Catalogue of literature

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Version	Title	Editors	Date	Changes
1.0	Catalogue of literature	Alenka Lipovec Hege Mhyre Monika Šket	26. 12. 2022	New chapter Abbreviations, new sources, renamed topic.
2.0	Catalogue of literature	Alenka Lipovec Hege Mhyre Monika Šket	30. 6. 2023	New structure, additional literature.

Introduction

The primary objective of this document is to provide an extensive review of the pertinent literature encompassing the subject matters addressed within the SETCOM project. Specifically, it aims to analyse and synthesize scientific resources that not only contribute to the existing knowledge but also explore novel insights in the fields of social and emotional learning (SEL) and AI literacy.

In recent years, the importance of SEL has gained significant recognition as educators, policymakers, and researchers acknowledge its profound impact on the holistic development of individuals. As our society becomes increasingly interconnected and technology-driven, there is a growing need to equip individuals with the necessary skills and competencies to navigate the complexities of the digital age. This is where AI literacy comes into play, as understanding and effectively utilizing artificial intelligence technologies have become essential for personal and professional success.

To comprehensively assess the relevant literature, we will delve into diverse scientific sources encompassing empirical studies, theoretical frameworks, professional publications, and exceptional resources that highlight the cutting-edge advancements in SEL and AI literacy. By examining these multidisciplinary resources, we aim to identify key trends, theoretical underpinnings, and practical applications that can further inform and enhance the SETCOM project's objectives.

Within the realm of SEL, the literature review will explore the latest research on the development of emotional intelligence, social awareness, self-management, relationship building, and responsible decision-making. We will examine how these skills can be effectively fostered in various educational contexts and how they contribute to students' overall well-being, academic achievement, and lifelong success.

Simultaneously, our review will encompass the intersection of SEL with AI literacy, exploring the evolving relationship between human emotions, social interactions, and the growing presence of AI technologies. We will explore how AI can be leveraged to enhance SEL initiatives, such as utilizing natural language processing algorithms to provide personalized feedback on social interactions or incorporating AI-based platforms for emotional regulation and self-reflection. Additionally, we will investigate the ethical considerations surrounding AI implementation in SEL programs, ensuring responsible and inclusive practices that mitigate potential biases and privacy concerns.

This literature review aims to provide a comprehensive understanding of the current state of research in SEL and AI literacy. By critically evaluating the existing body of knowledge, we can identify gaps, challenges, and opportunities for further exploration and innovation. The insights gained from this review will inform the development and implementation of effective strategies, interventions, and technologies within the SETCOM project, fostering the advancement of social and emotional learning and AI literacy for the benefit of individuals and society.

Acronyms/Abbreviations

AI Artificial intelligence

AIEd Artificial Intelligence in Education

EDTech izobraževalne tehnologije

HCAI Human-centred AI

ICT information and communication technology

IKT informacijsko komunikacijske tehnologije

ITS intelligent tutoring systems/inteligentni učni sistemi

ML Machine learning

SETCOM Podporna okolja za spodbujanje prečnih kompetenc v vzgoji in izobraževanju

SUI Sistemi umetne inteligence

SEL Social emotional learning

SČU Socialno in čustveno učenje

ST Strojno učenje

UI Umetna inteligenca

Glossary

Artificial Intelligence or AI systems
Artificial intelligence (AI) systems are software (and possibly also hardware) systems designed by humans that, given a complex goal, act in the physical or digital dimension by perceiving their environment through data acquisition, interpreting the collected structured or unstructured data, reasoning on the knowledge, or processing the information, derived from this data, and deciding the best action(s) to take to achieve the given goal. AI systems can either use symbolic rules or learn a numeric model, and they can also adapt their behaviour by analysing how the environment is affected by their previous actions. As a scientific discipline, AI includes several approaches and techniques, such as machine learning (of which deep learning and reinforcement learning are specific examples), machine reasoning (which includes planning, scheduling, knowledge representation and reasoning, search, and optimization), and robotics (which includes control, perception, sensors and actuators, as well as the integration of all other techniques into cyber-physical systems).

AI Practitioners
By AI practitioners we denote all individuals or organisations that develop (including research, design or provide data for) deploy (including implement) or use AI systems, excluding those that use AI systems in the capacity of end-user or consumer.

AI system's life cycle
An AI system's life cycle encompasses its development (including research, design, data provision, and limited trials), deployment (including implementation) and use phase.

Bias
Bias is an inclination of prejudice towards or against a person, object, or position. Bias can arise in many ways in AI systems. For example, in data-drive AI systems, such as those produced through machine learning, bias in data collection and training can result in an AI system demonstrating bias. In logic -based AI, such as rule-based systems, bias can arise due to how a knowledge engineer might view the rules that apply in a particular setting. Bias can also arise due to online learning and adaptation through interaction. It can also arise through personalisation whereby users are presented with recommendations or information feeds that are tailored to the user's tastes. It does not necessarily relate to human bias or human-driven data collection. It can arise, for example, through the limited contexts in which a system in used, in which case there is no opportunity to generalise it to other contexts. Bias can be good or bad, intentional, or unintentional. In certain cases, bias can result in discriminatory and/or unfair outcomes, indicated in this document as unfair bias.

Ethical AI
In this document, ethical AI is used to indicate the development, deployment and use of AI that ensures compliance with ethical norms, including fundamental rights as special moral entitlements, ethical principles, and related core values. It is the second of the three core elements necessary for achieving Trustworthy AI.

Human-Centric AI (HCAI)
The human-centric approach to AI strives to ensure that human values are central to the way in which AI systems are developed, deployed, used and monitored, by ensuring respect for fundamental rights, including those set out in the Treaties of the European Union and Charter of Fundamental Rights of the European Union, all of which are united by reference to a common foundation rooted in respect for human dignity, in which the human being enjoy a unique and inalienable moral status. This also entails consideration of the natural environment and of other living beings that are part of the human ecosystem, as well as a sustainable approach enabling the flourishing of future generations to come.

Machine learning (ML)
ML is a field of inquiry devoted to understanding and building methods that 'learn', that is, methods that leverage data to improve performance on some set of tasks. It is seen as a part of AI. Machine learning algorithms build a model based on sample data, known as training data, to make predictions or decisions without being explicitly programmed to do so.

Robust AI
Robustness of an AI system encompasses both its technical robustness (appropriate in each context, such as the application domain or life cycle phase) and as well as its robustness from a social perspective (ensuring that the AI system duly considers the context and environment in which the system operates). This is crucial to ensure that, even with good intentions, no unintentional harm can occur. Robustness is the third of the three components necessary for achieving Trustworthy AI.

Stakeholders
By stakeholders we denote all those that research develop, design, deploy or use AI, as well as those that are (directly or indirectly) affected by AI – including but not limited to companies, organisations, researchers, public services, institutions, civil society organisations, governments, regulators, social partners, individuals, citizens, workers and consumers.

Traceability
Traceability of an AI system refers to the capability to keep track of the system's data, development, and deployment processes, typically by means of documented recorded identification.

Trustworthy AI
Trustworthy AI has three components: (1) it should be lawful, ensuring compliance with all applicable laws and regulations (2) it should be ethical, demonstrating respect for, and ensure adherence to, ethical principles and values and (3) it should be robust, both from a technical and social perspective, since, even with good intentions, AI systems can cause unintentional harm. Trustworthy AI concerns not only the trustworthiness of the AI system itself but also comprises the trustworthiness of all processes and actors that are part of the system's life cycle.

List of relevant literature (**Social and Emotional Learning**)

TITLE	Handbook of Social and Emotional Learning: Research and Practice
EDUCATION AREA to which the resource refers	☒ pre-school education ☒ primary education ☒ secondary education ☒ higher vocational and higher education ☒ adult education ☒ education for people with disabilities
APA 7 CITATION	Durlak et al. (ed.) (2015). Handbook of Social and Emotional Learning: research and practice. New York: The Guillford Press.
KEYWORDS	SEL, Education, Community, Policy
SUMMARY	The book is 612 pages long and is divided into 3 major chapters, which deal with the CSR from different perspectives. The Handbook has 4 main objectives: a) offer a critical, integrative and contemporary perspective on ECCE research, practice and legislation that can be used to develop and scale up ECCE in schools, communities and families, b) offer content (research and how to put it into practice) to those, those who wish to learn about the literature in the field, c) develop critical debate on the research, impact, deployment, professional development, funding and legislation of CCE, and d) offer suggestions, recommendations and guidance for the design of future CCE research, practice and policy. The book is a systematic overview of the CSI. By defining it in detail, it sets clear frameworks on which to think about the integration of AI in the SETCOM project.

AUTHOR (First name Last name), Country	Robert J. Jagers, Deborah Rivas-Drake & Brittney Williams, USA
TITLE	Transformative Social and Emotional Learning (SEL): Toward SEL in Service of Educational Equity and Excellence
JOURNAL	Educational Psychologist
EDUCATION AREA to which the resource refers	☒ pre-school education ☒ primary education

	☒ secondary education ☒ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
APA 7 CITATION	Jagers, R. J., Rivas-Drake, D. & Williams, B. (2019) Transformative Social and Emotional Learning (SEL): Toward SEL in Service of Educational Equity and Excellence*, Educational Psychologist, 54*:3, 162-184. DOI: 10.1080/00461520.2019.1623032
KEYWORDS	Social emotional learning, transformation, social justice, empowerment
SUMMARY	This article is about transformative social and emotional learning (SEL), a form of SEL intended to promote equity and excellence among children, young people, and adults. Includes issues of race/ethnicity as a first step toward addressing the broader range of extant inequities. Transformative SEL is anchored in the notion of justice-oriented citizenship, and discuss issues of culture, identity, agency, belonging, and engagement as relevant expressions of the Collaborative for Academic, Social and Emotional Learning 5 core competencies. We also point to programs and practices that hold promise for cultivating these competencies and the importance of adult professional development in making these efforts maximally effective for diverse children and youth. The article highlights the potential of using SEL to promote equality in the educational, social, and economic spheres, and address's themes of social power, privilege, prejudice, discrimination, empowerment, and self-determination, which are also themes that are very much related to the ethical aspects of using AI.

AUTHOR (First name Last name), Country	Katherine Dowling, Margaret M. Barry, Ireland
TITLE	Evaluating the Implementation Quality of a Social and Emotional Learning Program: A Mixed Methods Approach
JOURNAL	International Journal of Environmental Research and Public Health

EDUCATION AREA to which the resource refers	☐ pre-school education ☐ primary education ☒ secondary education ☐ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
APA 7 CITATION	Dowling, K., & Barry, M. M. (2020). Evaluating the Implementation Quality of a Social and Emotional Learning Program: A Mixed Methods Approach. *International Journal of Environmental Research and Public Health, 17*(9), 3249. http://dx.doi.org/10.3390/ijerph17093249
KEYWORDS	social and emotional learning; school-based programs; implementation quality; mixed methods; adolescence; mental health and well-being
SUMMARY	School-based social and emotional learning (SEL) programs have been shown to be effective in producing positive outcomes for adolescents. However, variability in implementation quality can have a negative impact on these program effects. The aim of this study was to examine the variability in implementation quality for schools implementing the MindOut program and to identify factors that were likely to contribute to this variability. Employing a mixed methods approach, quantitative and qualitative data were collected from teachers (n = 16) and students (n = 280) who participated in the MindOut program. Quantitative indicators were used to score schools' implementation quality across four dimensions (dosage, adherence/fidelity, quality of delivery and participant responsiveness), and these were averaged to determine overall level of implementation (high/low). Qualitative data identified factors that contributed to implementation quality, and factors were then analysed in accordance with the schools' implementation level grouping. Findings indicated that variability in implementation quality existed both between and within schools. A total of eight schools were assigned as high implementers and another eight as low implementers. Influencing factors were categorized into five themes: (i) program factors, (ii) participant factors, (iii) teacher factors, (iv) school contextual factors, and (v) organizational capacity factors. Several differences between high and low implementers were found in relation to these influencing factors. The findings contribute to the evidence on implementation a high-quality

	SEL programs in schools by advancing knowledge on measuring implementation quality across crucial influencing dimensions/factors and development of strategies to optimize implementation of school based SEL programs in the future. The paper is relevant for the SETCOM project in addressing implementation quality of SEL programs. Namely, the quality of implementation was shown as directly related to producing positive effects of programs' outcomes for participant.

AUTHOR (First name Last name), Country	María B. Santamaría-Villar, Raquel Gilar-Corbi, Teresa Pozo-Rico, Juan L. Castejón, Spain
TITLE	Teaching Socio-Emotional Competencies Among Primary School Students: Improving Conflict Resolution and Promoting Democratic Co-existence in Schools
JOURNAL	Frontiers in Psychology
EDUCATION AREA to which the resource refers	☐ pre-school education ☒ primary education ☐ secondary education ☐ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
APA 7 CITATION	Santamaría-Villar, M. B., Gilar-Corbi, R., Pozo-Rico, T., & Castejón, J. L. (2021). Teaching Socio-Emotional Competencies Among Primary School Students: Improving Conflict Resolution and Promoting Democratic Co-existence in Schools. *Frontiers in Psychology, 12*, 659348. DOI: 10.3389/fpsyg.2021.659348
KEYWORDS	primary education, socio-emotional skills, school violence, disruptive behaviours, conflict resolution
SUMMARY	The primary goal of this research was to present an educational proposal for imparting socio-emotional competencies among primary school students with the aim to create a climate of cooperation in classrooms and reducing disruptive or aggressive behaviours among students. The impart socio-emotional competencies based on: (1) fostering self-knowledge, self-esteem, and respect for others among students; (2) developing behaviours that allow them to perceive and express feelings and self-regulating emotions; and (3) developing assertive

	communication skills aimed at improving conflict resolution. The educational program was implemented throughout the academic year by organizing bi-monthly sessions of 45 min each (in total 15 sessions). The sample consisted of 100 students in the third grade, with the control and experimental groups having an equal number of students (50 each). The instruments used for this research were: (a) BarOn Emotional Quotient Inventory (Youth Version [BarOn EQ-i:YV]): used for measuring emotional and social functioning; (b) the Matson Evaluation of Social Skills with Youngsters (MESSY): used for assessing social skills; and (c) Questionnaire for the Assessment of School Violence in Preschool and Primary School. To check the effectiveness of the educational intervention, a quasi-experimental design, along with pretest-posttest control group design, was used in accordance with the general linear model. The results of this study showed that educational intervention is useful in preventing violent behaviours and promoting the development of socio-emotional skills among primary school students. The applicability of this study to the SETCOM project is recognized in the implemented educational program, measurement tools for evaluation of its outcomes, and comparison of findings to our educational model's evaluation.

AUTHOR (First name Last name), Country	Stephanie M. Jones, Sophie P. Barnes, Rebeca Bailey, Emily J. Doolittle, USA
TITLE	Promoting Social and Emotional Competencies in Elementary School
JOURNAL	The Future of Children, SPRING 2017, Vol. 27, No. 1, Social and Emotional learning, pp. 49-72
EDUCATION AREA to which the resource refers	☒ pre-school education ☒ primary education ☐ secondary education ☐ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
APA 7 CITATION	Jones, S.M., Barnes, S.P., Bailey, R.F., & Doolittle, E.J. (2017). Promoting Social and Emotional Competencies in Elementary School. *The Future of Children, 27*, 49 – 72.

KEYWORDS	Social-Emotional Learning (SEL), programs, challenges
SUMMARY	In the article, the authors ask what the cause of such different results in the studies in which is they researched whether there is evidence of the influence of a student's proficiency in SEL skills on better relationships with others, on better academic success, and on better mental and physical health in adulthood. The results of the influence vary widely. The authors analysed eleven different SEL programs using four criteria and examined whether the expected outcomes of the program were consistent with the measurement used and the documented impact. They suggest to researchers, implementers, and policymakers, decision-makers: - Student SEL skills cannot be measured in isolation because classroom relationships and classroom atmosphere are important in measuring SEL program outcomes and student impact. The skills of the teacher SEL and the SEL skills of other adults who are part of the school environment have a major impact on students' social and emotional competences, so it is most important to focus on the teacher's (and other adults in the school environment's) own SEL competences. The atmosphere in the classroom is also important, as it has a great influence on the SEL of the students. The SEL's interventions in the classroom dynamics have a positive effect on the classroom community. - In the case of students in the preschool and elementary grades, it is necessary to adapt the program to the age groups, i.e., to create different programs for each age or year and not to use one program for all age groups, since middle childhood involves many and large developmental and environmental changes. - When measuring SEL skills at this age, we must focus on context and depth and not so much on learning outcomes. Stakeholders should choose measures (measurements) that are specific and adapted to the developmental stage. Measurements or data collection should be extended to the context, teachers, and other stakeholders to learn what works and what does not from their perspective. At the end, the authors also describe the challenges that remain when we talk about SEL programs and SEL interventions: programs that are too short or have too few hours; the possibility of choice when introducing SEL; SEL

	skills are sometimes presented as something additional, optional; most SEL programs focus on the classroom but not the environment (playgrounds, lunchroom, hallways, restrooms, gymnasium, locker rooms); teachers have inadequate SEL training or numbers are low; insufficient information about different and suitable SEL programs.

AUTHOR (First name Last name), Country	Megan M. McClelland, Shauna L. Tominey, Sara A. Schmitt, Robert Duncan, USA
TITLE	SEL Interventions in Early Childhood
JOURNAL	The Future of Children, SPRING 2017, Vol. 27, No. 1, Social and Emotional learning, pp. 33-47
EDUCATION AREA to which the resource refers	☒ pre-school education ☒ primary education ☐ secondary education ☐ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
APA 7 CITATION	McClelland, M.M., Tominey, S.L., Schmitt, S.A., & Duncan, R.J. (2017). SEL Interventions in Early Childhood. *The Future of Children, 27*, 33 - 47.
KEYWORDS	social-emotional learning, early childhood, interventions, self-awareness, family involvement
SUMMARY	The article "SEL Interventions in Early Childhood" explores the importance of social-emotional learning (SEL) interventions in promoting positive developmental outcomes for young children. The authors, Megan M. McClelland, Shauna L. Tominey, Sara A. Schmitt, and Robert Duncan, discuss the key components of effective SEL interventions, including promoting self-awareness, self-regulation, social awareness, relationship skills, and responsible decision-making. The article highlights several evidence based SEL interventions, such as the PATHS (Promoting Alternative Thinking Strategies) program, the Incredible Years program, and the Strong Start program. The authors discuss the positive outcomes of these interventions, including improved social skills, increased academic achievement, and reduced behaviour problems. The authors also address the importance of incorporating family and community involvement in SEL interventions.

	They suggest that involving parents, caregivers, and community members in SEL programs can increase the effectiveness of the intervention and promote a supportive environment for children's development. Overall, the article emphasizes the critical role that SEL interventions can play in promoting positive outcomes for young children. By providing children with the skills and tools needed to navigate social and emotional situations, SEL interventions can support children's academic and personal success both in the short-term and throughout their lives.

AUTHOR (First name Last name), Country	KOZINA, Ana (ed.), International
TITLE	Social, emotional and intercultural competencies for inclusive school environments across Europe: relationships matter
YEAR	2020
EDUCATION AREA to which the resource refers	☐ pre-school education ☒ primary education ☐ secondary education ☐ higher vocational and higher education ☐ adult education ☐ education for people with disabilities ☒ teacher training
Citation after APA 7	Kozina, A. (ed.). *Social, emotional and intercultural competencies for inclusive school environments across Europe: relationships matter*, (Studien zur Schulpädagogik, ISSN 1435-6538, 89). Hamburg: Dr. Kovac.
KEYWORDS	Socio-emotional competences, intercultural competences, students, teachers
SUMMARY	The monograph presents the results of the HAND in HAND project, which is presented here: https://2017-20.handinhand.si/?lang=sl The monograph includes an introduction to the basic concepts, an overview of the integration of core content (see keywords) in European education systems, a programme for students and a programme for teachers to develop socio-emotional and intercultural competences, and the results of analyses and impacts of the implementation of both programmes.

AUTHOR (First name Last name), Country	Fabian Müller, Albert Denk, Emily Lubaway, Christine Sälzer, Ana Kozina, Tina Vršnik Perše, Maria Rasmusson, Ivana Jugović, Birgitte Lund Nielsen, Mojca Rozman, Aleš Ojsteršek, Svetlana Jurko - international
JOURNAL	Educational Research Review
TITLE	Assessing social, emotional, and intercultural competences of students and school staff: A systematic literature review
YEAR	2020
EDUCATION AREA to which the resource refers	☐ pre-school education ☒ primary education ☒ secondary education ☐ higher vocational and higher education ☐ adult education ☐ education for people with disabilities ☒ teacher training
Citation after APA 7	Müller, F., Denk, A., Lubaway, E., Sälzer, C., Kozina, A., Vršnik Perše, T., Rasmusson, M., Jugović, I., Lund Nielsen, B., Rožman, M., Ojsteršek, A. and Jurko, S. (2020). Assessing social, emotional, and intercultural competences of students and school staff: A systematic literature review. *Educational Research Review,* *29*, February 2020. https://www.sciencedirect.com/science/article/abs/pii/S1747938X19300430
KEYWORDS	Social and emotional competences, assessment, systematic literature review
SUMMARY	The paper includes a systematic literature review, which was used to develop a list of existing instruments for measuring SEL competence in students and teachers. A key resource related to this article is the Catalogue of Instruments for Measuring SEL Competence, available at: https://2017-20.handinhand.si/wp-content/uploads/2019/12/SEI-measures_CATALOGUE.pdf

AUTHOR (First name Last name), Country	Rachel Lofthouse, UK
JOURNAL	Professional Development in Education
TITLE	Coaching in education: a professional development process in formation

YEAR	2019
EDUCATION AREA to which the resource refers	☐ pre-school education ☐ primary education ☒ secondary education ☒ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
Citation after APA 7	Lofthouse, R. (2018). *Coaching in education: a professional development process in formation.* Professional Development in Education 45 (1). https://doi.org/10.1080/19415257.2018.1529611
KEYWORDS	Coaching, professional development, co-construction
SUMMARY	Lofthouse's paper notes that consultancy mentoring has been developing as a form of professional development for teachers and school leaders in England for several decades. His research focused on the work of six advisory mentors in England. His research demonstrated the importance of relationships and communication in mentoring and the tools and models that support this. It confirms that mentoring is well suited to help individuals who are facing real challenges. It also shows that mentoring is one of the most valuable resources to support the education system when it is faced with a mismatch between lecturers and the management of institutions. Link to the project: spreading knowledge of the SEC field

AUTHOR (First name Last name), Country	Janez Musek, Slovenia
TITLE	Personality theories as a basis for school counselling
YEAR	2022
WEBSITE	ResearchGate
EDUCATION AREA to which the resource refers	☐ pre-school education ☒ primary education ☒ secondary education ☒ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
Citation after APA 7	Musek, J. (2022). Personality theories as a basis for school counselling. [Internet resource]. https://www.researchgate.net/profile/Janek-Musek-

	2/publication/266875643_TEORIJE_OSEBNOSTI_KOT_PODLAGA_SOLSKEGA_SVETOVALNEGA_DELA/links/54ca
KEYWORDS	Counselling, disorders in individuals, education service
SUMMARY	If we start from the idea that everything is innate in human beings, then we might as well abandon most educational and pedagogical efforts. If, on the other hand, we have the idea that everything is acquired, then education would still make some sense, but then we would be ignoring innate dispositions altogether, and we might be making an even bigger mistake. The purpose of this resource is to briefly highlight the extent to which psychological theories of personality are mirrored in the doctrines of school counselling. Alternatively, it could be put another way: on which elements of psychological and broader anthropological personality theory is the concept of school counselling based. Personality theory is intimately connected with schooling, although especially with that part of schooling which is associated with education (Hall & Lindzey, 1970; Musek, 1988; Thomson et al., 1995). Indeed, by many definitions, education is another name for the process of systematic personality formation. It is logical, therefore, that schoolwork is related to conceptions of personality. Connection to the project: schoolwork is very connected to SEC.

