the practical implications for fostering wellbeing in a digital environment.

DIGITAL LEARNING AND WELLBEING:
An overview of evidence-based practices

Student wellbeing has been considered an important condition for learning long before the COVID-19 pandemic. Extensive research has shown that school-based wellbeing interventions can positively impact academic and non-academic achievement, with significant additional learning gains (Dix et al. 2020).

Due to the long-lasting COVID-19 situation, schools have undergone various pedagogical experiments with intermittent online synchronous or asynchronous learning periods, combined with other forms of remote learning (OECD 2020b). Despite the vast number of guidelines and resources available for schools, previous evidence of what works best for K12 student wellbeing in a long-term digital learning setting is still limited. Therefore, this study reviewed over 60 scientific articles providing available evidence of:

- **the impact of student wellbeing on learning in the school environment**
- **the wellbeing of university students engaged with digital learning**
- **student wellbeing during the COVID-19 pandemic.**

Student wellbeing and its impact on learning within the school environment

It may be possible to adapt many of the strategies used to support student wellbeing in face-to-face teaching to a digital environment. Research evidence has suggested that, when digital courses are designed using pedagogically sound strategies, they may provide learning environments that are just as effective as face-to-face teaching and learning (Driscoll et al. 2012).

Evidence for the wellbeing of university students engaged with digital learning

There is an established body of research on wellbeing in digital courses for university students. Although it is difficult to extrapolate the research results from university students to K12 students, these studies may indicate the potential of various strategies.

Limited number of large-scale studies on wellbeing in times of COVID-19

Most of the recent studies have covered the experience of children and adolescents during the early pandemic, yet only a limited number of them are strictly related to wellbeing in digital learning settings. Nevertheless, the studies do provide an early indication of the challenges and potential impact of the pandemic on students studying digitally.

Considering the above limitations, our aim is to provide an overview of evidence-based strategies to continuously support student wellbeing in a digital learning environment during the pandemic and beyond. Additionally, the current paper offers an indication of the level of evidence for each strategy, based on the following categorization:

STRONG	Studies with high internal and external validity (ie studies that include a range of participants and settings and are large enough to allow for the results to be generalized)
MODERATE	Studies that support strong causal conclusions, but where generalization is uncertain
LIMITED	Expert/practitioner opinions, based on experiential evidence, where the results cannot be generalized

STUDENTS LEARNING DIGITALLY:
The main challenges for wellbeing

Early indications of student wellbeing during the pandemic have shown that limited direct social interactions with peers and teachers have increased the likelihood of students feeling alone, less engaged, and overwhelmed with remote learning tasks (Groarke et al. 2020). Other major concerns related to student wellbeing during the pandemic have included: issues of equity and inclusion, gaps in access to technology, and whether students have a safe home environment (OECD 2020a). Although the challenges for student wellbeing are complex, the present paper focuses on three of the most typical wellbeing-related challenges encountered by students when learning digitally:

- **overcoming isolation**
- **boosting learning engagement**
- **improving self-regulated learning skills.**

For each challenge, we present a definition, a brief overview of the research base, and examples of promising evidence-based practices.

OVERCOMING ISOLATION AND LONELINESS
in a digital environment

Definition: Social isolation and loneliness are often used interchangeably. There is, however, an essential conceptual difference between these terms. *Social isolation* is defined as the objective situation of lacking social relations and contact with others, such as we encounter during the COVID-19 pandemic. *Loneliness*, by contrast, is a subjective painful experience resulting from the discrepancy between actual and desired social contact (Menec et al. 2020). In other words, being socially disconnected doesn't necessarily result in feeling lonely. By the same token, a person may feel lonely despite having regular social interactions.

What do we know about the impact of isolation on learning and wellbeing?

A systematic review by Loades et al. indicates that there is extensive pre-pandemic research showing an established connection between loneliness and overall wellbeing in children and adolescents (Loades et al. 2020). Several research studies also indicate that a sense of isolation is likely to affect teaching and learning (Berge, Collins 1995). Research into post-secondary education has shown that students in self-paced mass digital courses often report social disconnectedness (Haefner 2000; Menchaca, Bekele 2008; Reisetter, Boris 2004).

Early studies during the lockdown have indicated an overall decrease in students' school connectedness (Elmer et al. 2020). Not all students, however, have felt the same during the pandemic. Moderate evidence has shown that, compared to pre-pandemic times, some students' overall wellbeing increased, and their school-related anxiety decreased. Students who already felt disconnected from school and peers before the pandemic saw larger improvements in wellbeing (Widnall et al. 2020). Not attending school may have protected some students from peer pressure, face-to-face bullying or direct interaction anxiety. More studies are needed, however, to validate these insights for prolonged digital learning interactions.

What promising practices could work in overcoming isolation in a digital environment?

Despite extensive evidence of the impact of loneliness and social isolation on children and adolescent wellbeing, there is still limited evidence of the effectiveness of specific interventions to prevent loneliness or reduce its effects on wellbeing in a digital environment. Several practices, however, have shown promising results. In this paper we briefly introduce some of these strategies:

Strategy 1: Building a social presence model

Strategy 2: Peer tutoring

Strategy 3: Backchannelling

BOOSTING LEARNING ENGAGEMENT
in a digital environment

Definition: Student engagement is determined by the interaction between the time, effort and other relevant resources invested in optimizing the student's experience and learning outcomes. Wellbeing is closely linked with emotional engagement, including enjoyment, support, belonging and attitudes towards teachers, peers, learning and school in general (eg Eccles et al. 1993; Watt 2004).

