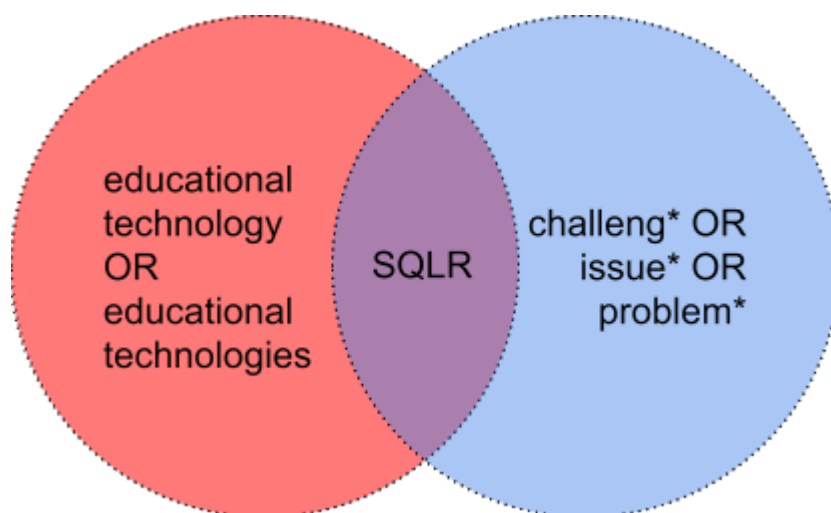


Systematic Literature Review of Educational Technology Challenges

Educational technology challenges reported in research from 2018-2023: A systematic literature review with meta-analysis of 2023 Educational Technology challenges prediction topics.

Scholarly Works (119) = Title: ((("educational technologies") OR ("education technology")) AND (challeng* OR (issue* OR problem*)))

Filters: Year Published = (2018 -)



Search: <https://link.lens.org/N2CHwtEM2tj>

This systematic quantitative literature review was conducted to analyse and synthesise research on educational technology challenges in education studies to identify themes and patterns in the research and suggest new avenues for research. Using the PRISMA method, a search of eight databases (2018–2023) revealed an initial pool of 119 papers, which was reduced to 7 after screening for eligibility. An analysis of the 7 papers was framed around the following questions:

- Q1. Topics explored in considering educational technology challenges
- Q2. Topics ranked in considering educational technology challenges

