CALL FOR PAPERS

SPECIAL ISSUE

Coding, Computational, Algorithmic, Design, Creative, and Critical Thinking in K-16 education

Submission Deadline: 3rd July 2023

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Overview

This special issue within the *IEEE Transactions on Education* journal welcomes contributions from researchers, educators, high school teachers and their students, and undergraduate students with their professors, on experiences of schools and universities connected through research. By leveraging on previous special issues and editorial guidelines [1-4], this special issue intends to distill best practices of educational experiences in using coding and computing considered key competencies and essential way of thinking in all aspects of life: from algorithms to user interface design, from creative to critical thinking. This way of thinking has to be applied in multiple fields, such as computing, arts, and humanities, with a special attention and an integrated view [5] to the disciplines of science, technology, engineering, and mathematics. The ultimate goal will be sharing best practices and guidelines on how create learning communities, from primary to higher education, to foster the development of global competencies able to guide citizens in their educational and working path thus reducing the percentage of young adult neither in employment nor in education and training (NEETs) [6-7]. Collaborative projects between schools and universities are also welcomed, perhaps offering bridges between undergraduate students acting as mentors for high school students and mutual mentorship opportunities between researchers, educators, parents, and students [8-

12]. The intent of this call is to seek best practices and to document the impact of actions such as tutoring, counseling, mentorship, near mentorship[1,2] [8], and actions towards enhancing relationships which contribute to a more inclusive educational community. This could be applied both in formal settings, such as a tutor for the training of newly appointed teachers and teacher students [13], and in non-formal settings, such as communities of practices for outreach activities [14].

The special issue aims to investigate one or more of the following research questions:

1) How to enhance learners' broad spectrum of 21st-century competencies [15] and thinking skills, and how to apply these in civic engagement and real-world contexts.

2) How to connect the educational pipelines, from kindergarten to undergraduate diploma, involving all the actors of the formal, non-formal, and informal educational process emphasizing best practices, impacts, and sustainability of the activities.

3) How to enhance the relationships and dialogue between actors of the educational community: student-teacher, teacher-teacher, teacher-researchers, outreach communities, and all stakeholders involved.

Contributions from teachers, graduate students, and undergraduate students are welcome.

Topics

Authors are invited to submit complete papers for the special issue. Contributions could include, but are not limited to, the following topics related to STEAM in K-16 education:

- Technologies, pedagogies, and content [16] for coding [17] and computing [18-19]
- Learning paths in computing education [20-22]
- Curricula related to coding and computing for the training of undergraduate and graduate students in primary education
- Pre-service teacher training in coding, computing, active digital citizenship
- Teacher professional development in coding and computing
- Near mentorship programs and experiences related to coding and computing
- Interdisciplinary and multidisciplinary applications of coding, computing, and digital citizenship
- Coding as a new literacy
- Coding and computational thinking in childhood education
- Pedagogy for teaching coding
- Design, development, and field study of learning resources and assessment activities [23] in K-12
- Use of technologies for improving the learning experience
- Coding and programming context from high school to undergraduate level
- Competitions aimed at promoting coding, computing, computational thinking, or algorithmic thinking
- Thinking (e.g., computational [24], algorithmic [25], design [26], creative [27], critical [28-30] and digital citizenship among school students of all ages
- 21st-century competencies for K-16 education
- Scientific, technical, and ethical aspects of artificial intelligence (AI) in education in relation to the European Commission approach and the OECD PISA 2024 strategic vision [31-36]

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[1] https://www.nsf.gov/crssprgm/reu/reu_contacts.jsp
[2] EuroScholars Program https://euroscholars.eu/

- Importance of data in education, research, and civic participation [37]
- Educational robotics and formative competitions
- Time on the web and student wellbeing [38-40]
- Importance of relationships in education [41-42]
- Parallel computing, algorithms, and applications to AI, data mining, and bioinformatics
- The ecological footprint of information communication technologies (ICT) [43-44]
- Environmental social governance (ESG) and social development goal (SDG) action [45]
- From formative to summative assessment: resources and best practices [23]
- Impact of outreach activities related to coding [46], making [47], literacy [48], and thinking developments [49-54]
- Serious game and game-based learning in K-16 education [55-57]
- Quantum computing in K-16 education: from hardware to software [58-60]

Submissions may be reviews, experience reports, position papers, research projects, works in progress, or complete case studies. Best practices and lessons learned emerging from international projects, e.g., those involving AICA, INDIRE and Scientix, are welcome.

Full paper submission criteria
In subsequent stages of development, in the full papers, authors should clearly address the following criteria:

- Submissions are expected to identify their contributions to one of three areas of scholarship: application, discovery, or integration. Authors are referred to the Author Resource website (https://ieee-edusociety.org/general/toe-author-resources) for more information on selecting the appropriate area of scholarship.
- Papers should support contributions and assertions with compelling evidence and provide explicit, transparent descriptions of the processes through which the evidence is collected, analyzed, and interpreted.
- Case studies will be considered for acceptance, but must present compelling evidence to support key assertions, in addition to describing the initiative.
- Scholarly position papers will also be considered if they contain arguments with sound theoretical justification.
- Please contact Lisa Jess, l.jess@ieee.org if you need assistance with ScholarOne submissions.

Information on the journal and information for authors can be found starting at http://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=13.

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