What do we know about the effect of student engagement on learning and wellbeing?

A sound body of literature has established robust correlations between student engagement and positive learning outcomes, including satisfaction, persistence, academic achievement and social engagement. Additionally, research has shown that perceived emotional engagement in teacher-student and peer group relations regulate students' school-related wellbeing (Rautanen et al. 2020).

What promising practices could help to boost engagement in a digital environment?

Several practices have shown promising results. Below we will present some of those strategies:

Strategy 4: Gamification of learning

Strategy 5: Digital stories

Strategy 6: Digital participation and resilience

IMPROVING SELF-REGULATED LEARNING SKILLS
in a digital environment

Definition: Self-regulated learning is an academically effective form of learning in which learners must set their goals and make plans before starting to learn. In an ongoing process, learners monitor and regulate their cognition, motivation and behaviour, and reflect on their learning process (Adam et al. 2017).

What do we know about the role of self-regulated learning and wellbeing?

Students who consider themselves highly competent in self-regulated learning are more motivated to learn. Furthermore, qualitative analysis has revealed that students who perceived themselves as highly competent seemed to cope better and have less need for support (Pelikan et al. 2021).

What promising practices could work in supporting self-regulated learning in a digital environment?

Several practices have shown promising results. We will present here some of those strategies:

Strategy 7: Supporting metacognitive skills

Strategy 8: Managing workload

Strategy 9: Mindfulness

Main takeaways from the literature review

1: Effective use of digital learning technology should be driven by learning, teaching and wellbeing goals rather than a specific technology.

2: To benefit from digital learning, students need the right set of skills and support systems.

3: A wellbeing infrastructure should be designed in any digital learning environment to boost learning outcomes and wellbeing.

4: Teachers need appropriate training and support in monitoring and assessing student wellbeing in a digital environment.

5: It is important to critically assess the impact on wellbeing of various tools and technologies before implementing them.

6: Evidence needs to be used to monitor, assess and improve students' wellbeing in digital learning environments, as a major opportunity to engage schools and teachers in innovation and experimentations.

NINE STRATEGIES TO FOSTER STUDENT WELLBEING
in a digital environment

OVERCOMING ISOLATION AND LONELINESS

Strategy 1: Building a social presence model

Strategy 2: Peer tutoring

Strategy 3: Backchannelling

BOOSTING LEARNING ENGAGEMENT

Strategy 4: Gamification of learning

Strategy 5: Digital stories

Strategy 6: Digital participation and resilience

IMPROVING SELF-REGULATED LEARNING SKILLS

Strategy 7: Supporting metacognitive skills

Strategy 8: Managing workload

Strategy 9: Mindfulness

For each of the three main challenges, the literature review has identified a set of promising strategies to foster wellbeing in a digital environment. Below, we present a summary of these nine strategies, providing a definition and some evidence, as well as implications for practice.

OVERCOMING ISOLATION AND LONELINESS
in a digital environment

STRATEGY 1: Building a social presence model

Definition: Originally, the term "social presence" was defined as the degree to which a person is perceived as a "real person" and connected to others in the process of communication through a medium (Mehrabian 1971). Garrison (2006a) defines social presence as "the ability to project oneself socially and affectively and getting to know each other as three-dimensional people despite not meeting face-to-face". More recent research has expanded the definition of the "social presence" concept, adding a focus on the social, cognitive and teaching dimensions of digital learning. Social presence can be created by more meaningful and significant digital learning experiences as a way to decrease the feeling of being disconnected (Garrison 2006b; Whiteside 2015).

What has research shown?

MODERATE	Students with strong perceptions of the social presence of others in the online learning space have higher levels of satisfaction with their learning. The study covered a total sample of 3,000 online students from 50 learning centres nationwide from a private university in Malaysia. The results showed a strong and positive correlation with large effect size (Nasir 2020).
MODERATE	Group discussion/small size group tasks are more effective in building a social presence feeling than large groups. The study has found that three-person groups maintained higher levels of communication quality than did six-person groups. Discussion quality was not significantly improved by simply being in a three-person group instead of a six-person group; however, other communication variables of appropriateness, openness, richness and accuracy were greater within the three-person groups than in the six-person groups (Lowry et al. 2006).
LIMITED	Course design and pedagogy have a significant impact on perceptions of social presence (Cui et al. 2013).
LIMITED	Social presence can be influenced by available technology affordance, instructors' readiness for digital teaching, and students' characteristics such as their computer and digital communication skills (Cui et al. 2013).

Implications for practice in fostering student wellbeing

- Incorporate into the digital learning space personal profiles, individual learning portfolios and photos that provide students with social cues and visual connection.

- Design opportunities for students to express their feelings, experiences and ideas, for example, through discussion forums, digital groups or case studies; real-world scenarios; or sharing experiences about assignments.

- Invest time in guiding students on their digital learning journey, for example, through summaries and timetables of overall class progress on assignments or assessments; emails to summarize a recent forum discussion or to congratulate students on their progress.