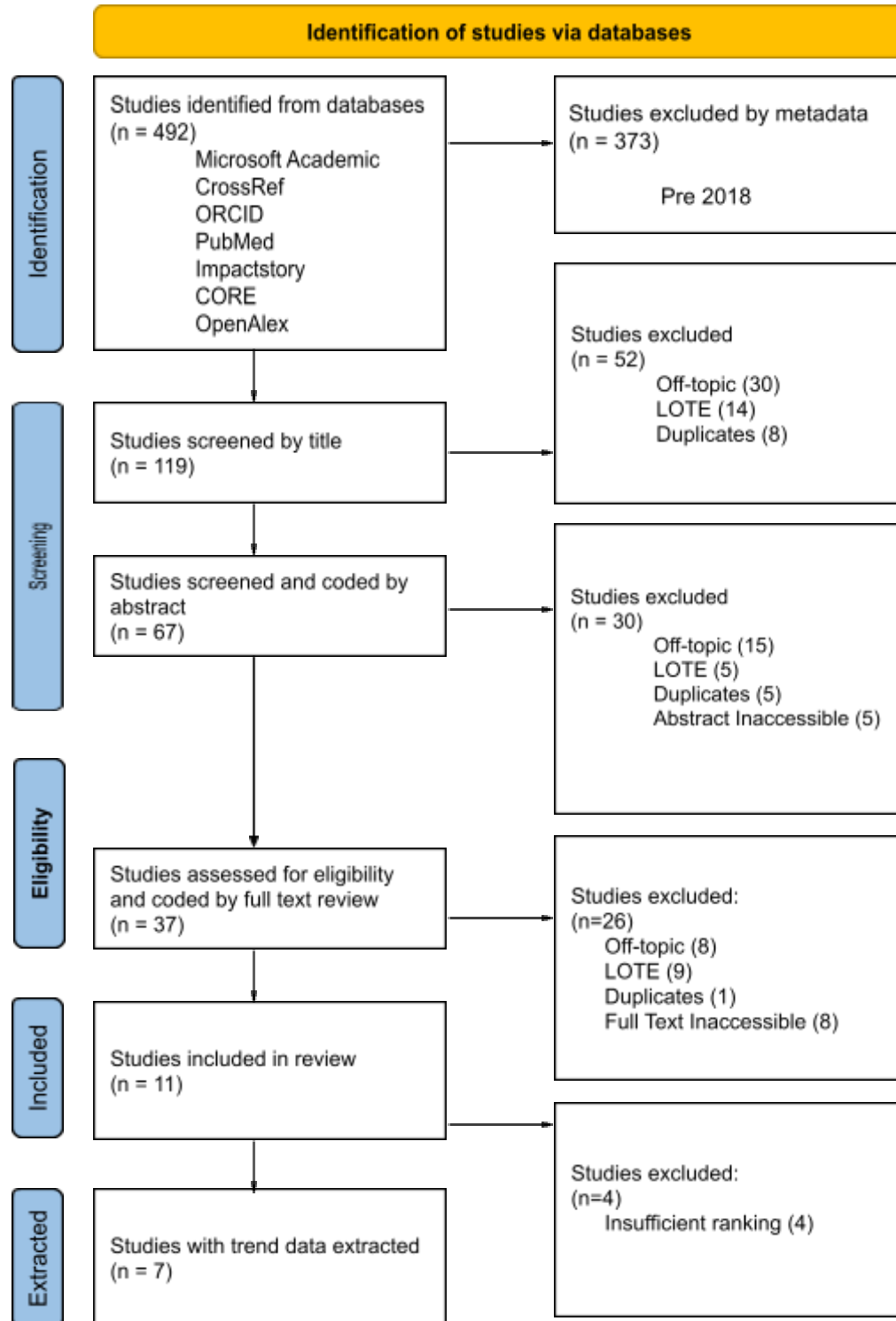
Coding Applied

a..d	Rating (a: Excellent, b. Good, c. Useful, d. Dubious)
[country name]	Country
[continent name]	Region (inc. Australasia)
survey, delphi, litreview, opinion	Type
meta, critique, panel	
ai, industry, he (higher ed)	Focus
engineering, language	Other

Rejection codes

Pre2018, Off-topic, LOTE, Duplicate, Review, Editorial, Abstract Inaccessible, Full Text Inaccessible, Vague (unable to extract challenges)

Table 1. Systematic Literature Review Process



Selection bias was mitigated (Belur, Tompson, Thornton, & Simon, 2021) through the use of four reviewers, two independent human reviews on each abstract and full-text review, and two independent dialogue agent reviews on each abstract and full-text review (ChatGPT version 1.3 (23 Feb 2023) and Jasper version 6.20.0 (3 March 2023) with overall interrater reliability (IRR) of 88.9