AUTHOR (First name Last name), Country	Maria Cristina Martinez-Bravo, Charo Sadaba Chalezquer, and Javier Serrano-Puche, Spain
JOURNAL	Sustainability
TITLE	Dimensions of Digital Literacy in the 21st Century Competency Frameworks
YEAR	2022
EDUCATION AREA to which the resource refers	☐ pre-school education ☒ primary education ☒ secondary education ☒ higher vocational and higher education ☒ adult education ☐ education for people with disabilities
Citation after APA 7	Martínez-Bravo, M.C., Sádaba Chalezquer, C., Serrano-Puche, J. (2022). Dimensions of Digital Literacy in the 21st Century Competency Frameworks. Sustainability, 14(1867), 1-13.

KEYWORDS	Dimensions of digital literacy; critical thinking, emotional intelligence
SUMMARY	The paper examines different understandings of digital competences in the light of 8 international frameworks, institutions, and initiatives: UNESCO, EU, OECD, ATCS, P21, NETS, NAEP and Engauge. Through content analysis of the texts, they identify the domains of competences and the links between the different domains. In more detail, 6 dimensions of digital competences are presented: critical, cognitive, social, operational, emotional, and projective, as well as 3 profiles/clusters: social-emotional, cognitive, and operational-critical, according to the understanding of the competences of each international framework.

AUTHOR (First name Last name), Country	Bartlett, J., Massachusetts, USA
JOURNAL	Journal of Physical Education, Recreation and Dance (Education & Educational Research, Q3, ESCI (2021) = 0.57)
TITLE	Social-emotional Learning, Health Education Best Practices, and Skills-based Health
YEAR	2019
EDUCATION AREA to which the resource refers	☒ pre-school education ☒ primary education ☒ secondary education ☒ higher vocational and higher education ☒ adult education ☒ education for people with disabilities
Citation after APA 7	Bartlett, J. (2019). Social-emotional Learning, Health Education Best Practices, and Skills-based Health. Journal of Physical Education Recreation and Dance, 90(2), 58-60. DOI:10.1080/07303084.2019.1548185
KEYWORDS	social-emotional learning, academic performance, health education, mental health, curriculum
SUMMARY	In the paper, the author discusses social-emotional learning (SEL), which he defines as "*the process through which children and adults acquire and effectively use the knowledge, attitudes and skills needed to understand and manage emotions, set and achieve goals, experience and show empathy for others, establish and maintain positive relationships, and make responsible decisions*" (p. 7). Based

	on the previous findings, the author identifies SEL as an important factor influencing how students learn and perform in school. It is therefore important to integrate SEL into everyday teaching in all subject areas, but especially in health education, whose curriculum is directly linked to SEL. According to the US National Standards for School Health Education, SEL involves the development of five key competences: 1) self-awareness; 2) self-control; 3) social awareness; 4) relational skills; 5) responsible decision-making. The focus is on skill development (e.g., what students can do) and less on cognitive learning (e.g., what students can do). The following article presents interesting practical examples of teacher activities that can be used to foster the development of SEL competences in students in their classrooms (CASEL, 2017). Templates of the examples presented are freely available on the World Wide Web. In conclusion, the author points out that social-emotional learning should be an integral element of any curriculum, as it contributes significantly to enhancing the social-emotional health of students at all levels of education in any school system.

AUTHOR (First name Last name), Country	Maria S. Poulou, Greece
JOURNAL	Early Childhood Education Journal (Education & Educational Research, Q4, IF (2021) = 1.656)
TITLE	Social and Emotional Learning and Teacher-Student Relationships: Preschool Teachers' and Students' Perceptions
YEAR	2017
EDUCATION AREA to which the resource refers	☒ pre-school education ☐ primary education ☐ secondary education ☐ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
EQUIPMENT USED (If specified)	Measures include the Teacher SEL Beliefs Scale (Brackett et al., 2012); the Self-Rated Emotional Intelligence Scale (SREIS; Brackett et al., 2006); the Young Children's Appraisal of Teacher Support (YCATS; Mantzicopoulos and

	Neuharth-Pritchett, 2003); the Student-Teacher Relationships Scale (STRS; Pianta, 2001).
Citation after APA 7	Poulou, M. S. (2017). Social and Emotional Learning and Teacher-Student Relationships: Preschool Teachers' and Students' Perceptions. Early Childhood Education Journal, 45(3), 427-435. DOI:10.1007/s10643-016-0800-3
KEYWORDS	emotional intelligence, social-emotional learning, teacher-student, educator-student relationships
SUMMARY	The authors of the paper highlight the link between the teacher's/educator's socio-emotional functioning and the quality of the pedagogical process. They were interested in how the quality of the teacher-student relationship can be predicted based on the educator's perceptions of his/her own social-emotional functioning in terms of emotional intelligence (e.g., perceiving, understanding, and managing one's own and others' emotions), and beliefs and commitment to the implementation of social-emotional learning (SEL) in the preschool period. The paper thus presents the results of an empirical study on a sample of 92 preschool teachers (91 female) who implemented compulsory school readiness programmes and 238 children (47.1% boys, 52.9% girls) aged 5-6 years who were enrolled in these programmes. Regression analysis showed that the educator's beliefs about SEL were the most significant predictor of a positive relationship between him/her and the group. Educators who scored higher on the SEL Beliefs Scale as well as on the Self-Rated Emotional Intelligence Scale reported a statistically significant more positive relationship with their mentees (e.g., a higher score on the SEL Beliefs Scale, a higher score on the SEL Commitment Scale, a higher score on the Self-Rated Emotional Intelligence Scale, a higher score on the Self-Rated Emotional Intelligence Scale). Based on the findings, the author pointed out that the educator's difficulties in establishing a good educational relationship with his/her children can also be explained in terms of his/her lower capacity to perceive, understand, and manage emotions. To establish positive interpersonal relationships in the educational process, it is therefore important to strengthen the social-emotional competences of teachers/educators.

AUTHOR (First name Last name), Country	Rebecca J. Collie, Jennifer D. Shapka, Nancy E. Perry, Andrew J. Martin, International
JOURNAL	Learning and Instruction (Education & Educational Research, Psychology, Educational, Q1, IF (2021) = 6.636)
TITLE	Teachers' beliefs about social-emotional learning: Identifying teacher profiles and their relations with job stress and satisfaction
YEAR	2015
EDUCATION AREA to which the resource refers	☐ pre-school education ☒ primary education ☒ secondary education ☐ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
EQUIPMENT USED (If specified)	Teacher SEL Beliefs Scale (Brackett) et al., 2012).
Citation after APA 7	Collie, R. J., Shapka, J. D., Perry, N. E., & Martin, A. J. (2015). Teachers' beliefs about social-emotional learning: Identifying teacher profiles and their relationships with job stress and satisfaction. Learning and Instruction, 39, 148-157. DOI: 10.1016/j.learninstruc.2015.06.002
KEYWORDS	teachers' beliefs, social-emotional learning, job satisfaction, stress, latent profile analysis
SUMMARY	This article discusses the importance of promoting social-emotional learning (SEL) to improve students' social-emotional competences (e.g., self-awareness, relational skills, cooperative learning, responsible decision-making), prosocial behaviour and academic achievement. Based on previous research, the authors point out that not all teachers have identical or equally positive beliefs about their students' social-emotional learning, but that these are often related to their own social-emotional competence, the subject area they teach, socio-demographic characteristics, experiences of stress and job satisfaction, and general beliefs about SEL in school. This article presents the results of an empirical study of a sample of 1267 Canadian teachers (80% female, $\bar{x}$ age = 44.9 years), 77% of whom taught at the elementary school grade level and 16% of whom worked in an elementary or secondary school counselling service (the remaining 7% were substitute teachers, librarians, and school administrators). The findings showed three different

	latent groups of teachers according to their beliefs about social-emotional learning: 1) SEL implementers (high beliefs and commitment, environmental support), 2) SEL promoters (high beliefs and commitment, low environmental support) and 3) SEL advocates (high commitment, low beliefs, and environmental support). The most positive beliefs were reported by teachers with the profile of SEL promoters, who were highly committed to SEL and had high support for it in the school environment. Differences were found between these groups in socio-demographic characteristics (e.g., female teachers reported higher support for SEL learning than male teachers, and classroom teachers reported higher support for SEL learning than subject teachers) and in experiences of stress and job satisfaction (e.g., SEL practitioners reported the least stress and highest job satisfaction). The highest levels of stress were found among the SEL advocate group, suggesting that perceived support from the school environment to promote social-emotional learning may play an even more important role in teachers' experiences of stress than their own beliefs.

AUTHOR (First name Last name), Country	Ksenija Lapornik, Slovenia - expert handbook
TITLE	Effective communication - a step towards fellow human beings and success
YEAR	2017
EDUCATION AREA to which the resource refers	☐ pre-school education ☐ primary education ☐ secondary education ☐ higher vocational and higher education ☒ adult education ☐ education for people with disabilities
Citation after APA 7	Lapornik, K. (2017). *Effective communication - a step to fellow human beings and success*, pp. 14-15. Retrieved from: https://www.zlu.si/uploads/Dokumenti/Gradivo_Ucinkovita%20communication%20-%20step%20to%20success%20and%20people%20in_1.0.pdf
KEYWORDS	Communication process, conflict and resolution, self-management

SUMMARY	One of the strong purposes of our primary and secondary education is to build a solid foundation for more effective and efficient communication in our future personal and business lives. Unfortunately, we most often fail to recognise the need for this at that time and do not take the opportunity to improve our speaking and listening skills at a young age. As a result, we often enter the world of business completely unprepared for the demands it places on us. This handbook covers topics that may not seem to be part of the narrower elements of communication. However, their importance and impact are greater than we might expect, as they form the basis of our thinking, our emotions, our energy levels, our response to stressful situations and our handling of ourselves, as well as the foundations of our health and vitality. The chapters of the manual have added value in polishing our communication competences. The material also includes encouraging thoughts communicated to the reader by the educators who participated in the programme's presentation training on 18 October 2017. Link to the project: communication is one of the methods that influence the success of SEC

AUTHOR (First name Last name), Country	Kimberly A. Schonert-Reichl, Canada
TITLE	Social and Emotional Learning and Teachers
JOURNAL	The Future of Children, SPRING 2017, Vol. 27, No. 1, Social and Emotional learning, pp. 137-155
EDUCATION AREA to which the resource refers	☒ pre-school education ☒ primary education ☐ secondary education ☐ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
APA 7 CITATION	Schonert-Reichl, K.A. (2019). Social and Emotional Learning and Teachers. The Future of Children, 27, 137 - 155.
KEYWORDS	social and emotional learning, teachers, pedagogical programs, teacher preparation courses
SUMMARY	The article presents research findings that show: That teaching is one of the most stressful professions, furthermore, stress is transmitted in the classroom: when the

	teacher is stressed, it is transmitted to the students. Students are also affected by how the teacher views their own effectiveness and whether they feel supported. SEL training for teachers has an impact on reducing psychological stress, reducing feelings of being under time pressure, and making significant progress in regulating the teacher's emotions and attention. Teachers implement the SEL program more successfully when they have a positive attitude toward it, are motivated, and have enough confidence in their abilities and knowledge about how to implement the SEL. This is important because classrooms with good teacher-student relationships support deep learning and positive social and emotional development for students. This means that it is not just a matter of how to teach the SE skills directly, but that the teacher him/herself must have the knowledge and skills to create a safe, supportive, and caring class community. To this end, the article presents a model for a prosocial class. The final part of the article presents how students are prepared for the teaching profession in the United States and the ways, if any, in which SEL content is included in subject curricula or in pedagogical programs in general at various institutions and in various pedagogical programs.

List of relevant literature **(Artificial Intelligence)**

AUTHOR (First name Last name), Country	Tsz Kit Ng, Samuel Kai Wah Chu, Maggie Shen, Jac Leung, China
TITLE	AI Literacy: Definition, Teaching, Evaluation and Ethical Issues
YEAR	2021
CONFERENCE	84th Annual Meeting of the Association for Information Science and Technology
EDUCATION AREA to which the resource refers	☐ pre-school education ☒ primary education ☒ secondary education ☒ higher vocational and higher education ☐ adult education ☐ education for people with disabilities

Citation after APA 7	Ng, Tsz Kit & Chu, Samuel & Shen, Maggie & Leung, Jac. (2021). AI Literacy: Definition, Teaching, Evaluation and Ethical Issues.
KEYWORDS	AI literacy, AI learning and teaching, AI in education, AI ethics
SUMMARY	As AI has evolved and spread into many areas of life and industry, the definition of AI literacy has changed over time and is still not uniform today. This article reviews 18 scientific articles on AI literacy, dividing the promotion of AI literacy into 4 aspects: knowledge and understanding of AI, use of AI, evaluation and creation of AI, ethics of AI. The reviewed scientific articles provide different answers to the 4 research questions: RQ1: How do researchers define the term AI literacy? 1) AI literacy is a set of skills in response to the new age of intelligence. 2) AI literacy is the ability to understand the basic methods and concepts behind AI in different products and services. 3) AI literacy is the basic knowledge that provides the learner with the perception of AI technology. RQ2: How do teachers help learners to develop AI literacy? Automata(?), intelligent agents, graphs and data structures, basic computer science, machine learning; AI without programming or even without using a computer: case studies, role-playing and storytelling. RV3: How do researchers evaluate students' AI literacy skills? Self-evaluation questionnaires, computer programs, documentation and presentation of experiments, photography, notes, student interviews, recording of student's interaction with the AI agent. RV4: What are the ethical concerns in the field of AI literacy? Prejudice, legal liability, intellectual property. To build responsible citizens through AI, we need to emphasise fairness, inclusiveness, transparency, and ethics. Link to the project: help define the concept of AI literacy.

AUTHOR (First name Last name), Country	Andrej Flogie, Boris Aberšek, Slovenia
TITLE	The impact of innovative ICT education and AI on the pedagogical paradigm
YEAR	2019

EDUCATION FIELD to which the resource refers	☐ pre-school education ☐ primary education ☐ secondary education ☒ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
Citation after APA 7	Flogie, A., Aberšek, B. (2019) The impact of innovative ICT education and AI on the pedagogical paradigm. Newcastle upon Tyne: Cambridge Scholars Publishing
KEYWORDS	education / ICT / artificial intelligence / pedagogical paradigm
SUMMARY	The book is divided into 9 chapters. The first chapter presents the development of the educational process, highlighting how the foundations of the science of education and the mind were laid in psychology, mathematical logic, and linguistics, and emphasising that theories of what the mind does need to evolve alongside theories of how the brain works. Chapter 2 presents philosophical concepts as the basis for educational systems. It points out that there are different branches of Philosophies that serve as the basis for philosophies of learning in each period. This section highlights some of the more important philosophies related to education systems and, indirectly, to learning and teaching. Chapter 3 points out that theories of learning are usually divided into several paradigms representing views of the learning process itself. Theories within the same paradigm share an identical basic view of the learning process. Chapter 3 discusses some of the most established and accepted learning/philosophical paradigms. This is followed by Chapter 4, which provides an overview of the history of the educational sciences, which began in ancient times. The term didactics, which is now accepted in all professional circles, derives from the Greek and later Latin word didáskein. Creativity, innovation, critical thinking and the meaningful use of modern information and communication technologies, combined with artificial intelligence, are key factors in creating new added value in the school environment and represent the main challenges of 21st century education. This is discussed in Chapter 5. The following chapter on cognitive science explicitly describes new cognitive models. These are linked to two different research perspectives proposed by cognitive

	scientists, which partly go beyond the basic assumption that the mind is either a symbolic manipulator or a connectionist network. The first (called the hybrid model) is a combination of two traditional approaches to mental architectures, the symbolic system hypothesis, and the connectionist network hypothesis; the second (called the dynamical model) is related to the dynamical systems hypothesis in mathematics, including situated/embodied cognitive movement. This is followed by chapters on competences and some innovative teaching methods. The book concludes with a chapter on innovative learning environments and artificial intelligence or Education 4.0. Given the possibility of designing an intelligent autonomous adaptive system that is capable of learning, adapting to new circumstances and performing (critical) self-evaluation, this chapter emphasises that a reductive human-machine correlation is possible, despite attempts to prove it so far having failed. It also highlights that there is a major challenge related to the notion of ethics and morality within such an autonomous adaptive AI-based system.

AUTHOR (First name Last name), Country	Andrej Flogie, Boris Aberšek, Slovenia
TITLE	Artificial Intelligence in Education
YEAR	2021
EDUCATION AREA to which the resource refers	☐ pre-school education ☒ primary education ☒ secondary education ☒ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
Citation after APA 7	Flogie, A., Aberšek, B. (2021). Artificial Intelligence in Education. In O. Lutsenko, & G. Lutsenko (Eds.), Active Learning - Theory and Practice. IntechOpen. https://doi.org/10.5772/intechopen.96498
KEYWORDS	Artificial intelligence, education, ethics, machine learning
SUMMARY	Information technology is playing an increasingly important role in modern society and education, directly influenced by the rapid development of technology, the development of services on the World Wide Web, the development of knowledge-based systems and artificial intelligence,

	interactive multimedia, and other technologies. This chapter of the monograph therefore presents some ideas on how to respond to this challenge and how to look at the field of training in education. The book chapter thus presents basic concepts and reflections on the development of a user-friendly education system designed to enable problem solving. It is based on the experience of intelligent tutoring systems and is primarily aimed at improving the delivery of instruction and the independent learning of students. Like all powerful tools, experience-based AI design approaches should be used with care. Without carefully designed experience and extensive testing, these systems could easily lead to undesirable outcomes (such as negative training or increased anxiety due to phobia). Despite the promise of early efforts, the best approaches to designing these experiences are still subject to research and debate. Any technology as powerful as artificial intelligence raises several general social and ethical issues for all of us. Do AI models systematise existing biases? What will AI do when it enters education? This is the question the authors try to answer in the book's chapter.

AUTHOR (First name Last name), Country	Ilkka Tuomi, Finland
TITLE	The Impact of Artificial Intelligence on Learning, Teaching, and Education
YEAR	2018
EDUCATION AREA to which the resource refers	☐ pre-school education ☒ primary education ☒ secondary education ☒ higher vocational and higher education ☒ adult education ☒ education for people with disabilities
Citation after APA 7	Tuomi, I. (2018). The Impact of Artificial Intelligence on Learning, Teaching, and Education. In M. Cabrera, R. Vuorikari, & Y. *Policies for the future*. Publications Office of the European Union, Luxembourg.
KEYWORDS	Artificial intelligence, competence
SUMMARY	The study presents opportunities and challenges for learning, teaching, and education in the age of AI, which the authors consider having great potential in the areas of innovation,

	educational practices, lifelong learning, skills and competences learning, inclusion, etc. It highlights 3 priorities: a) developing better use of digital technologies for teaching and learning, b) developing relevant digital competences and skills for digital transformation, and c) improving education through better data analytics. The study also highlights 3 priorities: a) developing better use of digital technologies for teaching and learning, b) developing relevant digital competences and skills for digital transformation, and c) improving education through better data analytics. They foresee that technological change will be very rapid and will create great pressure to transform educational practices, institutions, and orientations. Societies and economies will have to reinvent themselves and technological change will trigger social and cultural changes that will be reflected in changed lifestyles, norms, institutions, skills, as well as in the content and form of education. To circumvent dismissive thinking, it will be important to present AI in the context of the future of learning. AI needs a huge amount of data, but these algorithms are based on 'historical data', which raises some ethical dilemmas. How we understand learning, teaching and education is important. One of the most promising areas for the authors is video data processing in the classroom. It can also help us to imagine what a future teacher should look like. The results may show that some activities could be automated.

AUTHOR (First name Last name), Country	Stéphan Vincent-Lancrin, Reyer van der Vlies, International
TITLE	Trustworthy artificial intelligence (AI) in education: Promises and challenges
YEAR	2020
EDUCATION AREA to which the resource refers	☐ pre-school education ☒ primary education ☒ secondary education ☒ higher vocational and higher education ☒ adult education ☒ education for people with disabilities
Citation after APA 7	Vincent-Lancrin, S. and R. van der Vlies (2020), "Trustworthy artificial intelligence (AI) in education: Promises and challenges", OECD Education Working Papers, No.

	218, OECD Publishing, Paris, https://doi.org/10.1787/a6c90fa9-en.
KEYWORDS	Artificial Intelligence in Education, Systematic review, Complex skills
SUMMARY	This document has been written in support of the G20 Dialogue on Artificial Intelligence (AI). With the rise of Artificial Intelligence (AI), education faces two challenges: harnessing the benefits of AI to improve educational processes, both in the classroom and at system level; and preparing students with new skills for increasingly automated economies and societies. AI applications are often still in their infancy, but there are many examples of promising applications that indicate how AI could transform education. In the context of education, this article highlights how AI can accelerate personalised learning, supporting learners with special needs. At a system level, promising practices include predictive analytics to reduce drop-out rates and the assessment of new skill sets. AI and digitalisation also result in new demand for complex skills that are harder to automate (e.g., higher cognitive skills such as creativity and critical thinking). Achieving the full potential of AI requires stakeholders to trust not only the technology but also its use by humans. This raises new policy challenges regarding 'trustworthy AI', which encompasses data privacy and security, but also potential misuses of data that lead to bias against individuals or groups.