- Provide timely feedback, incorporating empathy, feelings and emotions. Video feedback may enhance the feeling of social presence in a digital learning environment more than written comments.

- Plan regular synchronous social communication within small groups. Immediacy is a critical element in social presence, and communication in real time often enhances social presence when handled well.

- Create open discussion forums, as a space where students can engage in informal discussions that are of interest to them.

STRATEGY 2: Peer tutoring

Definition: Peer tutoring refers to a variety of strategies in which learners work in pairs or small groups to provide each other with explicit teaching and assessment support. There are various scenarios to organize peer tutoring:

- same-age peer tutoring, when tutoring occurs between students of the same age or grade level

- cross-age peer tutoring, when tutoring occurs between students of differing ages where the older student tutors the younger student.

- reciprocal peer tutoring, when paired students alternate roles as tutor and tutee (EEF 2018).

What has research shown?

STRONG	Peer tutoring can have a moderate to high positive average effect on learning outcomes (EEF 2018).
STRONG	Four- to ten-week intensive blocks of peer tutoring programmes appear to provide maximum impact for both tutors and tutees (EEF 2018).
MODERATE	Academic improvements can be found regardless of students' learning abilities, with a positive moderate size effect (Okilwa, Shelby 2010).
LIMITED	The peer tutoring experience can lead to positive social and emotional benefits on both tutors and tutees, increasing their overall wellbeing while learning (Finlay 2019).

Implications for practice in fostering student wellbeing

- Plan "get to know each other" sessions or moments for personal bonding within the peer tutoring programme.

- Provide activities that are sufficiently challenging for the tutee to benefit from the tutor's support.

- Design effective support for the tutor to ensure the quality of peer interaction and their individual wellbeing.

- Train staff and tutors and implement improvements as the programme progresses, including strategies targeted to build confidence, trust and a growth mindset.

- Use tutoring activities to review or consolidate learning, rather than to introduce new material.

- Design an appropriate structure for the tutoring programme (EEF 2018).

STRATEGY 3: Careful integration of backchannelling

Definition: Backchannelling is a parallel type of digital communication that is happening concurrently with a specific face-to face or digital learning and teaching activity. It is also seen as a digital tool used for peer-to-peer interaction during a learning task (Holland 2015). Examples of backchannelling could include various social media tools: chat rooms, quiz tools, social networking tools, polls, questions and answers tools, whiteboards, pinboards, message boards, etc.

What has research shown?

STRONG	Several experiments have revealed small negative effects of social media use on wellbeing. However, accumulating evidence indicates that social media can enhance or diminish wellbeing depending on how people use them (Kross et al. 2021).
MODERATE	Media multitasking interferes with attention and working memory, negatively affecting test performance, recall, reading comprehension, note-taking, self-regulation and efficiency. Younger students may be more exposed to distraction than older ones (May, Elder 2018).
LIMITED	The teaching and learning lesson units that used backchannelling had a higher level of engagement than the section that did not use it (Harunasari, Halim 2019).
LIMITED	Backchannelling opportunities may favour students who would otherwise avoid interacting during group discussions over students who struggle to interact during class due to disabilities or other concerns (Neustifter et al. 2016).

Implications for practice in fostering student wellbeing

- Provide opportunities for peer-to-peer backchannelling that are linked to a specific pedagogical and wellbeing purpose.
- Assess the potential risk for distraction and scaffold and monitor the peer-to-peer interaction.
- Involve students in establishing clear values and norms for constructive communication.

BOOSTING LEARNING ENGAGEMENT
in a digital environment

STRATEGY 4: Gamification of learning

Definition: Gamification in the context of learning is a design process of adding game elements in order to change existing learning processes (Sailer, Homner 2020). Gamification is not the same as game-based learning. Where game-based learning implies the design of fully fledged (serious) games (Deterding et al. 2011), gamified learning focuses on augmenting or altering an existing learning process. The intent here is to revise the process, so that users experience it as game-like (Landers et al. 2017).

What has research shown?

STRONG	Gamification has significant small effects on cognitive, motivational and behavioural learning outcomes. The effect of gamification on cognitive learning outcomes appeared to be stable, with a level of heterogeneity of effect sizes for motivational and behavioural learning outcomes (Sailer, Homner 2020).
STRONG	Inclusion of game fiction (invented stories) and social interaction were significant moderators of the effect of gamification on behavioural learning outcomes (Sailer, Homner 2020).
STRONG	Gamification with combinations of competition and collaboration showed a medium-sized effect on motivational learning outcomes and outperformed gamification environments that solely used competition (Sailer, Homner 2020).
LIMITED	Gamification can have a positive impact on health and wellbeing, particularly for health behaviours (Johnson et al. 2016).

Implications for practice in fostering student wellbeing

- Before starting a gamified learning process, consider what pedagogical approaches would guide the overall design and sequencing of critical learning interactions and what the expected learning outcomes would be.

- Provide options for students to choose between gamification and traditional methods in order to decrease potential anxiety and ensure a positive level of engagement.

- Continuously involve students in self-assessment and reflection on their engagement with gamified learning experiences.

STRATEGY 5: Digital stories

Definition: Digital stories are short videos/presentations that combine stand-alone and first-person narratives with the use of multimedia (Gladstone, Stasiulis 2019). There are many different types of digital stories, for example: personal narratives – stories that contain accounts of significant incidents in one's life; historical documentaries – stories that examine dramatic events that help us to understand the past; and stories that inform or instruct the viewer on a particular concept or practice (Robin 2006).