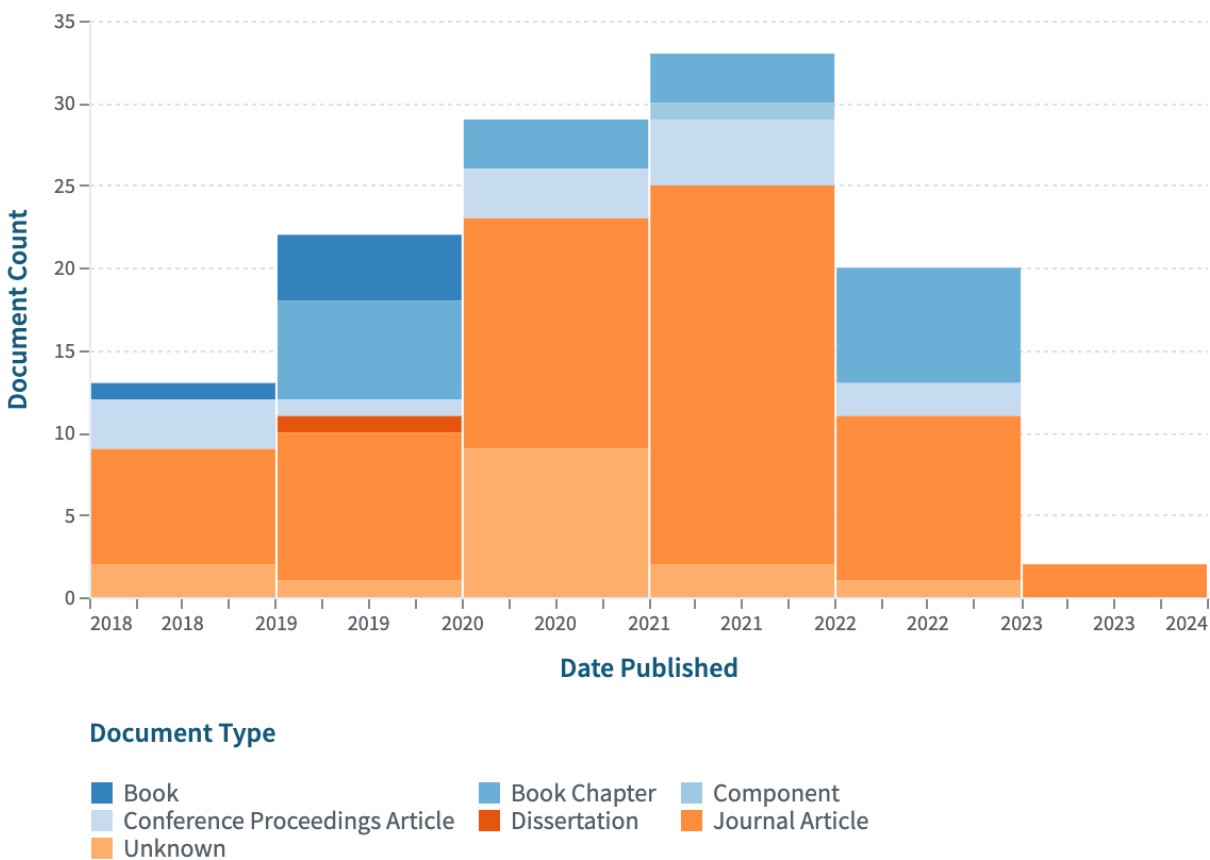
$IRR = \frac{TA}{(TR * R)} * 100$ (TA: Total Agreements, TR: Total Disagreements, R: Number of raters)

IRR 95.4 between AI raters

IRR 82.5 between human raters

IRR 88.9 overall

Table 2. Distribution of document types assessed in the review by count and date published



Literature Reviewed

The following challenges in educational technology use in education have been identified in relation to the study type, conducted in peer-reviewed studies.

Challenges

Delphi Studies

Zagami, J., Redmond, P., Joy, T., Flintoff, K., Speranza, A., Shires, R., Harris, N., Sleeman, T., Canning, C., Vernon, K., Sercombe, P., Madsen, S., Finch, R., Jones, M., Hogan, A., Urban, S., Moreton, B., Harrison, Y., Hunt, C.J., Loneragan, P., Finger, G., Feain, P., Levins, M., Angell, J., Jorgensen, M., Brandenburg, T., Stanhope, L., Banjer, F., Docherty, K., Thompson, P., Stephen, A., Rablin, A., Garvey, L., King, J., & Campbell, C. (2018). *Australian Education Technologies Trends 2018*. Australian Council for Computers in Education. [AETT2018 \(core.ac.uk\)](http://AETT2018(core.ac.uk))

Top 5 Ranked:

1. Professional Learning

Increased funding for the implementation of the Digital Technologies curriculum and other educational technologies initiatives are expected to continue, but the proportion of funding dedicated to teacher professional development to effectively use or teach about technologies is expected to remain low. Teachers, schools and systems will continue a trend towards supporting attendance at large commercial and system-organised conferences by relatively few teachers, supplemented by internally organised professional development provided by specialist IT teachers employed within schools. Centralised use of system-developed online courses to support professional development will increasingly occur to meet the scale required to support all teachers. Attendance at wider teacher-organised and professional association events is expected to continue to decline, with teachers relying upon, school and system-provided, professional learning, self-education resources, and learning networks available online. Teacher professional association membership will continue to fall, and higher education participation will remain at very low levels. The minimal professional learning requirements for ongoing teacher registration are expected to continue to have no significant impact.