AUTHOR (First name Last name), Country	Xieling Chen, Haoran Xie, Di Zou, Gwo-Jen Hwang, China
JOURNAL	Computers and Education: Artificial Intelligence
TITLE	Application and theory gaps during the rise of Artificial Intelligence in Education
YEAR	2020
EDUCATION FIELD to which the resource refers	☐ pre-school education ☐ primary education ☐ secondary education ☒ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
Citation after APA 7	Chen, X., Xie, H., Zou, D., & Hwang, G. J. (2020). Application and theory gaps during the rise of artificial

	intelligence in education. *Computers and Education: Artificial Intelligence*, 1, 100002. https://doi.org/10.1016/j.caeai.2020.100002
KEYWORDS	Artificial Intelligence in Education, Systematic Review, Application Gap, Theory Gap
SUMMARY	Given the growing importance of Artificial Intelligence in Education (AIEd) and the lack of a comprehensive review of it, the aim of this research is to conduct a comprehensive and systematic review of influential studies on AIEd. We analysed 45 articles according to annual distribution, leading journals, institutions, countries/regions, most used terms, and accepted theories and technologies. We also evaluated definitions of AIEd from broad and narrow perspectives and clarified the relationship between AIEd, educational data mining, computer-supported education and learning analytics. The results showed that: 1) there is a steadily growing interest and impact of AIEd research; 2) little work has been done to integrate deep learning technologies into educational contexts; 3) traditional AI technologies such as natural language processing have been widely adopted in educational contexts, while more advanced techniques have rarely been adopted; 4) there is a lack of studies that apply AI technologies and engage in depth with educational theories. Research findings suggested to 1) look for the possibility of applying AI in physical classrooms (not only online); 2) do not try to identify detailed links between students' answers and the desired conceptual understanding within intelligent tutoring systems; 3) pay more attention to the option of advanced deep learning algorithms such as generative adversarial networks and deep neural networks; 4) look for the potential of NLP in promoting precision or personalised education; 5) combine biomedical detection and imaging technologies, such as the electroencephalogram, and focus on student-related problems during the learning process; and 6) closely integrate the use of artificial intelligence technologies into educational theories.

AUTHOR (First name Last name), Country	Maud Chassignol, Aleksandr Khoroshavin, Alexandra Klimova, Anna Bilyatdinova, International
JOURNAL	Procedia Computer Science

TITLE	Artificial Intelligence trends in education: a narrative overview
YEAR	2018
EDUCATION AREA to which the resource refers	☒ pre-school education ☒ primary education ☒ secondary education ☒ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
Citation after APA 7	Chassignol, M., Khoroshavin, A., Klimova, A., & Bilyatdinova, A. (2018). Artificial Intelligence trends in education: a narrative overview. *Procedia Computer Science*, 136, 16-24. https://doi.org/10.1016/j.procs.2018.08.233
KEYWORDS	Artificial intelligence, education, machine learning, technology-enhanced learning
SUMMARY	Digital technologies have already become an intrinsic part of our lives. They are changing the way we seek information, the way we communicate with each other, even the way we behave. This transformation applies to many areas, including education. The main aim of this article is to identify the possible impact of artificial technologies on the study process and to anticipate changes in the educational sphere. In the presented literature review, we have considered four categories: personalised educational content, innovative teaching methods, technology-enhanced assessment, communication between student and lecturer. After reviewing publications on the topic, here we present a picture of how Artificial Intelligence (AI) will transform the landscape of education.

AUTHOR (First name Last name), Country	Jon Krohn, Beyleveld Grant, Bassens Aglaé, International
TITLE	Deep Learning Illustrated
YEAR	2020
EDUCATION AREA to which the resource refers	☐ pre-school education ☐ primary education ☒ secondary education ☒ higher vocational and higher education ☒ adult education

	☐ education for people with disabilities
Citation after APA 7	(Krohn, Grant, & Aglaé, 2020) Krohn, J., Grant, B., & Aglaé, B. (2020). Deep learning illustrated. Pearson; Addison Wesley.
KEYWORDS	Artificial intelligence, deep learning
SUMMARY	Many believe that machine learning is the future of statistics and computer engineering, transforming services, design, banking, medicine, manufacturing, and many other disciplines. It is difficult to overestimate its impact on the world today and the changes it will bring in the years and decades to come. Among the many different types of machine learning, deep learning is the most exciting. Deep learning has revolutionised computer vision and natural language processing, and researchers are still identifying new areas where neural networks could be used. The deepest impact is often seen in efforts to mimic human action, such as computer vision and language processing, as well as sound synthesis and translation. In other books on the subject, the mathematics and concepts underlying deep learning are intimidating to most readers and deter people from reading and delving deeper into the field. The authors of Deep Learning Illustrated challenge traditionally perceived barriers and communicate their knowledge with ease. The book is a pleasure to read because it is aimed at a wide audience. The mathematical notations in the book are preserved but at a level that does not scare the readers.

AUTHOR (First name Last name), Country	David Touretzky, Christina Gardner-McCune, Fred Martin, Deborah Seehorn, USA
TITLE	Envisioning AI for K-12: What Should Every Child Know about AI?
YEAR	2019
CONFERENCE	Proceedings of the AAAI Conference on Artificial Intelligence
EDUCATION AREA to which the resource refers	☒ pre-school education ☒ primary education ☒ secondary education ☐ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
Citation after APA 7	Touretzky, David & Gardner-McCune, Christina & Martin, Fred & Seehorn, Deborah. (2019) Envisioning AI for K-12:

	What Should Every Child Know about AI? Proceedings of the AAAI Conference on Artificial Intelligence. 33. 9795-9799. 10.1609/aaai.v33i01.33019795.
KEYWORDS	Artificial intelligence, curriculum, education
SUMMARY	A proposal for the US curriculum: the main ideas students should know. 1. **Computers sense the world using sensors.** ... and they need to have a wide range of knowledge to interpret what they perceive. up to 7 years: use voice agents and have experience of machine vision 8-10 years: use children's programming frameworks with AI concepts included 11-13 years: create their own app 14-17 years: identify and illustrate the limitations of machine perception systems. 2. **AI agents have a view of the world and use it to act** Students understand the concept of representing something and that computers construct a representation based on data processed by the algorithms behind it. up to 7 years: understand simple computer representations and show their own on paper 8-10 years: create representations using simple computer programs (Scratch) 11-13 years: read representations such as Google Knowledge Graph and design simple algorithms to search the graph 14-17: use basic data structures to program simple inference algorithms. 3. **Computers can learn from data.** Students understand that machine learning is a way of statistical reasoning that looks for patterns in data. Up to 7 years: they get experience with a computer that can recognise their face and simple movements. 8-10 years: they manipulate an application that recognises objects (they write a Scratch program that responds to objects from the camera). 11-13 years: judge how well the trained system responds to new inputs 14-17 years: learn/train the network using an interactive tool 4. **The essential challenge for AI developers is to teach agents to interact with people in a relaxed way**

	We want to teach agents to understand language, recognise emotions and infer intentions from observed behaviour. up to 7 years: describe the types of tasks an agent understands. 8-10 years: distinguish between bot and human; analyse natural language examples and judge which ones are difficult for a computer to understand and why. 11-13 years: parse sentences and understand which ones present difficulties for the agent. 14-17 years: they can make a dictionary to parse simple language and make a conversational bot. 5. **AI applications can impact society in good and bad ways.** They identify the ways in which AI affects their lives. Link to the project: guidelines for introducing AI in primary and secondary education.

AUTHOR (First name Last name), Country	Laurence Devillers, France
TITLE	About robots and people
YEAR	2017 (original; Slovenian translation is from 2021)
EDUCATION AREA to which the resource refers	☐ pre-school education ☐ primary education ☐ secondary education ☐ higher vocational and higher education ☐ adult education ☐ education for people with disabilities ☒ other
Citation after APA 7	Devillers, L. Of robots and humans. Ljubljana: Mladinska knjiga, 2021.
KEYWORDS	Robots, artificial intelligence, ethics, consciousness
SUMMARY	The book does not highlight artificial intelligence in education but is a general overview of the state of robotics from its first references in science fiction literature to the reality today. It defines the main concepts related to artificial intelligence. It introduces the current (2017) robots on the market, the leading companies and the most prominent scientists working on AI and robotics. Highlights the concept of robot, gives examples of human applications (household, nursing homes) and humanity (medicine, industry). Focuses on

	ethical and moral dilemmas and myths related to the topic. It defines concepts such as consciousness, emotions and empathy and identifies them in relation to their presence in artificial intelligence. He cites sources for his claims and recommends literature for a more detailed review, so it is a good starting point for a reader new to the field. The author is Professor of Artificial Intelligence at the Sorbonne in Paris, a Fellow of the Institute at the National Centre for Scientific Research and one of Europe's foremost experts on the social and moral issues of robots in everyday life. Link to the project: a general overview of the state of robotics from the first references in science fiction literature to the reality today.

AUTHOR (First name Last name), Country	Ismael Celik, Muhterem Dindar, Hanni Muukkonen, Sanna Järvelä, Finland
JOURNAL	TechTrends
TITLE	The Promises and Challenges of Artificial Intelligence for Teachers: A Systematic Review of Research
YEAR	2022
EDUCATION AREA to which the resource refers	☐ pre-school education ☒ primary education ☒ secondary education ☒ higher vocational and higher education ☒ adult education ☐ education for people with disabilities
Citation after APA 7	Celik, I., Dindar, M., Muukkonen, H., & Järvelä, S. (2022). The Promises and Challenges of Artificial Intelligence for Teachers: A Systematic Review of Research. *TechTrends*, 1-15.
KEYWORDS	Artificial intelligence, education, teachers, benefits, challenges
SUMMARY	The article first describes the development of AI, then describes examples of how AI can be used in education (e.g., chat-bots, intelligent tutors, automation of assessment) to support and personalise the learning process and to relieve the burden on teachers and highlights the important role of teachers in the development of AI in education. After a review of the literature, the authors identify several advantages of using AI in education. Specifically, they

	conclude that AI can help teachers with content planning (e.g., whether certain content is appropriately difficult for the level of knowledge of the students), implementation (e.g., whether the content is appropriately difficult for the level of knowledge of the students) and delivery (e.g., whether the content is appropriately challenging for the level of knowledge of the students). Teachers play a role in this as both teachers and co-creators of AI, who also decide on the appropriateness and accuracy of AI in education. The authors also identified challenges to the use of AI in education. Firstly, they cite technical shortcomings of AI (e.g., AI is not technically sophisticated enough to reliably assess complex products that include both text and images), limited reliability in assessment and high context dependency (AI can only be used in specific learning contexts). Finally, they cite teachers' lack of technological expertise and the lack of appropriate infrastructure in schools as two major barriers.

AUTHOR (First name Last name), Country	Jake Bryant, Christine Heitz, Saurabh Sanghvi, Dilip Wagle, USA
TITLE	How artificial intelligence will impact K-12 teachers
YEAR	2020
WEBSITE	https://www.mckinsey.com
YEAR OF ACCESS	2022
EDUCATION AREA to which the resource refers	☐ pre-school education ☒ primary education ☒ secondary education ☒ higher vocational and higher education ☒ adult education ☐ education for people with disabilities
Citation after APA 7	Bryant, J., Heitz, C., Sanghvi, S., & Wagle, D. (2020). How artificial intelligence will impact K-12 teachers. *Retrieved May 12*, 2020.
KEYWORDS	Technology, AI, teacher relief
SUMMARY	The authors begin by describing the problems teachers face - a huge increase in workload, with the increasing complexity of pupils' learning needs and a concomitant increase in administrative tasks, which often leads them to consider changing jobs. Despite concerns that robots and AI will replace teachers, the authors predict the opposite - they

	foresee that the number of teachers will grow, and AI will help them do their jobs better and more efficiently. The authors note that currently, on average, teachers spend only half of their working time interacting with students, with the rest of their time spent on activities such as preparation, assessment, and administration. By simultaneously reviewing the activities and the potential for automation, the authors found that the use of AI (or technology) can give teachers 20-30% of their working time that could be spent supporting and interacting with students. Specifically, the authors state that with the help of technology, 11 hours of preparation per week could be reduced to 6. This would allow teachers more time for their students, time to introduce new and innovative content and activities, etc. The time saved could therefore allow teachers to spend more time working individually with students, coaching, and advising them in the learning process, and promoting the development of social-emotional skills. However, the introduction of new technologies is challenging, as the effective integration of such technologies into the learning process is crucial.

AUTHOR (First name Last name), Country	Astrid Schepman, Paul Rodway, UK
JOURNAL	Computers in Human Behaviour Reports
TITLE	Initial validation of the general attitudes towards Artificial Intelligence Scale
YEAR	2020
EDUCATION FIELD to which the resource refers	☐ pre-school education ☐ primary education ☐ secondary education ☐ higher vocational and higher education ☒ adult education ☐ education for people with disabilities
Citation after APA 7	Schepman, A., & Rodway, P. (2020). Initial validation of the general attitudes towards Artificial Intelligence Scale. *Computers in human behaviour reports*, *1*, 100014.
KEYWORDS	Attitudes towards artificial intelligence, questionnaire, validation
SUMMARY	This article examines teachers' attitudes towards AI and reports on the validation of a new questionnaire on general

	attitudes towards AI. Attitudes towards AI will play an important role in the (non-)acceptance of AI in everyday life, but in general there are currently mixed feelings towards AI, with individuals recognising the benefits of using AI while experiencing negative feelings such as fear and anxiety. For these reasons, the authors have developed a new questionnaire to measure general attitudes towards AI. The questionnaire consists of 16 positive and 16 negative items, and analyses showed adequate factor structure and divergent and convergent validity.

AUTHOR (First name Last name), Country	Niel Selwyn, UK
TITLE	Should Robots Replace Teachers?: AI and the Future of Education
YEAR	2019
EDUCATION AREA to which the resource refers	☐ pre-school education ☒ primary education ☒ secondary education ☒ higher vocational and higher education ☒ adult education ☐ education for people with disabilities
Citation after APA 7	Selwyn, N. (2019). Should Robots Replace Teachers?: AI and the Future of Education. Cambridge: Polity Press.
KEYWORDS	AI, robots, education, intelligent tutoring
SUMMARY	The digital automation of teaching is set to be one of the defining educational challenges of the next 20 years. While the introduction of human-looking robots in classrooms remains more of a publicity stunt than a serious educational trend, many other forms of digital automation are being implemented in schools and universities around the world. Teachers are not being replaced by physical robots per se, but are increasingly surrounded by software, apps, platforms, and other forms of artificial intelligence designed to carry out pedagogical tasks. Most teachers remain convinced that "intelligent systems" are unlikely to displace them any time soon. Nevertheless, teachers at all levels of education are already facing the prospect of working alongside these technologies. It is therefore certainly worth exploring the extent to which human teachers could be displaced by machines soon. What aspects of teaching

	might soon no longer make sense for humans to deliver? Could automated systems free teachers to work in different and more rewarding areas? Alternatively, will the people who remain employed in educational settings be forced to work in an increasingly technical way? These are no longer frivolous or imaginary questions. Powerful technologies are now designed to autonomously support different kinds of learning - from babies picking up their first words to doctors honing their surgical skills. The multi-billion dollar 'EdTech' market continues to grow as investors, developers and self-proclaimed 'educators' seek to upend traditional education methods while making a tidy profit. The question of how people learn (and, by extension, how people are supported to learn) continues to be an area that is considered ripe for innovation, reform, and 'disruption'. The long-standing professional status of teachers and university lecturers is clearly under threat.

AUTHOR (First name Last name), Country	Rose Luckin, Karine George, Mutlu Cukurova, UK
TITLE	AI for school teachers
YEAR	2022
EDUCATION AREA to which the resource refers	☐ pre-school education ☒ primary education ☒ secondary education ☒ higher vocational and higher education ☒ adult education ☐ education for people with disabilities
Citation after APA 7	Luckin, R., George, K., & Cukurova, M. (2022). AI for school teachers. Boca Raton, London, New York: CRC Press - Taylor & Francis Group.
KEYWORDS	AI, education, challenges, data, ethics
SUMMARY	Minimum traffic, translate websites in a foreign language or play your favourite songs with voice commands. But AI technologies go far beyond making life more comfortable; its development is delivering breakthroughs in Herculean tasks, from twisting proteins to better understand the human body, to optimising data centres, to sequestering carbon to achieve zero net emissions. Achieving these innovations depends on AI technologies being developed responsibly - slowly, safely, and securely, and in the public interest.

	This technology brings risks, but also rewards risks that need to be regulated and risks that need to be mitigated and eradicated by industry. Public attitudes towards AI technology are complex. This is understandable, as the sector can appear opaque, perceived as the domain of a "tech fraternity" led by the 1% and rushing along at an unbearable pace. On the one hand, vague promises of social benefit are made to the public. It starts simple, it recognises your face and unlocks your phone; it helps you find the perfect film. Later, it will do the dirty, dangerous, boring jobs you do not want; it will also drive your car and look after your pets. This can lead to people choosing convenience over privacy - citizens accepting the immediate benefits and not questioning the impacts, not imagining, and asking why. For whom was this done? What am I unwittingly giving up when I use these technologies? How much is it worth? And then there are moments like the 2020 A-levels fiasco, and students outside Government House (10 Downing Street) shouting "fuck the algorithm". Notwithstanding the fact that experts believe it was a case of basic maths (not AI) being used inappropriately and asking the wrong question in the wrong way, the press, and the public saw this as a mutated version of the AI algorithm leaving a whole cohort, and a generation, disenfranchised.

AUTHOR (First name Last name), Country	Robert M. Aiken, Richard G. Epstein, USA
JOURNAL	International Journal of Artificial Intelligence in Education
TITLE	Ethical Guidelines for AI in Education: Starting a Conversation
YEAR	2000
YEAR OF ACCESS	2022 (article 2020)
EDUCATION AREA to which the resource refers	☒ pre-school education ☒ primary education ☒ secondary education ☒ Higher vocational and higher education ☒ adult education ☐ education for people with disabilities

Citation after APA 7	Aiken, R. M., & Epstein, R. G. (2000). Ethical guidelines for AI in education: Starting a conversation. *International Journal of Artificial Intelligence in Education*, *11*, 163-176.
KEYWORDS	humanity, ethics, AI community, education
SUMMARY	The article from 2000 is older but interesting because it talks about the future of AI, society, and education, so we can check which predictions have come true and which have not, how far AI development is and how far society is with the successful implementation of AI. Topics covered: - Social damage - Basic general ethical principles of professional ethics - Asimov's Laws of Robotics (1940) and Extended Laws of Robotics (1994) Most importantly, ten principles (guidelines) for AIED systems (Artificial Intelligence in Education) are written down, i.e., for researchers' awareness in creating AI in education systems.

AUTHOR (First name Last name), Country	Jiahong Su, Yuchun Zhong, China
JOURNAL	Computers and Education: Artificial Intelligence
TITLE	Artificial Intelligence (AI) in early childhood education: Curriculum design and future directions
YEAR	2022
EDUCATION AREA to which the resource refers	☒ pre-school education ☒ primary education ☐ secondary education ☐ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
Citation after APA 7	Zhong, Y., & Su, J. (2022). Artificial Intelligence (AI) in early childhood education: Curriculum design and future directions. *Computers and Education: artificial Intelligence, 3.*
KEYWORDS	artificial intelligence, AI curriculum, kindergarten, early learning, AI literacy
SUMMARY	The paper can be divided into three sections: an overview of the state of the art, a presentation of the research and finally a set of modules offered. In the first part of the set, we have an overview of the state of the art, in the second part we have the research presented and finally:

	- A review of existing guidelines and guidelines for the use of AI in education. - UI curriculum for early childhood education: behaviour, skills, attitudes (ethics, society, community, rights) - resources and tools for using AI in kindergartens. The second part presents a study that aims to contribute to a comprehensive understanding of the objectives, content, and specific methods, and to assess how to develop effective content, courses, curricula on the use of AI for children. The objectives of the research are to develop an AI curriculum framework for early childhood education and to examine relevant activities that constitute an AI curriculum framework. The research questions include which content should be included in an early childhood AI curriculum and which teaching and learning methods should be included in an early childhood AI curriculum. Five modules, five activities and a children's project are presented to help teachers and researchers develop the most effective curriculum for K 3-5 students. The most effective method for early AI instruction has been shown to be problem- and project-oriented instruction that promotes critical thinking, problem solving and collaborative skills.

AUTHOR (First name Last name), Country	Wayne Holmes, Kaska Porayska-Pomsta, Ken Holstein, Emma Sutherland & Toby Baker, Simon Buckingham Shum, Olga C. Santos5 & Mercedes T. Rodrigo, Mutlu Cukurova, Igbert Bittencourt, Kenneth R. Koedinger, International
JOURNAL	International Journal of Artificial Intelligence in Education
TITLE	Ethics of AI in Education: Towards a Community-Wide Framework
YEAR	2021
WEBSITE	https://link.springer.com/article/10.1007/s40593-021-00239-1
YEAR OF ACCESS	2022
EDUCATION AREA to which the resource refers	☐ pre-school education ☐ primary education ☐ secondary education ☐ higher vocational and higher education ☐ adult education ☐ education for people with disabilities

Citation after APA 7	Holmes, W., Porayska-Pomsta, K., Holstein, K. *et al.* (2022). Ethics of AI in Education: Towards a Community-Wide Framework. *International Journal of Artificial Intelligence in Education,* 32, 504-526.
KEYWORDS	Ui in education, ethics, fairness, pedagogy, human thinking
SUMMARY	Even if ethics seems natural, and even if the purpose of AI in education seems to be to support learning and teaching, experience in other fields shows that this is not the case. Therefore, this paper first starts by presenting the themes, dilemmas that arise in the field of ethics of AI in education (fairness, transparency, bias, autonomy, inclusion, etc.), followed by a presentation of the research on the AIED community (AI community in education). The following findings are presented: most members of the AIED community are not skilled in confronting and resolving ethical issues that arise in the field of AI in education, and there is an urgent need to discuss the value and usefulness of developing an ethical framework and practical guidelines for understanding and applying ethics in AIED.

AUTHOR (First name Last name), Country	Maciej Jakubowski and Ralph Hippe, Luxembourg
TITLE	Is student digital competence shaped by schools or individual factors? Insights from SELFIE using multilevel models.
JOURNAL	European Journal of Education, research, development, and policy
EDUCATION AREA to which the resource refers	☐ pre-school education ☒ primary education ☒ secondary education ☒ higher vocational and higher education ☒ adult education ☐ education for people with disabilities
APA 7 CITATION	Hippe, R. and Jakubowski, M. (2022). Is student digital competence shaped by schools or individual factors? Insights from SELFIE using multilevel models. Luxembourg: Publications Office. Cedefop working paper, No 14. http://data.europa.eu/doi/10.2801/00684
KEYWORDS (3 to 5)	Economic inequalities, Human capital, Competences,
SUMMARY	SELFIE (Self-reflection on effective learning by fostering

	the use of innovative educational technologies) supports schools preparing for the digital age. It is an online self-reflection tool that has been developed by the European Commission together with the education community. It measures schools' digital capacity (European Commission, 2021). SELFIE provides questionnaires on the use of digital technologies at schools that are filled out by school leaders, teachers and students. The questionnaires comprise eight areas that include all relevant topics on digital technology use, such as leadership, continuous professional development, pedagogy, or students' digital skills.