What has research shown?

MODERATE	Digital storytelling increases students' motivation, creative and critical thinking skills and problem-solving skills. A quasi-experimental study suggests that after 20 weeks of digital storytelling instruction, senior high school students demonstrated significant improvement in English proficiency, critical thinking, and learning motivation, especially for English listening, reading and writing, interpretation and evaluation of arguments and task value and self-efficacy (Yang, 2012).
MODERATE	Digital storytelling is an effective method in mental health and trauma-related therapy (De Vecchi et al. 2016).
LIMITED	Digital storytelling can help students improve their confidence and can contribute to better social and psychological skills (Smeda et al. 2014).
LIMITED	Digital storytelling can be used in mental health and trauma-related therapy disciplines and can be applied to students at different age levels (Demirbas, Sahin 2020).

Implications for practice in fostering student wellbeing

- There are multiple resources available for teachers on how to design a pedagogically sound digital story task. Explicitly define the wellbeing aspect that you want to address through digital stories and provide sufficient information to students about the process.

- Make sure students possess enough digital literacy to be able to use appropriate tools in the process of digital story development.

STRATEGY 6: Building digital participation and resilience

Definition: *Digital participation* refers to active involvement in digital society through the use of modern information and communication technology (ICT), such as the internet. This participation includes access not only to the internet, but also to various online services and content (Seifert, Rössel 2019). *Digital resilience* represents the technical, emotional and critical thinking skills students (and educators) need to enjoy the benefits of the internet, while still spotting the dangers and managing the risks (Young Minds 2016).

What has research shown?

STRONG	Moderate use of digital technology tends to be beneficial for children's mental wellbeing with significant small positive effects, while no use or too much use can have a small negative impact (Kardefelt-Winther, 2017).
STRONG	14- to 16-year-olds spend nearly twice as much time in digital environments than 9- to 10-year-olds (Smahel et al. 2020).
STRONG	Children who take up a wider range of digital activities are usually exposed to more digital risks. However, they may also be better equipped to cope with such risky situations, thus experiencing less harm (Smahel et al. 2020).
MODERATE	Non-participation in the digital world can lead to a feeling of social exclusion, whereas a feeling of social inclusion may be induced by having access to the internet, as well as the willingness and skills to use it (Seifert, Rössel 2019).

Implications for practice in fostering student wellbeing

- Various impact evaluations have shown that digital risk prevention and intervention programmes can be effective. The most frequently used intervention components include: education about cyberbullying, coping skills, empathy training, communication and social skills, digital citizenship, and parent education on cyberbullying (Hutson et al. 2018).

IMPROVING SELF-REGULATED LEARNING SKILLS
in a digital environment

STRATEGY 7: Supporting metacognitive skills

Definition: Metacognitive skills are strategies applied consciously or automatically during learning, a cognitive activity, and communication to manipulate cognitive processes before, during or after a cognitive activity. Examples are executive-function processes, such as verbal mediation, self-regulation, planning, judgment and self-monitoring (Flavell 1979).

What has research shown?

STRONG	Metacognition and self-regulation approaches consistently have high levels of impact, with students making an average of seven months' additional learning progress (EEF 2018).
STRONG	Metacognition strategies are usually more effective when taught in collaborative groups, so that learners can support each other and make their thinking explicit through discussion (EEF 2018).
STRONG	Metacognition programmes that seek to improve "learning to learn" skills have positive impacts, although smaller in size (around two months' progress on average) than the average seen in the wider evidence base. For some programmes there were indications that they were particularly beneficial for pupils from low-income families (EEF 2018).
MODERATE	The potential impact of metacognitive approaches is high, but it can be difficult to achieve in practice, as they require students to take greater responsibility for their learning and develop their understanding of what is required to succeed (EEF 2018).
MODERATE	The evidence indicates that teaching these strategies can be particularly effective for low-achieving and older students (EEF 2018).
MODERATE	Younger children are less likely to make accurate judgments about what they have learned, what they know, and how easy or difficult it will be to learn. Older students often have a deeper base of metacognitive knowledge than younger students (Steiner et al. 2020).
MODERATE	Metacognitive training programmes may be more effective for increasing motivation in the primary years and strategy use in the secondary years (Steiner et al. 2020).
MODERATE	Metacognitive scaffolding prompts, either from teachers or built into the technology, facilitate the development of metacognitive strategies in students engaged in digital learning (Bannert, Mengelkamp 2013).
MODERATE	Interventions that are longer in duration have been found to be most effective (Dignath, Büttner 2008).

Implications for practice in fostering student wellbeing

- Encourage students to think about the goal of their learning (set by the teacher or themselves) and to consider how they will approach the task; this includes ensuring that they understand the goal, activate relevant prior knowledge about the task, select appropriate strategies and consider how to allocate their effort (Darling-Hammond et al. 2020).

- Support students to self-assess the progress they are making; this includes the self-testing and self-questioning activities necessary to control learning and make changes to chosen strategies (EEF 2018).

- Adjust efforts to promote metacognition to grade levels. Primary students need more scaffolded support for developing metacognition than secondary students. Older students should make use of cognitive regulation strategies more heavily than primary students (Askell-Williams et al. 2012).