2. Higher-Order Thinking Skills

While governments, systems, schools and teachers will increasingly recognise the value of higher-order and 21C skills, the development of these skills is expected to remain marginalised by curricula focused on discipline knowledge, basic skill development, and testing of lower-order knowledge. It is however expected that the continuing focus of employment and industry studies highlighting the need for these capabilities will support a renewed interest in developing higher-order and 21C skills, either within the curriculum or as supplementary programs.

3. Change

The rate of change in teaching will continue to increase, in the curriculum, pedagogical approaches, and use of technologies. Educational technologies will continue to be used to encourage pedagogical changes, collect data, and support the management and surveillance of schools, teachers and students. Schools and systems will begin to recognise and address the impact of change on teacher

performance and well-being, assisting teachers to develop the ability to be innovative and gain agency over these processes, or resilience to the impact of changes.

Challenges

4. Expanding Roles

Teachers and schools will increasingly find the continually expanding expectations of their role a challenge. While education is rightly seen as the key to addressing many of the issues facing society, increasingly, the response is to suggest the problem be addressed within an already crowded curriculum, often shifting traditional responsibilities off parents to teachers and schools, reducing the depth achievable within the curriculum.

5. Teacher Professionalism

The professionalisation of teachers is expected to remain in conflict, while increased responsibility will be placed on professional learning and the expanded roles of teachers, performance measures and decreasing agency over the curriculum and in some cases pedagogy, will limit the ability of teachers to undertake professional responsibility and make independent decisions

Ranked:

1. Professional Learning (Development)
2. Higher Order Thinking (21C Skills)
3. Change (Resilience & Innovation)
4. Expanding Roles (Teachers & Schools)
5. Teacher Professionalisation (Agency)
6. Differentiation (Personalisation)
7. Work Intensification (Students & Staff)
8. Equity (Access & Opportunities)
9. Digital-Disconnect (Home vs School)
10. Digital Divide (Students/Schools)
11. Trust (Teachers & IT staff/Admin)
12. Obsolescence (Lifelong Learning)
13. Student Rights (Privacy & Access)
14. Accountability (Plagiarism/Cheating)
15. Accountability (Legal/Moral)
16. Certification (Reputation & Credentialing)
17. Out of Field (Teachers)
18. Lower Order Skills (Basics/Fundamentals)
19. Automation (Assistive & Replacement)
20. Scaling (Diffusion)
21. IP (Restrictions & Commercialisation)
22. Copyright (Fair Dealing)
23. Backlash (Waste & Misuse)

COSN. (2022). Driving K12 Innovation: 2023 Hurdles + Accelerators. [Driving K-12 Innovation: Hurdles & Accelerators \(cosn.org\)](https://cosn.org/Driving-K-12-Innovation-Hurdles-Accelerators)

Top 3 Ranked:

1. Attracting & Retaining Educators and IT Professionals
2. Designing Effective Digital Ecosystems
3. Digital Equity

Unranked:

Accessibility

Accessibility is immersed in the dialogue around equity and is a critical component of ensuring equitable learning opportunities. This multi-layered issue encompasses access to resources, access to multiple forms of representation and inclusive learning practices, multicultural access, and access for all students to develop as expert learners. In practice, accessibility in education frequently falls short of shared ethical standards and misses opportunities to leverage technology in the enactment of equity values.

Adopting Prohibitive Policies

Legal and local mandates intended to keep students safe, such as data governance and mobile device usage policies, can often hinder innovation; schools must find ways to revise their policies to promote safety and ethics while ensuring ample opportunity for emerging technology exploration.

Attracting & Retaining Educators and IT Professionals

Hiring and keeping school staff is a significant problem for school systems; many educators are experiencing low pay, and social and emotional burnout, causing them to set aside their passion for teaching and leave the field. For IT Professionals, there are the added stressors of low pay compared with private companies which are able to offer higher salaries, flexible work schedules, more time off, and lacking leadership.