AUTHOR (First name Last name), Country	Wayne Holmes in Kaśka Porayska-Pomsta, UK
TITLE	The Ethics of Artificial Intelligence in Education: Practices, Challenges, and Debates
EDUCATION AREA to which the resource refers	☐ pre-school education ☐ primary education ☐ secondary education ☒ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
APA 7 CITATION	Holmes, W. & Porayska-Pomsta, K. (2022). **The Ethics of Artificial Intelligence in Education: Practices, Challenges, and Debates.** Routledge, Taylor & Francis Group
KEYWORDS	Ethics, AI, Education
SUMMARY	There are still many unknowns about what influences learning and, moreover, what ethical considerations should be addressed when integrating AI into education. The book identifies and confronts key ethical issues generated over years of AI research and deployment in learning contexts. The ethical consequences of engaging with these new technologies in different organisations remain unexplored. Featuring expert perspectives from inside and outside the AIED scholarly community, this book provides frameworks, guidelines, policies, and regulations to ensure the positive impact of artificial intelligence in learning

AUTHOR (First name Last name), Country	High-level expert group on artificial intelligence set up by the European Commission
TITLE	AI The Assessment List for Trustworthy Artificial Intelligence (ALTAI) for self-assessment
EDUCATION AREA to which the resource refers	☒ pre-school education ☒ primary education ☒ secondary education ☒ higher vocational and higher education ☒ adult education ☒ education for people with disabilities
APA 7 CITATION	AI HLEG. (2020). The assessment list for trustworthy artificial intelligence (ALTAI). European Commission. https://doi. Org/10.2759/002360
KEYWORDS	Ethics Guidelines, Assessment list, Trustworthy
SUMMARY	In the book there are ethical guidelines for trustful AI: 1. Human Agency and Oversight. 2. Technical Robustness and Safety. 3. Privacy and Data Governance. 4. Transparency. 5. Diversity, Non-discrimination, and Fairness. 6. Societal and Environmental Well-being. 7. Accountability These are the themes that the project addresses in all modules, in the ZA section.

AUTHOR (First name Last name), Country	Adam Palmquist, Isak Barbopoulos & Miralem Helmefalk, Sweden
TITLE	AUTOMATON: A Gamification Machine Learning Project
JOURNAL	Encyclopaedia of Data Science and Machine Learning vol.3
EDUCATION AREA to which the resource refers	☐ pre-school education ☐ primary education ☐ secondary education ☒ higher vocational and higher education ☒ adult education ☒ education for people with disabilities
APA 7 CITATION	Palmquist, A., Barbopoulos, I., & Helmefalk, M. (2023). AUTOMATON: A Gamification Machine Learning Project. In *Encyclopaedia of Data Science and Machine Learning* (pp. 3090-3101). IGI Global.

EQUIPMENT USED (If indicated)	An in-house developed cloud- based interoperable and process-agnostic application programming interface (API)-platform.
NAME OF INSTITUTION where the equipment was used	University of Gothenburg & Linnaeus University
KEYWORDS	artificial intelligence, educational gamification, application programming interface, cloud platform
SUMMARY	This article displays a design ethnographic case study on an ongoing machine learning project at a Scandinavian gamification start-up company. From late 2020 until early 2021, the project produced a machine learning proof of concept, later implemented in the gamification start-up´s application programming interface to offer smart gamification. The initial results show promise in using prediction models to automate the cluster model selection affording more functional, autonomous, and scalable user segments that are faster to implement. The finding provides opportunities for gamification (e.g., in learning analytics). An identified challenge was performance; the neural networks required hyperparameter fine-tuning, which is time-consuming and limits scalability. Interesting further investigations should consider the neural network fine-tuning process, but also attempt to verify the effectiveness of the cluster models selection compared with a control group. This article is relevant to the project because it provides insight into how simplistic prediction models can be used to cluster users, which is common in the field of learning analytics. Additionally, the article gives insight into how AI can be used in game-based learning instruments to create more tailored user experiences.

AUTHOR (First name Last name), Country	Robert Bodily, USA
TITLE	Review of Research on Student-Facing Learning Analytics Dashboards and Educational Recommender Systems
JOURNAL	IEEE Transactions on Learning Technologies, Volume: 10, Issue: 4
EDUCATION AREA to which the resource refers	☐ pre-school education ☒ primary education ☒ secondary education ☒ higher vocational and higher education

	☒ adult education ☒ education for people with disabilities
APA 7 CITATION	R Bodily, R., & Verbert, K. (2017). Review of research on student-facing learning analytics dashboards and educational recommender systems. IEEE Transactions on Learning Technologies, 10(4), 405-418, DOI: 10.1109/TLT.2017.2740172.
KEYWORDS	Meta-Review, Learning Analytics, Recommender system., Student reaction
SUMMARY	This article presents a comprehensive literature review of student-facing learning analytics reporting systems that track and report learning analytics data directly to students. It built upon four previously conducted literature reviews in similar domains and analysed 93 out of 945 articles retrieved from databases and journals. The articles were coded based on five categories: functionality, data sources, design analysis, student perceptions, and measured effects. The review suggests a need for research focusing on the design and development process of learning analytics reporting systems rather than just the final product, which includes conducting needs analyses, visual design analyses, information selection justifications, and student perception surveys. Additionally, experiments are needed to determine the effects of these systems on student behaviour, achievement, and skills, as there currently needs to be more empirical evidence in this area. Usability tests and methodologies should also be employed to examine student use of these systems, as these factors may impact the experimental findings. Finally, observational study methods, such as propensity score matching, should be used to increase student access to these systems while rigorously measuring observed effects. This article has substantial relevance in the SETCOM project due to its macro approach to learning analytics tools which the majority uses A.I. algorithms. The review highlights the importance of a comprehensive approach to researching learning analytics reporting systems, which considers design and empirical evaluation to maximise their potential student benefits.

AUTHOR (First name Last name), Country	Daniel Schiff, USA

TITLE	Education for AI, *not* AI for Education: The Role of Education and Ethics in National AI Policy Strategies
JOURNAL	International Journal of Artificial Intelligence in Education
EDUCATION AREA to which the resource refers	☒ pre-school education ☒ primary education ☒ secondary education ☒ higher vocational and higher education ☒ adult education ☒ education for people with disabilities
APA 7 CITATION	Schiff, D. (2021). Education for AI, not AI for Education: The Role of Education and Ethics in National AI Policy Strategies. *International Journal of Artificial Intelligence in Education, 32*(3), 527–563. DOI: https://doi.org/10.1007/s40593-021-00270-2
KEYWORDS	Artificial intelligence, Ethics, Policy, Social implications of technology
SUMMARY	The article highlights that more than 30 countries have released national artificial intelligence (AI) policy strategies as of 2021 and examines 24 such English-language national AI policy strategies produced between 2016 and the beginning of 2020, reviewing the role of education in global AI policy discourse. It finds that the use of AI in education (AIED) is absent from policy conversations, while the instrumental value of education in supporting an AI-ready workforce and training more AI experts is overwhelmingly prioritized. Further, the ethical implications of AIED receive scant attention despite the prominence of AI ethics discussion in these documents. One of the questions that Schiff raises is whether policymakers view AI as a tool to improve education, or if they are focused on education as a tool to improve AI? Considering the findings in the article, Schiff applies a framework of five AI ethics principles to consider ways in which policymakers can better incorporate AIED's implications: Beneficence, non-maleficence, autonomy, justice, and explicability. The article also offers recommendations for AIED scholars on strategies for engagement with the policymaking process, and for performing ethics and policy oriented AIED research to that end, to shape policy deliberations on behalf of the public good.

	The article is from 2021, the data sampling done between 2016-2020, and it would be interesting to follow the changes in policy documents considering the enormous development in the field of AI in the years since then. The article is relevant for the SETCOM project because policy documents have implications for the mandate of schools and teachers in the AI area.

AUTHOR (First name Last name), Country	Li Sijing, Wang Lan, China
TITLE	Artificial Intelligence Education Ethical Problems and Solutions
JOURNAL	13th International Conference on Computer Science & Education (ICCSE)
EDUCATION AREA to which the resource refers	☒ pre-school education ☒ primary education ☒ secondary education ☒ higher vocational and higher education ☒ adult education ☒ education for people with disabilities
APA 7 CITATION	Sijing, L., & Lan, W. (2018, August). Artificial intelligence education ethical problems and solutions. In *2018 13th International Conference on Computer Science & Education (ICCSE)* (pp. 1-5). IEEE.
KEYWORDS	Artificial Intelligence, Education, Ethical Problems and Solutions
SUMMARY	Artificial intelligence technology is an opportunity for education, but it is also a challenge. We do not deny the changes that artificial intelligence technology brings to education. At the same time, we must also consider the problems in artificial intelligence education, such as the fairness and inclusiveness of AI education. Based on these, this paper analyses the causes of the problems, we found problems can divided into three categories. The irrationality of the algorithm; the incompleteness of the data, and the inaccuracy of the content. Through analysis, we found that the root of problems is in people. So, this paper divide people into three categories according to the different aspects that they are responsible for in artificial intelligence education. Programmers, teachers, and students. Finally, this paper gives cautions and solutions based on these three

	occupations. The starting points from the text can be used in the SETCOM project, especially in the last part of the ZA, where the project will deal with the ethics of (deployment of) AI technologies.

AUTHOR (First name Last name), Country	Xu Weiqu, Ouyang, Fan, China
TITLE	The application of AI technologies in STEM education: a systematic review from 2011 to 2021
JOURNAL	International Journal of STEM Education
EDUCATION AREA to which the resource refers	☒ pre-school education ☒ primary education ☒ secondary education ☒ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
APA 7 CITATION	Xu, W., Ouyang, F. The application of AI technologies in STEM education: a systematic review from 2011 to 2021. *IJ STEM Ed* **9**, 59 (2022). https://doi.org/10.1186/s40594-022-00377-5
KEYWORDS	Meta analysis, STEM, GST framework
SUMMARY	The application of AI technology in STEM education is confronted with the challenge of integrating diverse AI techniques in the complex STEM educational system. Grounded upon a GST framework, this research reviewed the empirical AI-STEM studies from 2011 to 2021. AI has potential to transform the instructor–student relationships in STEM education from the instructor-directed to student-centred learning. Among all the reviewed articles, 22 studies revealed the educational effects of AI technologies on students' learning performance. Most of them showed significantly positive influence of AI techniques on the improvement of students' learning performances. Many studies revealed the educational effects of AI technologies on students' affective perception, such as attitude, interest, and motivation (N = 17). On the one hand, students showed satisfaction and positive attitude towards the integration of AI technologies and STEM education. On the other hand, the application of AI technologies also arouses students' interests and motivation in STEM learning. Most of the AI applications were used in science and technology learning

	contents, and educational robots and automation were not applied in engineering and mathematics learning contents. Additionally, the range of AI applications was in higher education, while few of AI techniques were applied in other educational levels, especially in kindergarten. Learning prediction was more likely to applied with a large scale of students, and educational robots were inclined to be applied with a small scale of students. In limitations authors acknowledge that the complex relationships between different elements (e.g., instructor–learner, learner–learner relationship) in AI-STEM system need to be further explored to gain a deep understanding of the application of AI in STEM education. SETCOM addresses this area.

AUTHOR (First name Last name), Country	Ashraf Alam, Atasi Mohanty, India
TITLE	Foundation for the Future of Higher Education or 'Misplaced Optimism'? Being Human in the Age of Artificial Intelligence
CONFERENCE	Innovations in Intelligent Computing and Communication
EDUCATION AREA to which the resource refers	☐ pre-school education ☐ primary education ☐ secondary education ☒ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
APA 7 CITATION	Alam, A., Mohanty, A. (2022). Foundation for the Future of Higher Education or 'Misplaced Optimism'? Being Human in the Age of Artificial Intelligence. In: *et al.* Innovations in Intelligent Computing and Communication. ICIICC 2022. Communications in Computer and Information Science, vol 1737. Springer, Cham. https://doi.org/10.1007/978-3-031-23233-6_2
KEYWORDS	Smart tutoring systems, machine learning, curriculum
SUMMARY	This research surveys the existing literature by means of a systematic review. Only 112 of the 2984 articles identified between 2006 and 2021 met the exclusion and inclusion criteria necessary for incorporation in the final synthesis. Descriptive results show that STEM and subjects related to computer science predominate in AIEd articles and that 'quantitative methods' predominate in empirical research.

	The findings are arranged into 4 categorical groupings: (1) intelligent tutoring systems; (2) personalization and adaptive systems; (3) evaluation and assessment; and (4) prediction and profiling, all of which can be applied to institutional and administrative services, academic support services, and assessment and evaluation. The findings call for firm attention towards the lack of critical thinking on the challenges and risks of AIEd and towards the necessity for more comprehensive research on ethical and pedagogical techniques in the deployment of AIEd in higher education. Pedagogically sound goals, rather than technically feasible ones, should be pursued. In China, teachers are already able to see data about their students' participation and emotions in class thanks to face recognition technology displayed on a dashboard. Sometimes, even the most sophisticated AI systems may make a mistake. An AI system cannot acquire intelligence without the training data used to develop it. The most surprising aspect of this assessment is the astounding lack of critical consideration of the potential dangers and educational implications of using AI technologies in higher education. Recently conducted empirical research seldom addressed privacy problems in terms of ethical consequences. Educators and learning designers need to perform more research on how to include AI applications throughout the student lifecycle to take advantage of the immense potential that these technologies have for constructing intelligent learning and teaching systems. Our systematic review's absence of authors with links to education departments demonstrates the need for a pedagogical lens to be applied to these innovations in technology. Unfortunately, there is currently no evidence to back the development of psychological and pedagogical theories of learning in connection with technologies anchored in artificial intelligence. More than forty percent of the studies in three premier journals for educational technology lacked any practical application. Explicit educational views were missing from the papers that were reviewed. This is the gap addressed by SETCOM.

AUTHOR (First name Last name), Country	Ahmed Tlili, Boulus Shehata, Michael Agyemang Adarkwah, Aras Bozkurt, Daniel T. Hickey, Ronghuai Huang & Brighter Agyemang, International
TITLE	What if the devil is my guardian angel: ChatGPT as a case study of using chatbots in education
EDUCATION AREA to which the resource refers	☐ pre-school education ☐ primary education ☒ secondary education ☒ higher vocational and higher education ☒ adult education ☐ education for people with disabilities
APA 7 CITATION	Tlili, A., Shehata, B., Adarkwah, M.A. *et al.* What if the devil is my guardian angel: ChatGPT as a case study of using chatbots in education. *Smart Learn. Environ.* **10**, 15 (2023). https://doi.org/10.1186/s40561-023-00237-x
KEYWORDS	Generative AI, human-machine collaboration, chatbost
SUMMARY	This study conducted a user experience supported by qualitative and sentiment analysis to reveal the perception of users on ChatGPT in education. It specifically focused on the concerns that different stakeholders (e.g., policymakers, educators, learners) should keep in mind when using ChatGPT as a technology in education. Further discussions with experts from various domains, such as education, security, and psychology, should be established to catalyse the understanding and good use of chatbots as technology generally, and ChatGPT specifically. Consequently, more guidelines and policies should be established to facilitate the adoption of ChatGPT in schools and universities. Teachers are required to think about new teaching philosophies, which could rely on to assess their students. For instance, it is possible to use oral debate as the old stoics and Greeks did, to assess their students' logical and critical thinking, rationale and accuracy of arguments, and power of convincing. Additionally, incorporating a variety of assessment methods, such as group projects, importance of going beyond "yes-or-no" questions and hands-on activities could be reconsidered. It is therefore important to investigate the different human–machine collaboration strategies so that chatbots, particularly ChatGPT, could empower teachers and make the teaching process more engaging, hence achieving better learning outcomes. It is also important to investigate how "collaborative intelligence"

	could be achieved (i.e., design strategies, required competencies, etc.) to ensure that human intelligence could be combined with machine intelligence. For instance, it is possible to investigate how ChatGPT in collaboration with the human tutor could facilitate students' self-directed learning online. The user experiences showed that ChatGPT might generate different results depending on the way (e.g., wording) the question was asked, even if the conversation was about the same topic. Interaction style with chatbots is considered integral to their effective use. Therefore, it is crucial to think about how to get the most useful output to advance learning. While ChatGPT does not require many technical or Information and Communication Technology (ICT) competencies, it requires more critical thinking and question-asking competencies to get the best results. Most of the developed chatbots are task-oriented and do not ensure social relational qualities, such as sharing history and allowing personal intimacy. However, despite the evolution of technology used in chatbots, like the case of ChatGPT, our user experiences (see scenarios 8, 9 and 10) revealed that these considerations are not fully respected, and ChatGPT might have harmful behaviours, such as dishonesty, manipulation, and misinformation. In this context, Responsible AI is concerned with the design, implementation, and use of ethical, transparent, and accountable AI technology to reduce biases, promote fairness and equality, and help facilitate the interpretability and explainability of outcomes, which are particularly pertinent in an educational context. Future research should, therefore, focus on how to provide humanized chatbots in education by relying, for instance, on various theories that focus on understanding relationship formation between humans, such as social exchange theory that is directly connected to SEL in SETCOM.

AUTHOR (First name Last name), Country	Lijia Chen, Pingping Chen, Zhijian Lin, China
TITLE	Artificial Intelligence in Education: A Review
JOURNAL	IEEE Access: The Multidisciplinary Open Access Journal
EDUCATION AREA to which the resource refers	☒ pre-school education ☒ primary education

	☒ secondary education ☒ higher vocational and higher education ☒ adult education ☒ education for people with disabilities
APA 7 CITATION	Wei, H., Chen, W., & Liang, Y. (2021). Artificial intelligence in education: A review. Journal of Educational Technology Development and Exchange, 14(1), 1-14.
KEYWORDS	review, artificial intelligence, education
SUMMARY	The article "Artificial Intelligence in Education: A Review" provides an overview of the current state of research on the application of artificial intelligence (AI) in education. The authors discuss the potential benefits of using AI in education, including personalized learning, intelligent tutoring systems, and automated grading. They also examine some of the challenges and limitations of AI in education, such as concerns about data privacy and the potential for AI to perpetuate bias. The article concludes with a discussion of future directions for research in this area, including the need for interdisciplinary collaboration and the development of ethical guidelines for the use of AI in education.

AUTHOR (First name Last name), Country	Editors: Janez Bregant, Boris Aberšek, Bojan Borstner, Slovenia
TITLE	Sodobne perspektive družbe: umetna inteligenca na stičišču znanosti (Contemporary Perspectives of Society: Artificial Inteligence at the Intersection of Science)
EDUCATION AREA to which the resource refers	☐ pre-school education ☐ primary education ☐ secondary education ☒ higher vocational and higher education ☒ adult education ☐ education for people with disabilities
APA 7 CITATION	Bregant, J., Aberšek, B., Borstner, B. (ur.). *Sodobne perspektive družbe: umetna inteligenca na stičišču znanosti. Univerza v Mariboru, Univerzitetna založba.* DOI:10.18690/um.ff.112022
KEYWORDS	artificial inteligence, philosophy, psychology, education
SUMMARY	The collection contains 14 articles in Slovenian, divided into two parts. The first part deals with the intersections between

	artificially intelligent systems, philosophy, and ethics (transparency, trust, ethical evaluation, autonomy, moral responsibility), the second part with the intersections between artificially intelligent systems, psychology, and education (interaction, digital footprints and psychological characteristics of individuals, social relations, anthropomorphism, education, learning and teaching). Different experts apply different methods to deal with modern society by incorporating artificially intelligent systems into it.

AUTHOR (First name Last name), Country	Tom Taulli, USA
TITLE	Artificial intelligence basics: A non-technical introduction
EDUCATION AREA to which the resource refers	☐ pre-school education ☐ primary education ☒ secondary education ☒ higher vocational and higher education ☒ adult education ☐ education for people with disabilities
APA 7 CITATION	Taulli, Tom. (2019). Artificial Intelligence Basics: A Non-Technical Introduction. 10.1007/978-1-4842-5028-0.
KEYWORDS	artificial intelligence, data, machine learning, deep learning, natural language processing (NLP)
SUMMARY	Artificial intelligence touches every part of your day. While you may initially assume that technology such as smart speakers and digital assistants are the extent of it, AI has in fact rapidly become a general-purpose technology, reverberating across industries including transportation, healthcare, financial services, and many more. In our modern era, an understanding of AI and its possibilities for your organization is essential for growth and success. Artificial Intelligence Basics has arrived to equip you with a fundamental, timely grasp of AI and its impact. Author Tom Taulli provides an engaging, non-technical introduction to important concepts such as machine learning, deep learning, natural language processing (NLP), robotics, and more. In addition to guiding, you through real-world case studies and practical implementation steps, Taulli uses his expertise to expand on the bigger questions that surround AI. These include societal trends, ethics, and future impact

	AI will have on world governments, company structures, and daily life. Google, Amazon, Facebook, and similar tech giants are far from the only organizations on which artificial intelligence has had—and will continue to have—an incredibly significant result. AI is the present and the future of your business as well as your home life. Strengthening your prowess on the subject will prove invaluable to your preparation for the future of tech, and Artificial Intelligence Basics is the indispensable guide that you have been seeking.

AUTHOR (First name Last name), Country	Selena Nemorin, Andreas Vlachidis, Hayford M. Ayerakwa, Panagiotis Andriotis, UK
TITLE	AI hyped? A horizon scan of discourse on artificial intelligence in education (AIED) and development
JOURNAL	Learning, Media and Technology
EDUCATION AREA to which the resource refers	☐ pre-school education ☒ primary education ☒ secondary education ☒ higher vocational and higher education ☒ adult education ☐ education for people with disabilities
APA 7 CITATION	Nemorin, S., Vlachidis, A., Ayerakwa, H. M., & Andriotis, P. (2023). AI hyped? A horizon scan of discourse on artificial intelligence in education (AIED) and development. *Learning, Media and Technology*, *48*(1), 38-51. https://doi.org/10.1080/17439884.2022.2095568
KEYWORDS	AI, education and development, thematic analysis
SUMMARY	The study seeks to understand how the AI ecosystem might be implicated in a form of knowledge production which reifies kinds of epistemologies over others. Using text mining and thematic analysis, this paper offers a horizon scan of the key themes that have emerged over the past few years during the AIEd debate. We begin with a discussion of the tools we used to experiment with digital methods for data collection and analysis. This paper then examines how AI in education systems are being conceived, hyped, and potentially deployed into global education contexts. Findings are categorised into three themes in the discourse: (1) geopolitical dominance through education and technological

	innovation; (2) creation and expansion of market niches, and (3) managing narratives, perceptions, and norms.