STRATEGY 8: Managing workload

Definition: Managing workload is a complex set of self-management skills, covering planning and monitoring skills, time management skills, the ability to manage distraction and perseverance towards a learning goal. *Objective workload* commonly comprises compulsory curriculum instruction hours; additional instruction time; the number of assessment events or concentration of the internal or external assessment moments in a given period. *Subjective workload* expresses the impact of the objective workload on students' perceptions, emotions and attitudes (Ganzeboom et al. 2020).

What has research shown?

STRONG	PISA study 2015 has shown that being stressed by schoolwork influences a wide range of non-academic outcomes, such as health, health behaviour and wellbeing (OECD 2017).
STRONG	On average, across OECD countries participating in a 2015 PISA study, 59% of students reported that they often worry that taking a test will be difficult and 66% reported that they worry about poor grades. Some 55% of students reported feeling very anxious about a test, even when they are well prepared, and 52% reported that they get nervous when they don't know how to solve a school task (OECD 2017).
STRONG	Available data at the OECD countries participating in PISA (2015) have shown little to no direct link between the objective workload of students, on the one hand, and their life satisfaction and anxiety in school, on the other. PISA studies have shown no relationship between the time students spend studying, whether in or outside of school, and their life satisfaction (OECD 2017).
LIMITED	Information and cognitive overload are important factors that challenge student wellbeing in an online environment (Bradford 2011).

Implications for practice in fostering student wellbeing

- Help students to set small, reachable goals that they can work towards.
- Use various tools to track students' progress such as: time management logs, checklists, rubrics and rating scales for students' self-assessment.
- For challenging content, break learning content into units with clearly specified objectives which are pursued until they are achieved.

STRATEGY 9: Mindfulness

Definition: Mindfulness means maintaining a moment-by-moment awareness of our thoughts, emotions, bodily sensations, and surrounding environment with openness and curiosity (Mindful Schools | Mindfulness for Your School, Teachers, and Students. 20 July 2021. Mindful Schools. https://www.mindfulschools.org/).

What has research shown?

MODERATE	Students who are self-focused, as well as non-judging towards their inner experiences, are better at self-regulated learning (Hillgaar 2011).
MODERATE	The interventions are more effective for decreases in negative mental traits (eg affective disturbances, anxiety) than increases in positive mental traits (eg positive affect, pro-social functioning). Benefits were stronger for pre-adolescent students compared to their early adolescent peers (Schonert-Reichl, Lawlor 2010).
LIMITED	A mindfulness-based programme was implemented in Canada with early adolescent students and resulted in improved emotional control and self-monitoring, as well as decreased anxiety, depression and negative rumination (Lam, Seiden 2019).

Implications for practice in fostering student wellbeing

- Teachers identified a range of enablers that together created environments conducive to the successful implementation of mindfulness interventions: teachers' ability to embody mindfulness; collaboration with fellow teachers; support from school administrators and parents; a relaxing physical environment; and students' willingness to learn. Conversely, teachers identified time pressure and crowded curriculum content as the biggest barriers, along with students' disengagement with the programme (Joyce et al. 2010).

CONCLUSIONS AND POLICY CONSIDERATIONS

Main takeaways

Wellbeing is a critical component of designing an effective digital learning environment. Lacking a direct connection with their teachers and peers, many students may encounter isolation and loneliness, decrease their learning engagement or struggle with their tasks. However, other students may benefit from learning remotely if they are equipped with self-directed learning skills. Less direct social interaction may also decrease the level of negative behaviour, such as bullying or negative peer pressure. The current paper has presented a variety of strategies that may help teachers to foster the wellbeing of all students.

To benefit from digital learning, students need the right set of skills and support systems. Before implementing a digital learning system, it is essential to monitor students' ability to deal with online learning. The current paper has presented a set of skills that can enhance students' wellbeing while promoting their digital participation, media literacy, metacognition, and the ability to manage various risks online, such as cyberbullying.

It is important that teachers design a wellbeing infrastructure in any digital learning environment to boost learning outcomes and wellbeing. The relationship between technology, wellbeing and learning outcomes is complex. However, schools should consider the wellbeing of all students as a design principle. Without a clear rationale for the support and implementation of wellbeing measures, the use of technology is far less likely to have a positive impact on learning.

Teachers need appropriate training and support in monitoring and assessing student wellbeing in a digital environment. In addition, teachers' wellbeing should be a key priority when planning for a digital learning environment.

Policy considerations

Put wellbeing and pedagogy first. Effective use of digital learning technology should be driven by learning, teaching and wellbeing goals rather than by a specific technology.

Critically assess the impact of various tools and technologies on wellbeing before implementing them. Reflect on the benefits, limitations and strategies to overcome the potential risks for various categories of students.

Use evidence to monitor, assess and improve students' wellbeing in digital learning environments. Many aspects of student wellbeing in a digital learning environment are yet unknown. Therefore, there is an opportunity for schools and teachers to engage in thoughtful innovation and experimentation in this area.

REFERENCES

Adam, NL, Alzahri, FB, Cik Soh, S, Abu Bakar, N and Mohamad Kamal, NA. 2017. "Self-Regulated Learning and Online Learning: A Systematic Review". In H Badioze Zaman et al. (eds), *Advances in Visual Informatics*. IVIC 2017. Lecture Notes in Computer Science, vol. 10645. Cham, Switzerland: Springer.