Balancing Screen Time

As student screen time at school and especially outside of school increases and evolves, there are growing concerns from parents, media, and policymakers about its effects. Educators have a responsibility for student well-being, as well as their learning, which necessitates evaluating and addressing these concerns, especially as learning is going digital.

Capturing & Assessing Learning

With the shifting priorities for student learning and skill development, schools must rethink the definition of success and create new indicators of student success. Schools are challenged to evaluate the acquisition of soft skills at scale and meaningfully assess digital learning outputs. Thoughtfully capturing and assessing learning requires unique attention to digital tools and assessment design in the learning design process.

Change Management

Too often schools may lack the foresight to seamlessly understand, articulate, and apply clear outcome goals, aligned to the evolving needs of students, educators, and

communities, towards making both small and sweeping changes. Continuous support and scaffolding for those implementing the changes are key.

Changing Demographics

Many nations are experiencing an ageing of their population. K-12 students are dwindling in both relative and absolute terms. Additionally, demographic changes and new migrations are changing some communities' perceptions of race, religion, and ethnicity. School systems are challenged to adapt to meet learner needs in changing social environments.

Changing Nature of Discourse

Technology is a powerful vehicle that supports discourse in our digital world and is intimately connected with how we communicate, connect, and learn in a social context. Simultaneously, the challenges of civil discourse, democratic thought, and citizenship are human — not technological — in nature. Addressing this Hurdle requires teaching, demonstrating, and fostering the skills and ethics of discourse while continuing to grapple with the complexity of technology as a prevalent medium for communication.

Competing School Mandates

With schools facing a slew of mandates ranging from STEM programs to literacy approaches, technology is too often tacked on without sufficient meaning rather than being carefully conceived as a tool for helping to address the mandates.

Data Privacy & Ownership

Student data can be a powerful tool for teaching, learning, and student support. Yet increases in the use and awareness of student data also exacerbate unresolved issues of student privacy, the collection of student data, data ownership, legal implications, and student agency, understanding, and control of their data. Schools are challenged to create digital ecosystems — and this depends on building understanding and fostering active participation in the complexities of data.

Designing Effective Digital Ecosystems

A digital ecosystem is a group of connected information technology resources that allow students and teachers to interact and communicate in an effective, valuable way. But what are the keys to developing a successful digital ecosystem? Interoperability — the ability of computer systems to exchange, interact, and make use of information — as well as constant improvement of efficiencies, providing data analytics, and data visibility are all important.

Determining the Strategic Value of Technology

An initial technology deployment cannot generate consistent, high-value use across a school system. Determining the strategic value requires measuring and understanding the variability in usage along with how to shape the journey, over time, to reach long-term goals. These kinds of processes can be referred to as “implementation and improvement sciences.”

Developing Non-Cognitive Skills

Grit, self-confidence, and lifelong learning — among others — are only rising in importance, but remain elusive skills in terms of integration into learning experiences and assessment at school.

Digital Equity

Digital equity includes three, interrelated components: digital foundations, conditions for learning, and meaningful learning opportunities. This nuanced Hurdle encompasses more than just equitable access to quality digital technologies such as high-speed internet and powerful computing devices both inside and outside of school. It also includes ensuring that students have the knowledge and skills to use technology in the service of learning, that they interact with robust and accessible content and programs, that students and their identities are represented with and by the technologies themselves, and that they experience meaningful opportunities that empower them as learners.

Digital Fluency

More than just knowing how to use specific products, technology training is not deep or pervasive enough for both teachers and students.

Ensuring Security & Safety Online

Teaching, learning, and conducting business in education online is now a baseline requirement for teachers, students, and administrators. Yet there is a lack of trust that the K-12 ecosystem and learning environments are safe and secure online. Schools must be proactive in building systems to protect every user, at every level, in every technology system, in every application, and in every workspace – home or school, 24/7. The risk is intensified as technology needs to expand, new cybersecurity threats continuously enter the landscape, and threat actors get smarter. Schools are expected to keep up with these risks while increasing protection measures, employing qualified staff, and raising industry standards to strengthen the safety and security of the online world. To effectively manage this risk is costly and now, non-negotiable.