AUTHOR (First name Last name), Country	David Mhlanga, South Africa
TITLE	Open AI in Education, the Responsible and Ethical Use of ChatGPT Towards Lifelong Learning
JOURNAL	SSRN eLibrary
EDUCATION AREA to which the resource refers	☐ pre-school education ☐ primary education ☐ secondary education ☒ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
APA 7 CITATION	Mhlanga, D. (2023). Open AI in education, the responsible and ethical use of ChatGPT towards lifelong learning. Education, the Responsible and Ethical Use of ChatGPT Towards Lifelong Learning (February 11, 2023). http://dx.doi.org/10.2139/ssrn.4354422
KEYWORDS	ChatGPT, Education, Ethical, Responsible
SUMMARY	Significant changes have been brought about in society, the economy, and the environment because of the quick development of technology and the interconnection of the world. Artificial intelligence has advanced significantly in recent years, which has sparked the creation of ground-breaking technologies like Open AI's ChatGPT. Modern technology like the ChatGPT language model has the potential to revolutionize the educational landscape. This article's goals are to present a thorough analysis of the responsible and ethical usage of ChatGPT in education, as well as to encourage further study and debate on this important subject. The study found that the use of ChatGPT in education requires respect for privacy, fairness and non-discrimination, transparency in the use of ChatGPT, and a few other factors that were included in the paper. To sustain ethics and accountability in the global education sector, it is advised in this study that all these recommendations be carried out.

AUTHOR (First name Last name), Country	Nabeel Gillani, Rebecca Eynon, Catherine Chiabaut and Kelsey Finkel, International (UK, USA)
TITLE	Unpacking the “Black Box” of AI in Education
JOURNAL	Educational Technology & Society
EDUCATION AREA to which the resource refers	☐ pre-school education ☒ primary education ☐ secondary education ☐ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
APA 7 CITATION	Gillani, N., Eynon, R., Chiabaut, C., & Finkel, K. (2023). Unpacking the “Black Box” of AI in Education. *Educational Technology & Society*, *26*(1), 99–111. https://www.jstor.org/stable/48707970
KEYWORDS	K-12 education, AI in education, educational data mining, Learning analytics
SUMMARY	Recent advances in Artificial Intelligence (AI) have sparked renewed interest in its potential to improve education. However, AI is a loose umbrella term that refers to a collection of methods, capabilities, and limitations—many of which are often not explicitly articulated by researchers, education technology companies, or other AI developers. In this paper, we seek to clarify what “AI” is and the potential it holds to both advance and hamper educational opportunities that may improve the human condition. We offer a basic introduction to different methods and philosophies underpinning AI, discuss recent advances, explore applications to education, and highlight key limitations and risks. We conclude with a set of questions that educationalists may ask as they encounter AI in their research and practice. Our hope is to make often jargon-laden terms and concepts accessible, so that all are equipped to understand, interrogate, and shape the development of human-centred AI in education.

AUTHOR (First name Last name), Country	Muhammad Ali Chaudhry, Emre Kazim, UK
JOURNAL	AI and Ethics
TITLE	Artificial Intelligence in Education (AIEd): a high-level academic and industry note 2021
YEAR	2022

EDUCATION AREA to which the resource refers	☐ pre-school education ☒ primary education ☒ secondary education ☒ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
Citation after APA 7	Chaudhry, M. A., Kazim, E. (2022). Artificial Intelligence in Education (AIEd): a high-level academic and industry note 2021. *AI and Ethics, 2,* 157-165. https://doi.org/10.1007/s43681-021-00074-z
KEYWORDS	The AI-driven educational equipment industry, the purposes of AI in education, ethical dilemmas
SUMMARY	AI is defined as a computer system that can perform a task with certain abilities (such as speech or vision) and intelligent behaviours that were once only considered human. The purpose of AI in education (AIEd) is: to reduce the workload of teachers without affecting learning outcomes; to provide personalised and/or personalised learning experiences for students based on their context and learning background; to improve our understanding of students, which includes not only what they know but also how they learn and which pedagogical methods are effective for them; and to provide intelligent learning environments that can interact with students, provide personalised feedback and improve their understanding of specific topics. The article lists the following conferences relevant to UIIz: Artificial Intelligence in Education (AIEd), Learning Analytics and Knowledge (LAK), and the Conference on Human Factors in Computing Systems. It also lists some of the manufacturers of equipment for UIIz (e.g., Pearson, Amazon, Cisco, Century Tech EDUCATE, Third Space Learning (for mathematics only)). It highlights the role of MOOCs, which collect large amounts of data that could enable a better understanding of learners. Finally, he highlights classic ethical dilemmas. In the field of AIEd and AI-driven educational technology tools, with the influx of big data due to online learning during the pandemic, we are likely to see an increasing number of AI-driven ed-tech products. The disadvantages of using AI, such as discrimination against certain groups due to insufficient data, stigmatisation due to reliance on certain shortcomings of machine learning modelling, and exploitation of personal

	data due to lack of awareness, may go unnoticed and without any accountability. One high-profile example of the harm of AI was the use of an algorithm to predict university entrance results for students who were unable to sit exams due to the pandemic. The system turned out to be biased against students from poorer backgrounds. As in other sectors where AI is having a major impact, AIEd raises an important ethical question about giving students the freedom to opt out of AI-driven predictions and automated assessments.

AUTHOR (First name Last name), Country	K. M. Shabana, Chandrashekar Lakshminarayanan, Jude K. Anil, India
TITLE	Curriculum Tutor: An Adaptive Algorithm for Mastering a Curriculum
YEAR	2022
CONFERENCE	AIED 2022: Artificial Intelligence in Education
EDUCATION AREA to which the resource refers	☐ pre-school education ☒ primary education ☒ secondary education ☒ higher vocational and higher education ☒ adult education ☐ education for people with disabilities
Citation after APA 7	Shabana, K.M., Lakshminarayanan, C., Anil, J.K. (2022). Curriculum Tutor: An Adaptive Algorithm for Mastering a Curriculum. In: Rodrigo, M.M., Matsuda, N., Cristea, A.I., Dimitrova, V. (Eds.) *Artificial Intelligence in Education. AIED 2022. Lecture Notes in Computer Science*, vol 13355. Springer, Cham. https://doi.org/10.1007/978-3-031-11644-5_26
KEYWORDS	Intelligent Learning System, personalisation of learning, adaptive sequencing
SUMMARY	Personalised approaches to learning, tailored to each student's individual needs, skills, and interests, not only provide an engaging learning experience, but also significantly improve student achievement. Intelligent tutoring systems (ITS) have been effective in automatically delivering personalised learning to students. ITSs consist of three important components, namely: (i) a domain model, which captures the relationships or dependencies between the different concepts to be learned, (ii) a learner model, which

	represents the learner's current level of knowledge and how it changes during the learning process, and (iii) an instructional model, which determines the sequence of learning activities presented to the learner. The instructional model implements an adaptive sequence of activities, whereby the learning activities presented to the learners are selected based on the learners' proficiency level, as assessed by their interactions with the system. An important problem is how to adapt the sequences of learning activities. In this paper, intelligent tutoring is considered in the context of learning by doing (LbD), where the concepts to be learned, together with their interdependencies, are provided as a curriculum graph, and a given concept is learned by performing an activity related to that concept (such as solving/answering a problem/question). For this setting, recent works have proposed algorithms based on multi-armed bandits (MAB) algorithms, where activities are adaptively ranked using the learners' response to these activities as direct feedback. The MAB consists of a fixed set of actions (arms) and an unknown distribution of rewards associated with each arm. The system must select the actions (arms) in such a way that its long-term cumulative reward is maximised. The key challenge in this problem is to balance the exploitation of the information already obtained about the effectiveness of each action with the exploration of actions where estimates of their value are still relatively uncertain, a trade-off between exploration and exploitation. Over time, the system learns which actions are more efficient and can earn higher rewards. In this paper, they propose Curriculum Tutor, a novel technique that combines the MAB algorithm and a change-point detection algorithm for the adaptive activity sequencing problem. They decompose the adaptive activity sequencing problem into two sub-problems, namely (i) activity selection to account for the trade-off between exploration and exploitation, and (ii) proficiency level detection to account for the volatility of students' responses. The algorithm improves on previous MAB algorithms for LbD tuning by (i) providing better learning gains and (ii) reducing hyperparameters, thus improving personalization. We show that the learning algorithm significantly outperforms previous approaches in the benchmark domain of addition of two maximum four-digit numbers.

AUTHOR (First name Last name), Country	Alenka Lipovec, Igor Pesek, Gregor Harih, Katja Kous Slovenia
TITLE	Developing content proposals for study programmes
YEAR	2020
EDUCATION FIELD to which the resource refers	☐ pre-school education ☐ primary education ☐ secondary education ☒ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
Citation after APA 7	Lipovec, A., Pesek, I., Harih, G., Kous, K. (2020). *Designing content proposals for study programmes. DIH Slovenia.* https://dihslovenia.si/assets/images/OBLIKOVANJE-PREDLOGOV-VSEBIN-ZA-%C5%A0TUDIJSKE-PROGRAME-Poro%C4%8Dilo-priloga.pdf
KEYWORDS	Analysis of existing study programmes, review of business needs, minimum levels of digital competences
SUMMARY	The report provides an overview of the study programmes, a review of available analyses and reports on the forecasting of the digital workforce, a list of digital competences that need to be addressed to successfully address the employment challenges in the digital workforce, and a proposal for content and programmes for the purpose of acquiring the necessary digital competences. A classification of study programmes has been developed which divides study programmes into three areas of digital profiles: pure digital profiles, supporting digital profiles and non-digital profiles. Pure digital profiles are those profiles that match the description of the digital profiles presented in the e-KO or SIST EN-16234-1:2020 standard. These occupations could be classified in the primary area of working with digital tools, solutions, and services, as they are created and developed by these profiles. Digital support profiles are profiles that make intensive use of digital tools in their field and create products and products using digital tools. Non-digital profiles are profiles that work with digital tools but use them as a tool to help them achieve their goals. Teaching staff fall into the non-digital profiles. For most of the DigComp2.1 sub-areas, these profiles are expected to reach the Survival level, while for the sub-areas Engaging Citizenship through Digital

	Technologies and Online Etiquette, the level of Overcoming Barriers is expected. The areas with the highest average achievement of the minimum competences are expected to be Information Literacy, Communication and Collaboration and Security; the area with the lowest average achievement of the minimum competences is Digital Content Production. For non-digital profiles, it is proposed to include a stand-alone ICT learning unit with digital content and to make basic digital skills part of the core transferable skills. The proposed digital and peripheral digital contents are: data, information and digital content; communication and collaboration using digital technologies; digital content development (without programming); use of digital technologies; online etiquette; digital identity; copyright and licensing; online safety; technology support for the development of active learning and learning strategies, analytical and critical thinking and creativity, originality and initiative; and solving complex problems in the field of the curriculum using technology.

AUTHOR (first name last name) Country	Aditi Bhutoria, India
JOURNAL	Computers and Education: Artificial Intelligence
TITLE	Personalized education and Artificial Intelligence in the United States, China, and India: A systematic review using a Human-In-The-Loop model
YEAR	2022
EDUCATION AREA to which the resource refers	☐ pre-school education ☒ primary education ☒ secondary education ☒ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
Citation after APA 7	Bhutoria, A. (2022). Personalized education and Artificial Intelligence in the United States, China, and India: A systematic review using a Human-In-The-Loop model. *Computers and Education: Artificial Intelligence, 3.* https://doi.org/10.1016/j.caeai.2022.100068.
KEYWORDS	Personalisation, data mining in education, learning analytics
SUMMARY	Innovations such as big data, machine learning and artificial intelligence have allowed modern technology to adapt to

	people's specific needs - smart machines and computers have been built to understand individual needs. This opens the possibility of personalised education (PIE), which is designed to recognise and analyse an individual's specific learning abilities, learning requirements and learning objectives, and tailor the content delivered accordingly. The two essential building blocks of PIz are Educational Data Mining (EDM) and learning analytics. Examples of the use of AI in education are interactive PLS (Personalised Learning Spaces) and AI-based ITS. From the plethora of EdTech start-ups to government funding of AI research, it is evident that the next generation of education reforms will take a quantum leap forward through big data analytics and AI. The aim of this paper is to organize the vast literature on the use of AI for PIz and to highlight the key themes by which an AI-driven approach is structurally changing the existing education system. To this end, the paper employs a systematic review using the Human-In-The-Loop natural language processing model of the last two years (2019-2021) of the English language literature in China, India, and the USA. Among more than 2000 search results, 353 articles were shortlisted for in-depth analysis. Findings highlight learner-centred methods, integration of learning performance and learning habits, personalised learning pathways, diagnosis, and prevention rather than after-the-fact solutions, augmentation of educational contexts, integration of non-cognitive skill development (e.g., gamification learning, VR, AR), and the changed role of educators. For example, the AI platform Third Space Learning, has reduced the workload of teachers in China by almost 11 hours per week. The upward trajectory of AI education is opening a new horizon of PIz for future generations, but it also brings its own challenges. Recent literature has cited issues of data privacy, availability of digital resources and cost constraints as barriers to promoting such technologies for everyday practice.

AUTHOR (first name last name) Country	Fati Tahiru, Ghana
JOURNAL	Journal of Cases on Information Technology (JCIT)
TITLE	AI in Education: A Systematic Literature Review

YEAR	2021
EDUCATION AREA to which the resource refers	☐ pre-school education ☒ primary education ☒ secondary education ☒ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
Citation after APA 7	Tahiru, F. (2021). AI in Education: A Systematic Literature Review. *Journal of Cases on Information Technology (JCIT), 23*(1), 1-20. http://doi.org/10.4018/JCIT.2021010101.
KEYWORDS	Machine learning, smart content, ITS, TOE approach
SUMMARY	The paper categorises weak AI in education into four areas: automation of administrative tasks (e.g., assessment, enrolment procedures), Smart Content (e.g., Cram101 uses AI to ensure textbooks are coherent and easier to navigate using summaries, flashcards, and practical tasks) and ITS-intelligent tutoring systems. A TOE (technological-organizational-environmental context) approach is used. English publications between 2010 and 2019 are reviewed. 25 articles were shortlisted. ITS were found to offer better feedback to learners but not to offer a better environment for learners who self-regulate. AIED systems seem to be more effective than a combination of computer-assisted instruction (CAI) and teacher in large groups of students, only slightly inferior to one-on-one teacher. The paper also offers a set of challenges ranging from data ownership, changing the teaching profession and other ethical considerations.

AUTHOR (First name Last name) Country	Lina Markauskaite, Rebecca Marrone, Oleksandra Poquet, Simon Knight, Roberto Martinez-Maldonado, Sarah Howard, Jo Tondeur, Maarten De Laat, Simon Buckingham Shum, Dragan Gašević, George Siemens, International
JOURNAL	Computers and Education: Artificial Intelligence
TITLE	Rethinking the entwinement between artificial intelligence and human learning: What capabilities do learners need for a world with AI?
YEAR	2022
EDUCATION AREA to which the resource refers	☐ pre-school education ☒ primary education ☒ secondary education

	☒ higher vocational and higher education ☒ adult education ☐ education for people with disabilities
Citation after APA 7	Markauskaite, L., Marrone, R., Poquet, O., Knight, S., Martinez-Maldonado, R., Howard, S., Tondeur, J., De Laat, M., Buckingham Shum, S., Gašević, D. and Siemens, G. (2022). Rethinking the entwinement between artificial intelligence and human learning: what capabilities do learners need for a world with AI?, *Computers and Education: Artificial Intelligence, 3*, 100056. DOI: 10.1016/j.caeai.2022.100056.
KEYWORDS	AI capabilities, AI in education, post digital dialogue, ecological approach
SUMMARY	The paper answers the questions: 1) What capabilities do people need in an AI-filled world? 2) How can we conceptualise these capabilities? 3) How can we help learners to develop them? And 4) How can we empirically study and assess their development? The paper uses a dialogic knowledge construction approach, and a group of 11 co-authors participated in an orchestrated written discussion - partly independent and partly collaborative written discussion. In synthesising these ideas, they suggest that there is a need to move beyond AI-centric views of capabilities and consider the ecology of technology, cognition, social interaction, and values. They adopt a definition of AI literacy as a set of competences that enable individuals to critically evaluate AI technologies, communicate and collaborate effectively with AI, and use AI as a tool online, at home and in the workplace" (Long and Magerko, 2020, p. 1). The answer to question 1. includes self-regulated learning, performing cognitive work where AI is less capable, creativity, responsibility in using AI, creating AI for humanistic values, and using collaborative thinking using representational tools. They were categorised into three perspectives: humanistic (human-centred AI, humanistic values, and freedoms, etc.), social perspective (e.g., AI-mediated dialogue, networked learning, knowledge of the arts,) and cognitive perspective (e.g., creativity, self-regulation, hybrid cognition). Question 2. includes the systems concepts of the hybrid cognitive perspective, the 4C perspective (mini c - personal creativity, little c - everyday creativity, Pro C - professional creativity and Big C -

	legendary creativity), the human-centred perspective, the social realist perspective, the AI-mediated discourse perspective, and the networked learning perspective. The answer to question 3 includes: explicit teaching, authentic learning, critical thinking and reflective practices, discourse, and epistemological practices (co-creation) and AI mediated learning. The answer to question 4 includes: non-intensive AI-based techniques, modelling methods, tools for measuring creativity involving people, authentic situations and design and participatory based approaches.

List of relevant literature **(Artificial Intelligence and Social and Emotional Learning)**

AUTHOR (First name Last name), Country	Annalaura Nocentini, Valentina Zambuto, Ersilia Menesini, Italy
JOURNAL	Aggression and Violent Behaviour
TITLE	Anti-bullying programmes and Information and Communication Technologies (ICTs): A systematic review
YEAR	2015
EDUCATION AREA to which the resource refers	☐ pre-school education ☒ primary education ☐ secondary education ☐ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
Citation after APA 7	Nocentini, A., Zambuto, V., Menesini, E. (2015) Anti-bullying programs and Information and Communication Technologies (ICTs): A systematic review. Aggression and Violent Behaviour 23: 52-60. DOI: 10.1016/j.avb.2015.05.012.
KEYWORDS	Peer violence, prevention, interventions, ICT, review article
SUMMARY	This is a review article that aims to provide an overview of interventions to prevent and tackle MVN that have included ICT, to analyse the characteristics of these programmes and to review data on their effectiveness. The article is not recent, but I deliberately searched for a paper where AI tools (some of the programmes mentioned include AI) were used to tackle MVN, which is an aspect of social and emotional learning. I have not found a paper that fulfils this condition

	published after 2015. The added value of the paper is that it makes a good case for the advantages of ICT-based interventions over traditional interventions. The literature review includes 32 articles representing 13 intervention programmes, based on the use of games and simulations (serious games). From the descriptions, I can see that only one of them involves artificial intelligence, so I only summarise the findings related to this programme. This is the FearNot programme (Fun with Empathic Agents to achieve Novel Outcomes in Teaching; Paiva et al., 2004), an intervention aimed at helping victims of MVN to effectively resist MVN. It is about enhancing the problem-solving skills of actual or potential victims of MVN in a way that encourages learners to generate and evaluate a wide range of possible responses to MVN in a safe environment with guaranteed privacy. The interactive virtual learning environment involves a virtual school and students who have different roles (perpetrator, victim, observer) in the MVN process. The AI element is in the aspect that these virtual students learn from past experiences and can develop effective coping strategies through different events. Few studies have tested the effectiveness of this intervention programme. They conclude that the programme has short-term effects in terms of successful avoidance of victimisation.

AUTHOR (First name Last name), Country	Sdenka Zobeida Salas-Pilco, China
JOURNAL	British Journal of Educational Technology
TITLE	The impact of AI and robotics on physical, social-emotional and intellectual learning outcomes: An integrated analytical framework
YEAR	2020
EDUCATION AREA to which the resource refers	☐ pre-school education ☒ primary education ☐ secondary education ☐ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
Citation after APA 7	Salas-Pilco, S. Z. (2020). The impact of AI and robotics on physical, social-emotional and intellectual learning

	outcomes: An integrated analytical framework. *British Journal of Educational Technology, 51*(5), 1808-1825. https://doi.org/10. 1111/bjet.12984
KEYWORDS	Learning outcomes, artificial intelligence, robotics, learning outcomes taxonomy, case study
SUMMARY	The starting point of this paper is that traditionally research on learning outcomes has focused on intellectual (cognitive) outcomes, rather than supporting a more holistic perspective that also includes psychomotor and socio-emotional aspects. This is also true for the study of the effects of AI and robotics on learning outcomes. The author summarises that in the use of robots in education it is important to distinguish between (a) the use of robots as learning tools that are used by students during the learning process, as presented in the present paper, and (b) the use of robots as learning companions or tutors that teach and even enter or create social interactions with students. The present study presents an example of the use of AI and robotics in the classroom (teaching basic robotics in primary school) and analyses how this is reflected in learning outcomes by applying a holistic-analytical framework of three learning domains (physical, socio-emotional and intellectual). It is a qualitative study whose findings are not generalisable; different students presented unique learning pathways as they learn through different pathways and at different paces. The author concludes that, based on the findings of this study, researchers should further investigate the correlation between the achievement of different learning outcomes from a social, psychological, and technological perspective. I see the added value of the paper in the excellent summary of current knowledge on the integration of AI and robotics in teaching and what the study contributes to this (p. 1809)

AUTHOR (First name Last name), Country	Kristin M. Murphy, Amy L. Cook, & Lindsay M. Fallon, USA
JOURNAL	Phi Delta Kappan
TITLE	Mixed reality simulations for social-emotional learning
YEAR	2021
EDUCATION AREA to which the resource refers	☐ pre-school education ☒ primary education ☐ secondary education

	☐ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
EQUIPMENT USED (If specified)	Mursion, TeachLivE
Citation after APA 7	Murphy, K. M., Cook, A. L., & Fallon, L. M. (2021). "Mixed Reality Simulations for Social-emotional Learning." Phi Delta Kappan 102 (6): 30-37. DOI:10.1177/0031721721998152.
KEYWORDS	Mixed reality simulation, social and emotional competences, training
SUMMARY	This is a peer-reviewed paper in which the authors report on the use of mixed reality simulations to support social and emotional learning for primary school pupils. These technologies are well established in vocational education or at higher levels of education, but less so in primary education to support social and emotional competences. In this paper, the authors make the case for the importance of social and emotional learning in school, citing the negative effects of distance education due to the Covid-19 epidemic on students' social, emotional, and learning outcomes alongside all the established arguments. They further argue for the importance of simulations of authentic situations for learning (e.g., role-plays and micro-teaching in teacher education) and analyse their limitations (e.g., they are sometimes not able to authentically reflect real-life situations). They also derive the potential of mixed-reality simulations. These differ from virtual reality in that the avatars are controlled by a combination of human resources and artificial intelligence. Some of the avatars' responses are automatic, while others can be controlled by a "simulation specialist". In this case, the learner sees only the avatar, while the "simulation specialist" sees the learner through the camera, allowing the "simulation specialist" to react to the learner's current behaviour. The latter contributes to the authenticity of the simulation by expanding the range of responses from pre-programmed to more authentic. The authors then present an example of the use of this technology to teach social and emotional skills, analysing the advantages (e.g., the student can practice these skills in a safe environment before trying them out in social situations) and disadvantages (the use of these technologies in school requires a trained simulation specialist).