Askell-Williams, H, Lawson, MJ and Skrzypiec, G. 2012. "Scaffolding Cognitive and Metacognitive Strategy Instruction in Regular Class Lessons". *Instructional Science*. Vol 40. Pp 413–443.

Bannert, M and Mengelkamp, C. 2013. "Scaffolding Hypermedia Learning Through Metacognitive Prompts". In R Azevedo and V Aleven (eds), *International Handbook of Metacognition and Learning Technologies*. Springer International Handbooks of Education, vol 28. New York, NY: Springer.

Berge, Z and Collins, M (eds). 1995. *Computer Mediated Communication and the Online Classroom*. Cresskill, NJ, USA. Hampton Press.

Bradford, RG. 2011. "A Relationship Study of Student Satisfaction with Learning Online and Cognitive Load: Initial Results". *The Internet and Higher Education*. Vol 14, number 4. Pp 217–226.

Christy, KR and Fox, J. 2014. "Leaderboards in a Virtual Classroom: A Test of Stereotype Threat and Social Comparison Explanations for Women's Math Performance". *Computers & Education*. Vol 78. Pp 66–77.

Clark, DB, Tanner-Smith, EE and Killingsworth, SS. 2016. "Digital Games, Design, and Learning: A Systematic Review and Meta-analysis". *Review of Educational Research*. Vol 86, number 1. Pp 79–122.

Cui, G, Lockee, B and Meng, C. 2013. "Building Modern Online Social Presence: A Review of Social Presence Theory and Its Instructional Design Implications for Future Trends". *Education and Information Technologies*. Vol 18. Pp 661–685.

Darling-Hammond, L, Flook, L, Cook-Harvey, C, Barron, B and Osher, D. 2020. "Implications for Educational Practice of the Science of Learning and Development". *Applied Developmental Science*. Vol 24, number 2. Pp 97–140.

De Vecchi, N, Kenny, A, Dickson-Swift, V and Kidd, S. 2016. "How Digital Storytelling Is Used in Mental Health: A Scoping Review". *International Journal of Mental Health Nursing*. Vol 25, number 3. Pp 183–193.

Demirbas, I and Sahin, A. 2020. "A Systemic Analysis of Research on Digital Storytelling in Turkey". *International Journal of Progressive Education*. Vol 16, number 4. Pp 45–65.

Deterding, S, Dixon, D, Khaled, R and Nacke, L. 2011. "From Game Design Elements to Gamefulness: Defining 'Gamification'". In A. Lugmayr (ed.), *Proceedings of the 15th International Academic Mindtrek Conference: Envisioning Future Media Environments* (pp. 9–15). New York, USA: ACM.

Dignath, C and Büttner, G. 2008. "Components of Fostering Self-regulated Learning Among Students. A Meta-analysis on Intervention Studies at Primary and Secondary School Level". *Metacognition Learning*. Vol 3. Pp 231–264.

Dix, K, Kashfee, SA, Carslake, T, Sniedze-Gregory, S, O'Grady, E and Trevitt, J. 2020. *A Systematic Review of Intervention Research Examining Effective Student Wellbeing in Schools and Their Academic Outcomes* [Executive Summary]. Melbourne, Australia: Evidence for Learning.

Driscoll, A, Jicha, K, Hunt, AN, Tichavsky, L and Thompson, G. 2012. "Can Onlinel Courses Deliver In-class Results? A Comparison of Student Performance and Satisfaction in a Digital versus a Face-to-face Introductory Sociology Course". *Teaching Sociology*. Vol 40, number 4. Pp 312–331.

Eccles, JS, Midgley, C, Wigfield, A, Buchanan, CM, Reuman, D, Flanagan, C and Mac Iver, D. 1993. "Development During Adolescence: The Impact of Stage-environment Fit on Young Adolescents' Experiences in Schools and in Families". *American Psychologist*. Vol 48, number 2. Pp 90–101.

Education Endowment Foundation (EEF). 2018. S*utton Trust-Education Endowment Foundation Teaching and Learning Toolkit*. London, UK: Education Endowment Foundation.

Elmer, T, Mepham, K and Stadtfeld, C. 2020. "Students Under Lockdown: Comparisons of Students' Social Networks and Mental Health Before and During the COVID-19 Crisis in Switzerland". *PLoS ONE*. Vol 15, number 7. Pp e0236337.

Finlay, S. 2019. "Academic and Personal Impact of Peer Tutoring on the Peer Tutor". In C Denman and R Al-Mahrooqi (eds), *Handbook of Research on Curriculum Reform Initiatives in English Education* (pp. 234–249). Hershey, PA, USA: IGI Global.

Flavell, JH. 1979. "Metacognition and Cognitive Monitoring: A New Area of Cognitive–Developmental Inquiry".

American Psychologist. Vol 34, number 10. Pp 906–911.

Ganzeboom, HBG, Nagel, I and Schröder, H. 2020. *Student Workload And Well-Being In The International Baccalaureate Diploma Programme*. IBO, Internal IBO report: unpublished

Garrison, DR. 2006a. "Online Collaboration Principles". J*ournal of Asynchronous Learning Networks*. Vol 10, number 1. Pp 25–34.