Ensuring Well-Being

How do we cultivate the well-being of learners, educators, parents, and others involved in education, in physical, hybrid, and online modalities? This Hurdle includes an awareness of factors influencing the experience of those involved in education. Intentional measures need to be taken to address multiple dimensions of well-being, including cognitive, subjective, physical, mental, emotional, and social well-being, when setting expectations and developing education programs, products, and services necessary to meet learning modalities.

Equity, Social Justice & Economic Inequality

It is imperative that school systems actively engage in the work of creating space and opportunity for all people of all identities and all socioeconomic statuses in all geographic locations. This work includes actively creating equitable educational opportunity, fostering representation of a diversity of identities and experiences,

dismantling systems and behaviours that perpetuate oppressions and inequities in education, valuing difference and actively enacting this value. The availability of technology and funding can each play a significant role in facilitating — or inhibiting — the enactment of diversity and inclusion.

Evolution of Teaching & Learning

The teaching and learning landscape is changing, opening up the opportunity to move toward a better balance of teacher facilitation and student learning. As teaching and learning outcomes are constantly being redefined, schools are tasked with ensuring that teaching practices and pedagogies intentionally integrate advances in technology and learning sciences. Professional development is essential in this evolution.

The Future of Work

The rapid and accelerating pace of change (in technology, society, communications, environment, and other aspects of life) is transforming the future of work and placing students in an emerging world with social-technical dynamics both congruent and dis-contiguous from ours. Schools and educators have a responsibility to understand and prepare students with the foundational skills and mindsets they need to succeed in life, learning, and work — and the complex ideation and problem-solving capabilities to envision, adapt, and create the future.

Hybrid Learning

The pandemic has highlighted a critical pedagogy/technology gap: there is insufficient understanding and training around how to teach online and engage students in and across different learning modalities. This includes an understanding of the various online and in-person ways of learning and how each requires a shift in pedagogy.

Humanising Learning

As more learning experiences take place fully virtual or in a blended format, schools are grappling with how to create supportive environments, engaging learning experiences, and deep interactions that feel authentic.

Inadequate Resources

Schools are challenged to do a lot with little — setting up students with a competitive advantage requires an adequate budget and allocation of time and resources for the development of rich learning experiences and the integration of new learning tools.

Lack of Systemic Perspectives

Particularly around the implementation of technology, facilitating positive changes in schools requires an all-too-rare systemic view of K-12, which includes school management, communications, organisational development, and many more vital dimensions affecting the whole school system. Leadership is a key component of this Hurdle, including the stability of leadership, strategic leadership, system leaders, and improvement science.

Ongoing Professional Development

Personalised, job-embedded professional learning can support educators in their journeys as lifelong learners and practitioners who continue developing their professional skills. Educators aren't always privy to or supported in pursuing continued formal/informal training to upskill.

Organisational Culture

Organisational culture refers to the "patterns that predict outcomes" within an organisation, including patterns in decision-making, communication, collaboration and relationships, enacted values, leadership, and accountability. It is the inner workings, expectations, attitudes, and beliefs that contribute to the behaviour of the organisation. It's anchored in the social order, norms, and leadership of the organisation and its enacted values and priorities — it influences every interaction. It is necessary to intentionally create organisation cultures and leadership in education that reflect our values, foster innovation, and align our actions.

Parent/Community Perceptions of EdTech

Schools are challenged to constantly articulate the academic purposes, benefits, and applications of Edtech to parents and other school community members. These stakeholders may be concerned about extensive technology use by students (screen time, etc.), be fearful of technology use, and/or have insufficient experience or context knowledge to understand/support the technology use.

Pedagogy vs. Technology Gap

When new technologies are introduced and mandated, educators do not always have sufficient training or professional development to understand how they can integrate them into the curriculum and effective practices. The forced use of technology in a school system can blindside educators across the education system — not just the classroom — and the surmounting of this Hurdle needs to include all stakeholders (including students, teachers, school leaders, district administrators, and others). Tech procurement should be led by clearly defined pedagogical goals whose development involves multiple stakeholder groups.