AUTHOR (First name Last name), Country	Sandra Leaton Gray, UK
JOURNAL	London Review of Education
TITLE	Artificial intelligence in schools: Towards a democratic future
YEAR	2021
EDUCATION AREA to which the resource refers	☒ pre-school education ☒ primary education ☒ secondary education ☒ higher vocational and higher education ☒ adult education ☒ education for people with disabilities
Citation after APA 7	Leaton Gray, S. (2020). Artificial intelligence in schools: Towards a democratic future. *London Review of Education, 18*(2), 163-177. https://doi.org/10.14324/LRE.18.2.02
KEYWORDS	AI in education, potentials of using AI in education
SUMMARY	The author starts from the question of how to ensure an appropriate level of democracy, accountability, trust, and fairness when it comes to the deployment of AI in education, in the apparent commercial quest for "digital winners". Equity is highlighted as a key value in education in contemporary societies, and it is therefore crucial when considering AI that new technologies or processes are not judged solely based on efficiency or intellectual impact, but also how they can contribute to a healthy democracy. Next, the author defines AI and related terms and analyses the possible potentials of using AI in education (table on p. 165). These concepts are: (1) Predictive analysis: in education, it can be useful, for example, to predict the outcomes of individual pupils according to their characteristics. In this context, the author points out the possible bias of algorithms, which violates the principle of democracy (e.g., a certain group can be automatically excluded). (2) Deep learning: uses algorithms to compute "higher order" features (e.g., face recognition systems). The author gives examples of meaningful use in education. (3) Machine learning: the use of algorithms and statistical models to perform a task without specific instructions and with little or no human intervention.

	Examples of reasonable use and pitfalls are given. (4) Neural networks: refers to a system that is intended to mimic a biological system such as the human brain; the concept of nodes. Criticism: cultural bias, violation of privacy, risk of inaccuracy and discrimination. (5) Expert systems: used for tutoring activities (activities to guide and direct learners). However, the potential of these systems is limited by the individual's ability to update his/her own knowledge. Examples commonly used in English-speaking schools include the Education Perfect platform, Mathletics and Spellodrome, which offer tailored learning solutions for schools to complement classroom activities. Schools that can afford to access these platforms can accelerate student learning, while at the same time disadvantaging students who may not have access to the same resources. (6) Social robots: digital classroom assistants. The author focuses on helping with classroom administration. The author further discusses the challenges of balancing or simultaneously considering different social imperatives and argues for the importance of a dyadic (rather than top-down) relationship between technology and school (not only do advances in technology determine use in school, but also vice versa). It then defines AI in relation to pedagogical rights as defined by Bernstein (advancement, inclusion, participation) and reflects on AI in education from the perspective of social exchange theory (exchanges that are democratic and balanced and those that are not). Finally, it addresses issues of privacy, informed consent, power imbalances and other ethical considerations. Unfortunately, it is not possible to summarise all this in a nutshell, but we recommend the article as it contributes to raising awareness of the benefits and pitfalls of using AI in education.

AUTHOR (First name Last name), Country	Sarika Kewalramani, Gillian Kidman, Ioanna Palaiologou, Australia
JOURNAL	European Early Childhood Education Research Journal

TITLE	Using Artificial Intelligence (AI)-Interfaced Robotic Toys in Early Childhood Settings: A Case for Children's Inquiry Literacy
YEAR	2021
EDUCATION AREA to which the resource refers	☒ pre-school education ☐ primary education ☐ secondary education ☐ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
EQUIPMENT USED (If specified)	Cosmo, BlueBot, Coji by wowee, Cobo the snail, Verine Lego boost bot
Citation after APA 7	Kewalramani, S., Kidman, G., Palaiologou, I. (2021). Using Artificial Intelligence (AI)-Interfaced Robotic Toys in Early Childhood Settings: A Case for Children's Inquiry Literacy. *European Early Childhood Education Research Journal, 29* (5), 662-668.
KEYWORDS	Robotic toys in early childhood, children's inquiry literacy, artificial Intelligence (AI), toys in early childhood, emotional literacy
SUMMARY	The authors of the paper explore how AI robotic toys shape children's development of inquiry literacy. This study shows how children construct meaning through inquiry-driven questions while interacting with AI robotic toys. Children attribute anthropomorphic (human-like) feelings and characteristics to their toy, evaluate problems that robots may encounter and, therefore, design solutions to these problems (creative enquiry and collaborative enquiry literacy). Through joint attention and reciprocal interactions with the educator, children provide metaphorical descriptions of situations that the robot may encounter and consequently persist in problem solving (Emotional and Collaborative Inquiry Literacy). The results show how AI toys provide opportunities to create environments for learning and the application of cognitive skills. This in turn activates children's creativity, problem-solving and resilience, enabling the development of their exploratory literacy skills.

AUTHOR (First name Last name), Country	OECD, ed. Tracey Burns, Francesca Gottschalk, International

TITLE	Educating 21st Century Children: Emotional well-being in the digital age
YEAR	2019
EDUCATION AREA to which the resource refers	☒ pre-school education ☒ primary education ☒ secondary education ☐ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
Citation after APA 7	Burns, T. and Gottschalk. *Educating 21st Century Children: Emotional Well-being in the Digital Age.* Educational Research and Innovation. Paris: OECD Publishing,
KEYWORDS	Emotional well-being, digital age, technology, education
SUMMARY	The book includes chapters such as understanding childhood in the 21st century, with a focus on emotional well-being in a digital world. Trends are presented, as well as various policies related to improving technological infrastructure and support for digital literacy skills. Challenges faced by children in digital environments are highlighted. Trends related to emotional well-being and mental health, protective factors for mental health, key features of effective prevention and intervention programmes are presented. This is followed by chapters on parenting and friendships in the 21st century. The 21st century, online and offline relationships, digital parenting and dating children (from pregnancy apps to parental trackers), social contexts of adolescent relationships, children's time spent with technology and mental health outcomes, inequalities between young people in digital interactions, protecting children online, how to promote digital literacy and mental health, how to promote ethical digital literacy among young people, teacher training and fostering school-parent partnerships on digital literacy and mental health, and how to ensure children's mental health in a digital world. The book connects with the project content in terms of placing the social-emotional field and digitisation in the broader context of social relations, ethical issues, and challenges.

AUTHOR (First name Last name), Country	Selin Akgun, Christine Greenhow, Switzerland
JOURNAL	AI and Ethics
TITLE	Artificial intelligence in education: Addressing ethical challenges in K-12 settings
YEAR	2021
EDUCATION AREA to which the resource refers	☐ pre-school education ☒ primary education ☐ secondary education ☐ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
Citation after APA 7	Agkun, S., Greenhow, C. (2021). Artificial intelligence in education: Addressing ethical challenges in K-12 settings. *AI and Ethics, 2 (*3), 431-440. https://doi.org/10.1007/s43681-021-00096-7
KEYWORDS	Artificial intelligence; ethics; primary education; teacher education;
SUMMARY	Artificial intelligence can be used in education, for example as personalised learning platforms to stimulate student learning, automated assessment systems to help teachers, and facial recognition systems to provide insights into student behaviour. Despite the potential benefits of AI to support students' learning experiences and teachers' practices, the ethical and social drawbacks of these systems are rarely fully considered in K-12 educational contexts. The ethical challenges of AI in education need to be identified and communicated to teachers and students. To address these issues, this article (1) briefly defines AI using the concepts of machine learning and algorithms; (2) introduces the use of AI in educational settings and the benefits of AI systems to support students' learning processes; (3) describes the ethical challenges and dilemmas of using AI in education; and (4) addresses the teaching and understanding of AI by providing recommended learning resources from two vendors, i.e., the Massachusetts Institute of Technology (MIT) Media Lab and Code.org. The aim of this article is to help practitioners to reap the benefits and manage the ethical challenges of integrating AI into primary school classrooms, while presenting learning resources that teachers can use to improve their students' understanding of AI and ethics in primary school.

AUTHOR (First name Last name), Country	Vignesh Mukund, Mayank Sharma, Anurati Srivastva, Robin Sharma, Matthew Farber, Nandini Chatterjee Singh, International
JOURNAL	GAMES FOR HEALTH JOURNAL: Research, Development, and Clinical Applications
TITLE	Effects of a Digital Game-Based Course in Building Adolescents' Knowledge and Social-Emotional Competencies
YEAR	2022
EDUCATION AREA to which the resource refers	☐ pre-school education ☒ primary education ☒ secondary education ☐ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
Citation after APA 7	Mukund, V., Sharma, M., Srivastva, A., Sharma, R., Farber, M., & Singh, N. C. (2022). Effects of a Digital Game-Based Course in Building Adolescents' Knowledge and Social-Emotional Competencies. Games for health journal: Research, Development, and Clinical Applications, 11(1), 18-29
KEYWORDS	Digital games, empathy, compassion, migration, learning
SUMMARY	This paper shows that newer computer games can be an effective didactic tool for practicing behaviour in different situations and for developing different thinking strategies. One could speak of situational experiential learning, where players practice with a "digital" role-playing game, where they feel different emotions at the results, become aware of them and identify with different interactive activities. The authors present Bury me, my love, a game addressing the issue of global migration, based on real conversations with migrants from Syria who have fled to Germany. The actor is the husband of a Syrian woman who has fled to Europe. He receives different information about the events and has a suggested choice of reactions. The game has 3 modules: refugees and the migration crisis, home, property, identity, and dreams. Each module includes discussions, reflections, synchronous and asynchronous tasks to think about the different reasons for migration and ethical dilemmas, all through a story describing the events of the journey. The

	study measured the effectiveness of the game in the acquisition of migration knowledge and the socio-emotional competence of empathy and compassion in adolescents (13-18) from India and the United Arab Emirates. Migration knowledge (using a questionnaire designed for the occasion) and socio-emotional competence (using the BES17 standardised empathy questionnaire, Jolliffe and Farrington, and the CEAS18 standardised compassion questionnaire, Gilbert et al.) were measured before and after the use of the game. Statistically significant results were found for individuals in both countries, in both knowledge and socio-emotional competence.

AUTHOR (First name Last name), Country	Catherine Prentice, Sergio Dominique Lopes, Xuequn Wang, International
JOURNAL	Journal of Hospitality, Marketing & Management
TITLE	Emotional intelligence or artificial intelligence- an employee perspective
YEAR	2020
EDUCATION AREA to which the resource refers	☐ pre-school education ☐ primary education ☐ secondary education ☐ higher vocational and higher education ☐ adult education ☐ education for people with disabilities ☒ other
Citation after APA 7	Prentice, C., Lopes, S. D. & Wang, X. (2020) Emotional intelligence or artificial intelligence- an employee perspective. *Journal of Hospitality Marketing & Management*, 29:4, 377- 403, DOI: 10.1080/19368623.2019.1647124
KEYWORDS	Artificial intelligence, emotional intelligence (EI)
SUMMARY	This paper explores the links between AI and emotional intelligence in the field of employee satisfaction in tourism, or how AI and emotional intelligence contribute to better outcomes for hotel employees. It argues that since both AI and Emotional Intelligence are linked to organisational performance through influencing employees and/or customers, understanding the link between AI and Emotional Intelligence has great potential for increasing organisational performance-related outcomes.

	It specifically addresses the question of how emotional intelligence influences outcomes related to hotel employees, given different levels of artificial intelligence. It includes a review of the literature on emotional intelligence, a review of the literature on artificial intelligence and an empirical section. The study concludes that human intelligence, compared to machine intelligence, has a dominant impact on employees, especially in professions related to working with people. Artificial intelligence plays a moderating role in the relationship between human intelligence and employee outcomes. Emotional intelligence is recognised as a valid predictor of employee attitudes and behaviours (e.g., outcome performance, commitment, etc.). Although artificial intelligence is an important concept in contemporary research on improving business performance, it is human intelligence in emotional skills and abilities that plays a dominant role in employee and customer management. Customers today still prefer to interact with employees as opposed to robots or machines. Research confirms that AI can act as a buffer to human tasks but is unlikely to replace human works.

AUTHOR (First name Last name), Country	Markus D. Dubber, Frank Pasquale, Sunit Das, Canada
TITLE	Oxford Handbook of Ethics of AI
YEAR	2021
EDUCATION AREA to which the resource refers	☐ pre-school education ☐ primary education ☐ secondary education ☒ higher vocational and higher education ☒ adult education ☐ education for people with disabilities
Citation after APA 7	D. Dubber, M., Pasquale, F. and Das, S. (ed.). (2021). *Oxford Handbook of Ethics of AI*. Oxford University Press.
KEYWORDS	AI, Ethics, Ethics of AI
SUMMARY	The monograph is a collection of articles from various fields, which relate to the field of AI ethics in the broadest sense of the word. The first part situates AI ethics, or AI and ethics, in context and fields. The second part presents the frameworks of AI ethics (codes, normativity, regulation, etc.). The third

	part covers the concepts and dilemmas of ethics and AI (anthropology and AI, law, education, rights, autonomy, race and gender, consent, sexuality, etc.).) Part 4 covers perspectives and approaches (economics, statistics, philosophy, Europe, Asia, Global South, computing, engineering, etc.) Part 5 covers examples and applications (education, military, public law, criminal law, smart cities, etc.).

AUTHOR (First name Last name), Country	Olga Chernikova, Nicole Heitzmann, Matthias Stadler, Doris Holzberger, Germany
JOURNAL	Review of Educational Research
TITLE	Simulation-Based Learning in Higher Education: A Meta-Analysis
YEAR	2020
EDUCATION AREA to which the resource refers	☐ pre-school education ☐ primary education ☐ secondary education ☒ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
Citation after APA 7	Chernikova, O., Heitzmann, N., Stadler, M., Holzberger, D. Simulation-Based Learning in Higher Education: A Meta-Analysis. *Review of Educational Research, 90:4*, 449-541. https://doi.org/10.3102/0034654320933544
KEYWORDS	simulation-based learning, higher education, complex skills, scaffolding, meta-analysis
SUMMARY	This article presents a meta-analysis of simulation-based learning in higher education and shows that simulations are *among the most effective means to facilitate learning of complex skills*. However, the meta-study indicates that most of the simulation activity is carried out within health studies: only seven out of 145 studies were from the field of teacher education, and the authors *"hope that this analysis will instigate future studies in other domains, such as teacher education to better understand and to realise the enormous potential as well as the potential pitfalls that come with simulation-based learning."*. One of the key concepts in the article is *complex skills*; skills that students should acquire during their education in addition to domain-specific knowledge and skills to be able

	to make professional decisions and implement solutions. The authors connect complex skills to 21st century skills: critical thinking, problem solving, communication and collaboration. The authors pinpoint that different professional domains require specific professional knowledge, but the complex skills required appear to be similar across domains: one should be able to identify the problem, analyse the context, and apply professional and experiential knowledge to make practical decisions. They build upon Fischer et al. (2014), who have suggested a framework of epistemic activities that is relevant to a broad range of problem-solving and decision-making procedures across domains: identifying the problem, questioning, generating hypotheses, constructing artifacts, generalizing, and evaluating evidence, drawing conclusions, and communicating processes and results. In their meta-analysis, focus on learning outcomes that involve these epistemic activities, critical thinking, and problem solving are among the most important eligibility criteria. The results of the meta-analysis show that simulation-based learning has large positive overall effects on the advancement of a broad range of complex skills and across a broad range of different domains in higher education.

AUTHOR (First name Last name), Country	Catherine A. Gao, Frederick M. Howard, Nikolay S. Markov, Emma C. Dyer, Siddhi Ramesh, Yuan Luo, Alexander T. Pearson, USA
TITLE	Comparing scientific abstracts generated by ChatGPT to original abstracts using an artificial intelligence output detector, plagiarism detector, and blinded human reviewers.
JOURNAL	*bioRxiv*
EDUCATION AREA to which the resource refers	☐ pre-school education ☐ primary education ☐ secondary education ☒ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
APA 7 CITATION	Gao, C. A., Howard, F. M., Markov, N. S., Dyer, E. C., Ramesh, S., Luo, Y., & Pearson, A. T. (2022). Comparing scientific abstracts generated by ChatGPT to original abstracts using an artificial intelligence output detector,

	plagiarism detector, and blinded human reviewers. *bioRxiv*, 2022-12.
KEYWORDS	language model Chat GPT, medical journal, scientific abstracts
SUMMARY	Ten research abstracts from five high impact factor medical journals (n=50) were selected for the study. ChatGPT generated the research abstracts based on their titles and journals. The abstracts were assessed using an AI outcome detector, the Plagiarism Detector and two "blind" human reviewers. All abstracts generated by ChatGPT were clearly written, but only 8% correctly followed the formatting requirements of the specific journal. Most of the generated abstracts were detected by the AI abstract detector. The generated abstracts scored very high on the plagiarism detector for originality. The generated abstracts had a similar patient cohort size to the original abstracts, although the exact numbers were fictitious. When given a mixture of original and generic abstracts, 68% of the generated abstracts were correctly identified by the reviewers as being generated by ChatGPT, while 14% of the original abstracts were incorrectly identified as being generated. The reviewers stated that it was surprisingly difficult to distinguish between the two, but the generated summaries were slightly vaguer, appearing to follow the writing templates. Authors warn that the assessment of abstracts for journals needs to adapt policy and practice to maintain rigorous scientific standards; it is suggested that AI detectors be included in the editorial process and that clear disclosure be made if these technologies are used. The limits of ethical and acceptable use of large-scale language models to aid scientific writing remain to be determined. The project will also address the area of scientific writing, particularly in Module A..

AUTHOR (First name Last name), Country	UNESCO’s Unit for Technology and Artificial Intelligence in Education
TITLE	K-12 AI curricula. A mapping of government- endorsed AI curricula
EDUCATION AREA to which the resource refers	☐ pre-school education ☒ primary education ☒ secondary education

	☐ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
APA 7 CITATION	UNESCO (Ed.). (2022). K-12 AI curricula: A mapping of government-endorsed AI curricula. https://unesdoc.unesco.org/ark:/48223/pf0000380602
KEYWORDS	Curriculum, primary school, secondary school, teacher education
SUMMARY	The report contains the key findings and recommendations of UNESCO's global survey on K-12 AI curricula. It reveals that only 11 countries have developed and endorsed K-12 AI curricula, while another four countries are in the process of developing AI curricula. This is a strong call for Member States to develop AI curricula for K-12 learners and to establish stronger mechanisms for validating the non-governmental AI curricula they offer, to balance the private initiative-based approach. The report also reveals that the learning outcomes of AI curricula need to be more focused on fostering creativity in the design of AI technologies and on contextual ethics. Teacher training is key to ensuring the implementation of AI curricula, and teachers need to be trained to design and facilitate project-based learning, the most used pedagogical methodology in existing AI curricula. The report also advises an "agnostic approach" to AI brands and products when deploying AI technologies for specific domains. Regulations alone are not sufficient to ensure AI as a common good for education and humanity. All citizens need to be equipped with a certain level of AI literacy, covering AI values, knowledge, and skills. The project will address this area in Module B and Module C, strand WITH.

AUTHOR (First name Last name), Country	Shijin Li, Xiaoqing Gu, China
TITLE	A Risk Framework for Human-centred Artificial Intelligence in Education
JOURNAL	Educational Technology & Society
EDUCATION AREA to which the resource refers	☐ pre-school education ☐ primary education ☐ secondary education

	☐ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
APA 7 CITATION	Li, S., & Gu, X. (2023). A Risk Framework for Human-centred Artificial Intelligence in Education. *Educational Technology & Society*, *26*(1), 187–202. https://www.jstor.org/stable/48707976
KEYWORDS	Human centred AI, AI misuse, bias risk
SUMMARY	With artificial intelligence (AI) is extensively applied in education, human-centred AI (HCAI) has become an active field in research. There although has been increasing concern about how to systematically enhance the AI applications effect, AI risk governance in HCAI education has not been discussed yet. This study adopted literature meta-analysis, along with the Delphi and analytic hierarchy process methods to establish the risk framework and calculate the index weight of HCAI education. The results confirm that the risk framework includes eight indicators, which respectively are misunderstanding of the HCAI concept (MC), misuse of AI resources (MR), mismatching of AI pedagogy (MP), privacy security risk (PSR), transparency risk (TR), accountability risk (AR), bias risk (BR), and perceived risk (PR). Meanwhile, the eight indicators are divided into four categories such as HCAI concept, the application process, ethical security, and human-machine interaction. Moreover, the trend of risk types indicates that more than half of the articles consider only three or fewer risk types, and the evolution results of risks indicators gradually increased between 2010 and 2021. Additionally, the weights of the eight indicators are MP > MR > AR > PSR > TR > PR > BR > MC. Results could provide theoretical evidence and development suggestions for future scientific governance of HCAI education also in SETCOM.

AUTHOR (First name Last name), Country	Ilkka Tuomi, Finland
TITLE	Artificial intelligence, 21st century competences, and socio-emotional learning in education: More than high-risk?
JOURNAL	European Journal of Education
EDUCATION AREA to which the resource refers	☒ pre-school education

	☒ primary education ☒ secondary education ☒ higher vocational and higher education ☒ adult education ☒ education for people with disabilities
APA 7 CITATION	Tuomi, I. (2022). Artificial intelligence, 21st century competences, and socio-emotional learning in education: More than high-risk? *European Journal of Education, 57*, 601–619. https://doi.org/10.1111/ejed.12531
KEYWORDS	Competencies vs. skills, machine learning, predictions
SUMMARY	In this article, the author discusses 21st century competences from the perspective of sociological theories. She calls social and emotional competences "non-epistemological" and presents a model of the components of competences. She further discusses the stability vs. malleability of these competences. Finally, he compares the process of training these competences with the process of machine learning, which differs from competence training in that the machine learning process stops when the system is working well enough and the predictions it generates are sufficiently generalisable. In the discussion, the author starts from the fact that social and emotional competences predict well-being-related outcomes and proposes that AI systems will be better at predicting these outcomes than existing ways of recognising them. It also highlights ethical considerations. In this respect, the paper may be of interest to the project.

