

# Introduction to SI

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For almost a century, educators have been at the forefront of technology innovation, experimenting with new and novel methods and tools to improve instructional effectiveness. For example, a modern manifestation of this, in the early 1900s, predating the computing era, was the invention, by psychologists S. L. Pressey, N. Crowder, and B. F. Skinner, of electromechanical teaching machines. Their work led to the development, in the 1960s, of computer-assisted instruction (CAI), the predecessor to today's eLearning. In the 21<sup>st</sup> Century, eLearning has moved well beyond its original K-12 and higher education implementations to become an essential part of corporate and government training. And in this past year of Covid-19 isolation, eLearning, frequently referred to as distance learning, offered either in conventional one-to-one (computer-to-learner) instruction or in one-to-many Zoom-like settings, has been the primary and ubiquitous method of instructional delivery. But eLearning is only one instance of technology's relationship to education. This special issue of ITPro offers a glimpse of a few others.

The papers we have chosen from the dozens we received for this special issue represent important computing technology trends and activities taking place in education—trends that have implications beyond the environments in which they are described in the papers we have chosen. We have selected these five papers, not only because the methodologies they describe are educationally innovative, but also because they have implications for new applications and environments familiar to the readers of ITPro.

In the first paper, *Educating Socially Vulnerable Populations During COVID-19: How Technology can be Both the Problem and the Solution*, the authors describe the current worldwide environment in which education is being challenged by the Covid virus.

These challenges are by no means homogenous across all learning environments in terms of available technologies, alternative learning conditions, student diversity, etc. The challenges are great, and the implications of the last year on the future are still to be determined.

The second paper, *Influence of Technological Resources on the Development of Mathematical*

*Competence in High School* illustrates that all educational technology does not revolve around eLearning, despite most of our readers' orientation toward American higher education or corporate/industry training. This article describes a different learning environment. The authors present a comparative research study of alternative instructional strategies in a Spanish high school mathematics course. An interesting aspect of this article is that in the context of educational technology, it presents our readers with insight into typical educational research methodologies. While such studies are often inconclusive, they can help educational professionals develop instructional strategies appropriate to their own their education and training challenges, regardless of the environments in which they practice.

In *Simulation-Based Training via a "Readymade" Virtual World Platform: Teaching and Learning with Minecraft Education*, the authors describe technologies with which most ITPro readers are familiar, albeit in contexts different than educational technology. The paper describes a gamified, virtual environment in which collaborative teams participate competitively in higher education, Scrum based learning projects. This article illustrates many of the diverse components of technology's application to education today. Students' experience in collaborative learning is an essential skill for entering the workforce, whether in "real" work environments or the virtual ones so common in these days of Zooming. Gamification of collaboration can motivate teams toward producing better project outcomes as they move toward their project goals. And of course, most ITPro readers will be familiar with Scrum as one of the more popular agile system/software engineering methodologies.

The authors of the next article, *Technology-enhanced Educational Escape Rooms: A Road Map* describe their work as providing "... a road map for the development of Information and Communication Technologies (ICT) solutions aimed at creating and supporting educational escape rooms." Again we see the importance of teamwork as an essential element of learning to prepare undergraduate students for the project-oriented world into which they will enter when they graduate—whether that work world is academia or industry. Lest any readers confuse Escape Rooms with Zoom's Waiting Room, from which one can only be released by the meeting coordinator, this article describes Escape Rooms as "one of the leading leisure activities around the globe in the last few years." And according to one of their references, these can be defined as "live-action team-based games where players discover clues, solve puzzles, and accomplish tasks in one or more rooms in order to accomplish a specific goal (usually escaping from the room) in a limited amount of time." This article too focuses on developing team collaboration, but in very different technology-based instructional settings. This article also provides guidance on a topic too infrequently referenced in descriptions of innovative practices, and that is how to employ learning analytics in such an environment. After all, at the end of the day, instructors need to know how students are performing, regardless of the creative nature of the learning setting. The authors also posit how AI techniques might be useful in this endeavor, given the quantity and complexity of data potentially collectible in such a real-time learning situation.

In our final selection, *On the Generation of E-learning Resources Using Business Process, Natural Language Processing and Web Services*, the authors describe the challenge and importance of mapping e-learning resources, sometimes called "learning objects," into industry training related to what needs to be learned to accomplish real workplace goals. The authors describe methodologies for parsing business process models into sets of "related activities, events, and gateways" so that "tasks" can be defined to operationalize the elements of those sets. Once parsed, e-learning resources can then be used for instruction related to those tasks. Resources can be different

media types, and independent and reusable—this definition being consistent with the many formal standards related to the definitions of learning objects. The authors then describe how and why to package these resources as reusable, learning "web services."

As a final note, we, the editors of this special issue hope that you find these articles useful and interesting. We clearly enjoyed receiving and reviewing them and learning about the interesting work being conducted globally in this arena. Unfortunately (or perhaps fortunately) we received far too many exceptional papers for us to include in a single issue of ITPro. The limits of budget and space did not allow us to include more of them in this issue. However, allowances have been made for some of the papers to be considered for future issues of ITPro, and also for potential inclusion in the IEEE Computer Society's COMPSAC conference symposium (track) entitled Computer Education and Learning Technologies.

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