Garrison, DR. 2006b. *Online Community of Inquiry Review: Social, Cognitive, and Teaching Presence Issues.* http://files.eric.ed.gov/fulltext/EJ842688.pdf

Gladstone, BM and Stasiulis, E. 2019. "Digital Storytelling Method". In P Liamputtong (ed.), *Handbook of Research Methods in Health Social Sciences.* Singapore: Springer.

Groarke, JM, Berry, E, Graham-Wisener, L, McKenna-Plumley, PE, McGlinchey, E and Armour, C. 2020. "Loneliness in the UK during the COVID-19 Pandemic: Cross-sectional Results from the COVID-19 Psychological Wellbeing Study". *PLoS ONE*. Vol 15, number 9. Pp e0239698.

Haefner, J. 2000. "Opinion: The Importance of Being Synchronous". https://wac.colostate.edu/aw/teaching/haefner2000.htm

Harunasari, S and Halim, N. 2019. "Digital Backchannel: Promoting Students' Engagement in EFL Large Class". *International Journal Of Emerging Technologies In Learning* (IJET). Vol 14, number 7. Pp. 163–178.

Hillgaar, SD. 2011. "Mindfulness and Self-Regulated Learning". Master's Thesis in Social and Community Psychology. Trondheim, Norway: Department of Psychology, The University of Science and Technology.

Holland, B. 2014. T*he Backchannel: Giving Every Student a Voice in the Blended Mobile Classroom*. Edutopia. https://www.edutopia.org/blog/backchannel-student-voice-blended-classroom-beth-holland

Hutson, E, Kelly, S and Militello, LK. 2018. "Systematic Review of Cyberbullying Interventions for Youth and Parents with Implications for Evidence-Based Practice". *Worldviews on Evidence-based Nursing*. Vol 15, number 1. Pp 72–79.

Johnson, D, Deterding, S, Kuhn, K, Staneva, A, Stoyanov, S and Hides, L. 2016. "Gamification for Health and Wellbeing: A Systematic Review of the Literature". *Internet Interventions*. Vol 6. Pp 89–106.

Joyce, A, Etty-Leal, J, Zazryn, T, Hamilton, A and Hassed, C. 2010. "Exploring a Mindfulness Meditation Program on the Mental Health of Upper Primary Children: A Pilot Study". *Advances in School Mental Health Promotion*. Vol 3, number 2. Pp 17–25.

Kardefelt-Winther, D. 2017. "How Does the Time Children Spend Using Digital Technology Impact Their Mental Wellbeing, Social Relationships and Physical Activity? An Evidence Focused Literature Review". Innocenti Discussion Paper 2017-02. Florence, Italy: UNICEF Office of Research – Innocenti.

Kaye-Kauderer, H, Feingold, J, Feder, A, Southwick, S and Charney, D. 2021. "Resilience in the Age of COVID-19". *BJPsych Advances*. Vol 27, number 3. Pp 1–13.

Kross, E, Verduyn, P, Sheppes, G, Costello, CK, Jonides, J and Ybarra, O. 2021. "Social Media and Well-Being: Pitfalls, Progress, and Next Steps". *Trends in Cognitive Sciences*. Vol 25, Issue 1, p. 55-66.

Lam, K and Seiden, D. 2020. "Effects of a Brief Mindfulness Curriculum on Self-reported Executive Functioning and Emotion Regulation in Hong Kong Adolescents". *Mindfulness*. Vol 11. Pp 627–642.

Landers, RN, Bauer, KN and Callan, RC. 2017. "Gamification of Task Performance with Leaderboards: A Goal Setting Experiment". *Computers in Human Behavior*. Vol 71. Pp 508–515.

Lee, J, Lin, L and Robertson, T. 2012. "The Impact of Media Multitasking on Learning". *Learning, Media and Technology*. Vol 37, number 1. Pp 94–104.

Loades, ME, Chatburn, E, Higson-Sweeney, N, Reynolds, S, Shafran, R, Brigden, A, Linney, C, McManus, MN, Borwick, C and Crawley, E. 2020. "Rapid Systematic Review: The Impact of Social Isolation and Loneliness on the Mental Health of Children and Adolescents in the Context of COVID-19". *Journal of the American Academy of Child and Adolescent Psychiatry*. Vol 59, number 11. Pp 1218–1239.e3.

Lowry, PB, Roberts, TL, Romano, NC, Cheney, PD and Hightower, RT. 2006. "The Impact of Group Size and Social Presence on Small-Group Communication: Does Computer-Mediated Communication Make a Difference?" *Small Group Research*. Vol 37, number 6. Pp 631–661.

May, KE and Elder, AD. 2018. "Efficient, Helpful, or Distracting? A Literature Review of Media Multitasking in Relation to Academic Performance". *International Journal of Educational Technology in Higher Education*. Vol 15, number 13.

Mehrabian, A. 1971. *Silent Messages: Implicit Communication of Emotions and Attitudes.* Belmont, CA, USA:

Wadsworth.

Menchaca, MP and Bekele, TA. 2008. "Learner and Instructor Identified Success Factors in Distance Education". *Distance Education.* Vol 29, number 3. Pp 231–252.