AUTHOR (First name Last name), Country	Thomas K.F. Chiua, Benjamin Luke Moorhouseb, Ching Sing Chaiaand, Murod Ismailov, Hong Kong, Japan
TITLE	Teacher support and student motivation to learn with Artificial Intelligence (AI) based chatbot
JOURNAL	Interactive Learning Environments
EDUCATION AREA to which the resource refers	☐ pre-school education ☐ primary education ☒ secondary education ☐ higher vocational and higher education ☐ adult education ☐ education for people with disabilities

APA 7 CITATION	Chiua, T., K. F., Moorhouseb, B. L., Chaia, C. S. & Ismailov, M. (2023). Teacher support and student motivation to learn with Artificial Intelligence (AI) based chatbot. *Interactive Learning Environments*, https://doi.org/10.1080/10494820.2023.2172044
EQUIPMENT USED (If indicated)	chatbot designed and operationalized by the Mass Transit Railway (MTR), Hong Kong
KEYWORDS	AI in education, self-determination theory, motivation, teacher support, chatbots
SUMMARY	The experiment reported in this paper was designed to investigate how teacher support moderate's student expertise and intrinsic motivation to learn with chatbots from the perspectives of needs satisfaction. This study aims to understand the role of AI technologies in student learning. Therefore, this paper presents four empirical implications, two theoretical contributions and three practical suggestions for both researchers, teachers, and AI application developers. As predicted, student expertise and teacher support had an interaction effect on student intrinsic motivation to learn with the chatbot. With the teacher support, the novice students perceived greater motivation than the advanced. In contrast, without teacher support, the support students reported less motivation than the advanced students. These results suggest that teacher support is more effective in motivating novice student learning with chatbot. I recommend reading the whole article as it illustrates well and presents a model of the importance of teacher support in the implementation of AI to support learning.

AUTHOR (First name Last name), Country	Ismail Celik, Finland
TITLE	Towards Intelligent-TPACK: An empirical study on teachers' professional knowledge to ethically integrate artificial intelligence (AI)-based tools into education
JOURNAL	Computers in Human Behaviour
EDUCATION AREA to which the resource refers	☒ pre-school education ☒ primary education ☒ secondary education ☒ higher vocational and higher education ☒ adult education

	☒ education for people with disabilities
APA 7 CITATION	Celik, I. (2023). Towards Intelligent-TPACK: An empirical study on teachers' professional knowledge to ethically integrate artificial intelligence (AI)-based tools into education. Computers in Human Behaviour, 138, 107468, https://doi.org/10.1016/j.chb.2022.107468
KEYWORDS	artificial intelligence, teacher education, technology integration, TPACK
SUMMARY	The study explored teacher knowledge to use AI-based tools pedagogically and ethically. A scale to measure the knowledge for instructional AI use based on the technological, pedagogical, and content knowledge (TPACK) framework (and extended with ethical aspects) was developed. In addition, a model to investigate the interplay of TPACK components and ethics was proposed. The results indicated that if teachers have more knowledge to interact with AI-based tools, they will have a better understanding of the pedagogical contributions of AI. Further, technological knowledge (TK) allows teachers to better assess decisions of AI. However, only TK is not sufficient educational integration of AI-based tools. For teachers to deploy AI in education efficiently, TK is meaningful when it is combined with pedagogical knowledge (PK), reflected in technological pedagogical knowledge (TPK). The scale developed in this study could be very useful for our project.

AUTHOR (First name Last name), Country	Anthony Seldon, Oladimeji Abidoye, UK
TITLE	The Fourth Education Revolution - Will Artificial Intelligence liberate or infantilise humanity?
EDUCATION AREA to which the resource refers	☒ pre-school education ☒ primary education ☒ secondary education ☒ higher vocational and higher education ☒ adult education ☒ education for people with disabilities
APA 7 CITATION	Seldon, A., & Abidoye, O. (2018). *The Fourth Education Revolution*. Legend Press. Retrieved from

	https://www.perlego.com/book/990540/the-fourth-education-revolution-pdf
KEYWORDS	AI, schools, education
SUMMARY	The book introduces the development of education that led towards the revolution, including AI in education, called fourth education revolution. It examines the human inteligence, the evolution of the AI and the prediction of where AI could evolve in near future, especially regarding education. The book also discusses the potential risks and benefits of AI in education. The book deals with the same issues that SETCOM project is dealing with.

AUTHOR (First name Last name), Country	Anthony Seldon, Oladimeji Abidoye, UK
TITLE	The Fourth Education Revolution: Will Artificial Intelligence Liberate or Infantilise Humanity, 2nd edition
EDUCATION AREA to which the resource refers	☒ pre-school education ☒ primary education ☒ secondary education ☒ higher vocational and higher education ☒ adult education ☒ education for people with disabilities
APA 7 CITATION	Seldon, A., & Abidoye, O. (2020). *The Fourth Education Revolution* (2nd ed.). University of Buckingham Press. Retrieved from https://www.perlego.com/book/1536795/the-fourth-education-revolution-will-artificial-intelligence-liberate-or-infantilise-humanity-pdf
KEYWORDS	AI, schools, education
SUMMARY	The second edition (for first edition see above) in updated and extended compared to first edition The reason for updating was COVID situation and it led the author to emphasize even more strongly the role AI can play in education and how its use is being accelerated,

AUTHOR (First name Last name), Country	Olga Viberg, Sweden
TITLE	Introduction to ‘Machine Learning and Human Learning´
JOURNAL/Chapter	Lecture Notes in Networks and Systems, vol 456: *Learning with Technologies and Technologies in Learning*

EDUCATION AREA to which the resource refers	☐ pre-school education ☐ primary education ☐ secondary education ☒ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
APA 7 CITATION	Viberg, O. (2022). Introduction to 'Machine Learning and Human Learning'. In: Auer, M.E., Pester, A., May, D. (eds) Learning with Technologies and Technologies in Learning. Lecture Notes in Networks and Systems, vol 456. Springer, Cham. https://doi.org/10.1007/978-3-031-04286-7_23
EQUIPMENT USED (If indicated)	N/A
NAME OF INSTITUTION where the equipment was used	KTH Royal Institute of Technology
KEYWORDS	Overview, Human Learning, Machine Learning
SUMMARY	In this paper, Viberg provides a comprehensive introduction to the emerging field of "machine learning and human learning." It presents a brief overview of the current state of machine learning in higher education, highlighting recent developments such as the use of deep learning approaches. The paper also emphasizes the need for a human-centred approach to the design of machine-learning support tools. As machine learning continues to play an increasingly important role in education, these tools must be designed with learners' needs and preferences in mind. The approach requires focusing on user-centred design principles and ongoing collaboration between researchers, teachers, and other educational stakeholders. By taking a human-centred approach to the design of machine learning tools, we can ensure that these technologies are used to support and enhance the learning experience for all students. The paper is highly relevant to the project due to its focus on human learning and A.I.

AUTHOR (First name Last name), Country	Meredith Broussard, US
TITLE	Artificial Unintelligence
EDUCATION AREA to which the resource refers	☐ pre-school education ☒ primary education ☒ secondary education

	☒ higher vocational and higher education ☒ adult education ☒ education for people with disabilities
APA 7 CITATION	Broussard, M. (2019). *Artificial Unintelligence: How computers misunderstand the world*. MIT Press.
KEYWORDS	Techno chauvinism, limits, prudence
SUMMARY	The author warns against if computers always get things right and highlights the fundamental limits of what we can and should do with technology. She argues that our belief in techno chauvinism, the notion that technology is always the solution, has led to a proliferation of poorly designed systems. Through a series of adventures in computer programming, Broussard shows that social problems cannot be solved through a digitally enabled Utopia. By acknowledging the limitations of technology, she contends that we can make better choices about how to use it to improve the world. "Artificial Unintelligence" is a thought-provoking examination of our relationship with technology and a call to action for a more nuanced, thoughtful approach to its integration in our lives. We could use this for the last part - “FOR”.

AUTHOR (First name Last name), Country	Randi Williams, Hae Won Park, Cynthia Breazeal, USA
TITLE	A is for Artificial Intelligence: The Impact of Artificial Intelligence on Young Children’s Perception of Robots
JOURNAL	ACM Digital Library
CONFERENCE	2019 CHI Conference on Human Factors in Computing Systems
EDUCATION AREA to which the resource refers	☒ pre-school education ☒ primary education ☐ secondary education ☐ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
APA 7 CITATION	Williams, R., Park, H. W., & Breazeal, C. (2019). A is for Artificial Intelligence: The Impact of Artificial Intelligence Activities on Young Children's Perceptions of Robots. CHI '19: Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems. 1-11. 10.1145/3290605.3300677.

EQUIPMENT USED (If indicated)	Smartphone-based social robot, LEGO blocks, LEGO WeDo motors, a block-based programming interface on a tablet
NAME OF INSTITUTION where the equipment was used	MIT Media Lab
KEYWORDS	AI education, early childhood education, child-robot interaction, social robots
SUMMARY	Authors developed a novel early childhood artificial intelligence (AI) platform, PopBots, where preschool children train and interact with social robots to learn three AI concepts: knowledge-based systems, supervised machine learning, and generative AI. They evaluated how much children learned by using AI assessments they developed for each activity. The median score on the cumulative assessment was 70% and children understood knowledge-based systems the best. They analysed the impact of the activities on children's perceptions of robots. Younger children came to see robots as toys that were smarter than them, but their older counterparts saw them more as people that were not as smart as them. Children who performed worse on the AI assessments believed that robots were like toys that were not as smart as them, however children who did better on the assessments saw robots as people who were smarter than them. Authors believe early AI education can empower children to understand the AI devices that are increasingly in their lives. We could use this idea as a base for our own similar platform for children (and/or adults).

AUTHOR (First name Last name), Country	Debra Bernstein, Kevin Crowley, USA
TITLE	Searching for Signs of Intelligent Life: An Investigation of Young Children's Beliefs About Robot Intelligence
JOURNAL	The Journal of the Learning Sciences
EDUCATION AREA to which the resource refers	☒ pre-school education ☒ primary education ☐ secondary education ☐ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
APA 7 CITATION	Bernstein, D., & Crowley, K. (2008). Searching for Signs of Intelligent Life: An Investigation of Young Children's Beliefs

	about Robot Intelligence. *The Journal of the Learning Sciences*, *17*(2), 225–247. http://www.jstor.org/stable/27736728
EQUIPMENT USED (If indicated)	/ (just cards with pictures)
KEYWORDS	Children, robots, biological life, machines, distinction
SUMMARY	Children's worlds are increasingly populated by intelligent technologies. This raises several questions about the ways in which technology can change children's ideas about important concepts, like what it means to be alive or smart. In this study, authors examined the impact of experience with intelligent technologies on children's ideas about robot intelligence. A total of 60 children aged 4 through 7 were asked to identify the intellectual, psychological, and biological characteristics of 8 entities that differed in terms of their life status and intellectual capabilities. Results indicated that as children gained experience in this domain, they began to differentiate robots from other familiar entities. This differentiation was indicated by a unique pattern of responses about the intellectual and psychological characteristics of robots. These findings suggest that experience may yield a more highly developed viewpoint that reflects an appreciation of the distinctions between biological life, machines, and artificially intelligent technologies. We could make similar research with Norwegian and Slovenian children.

AUTHOR (First name Last name), Country	Chun Chen, Chunyan Yang, Qian Nie, International
TITLE	Social-Emotional Learning Competencies and Problematic Internet Use among Chinese Adolescents: A Structural Equation Modelling Analysis
JOURNAL	International Journal of Environmental Research and Public Health
EDUCATION AREA to which the resource refers	☐ pre-school education ☐ primary education ☒ secondary education ☐ higher vocational and higher education ☐ adult education ☐ education for people with disabilities

APA 7 CITATION	Chen, Chun, Chunyan Yang, and Qian Nie. 2021. "Social-Emotional Learning Competencies and Problematic Internet Use among Chinese Adolescents: A Structural Equation Modeling Analysis" International Journal of Environmental Research and Public Health 18, no. 6: 3091. https://doi.org/10.3390/ijerph18063091
KEYWORDS	problematic Internet use; social emotional learning (SEL) competencies; structural equation modelling; Chinese adolescents
SUMMARY	To advance the understanding about social-cognitive factors related to Chinese adolescents' experience with problematic Internet use (PIU), this study examined the associations between social-emotional learning (SEL) competencies (i.e., responsible decision-making, social awareness, self-management, self-awareness, and social relationship) and problematic Internet use (PIU) among 1141 high school students from Southwest China. Through comparing of PIU across students with different demographic background (i.e., gender, social-economic status, left-behind status), the study found that male students endorsed higher levels of overall PIU and more problematic time management with Internet use than female students. No latent PIU mean differences were observed across family income and students' left-behind status. Using structural equation modelling (SEM) while controlling for demographic factors, overall SEL competencies were found to have a significantly negative association with PIU. Meanwhile, all five SEL domains were also negatively associated with students' PIU. The findings imply the importance of fostering SEL competencies in preventing PIU among Chinese adolescents. This study is important for the SETCOM project from the point of addressing the correlations between SEL and AI. A similar analysis would be interesting to implement in the population of Slovenian adolescents, especially before and after the educational modules.

AUTHOR (First name Last name), Country	Jill Walker Rettberg, Norway
TITLE	Situated data analysis: a new method for analysing encoded power relationships in social media platforms and apps
JOURNAL	Humanities & social sciences communications

EDUCATION AREA to which the resource refers	☐ pre-school education ☐ primary education ☐ secondary education ☒ higher vocational and higher education ☒ adult education ☐ education for people with disabilities
APA 7 CITATION	Rettberg, J.W. (2020). Situated data analysis: a new method for analysing encoded power relationships in social media platforms and apps. *Humanities & social sciences communications, 7*(1), 1-13. DOI: https://doi.org/10.1057/s41599-020-0495-3
KEYWORDS	Situated Data Analysis, Environmental Power, Machine Learning
SUMMARY	The article proposes situated data analysis as a new method for analysing social media platforms and digital apps. An analysis of the fitness tracking app Strava is used as a case study to develop and illustrate the method. Rettberg claims that situated data analysis allows researchers to analyse how data is constructed, framed, and processed for different audiences and purposes. Situated data analysis recognises that data is always partial and situated, and it gives scholars tools to analyse how it is situated, and what effects this may have. Situated data analysis examines representations of data, like data visualisations, which are meant for humans, and operations with data, which occur when personal or aggregate data is processed algorithmically by machines. Rettberg analyses four levels of situated data in the well-known fitness tracking app Strava: (1) personal data visualised for the individual user and as shared with friends and nearby users, (2) aggregate data visualised for humans, and (3) aggregate data as an operational dataset, intended either for human users manipulating data through a dashboard showing data visualisations, or (4) for machines that process the data to generate new information. Rettberg uses the terms *environmentality* an *environmental power* as lenses for understanding how aggregated personal data can involve a different kind of power in addition to the biopolitical and neoliberal control of bodies and population through numbers.

	One conclusion is that as the data is situated in a more operational context, the power relations also move towards the environmental. Rettberg hopes that situated data analysis will be a tool that allows us to tease apart more easily and understand how these different ways of situating data can lead to very different experiences and effects of power. The article is relevant in the field of education through the awareness it promotes about how social media affects us, including through its influence on the design of our environments.

AUTHOR (First name Last name), Country	Tanner M. Phillips, Asmalina Saleh, Gamze Ozogul, USA
TITLE	An AI toolkit to support teacher reflection
JOURNAL	International Journal of Artificial Intelligence in Education
EDUCATION AREA to which the resource refers	☒ pre-school education ☒ primary education ☒ secondary education ☒ higher vocational and higher education ☒ adult education ☒ education for people with disabilities
APA 7 CITATION	Phillips, T. M., Saleh, A., & Ozogul, G. (2022). An AI toolkit to support teacher reflection. International *Journal of Artificial Intelligence in Education*. https://doi.org/10.1007/s40593-022-00295-1
KEYWORDS	Natural Language Processing, Deep learning, Reflective Practices, Blended learning, Higher education
SUMMARY	The authors pinpoints that there is a need for more support for teacher reflection among in-service teachers, particularly in terms of sustainable, continuous reflection, analysis, and interpretation of rich, usable data. The article presents a new, AI-based method for raising teachers' reflective practice, and in this case, they go through assessment material. In designing the AI toolkit, the authors considered (a) how the method leverages existing data streams and eases the burden of data collection, (b) how the method allows for automated analysis, (c) how the output of the analysis could aid in teacher reflection.

	To investigate this, they used assessment material from a course, consisted of four different types: (a) homework, (b) exams, (c) a practice exam and (d) “other” assessment material. The final goal of the model is to map assessment difficulty onto lecture material so that the AI toolkit can support teacher analysis of student learning. Through the AI toolkit, this data is aggregated and can then be used by teachers to reflect upon the language of their own teaching, f. ex. by flagging the information given by the teacher as “difficult”. Despite differences is language between lecture and assessment content, the authors found the by training a model to predict assessment content difficulty, they could shed light on the difficulty of lecture material, giving teachers a potential asset for quickly reflecting on the quality of their lecture material. The AI toolkit may offer a holistic view of when things are easy and when things are hard, aiding teachers in reflecting on what skills they need to develop.

AUTHOR (First name Last name), Country	Michael Ball, USA
TITLE	The Metaverse
EDUCATION AREA to which the resource refers	☐ pre-school education ☐ primary education ☐ secondary education ☐ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
APA 7 CITATION	Ball, M. (2022). *The Metaverse.* Liveright Publishing Corporation.
KEYWORDS	Metaverse, Artificial intelligence, ethical considerations
SUMMARY	The book explores the concept of the Metaverse, a virtual world that is integrated with the physical world through the “Internet of Things”. The book discusses the potential implications and applications of the Metaverse for society, business, and individuals. Artificial intelligence (AI) and its role in the Metaverse is one of the key themes of the. Ball predicts that AI will be a crucial component of the Metaverse, powering virtual assistants, chatbots, and other intelligent agents that will

	help users navigate and interact with the virtual world. He also discusses the potential for AI to create personalized experiences for users, such as customized virtual environments and tailored content. Potential risks and challenges associated with AI in the Metaverse are also acknowledged. And the need for ethical considerations and responsible use of AI in the Metaverse is highlighted. Developers and policymakers need to prioritize transparency, fairness, and accountability in the design and deployment of AI in the virtual world. Individuals should be educated about the potential risks and benefits of AI in the Metaverse and should have the ability to control their own data and privacy. "The Metaverse" provides a thought-provoking exploration of the potential implications of the Metaverse for society and individuals, with a particular focus on the role of AI. Ball's insights and recommendations are likely to be valuable for anyone interested in the intersection of technology, ethics, and society in the digital age.

AUTHOR (First name Last name), Country	Fan Ouyang, Pengcheng Jiao, China
TITLE	Artificial intelligence in education: The three paradigms
JOURNAL	Computers and Education: Artificial Intelligence
EDUCATION AREA to which the resource refers	☐ pre-school education ☐ primary education ☒ secondary education ☒ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
APA 7 CITATION	Ouyang, F., & Jiao, P. (2021). Artificial intelligence in education: The three paradigms. *Computers and Education: Artificial Intelligence*, *2*, 100020.
KEYWORDS	Artificial intelligence in education, Paradigms, AI-Directed, Learner-as-recipient, AI-Supported, Learner-as-collaborator, AI-Empowered, Learner-as-leader
SUMMARY	With the development of computing and information processing techniques, artificial intelligence (AI) has been extensively applied in education. Artificial intelligence in education (AIEd) opens new opportunities, potentials, and challenges in educational practices. In its short history, AIEd

	has been undergoing several paradigmatic shifts, which are characterized into three paradigms in this position paper: AI-directed, learner-as-recipient, AI-supported, learner-as-collaborator, and AI-empowered, learner-as-leader. In three paradigms, AI techniques are used to address educational and learning issues in varied ways. AI is used to represent knowledge models and direct cognitive learning while learners are recipients of AI service in Paradigm One; AI is used to support learning while learners work as collaborators with AI in Paradigm Two; AI is used to empower learning while learners take agency to learn in Paradigm Three. Overall, the development trend of AIEd has been developing to empower learner agency and personalization, enable learners to reflect on learning and inform AI systems to adapt accordingly, and lead to an iterative development of the learner-centred, data-driven, personalized learning. The text links the two components (AI and SEL) being studied in SETCOM and could also be a help for part of the project (ZA).

AUTHOR (First name Last name), Country	Vincent C. Müller, Germany
TITLE	Ethics of Artificial Intelligence and Robotics
JOURNAL	Stanford Encyclopaedia of Philosophy (Summer 2021 Edition), Edward N. Zalta (ed.)
EDUCATION AREA to which the resource refers	☒ pre-school education ☒ primary education ☒ secondary education ☒ higher vocational and higher education ☒ adult education ☒ education for people with disabilities
APA 7 CITATION	Müller, V. C. (2020). Ethics of artificial intelligence and robotics.
KEYWORDS	Artificial intelligence, Robotics, Ethics
SUMMARY	Artificial intelligence (AI) and robotics are digital technologies that will have significant impact on the development of humanity soon. They have raised fundamental questions about what we should do with these systems, what the systems themselves should do, what risks they involve, and how we can control these. After the Introduction to the field (§1), the main themes (§2) of this article are: Ethical issues that arise with AI systems as

	objects, i.e., tools made and used by humans. This includes issues of privacy (§2.1) and manipulation (§2.2), opacity (§2.3) and bias (§2.4), human-robot interaction (§2.5), employment (§2.6), and the effects of autonomy (§2.7). Then AI systems as *subjects*, i.e., ethics for the AI systems themselves in machine ethics (§2.8) and artificial moral agency (§2.9). Finally, the problem of a possible future AI superintelligence leading to a "singularity" (§2.10). We close with a remark on the vision of AI (§3). For each section within these themes, we provide a general explanation of the *ethical issues*, outline existing *positions* and *arguments*, then analyse how this play out with current *technologies* and finally, what *policy* consequences may be drawn. The article is applicable to SETCOM project reflections, especially in the introductory part and at the end of the project (ZA).