Preparing Students for (Digital) Lifelong Learning

A core responsibility of K-12 is to set up students with the attitudes, curiosities, skills, and opportunities to be self-directed learners who engage in continuous learning through formal and informal environments and in-person and online settings. This often requires personalization and motivation as it is a multifaceted undertaking that is challenging to measure.

Reinforcement of Poor Practices

There is the risk of technology simply reinforcing rote learning by way of outdated or irrelevant teaching practices. Instead, schools must consider the ways in which technology can enable real-world learning that is collaborative and more personalised and use it as an opportunity to revisit pedagogical discussions.

Remaining Relevant

As the wide variety of informal learning communities and tools continues to grow, it is becoming easier for students to learn and gain new skills outside of school; schools will need to consider how to evolve in ways that embrace outside learning.

Scaling Innovation & Inertia of Education Systems

Whether they are practices for effective teaching and learning, organisational business processes, or technology usage, schools are challenged to engage in and effectively scale innovation – adapting what is working well and scaling it out across a school, district, or state/country. During the pandemic, the education system as we knew it experienced seismic opportunities for change when learning went fully remote; yet, in many school systems and parts of society, there is now an even greater pullback to the familiar pre-pandemic models of education. This highlights an inertia in education that resists change: a complex system that reinforces past practices and discourages innovation. This Hurdle reflects both the resistance to change present within many schools and the education and social systems that permeate schools and exert pressure against change, as well as the need to expand what is working to a larger scale.

Technology Training in Pre-service Teacher Education Programs

In their higher education programs, pre-service teachers must be taught the technology and pedagogy skills necessary to become masterful at blending many modalities into their instructional practice and incorporating digital tools. This includes the foundational knowledge and skills to use basic technologies used in schools, the ability to find and adapt to new technologies transformatively for academic purposes, practice becoming facilitators of learning, and interpret and use data to drive pedagogical innovation.

Thinking Outside the Box

Due to time constraints and fear of failure, schools can remain stagnant in terms of innovation and creative mindsets, which ends up blocking them from exploring and achieving new solutions.

Trust in Education Systems

Intentional learning is widely considered invaluable for economic mobility, career success, and personal development, and yet there is evidence of diminishing trust in education systems and accountability measures by policymakers and societies. One example of this is the decreasing status of the teaching profession in many countries. Conversely, high levels of trust seem to be exhibited in countries that have high-performing educational systems.

Unbalanced Strategic Influence

Strategic decisions about educational technology and other pressing matters are largely made at the “executive level,” where leaders do not adequately seek input from practitioners and others who may understand the potential or shortcomings of tools for teaching and learning. Decisions may also be shaped by other elite influencers, like the business community and founding funders.

Meta Study

Dağhan, G., & Gündüz, A. Y. (2022). Research trends in educational technology journals between 2000 and 2018: a web scraping study. *Education and Information Technologies*, 1-36. [Research trends in educational technology journals between 2000 and 2018: a web scraping study | SpringerLink](#)

Ranked:

1. Pedagogical issues
2. Improving classroom teaching
3. Collaboration
4. Learning
5. Evaluation methodologies
6. Evaluation of CAL systems
7. Motivation
8. Assessment
9. Teacher Education
10. Education
11. Technology integration
12. Evaluation
13. Cognitive load
14. Professional Development
15. Social presence
16. Mathematics
17. Feedback
18. Problem-solving
19. Gender
20. Self-efficacy
21. Engagement
22. Science Education
23. Gender studies
24. Scaffolding
25. Reflection
26. Student engagement
27. Creativity
28. Navigation
29. Critical thinking
30. Satisfaction
31. Teaching
32. Teachers

Opinion

Best, K. L., & Pane, J. F. (2018). Privacy and interoperability challenges could limit the benefits of education technology. RAND.

<https://www.rand.org/pubs/perspectives/PE313.html>

- Data Privacy
- Notice/Awareness
- Choice/Consent
- Access/Participation
- Integrity/Security
- Enforcement/Redress

Chew, S. W., Cheng, I. L., & Chen, N. S. (2018). Exploring challenges faced by different stakeholders while implementing educational technology in classrooms through expert interviews. *Journal of Computers in Education*, 5, 175-197.