Menec, VH, Newall, NE, Mackenzie, CS, Shooshtari, S and Nowicki, S. 2020. "Examining Social Isolation and Loneliness in Combination in Relation to Social Support and Psychological Distress Using Canadian Longitudinal Study of Aging (CLSA) Data". *PLoS ONE.* Vol 15, number 3. Pp e0230673.

Nasir, M. 2020. "The Influence of Social Presence on Students' Satisfaction toward Online Course". *Open Praxis.* Vol 12, number 4. Pp 485–493.

Neustifter, R, Kukkonen, T, Coulter, C and Landry, S. 2016. "Introducing Backchannel Technology into a Large Undergraduate Course". *Canadian Journal of Learning and Technology.* Vol 42, number 1.

OECD. 2020a. *The Impact of COVID-19 on Student Equity and Inclusion: Supporting Vulnerable Students During School Closure and School Re-opening.* https://www.oecd.org/coronavirus/policy-responses/the-impact-of-covid-19-on-student-equity-and-inclusion-supporting-vulnerable-students-during-school-closures-and-school-re-openings-d593b5c8/

OECD. 2020b. I*nitial Education Policy Responses to COVID-19: Country Snapshots.* https://www.oecd.org/education/policy-outlook/covid-19-responses-snapshots.htm

OECD. 2017. *PISA 2015 Results (Volume III).* Paris, France: OECD.

Okilwa, NSA and Shelby, L. 2010. "The Effects of Peer Tutoring on Academic Performance of Students With Disabilities in Grades 6 Through 12: A Synthesis of the Literature". *Remedial and Special Education.* Vol 31, number 6. Pp 450–463.

Pelikan, ER, Lüftenegger, M, Holzer, J et al. 2021. "Learning During COVID-19: The Role of Self-regulated Learning, Motivation, and Procrastination for Perceived Competence". *Z Erziehungswiss.* Vol 24. Pp 393–418.

Rautanen, P, Soini, T, Pietarinen, J, and Pyhältö, K. 2020. "Primary school students' perceived social support in relation to study engagement". *European Journal of Psychology of Education.*

Reisetter, MF and Boris, G. 2004. "WHAT WORKS: Student Perceptions of Effective Elements in Online Learning". *The Quarterly Review of Distance Education.* Vol 5. Pp 277–291.

Robin, B. 2006. "The Educational Uses of Digital Storytelling". In C. Crawford et al. (eds), P*roceedings of Society for Information Technology and Teacher Education International Conference 2006* (pp. 709–716). Chesapeake, VA, USA: AACE.

Sailer, M and Homner, L. 2020. "The Gamification of Learning: A Meta-analysis". *Educational Psychology Review.* Vol 32. Pp 77–112.

Schonert-Reichl, KA and Lawlor, MST. 2010. "The Effects of a Mindfulness-Based Education Program on Pre- and Early Adolescents' Wellbeing and Social and Emotional Competence". *Mindfulness.* Vol 1. Pp 137–151.

Seifert, A and Rössel, J. 2019. "Digital Participation". In D Gu and M Dupre (eds), *Encyclopedia of Gerontology and Population Aging*. Cham, Switzerland: Springer.

Shufang, S., Goldberg, SB, Loucks, EB and Brewer, JB. 2021. Mindfulness-based Interventions Among People of Color: A Systematic Review and Meta-analysis. *Psychotherapy Research.* Vol 7. Pp 1–14.

Smahel, D, Machackova, H, Mascheroni, G, Dedkova, L, Staksrud, E, Ólafsson, K, Livingstone, S and Hasebrink, U. 2020. "EU Kids Online 2020: Survey Results from 19 Countries". *EU Kids Online.* http://eprints.lse.ac.uk/103294/1/EU_Kids_Online_2020_March2020.pdf

Smeda, N, Dakich, E and Sharda, N. 2014. "The Effectiveness of Digital Storytelling in the Classrooms: A Comprehensive Study". *Smart Learning Environments.* Vol 1, number 6.

Steiner, M, van Loon, MH, Bayard, NS et al. 2020. "Development of Children's Monitoring and Control When Learning From Texts: Effects of Age and Test Format". *Metacognition Learning.* Vol 15. Pp 3–27.

Watt, HMG. 2004. "Development of Adolescents' Self-Perceptions, Values, and Task Perceptions According to Gender and Domain in 7th- through 11th-Grade Australian Students". *Child Development.* Vol 75. Pp 1556–1574.

Whiteside, A. 2015. "Introducing the Social Presence Model to Explore Online and Blended Learning Experiences". *Online Learning.* Vol 19, number 2.

Widnall, E. C., Winstone, L., Mars, B., Haworth, C. M. A., & Kidger, J. L. (2020). Young People's Mental Health during the COVID-19 Pandemic. University of Bristol. https://sphr.nihr.ac.uk/wp-content/uploads/2020/08/Young-Peoples-Mental-Health-during-the-COVID-19-Pandemic-Report-Final.pdf

Yang, YTC and Wu, WCI. 2012. "Digital Storytelling for Enhancing Student Academic Achievement, Critical Thinking, and Learning Motivation: A Year-Long Experimental Study". *Computers & Education.* Vol 59, number 2. Pp 339–352.

Young Minds. 2016. *Resilience for the Digital World: Research into Children and Young People's Social and Emotional Wellbeing Online.* https://youngminds.org.uk/media/1490/resilience_for_the_digital_world.pdf