AUTHOR (First name Last name), Country	Virginia Dignum, UK
TITLE	The role and challenges of education for responsible AI
JOURNAL	London Review of Education
EDUCATION AREA to which the resource refers	☒ pre-school education ☒ primary education ☒ secondary education ☒ higher vocational and higher education ☒ adult education ☒ education for people with disabilities
APA 7 CITATION	Dignum, V. (2021). The role and challenges of education for responsible AI. *London Review of Education*, *19*(1), 1-11.
KEYWORDS	artificial intelligence, responsible AI, ethics, trustworthy AI
SUMMARY	Artificial intelligence (AI) is impacting education in many ways. From virtual assistants for personalized education, to student or teacher tracking systems, the potential benefits of AI for education often come with a discussion of its impact on privacy and well-being. At the same time, the social transformation brought about by AI requires reform of traditional education systems. This article discusses what a responsible, trustworthy vision for AI is and how this relates to and affects education. This article can help us in the SETCOM project to develop a final vision.

AUTHOR (First name Last name), Country	Lijia Chen, Pingping Chen, Zhijian Lin, China
TITLE	Artificial Intelligence in Education: A Review
JOURNAL	IEEE Access (Volume: 8)
EDUCATION AREA to which the resource refers	☐ pre-school education ☒ primary education ☒ secondary education ☒ higher vocational and higher education ☒ adult education ☐ education for people with disabilities
APA 7 CITATION	Chen, L., Chen, P., & Lin, Z. (2020). Artificial intelligence in education: A review. Ieee Access, 8, 75264-75278.
KEYWORDS	Education, artificial intelligence, learner
SUMMARY	The purpose of this study was to assess the impact of Artificial Intelligence (AI) on education. Premised on a narrative and framework for assessing AI identified from a preliminary analysis, the scope of the study was limited to the application and effects of AI in administration, instruction, and learning. A qualitative research approach, leveraging the use of literature review as a research design and approach was used and effectively facilitated the realization of the study purpose. Artificial intelligence is a field of study and the resulting innovations and developments that have culminated in computers, machines, and other artifacts having human-like intelligence characterized by cognitive abilities, learning, adaptability, and decision-making capabilities. The study ascertained that AI has extensively been adopted and used in education, particularly by education institutions, in different forms. AI initially took the form of computer and computer related technologies, transitioning to web-based and online intelligent education systems, and with the use of embedded computer systems, together with other technologies, the use of humanoid robots and web-based chatbots to perform instructors' duties and functions independently or with instructors. Using these platforms, instructors have been able to perform different administrative functions, such as reviewing and grading students' assignments more effectively and efficiently and achieve higher quality in their teaching activities. On the other hand, because the systems leverage machine learning and adaptability, curriculum and content has been customized and personalized in line with students' needs,

	which has fostered uptake and retention, thereby improving learners experience and overall quality of learning. The topics discussed in the article could be useful in the project, especially in the work of the SETCOM project, where we will deal with the starting points for the selection of those AI technologies in practice, which will be the most widespread and unproblematic in the field of artificial intelligence (project part Z).

AUTHOR (First name Last name), Country	Xuesong Zhai, Xiaoyan Chu, Ching Sing Chai, Morris Siu Yung Jong, Andreja Istenic, Michael Spector, Jia-Bao Liu, Jing Yuan, Yan Li, International
TITLE	A Review of Artificial Intelligence (AI) in Education from 2010 to 2020
JOURNAL	Hindawi Complexity, Volume 2021
EDUCATION AREA to which the resource refers	☐ pre-school education ☒ primary education ☒ secondary education ☒ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
APA 7 CITATION	Zhai, X., Chu, X., Chai, C. S., Jong, M. S. Y., Istenic, A., Spector, M., ... & Li, Y. (2021). A Review of Artificial Intelligence (AI) in Education from 2010 to 2020. *Complexity*, *2021*, 1-18.
KEYWORDS	Review, Artificial Intelligence (AI), Education
SUMMARY	This study provided a content analysis of studies aiming to disclose how artificial intelligence (AI) has been applied to the education sector and explore the potential research trends and challenges of AI in education. A total of 100 papers including 63 empirical papers (74 studies) and 37 analytic papers were selected from the education and educational research category of Social Sciences Citation Index database from 2010 to 2020. The content analysis showed that the research questions could be classified into development layer (classification, matching, recommendation, and deep learning), application layer (feedback, reasoning, and adaptive learning), and integration layer (affection computing, role-playing, immersive learning, and gamification). Moreover, four research trends, including Internet of Things, swarm intelligence, deep learning, and neuroscience, as well as an assessment of AI in education,

	were suggested for further investigation. However, we also proposed the challenges in education may be caused by AI regarding inappropriate use of AI techniques, changing roles of teachers and students, as well as social and ethical issues. The results provide insights into an overview of the AI used for education domain, which helps to strengthen the theoretical foundation of AI in education and provides a promising channel for educators and AI engineers to carry out further collaborative research. The text of the paper can also serve as a broad-based starting point for some of the initial and future research questions in the SETCOM project, which should be placed in the Slovenian educational system when introducing AI technologies.

AUTHOR (First name Last name), Country	Ke Zhang, Ayse Begum Aslan, USA
TITLE	AI technologies for education: Recent research & future directions
JOURNAL	Computers and Education: Artificial Intelligence
EDUCATION AREA to which the resource refers	☐ pre-school education ☒ primary education ☒ secondary education ☒ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
APA 7 CITATION	Zhang, K., & Aslan, A. B. (2021). AI technologies for education: Recent research & future directions. *Computers and Education: Artificial Intelligence*, *2*, 100025.
KEYWORDS	Artificial intelligence, AI, AI in Education
SUMMARY	From unique educational perspectives, this article reports a comprehensive review of selected empirical studies on artificial intelligence in education (AIEd) published in 1993–2020, as collected in the Web of Sciences database and selected AIEd-specialized journals. A total of 40 empirical studies met all selection criteria, and were fully reviewed using multiple methods, including selected bibliometrics, content analysis and categorical meta-trends analysis. This article reports the current state of AIEd research, highlights selected AIEd technologies and applications, reviews their proven and potential benefits for education, bridges the gaps between AI technological innovations and their educational

	applications, and generates practical examples and inspirations for both technological experts that create AIEd technologies and educators who spearhead AI innovations in education. It also provides rich discussions on practical implications and future research directions from multiple perspectives. The advancement of AIEd calls for critical initiatives to address AI ethics and privacy concerns and requires interdisciplinary and transdisciplinary collaborations in large-scaled, longitudinal research and development efforts. This article is a broad overview and provides a good starting point for all parts of the SETCOM project.

AUTHOR (First name Last name), Country	Beverly Park Woolf, USA
TITLE	AI and Education: Celebrating 30 years of Marriage
JOURNAL	AIED 2015 Workshop Proceedings - Vol 4
EDUCATION AREA to which the resource refers	☐ pre-school education ☒ primary education ☒ secondary education ☒ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
APA 7 CITATION	Woolf, B. P. (2015). AI and Education: Celebrating 30 Years of Marriage. In AIED Workshops (Vol. 4, pp. 38-47).
KEYWORDS	Artificial intelligence, AI in Education, Impact on Education
SUMMARY	This article describes contributions that artificial intelligence (AI) has made and needs to continue to make towards long-term educational goals. The article articulates two challenges in education that require the use of AI: personalizing teaching and learning 21st century skills. This article first describes AI and some of its history and then suggests why AI is invaluable to development of instructional systems. Instructional systems that use AI technology are described, e.g., computational tools that personalize instruction, enhance student experience and supply data for development of novel education theory development. Additionally, some intelligent tutors supply researchers with new opportunities to analyse vast data sets of instructional behaviour and learn how students behave. The paper is also an interesting encouragement for the SETCOM project to

	believe that the introduction of AI in education is necessary and useful.

AUTHOR (First name Last name), Country	Dana Remian, USA
TITLE	Augmenting Education: Ethical Considerations for Incorporating Artificial Intelligence in Education
JOURNAL	University of Massachusetts Boston Scholar Works at UMass Boston; Instructional Design Capstones Collection
EDUCATION AREA to which the resource refers	☐ pre-school education ☒ primary education ☒ secondary education ☒ higher vocational and higher education ☒ adult education ☐ education for people with disabilities
APA 7 CITATION	Remian, D. (2019). Augmenting education: ethical considerations for incorporating artificial intelligence in education.
KEYWORDS	Artificial intelligence, machine learning, education, ethics
SUMMARY	Artificial intelligence (AI) has existed in theory and practice for decades, but applications have been limited in most domains. Recent developments in AI and computing have placed AI-enhanced applications in various industries and a growing number of consumer products. AI platforms and services aimed at enhancing educational outcomes and taking over administrative tasks are becoming more prevalent and appearing in more and more classrooms and offices. Conversations about the disruption and ethical concerns created by AI are occurring in many fields. The development of the technology threatens to outpace academic discussion of its utility and pitfalls in education, however. Conversations about the disruption and ethical concerns created by AI are occurring in many fields. To ensure that AI in education serves learners and educators and that ethical concerns are answered or mitigated, the field must first clarify what those concerns are. This paper surveys academic and trade literature and draws upon a parallel questionnaire deployed to define existing and emerging ethical concerns of AI in education. The text will help us in the SETCOM project to work ZA, as it addresses

	in a sufficiently broad way the ethical issues that we have already identified in the deployment of AI technologies in the project.

AUTHOR (First name Last name), Country	Andy Nguyen, Ha Ngan Ngo, Yvonne Hong, Belle Dang, Bich-Phuong Thi Nguyen, China
TITLE	Ethical principles for artificial intelligence in education
JOURNAL	Education and Information Technologies (2022)
EDUCATION AREA to which the resource refers	☒ pre-school education ☒ primary education ☒ secondary education ☒ higher vocational and higher education ☒ adult education ☒ education for people with disabilities
APA 7 CITATION	Nguyen, A., Ngo, H. N., Hong, Y., Dang, B., & Nguyen, B. P. T. (2022). Ethical principles for artificial intelligence in education. Education and Information Technologies, 1-21.
KEYWORDS	Artificial Intelligence, AIED, Ethics, Policies, Privacy
SUMMARY	The advancement of artificial intelligence in education (AIED) has the potential to transform the educational landscape and influence the role of all involved stakeholders. In recent years, the applications of AIED have been gradually adopted to progress our understanding of students' learning and enhance learning performance and experience. However, the adoption of AIED has led to increasing ethical risks and concerns regarding several aspects such as personal data and learner autonomy. Despite the recent announcement of guidelines for ethical and trustworthy AIED, the debate revolves around the key principles underpinning ethical AIED. This paper aims to explore whether there is a global consensus on ethical AIED by mapping and analysing international organizations' current policies and guidelines. In this paper, we first introduce the opportunities offered by AI in education and potential ethical issues. Then, thematic analysis was conducted to conceptualize and establish a set of ethical principles by examining and synthesizing relevant ethical policies and guidelines for AIED. We discuss each principle and associated implications for relevant educational stakeholders, including students, teachers, technology developers, policymakers, and institutional decision-makers. The proposed set of ethical principles is expected to serve

	as a framework to inform and guide educational stakeholders in the development and deployment of ethical and trustworthy AIED as well as catalyse future development of related impact studies in the field. The guidelines given in the content of this article will be the most useful for the final part of the SETCOM (ZA) project.

AUTHOR (First name Last name), Country	Safinah Ali, Blakeley H. Payne, Randi Williams, Hae Won Park, Cynthia Breazeal, USA
TITLE	Constructionism, Ethics, and Creativity: Developing Primary and Middle School Artificial Intelligence Education
JOURNAL	MIT Media Lab, Cambridge, MA 02139
EDUCATION AREA to which the resource refers	☐ pre-school education ☒ primary education ☒ secondary education ☒ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
APA 7 CITATION	Ali, S., Payne, B. H., Williams, R., Park, H. W., & Breazeal, C. (2019, June). Constructionism, ethics, and creativity: Developing primary and middle school artificial intelligence education. In International workshop on education in artificial intelligence k-12 (eduai'19) (Vol. 2, pp. 1-4).
KEYWORDS	Constructionism, Ethics, Creativity, Artificial Intelligence Education
SUMMARY	Children growing up in the era of artificial intelligence (AI) will have a fundamentally different relationship with technology than those before them. As AI changes how we live, work, and play this raises the critical question," How do we best pre- pare students to flourish in the era of AI?" To create a future where a diverse and inclusive citizenry can participate in the development of the future of AI, we are developing powerful K- 12 AI education curricula that emphasize constructionist learning, designing with ethics in mind, and developing a creative mindset. Children will need all these skills to thrive in the AI era. Here, we describe the tools we created and studies we con- ducted to build curricula that embody these core principles. The paper is interesting for the SETCOM project because it focuses on the competences and empowerment of AI users, especially children.

AUTHOR (First name Last name), Country	Benedict du Boulay, UK
TITLE	Artificial Intelligence in Education and Ethics
JOURNAL	Handbook of Open, Distance and Digital Education
EDUCATION AREA to which the resource refers	☒ pre-school education ☒ primary education ☒ secondary education ☒ higher vocational and higher education ☒ adult education ☒ education for people with disabilities
APA 7 CITATION	du Boulay, B. (2022). Artificial intelligence in education and ethics. In Handbook of Open, Distance and Digital Education (pp. 1-16). Singapore: Springer Nature Singapore.
KEYWORDS	Artificial intelligence in education, Ethics, Analytics
SUMMARY	This chapter traces the ethical issues around applying artificial intelligence (AI) in education from the early days of artificial intelligence in education in the 1970s to the current state of this field, including the increasing sophistication of the system interfaces and the rise in data use and misuse. While in the early days most tools were learner-facing, now there are tools that are teacher-facing, supporting their management of the classroom, and administrator-facing, assisting in their management of cohorts of students. Learner-facing tools now consider the affective and motivational aspects of learning as well as the cognitive. The rise of data collection and its associated analytic tools has enabled the development of dashboards for the dynamic management and reflective understanding of learners, teachers, and administrators. Ethical issues hardly figured in the early days of the field but now they loom large. This is because of the legitimate fears that learners' and teachers' autonomy will be compromised, that learner data will be collected and potentially misappropriated for other purposes, and that AI will introduce extra biases into educational decisions and increase existing inequity and because of the scary reputation that AI has in general. The paper addresses the main issues of the SETCOM project on the ethics of introducing AI in the highly sensitive field of education and training (ZA).

AUTHOR (First name Last name), Country	Jason M. Harley, Reinhard Pekrun , James J. Gross, International
TITLE	Developing Emotion-Aware, Advanced Learning Technologies: A Taxonomy of Approaches and Features
JOURNAL	International Journal of Artificial Intelligence in Education
EDUCATION AREA to which the resource refers	☒ pre-school education ☒ primary education ☒ secondary education ☒ higher vocational and higher education ☐ adult education ☒ education for people with disabilities
APA 7 CITATION	Harley, J. M., Lajoie, S. P., Frasson, C., & Hall, N. C. (2016). Developing Emotion-Aware, Advanced Learning Technologies: A Taxonomy of Approaches and Features. International Journal of Artificial Intelligence in Education, 27(2), 268–297. https://doi.org/10.1007/s40593-016-0126-8
KEYWORDS	emotion detection, personalized learning, advanced learning technologies
SUMMARY	The article examines various approaches and features for developing advanced learning technologies that can detect and manage students' emotions. The authors propose a taxonomy of approaches and features based on a review of literature on the use of sensors and analytical methods for emotion detection and the use of such data to personalize learning and support the learning process. The proposed approaches include the use of sensors to detect bodily responses, speech and language analysis, facial expression recognition, motion analysis, and others. The authors also propose the use of technologies for managing and analysing data on students' emotional states, which can serve as support for personalized learning and improving the learning process. Together, the proposed approaches and features form a taxonomy that can serve as a guideline for researchers and developers of learning technologies who want to develop emotionally aware learning technologies for personalized learning.

AUTHOR (First name Last name), Country	Vicky Charisi, Stéphane Chaudron, Rosanna Di Gioia, Riina Vuorikari, Marina Escobar-Planas, Ignacio Sanchez, Emilia Gómez, International

TITLE	Artificial Intelligence and the Rights of the Child Towards an Integrated Agenda for Research and Policy
JOURNAL	Joint research centre EU Commission
EDUCATION AREA to which the resource refers	☒ pre-school education ☒ primary education ☒ secondary education ☐ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
APA 7 CITATION	Charisi, V., Chaudron, S., Di Gioia, R., Vuorikari, R., Escobar-Planas, M., Sanchez, I., Gomez, E. (2022). *Artificial Intelligence and the Rights of the Child: Towards an Integrated Agenda for Research and Polic.* Publications Office of the European Union. DOI:10.2760/012329, JRC127564.
KEYWORDS	Artificial intelligence, rights of the child, EU policy
SUMMARY	Artificial Intelligence undoubtedly offers children many opportunities, but it also raises the risk of compromising their rights. While an increasing number of policy initiatives and corresponding research seek to better understand and provide solutions to mitigate the risks and augment the benefits of AI-based technologies for children, there is often a lack of interaction among stakeholders. This report provides elements for an integrated agenda for research and policy regarding children's rights and Artificial Intelligence. It aims to connect scientific evidence with policymaking, to gain insights of the interplay between different stakeholders, and to go beyond the identification of ethical guidelines towards methods for practical future implementations. A review of relevant policy initiatives is presented. This is followed by an overview of research on three selected AI applications for children, namely conversational agents, recommender systems and robotic systems, under the lens of children's rights. Then, the results of two workshops with children and young people, and three workshops with stakeholders from policy and research in the field of AI and child's rights are presented. A thematic analysis of the discussions revealed different sets of topics proposed by the stakeholders, which have then been

	triangulated to identify priorities from the different perspectives. Based on the above-mentioned input, a set of recommendations for an integrated agenda and future directions in research and policy are provided. Requirements are: 1. AI minimisation, valuable purpose, and sustainability: The use of AI technology should be considered as a limited resource. Strategic and systemic choices should be made to develop AI-based services for children, both at a public and private level. 2. Transparency, explainability, communication and accountability: These elements should be developed to inform and empower young citizens and all users of AI technology, preventing mistrust or over-trust in AI systems. 3. Inclusion and non-discrimination: AI technology should be child-friendly when appropriate and not reflect discriminatory biases. 4. Privacy, data protection and safety: Children and their carers should be facilitated and empowered to control how their personal data are exploited by AI technology. 5. Integration and respect of children's agency: Children should be integrated further in conscious interactions with AI technology and research should support the construct of children's agency in this context. The link to the SETCOM is in raising awareness how AI can impact children cognition, behaviour (SEL) and development.

AUTHOR (First name Last name), Country	Andrew McStay, UK
TITLE	Emotional AI and EdTech: serving the public good?
JOURNAL	Learning, Media and Technology
EDUCATION AREA to which the resource refers	☐ pre-school education ☒ primary education ☒ secondary education ☒ higher vocational and higher education ☒ adult education ☐ education for people with disabilities

APA 7 CITATION	McStay. A. (2020) Emotional AI and EdTech: serving the public good?, *Learning, Media and Technology, 45*:3, 270-283. DOI: 10.1080/17439884.2020.1686016
KEYWORDS	Affective computing, EdTech, emotional AI, human rights
SUMMARY	Education Technology (EdTech) companies are deploying emotional AI to quantify social and emotional learning. Focusing on facial coding emotional AI that uses computer vision and algorithms to see, recognise, categorise and learn about facial expressions of emotion, this paper evaluates nascent usage of these technologies in education. To do this, it assesses the nature of child rights, the history and modern usage of face-based emotional AI, methodology and efficacy, and what this paper sees as a clash of private and public interests. Concern is shown to be two-fold: first is on method, especially given scope for material effects on students; second are ethical and legal concerns. While proposing a list of considerations for any implementation for these technologies in the classroom, the paper concludes that significant risks exist in deployment of these technologies in the classroom. Link to the SETCOM project is understanding how AI can assist in personalised learning, development of social and emotional learning with AI and what kind of concerns can occur in this process.

AUTHOR (First name Last name), Country	A monograph by the ZRSŠ, numerous authors, expert editors..., Slovenia
TITLE	A view of the 21st century school in the spirit of competence and literacy
EDUCATION AREA to which the resource refers	☒ pre-school education ☒ primary education ☒ secondary education ☒ higher vocational and higher education ☐ adult education ☐ education for people with disabilities
APA 7 CITATION	Krapše, T. (ur.). (2022). *Pogled na šolo 21. stoletja v duhu kompetenc in pismenosti*. Zavod RS za šolstvo. https://www.zrss.si/pdf/Pogled_na_solo_21_stoletja.pdf
KEYWORDS	literacy / critical thinking / curricula / competences

SUMMARY	The scientific monograph was created based on the results of projects such as national projects called NA-MA POTI and OBJEM. In the context of defining the school of the future in connection with the concept of entrepreneurship, the increasing importance and influence of new technologies such as artificial intelligence is highlighted, but the importance of developing social-emotional competences in teachers and children and the emotional development of individuals is highlighted even more concerning different aspects of literacy and critical thinking.

AUTHOR (First name Last name), Country	Dan Fitzpatrick, Amanda Fox, Brad Weinstein, USA
TITLE	The AI Classroom: The Ultimate Guide to Artificial Intelligence in Education (The Hitchhiker's Guide for Educators Series)
JOURNAL	TeacherGoals Publishing
EDUCATION AREA to which the resource refers	☒ pre-school education ☒ primary education ☒ secondary education ☒ higher vocational and higher education ☒ adult education ☒ education for people with disabilities
APA 7 CITATION	Fitzpatrick, D., Fox, A., Weinstein B. (2023). The AI Classroom: The Ultimate Guide to Artificial Intelligence in Education (The Hitchhiker's Guide for Educators Series). TeacherGoals Publishing
KEYWORDS	Artificial Intelligence (AI), Social-Emotional Learning (SEL), Education Technology
SUMMARY	Humanity and technology are teaming up to unleash a brand-new world of possibilities filled with ground-breaking advances that will allow us to reimagine teaching and learning! Are you an educator looking to stay ahead in the ever-changing world of education? Look no further than ***The AI Classroom***, the ultimate guide for navigating the complexities of AI in education. This thought-provoking book provides practical strategies for incorporating AI tools into your teaching practices, while exploring the potential of AI to transform traditional models of teaching and learning. Discover how AI can help you create inclusive and

	accessible learning environments, personalize learning, reach more students, and get your time back. Let us unlock the full potential of artificial intelligence and embrace its transformative power to take your craft to the next level!

Literature

AI HLEG. High-Level Expert Group on Artificial Intelligence. (2022). Ethics guidelines for trustworthy AI. https://digital-strategy.ec.europa.eu/en/policies/expert-group-ai

Mitchell, T. (1997). *Machine Learning.* New York: McGraw Hill.

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