<https://doi.org/10.1007/s40692-018-0102-4>

- Learning gap among learners with the existence of informal and non-formal learning
- The lack of time and additional effort in implementing technology in the classroom
- Perception of parents on the application of technology in education
- Teacher-centred models used in managing the institution
- Complicated systems are designed which requires users' customisation
- Relationship of researchers with the classroom

Duran, M. (2022). Legal and Ethical Issues in Educational Technology. In *Learning Technologies: Research, Trends, and Issues in the US Education System* (pp. 89-122). Cham: Springer International Publishing.

http://dx.doi.org/10.1007/978-3-031-18111-5_6

- Plagiarism
 - Copyright and Fair Use
 - Safety and Privacy
 - Netiquette
 - Remember the human
 - Adhere to the same standards of behaviour online that you follow in real life
 - Know where you are in cyberspace
 - Respect other people's time and bandwidth
 - Make yourself look good online
 - Share expert knowledge
 - Help keep flame wars under control
 - Respect other people's privacy
 - Don't abuse your power
 - Be forgiving of other people's mistakes
- Shea ([2011](#))

- Make real people a priority
 - Use respectful language
 - Share with discretion
 - Don't exclude others
 - Choose friends wisely
 - Respect people's privacy
 - Fact check before reposting
 - Don't spam
 - Respond to emails and texts promptly
 - Update online information
 Hartney (2010)
- Cyberbullying
- Mixed-harassment
- Objectionable Materials and Educational Control

Huang, R., Spector, J. M., Yang, J., Huang, R., Spector, J. M., & Yang, J. (2019). Emerging issues in educational technology. *Educational Technology: A Primer for the 21st Century*, 231-241. https://doi.org/10.1007/978-981-13-6643-7_13

Diffusion of Innovations (Rogers, 2003)

- ethical
- security and privacy
- quality control
- accreditation and sustainability
- culture and regional
- personalising education
- assessing student learning
- supporting social learning
- diminishing boundaries
- developing alternative teaching strategies
- enhancing the role of stakeholders
- addressing policy changes

Moshinski, V., Pozniakovska, N., Mikluha, O., & Voitko, M. (2021). Modern education technologies: 21st-century trends and challenges. In *SHS Web of Conferences* (Vol. 104, p. 03009). EDP Sciences. <https://doi.org/10.1051/shsconf/202110403009>

- Informational Security
- Financing
- Digital Integration
- Accessibility

Pachler, N., & Turvey, K. (2018). Looking back, moving forward: Impact and measurability of the use of educational technology. https://doi.org/10.1007/978-3-319-71054-9_82

- Defining Terms and Parameters
- Identifying the Gaps

- Aggregation, Opportunities, and Limitations
- Theoretical Positioning
- A failure to understand how learners think
- A problem with identifying actual types of educational technology use contributing to learning gains
- A lack of knowledge about the kinds of curriculum implementation and classroom settings that are most influential
- The variability in teachers' knowledge and pedagogical use of educational technology
- A lack of match of learning objectives and the learning outcomes being measured
- Interoperability
- Qualifying the Quantitative
- Post Hoc and Concurrent Analysis
- Broadly Defined but Rigorously Theorised

Scanlon, E. (2021). Educational technology research: Contexts, complexity and challenges. *Journal of Interactive Media in Education*, 2021(1). <https://doi.org/10.5334/jime.580>

- Personalisation And Adaptive Instruction
- Societal Influences And Social Learning
- Learning Design, Analytics And Data-Driven Improvement
- Artificial Intelligence And Machine Learning

Zuo, C. (2019). The Current Situation, Problems and Countermeasures of the Application of Double Qualified Teachers' Education Technology. In *Application of Intelligent Systems in Multi-modal Information Analytics* (pp. 1114-1121). Springer International Publishing. https://doi.org/10.1007/978-3-030-15740-1_142

- Challenges of teachers of both vocational and general education

References

Belur, J., Tompson, L., Thornton, A., & Simon, M. (2021). Interrater reliability in systematic review methodology: exploring variation in coder decision-making. *Sociological methods & research*, 50(2), 837-865.