

Past, Present, and Future of TLT's Journey in Publishing

I. JOURNAL HISTORY AND TRAJECTORY

ESTABLISHED in 2007, IEEE TRANSACTIONS ON LEARNING TECHNOLOGIES (TLT) has been publishing research from various scientific communities for 15 years [1]. Under the auspices of IEEE's Computer Society and Education Society, TLT was led by three chief editors: Wolfgang Nejdl of the University of Hannover (2008–2012), Peter Brusilovsky of the University of Pittsburgh (2013–2018), and Mark J.W. Lee of the Charles Sturt University (2019–2022) [1]. Arnold Pears from the KTH Royal Institute of Technology served as the acting Editor-in-Chief (EiC) before Minjuan Wang (author of this editorial) was appointed in June 2022.

According to the current President of the IEEE Education Society, Dr. Edmundo Tovar (Universidad Politécnica de Madrid), this Society made a commitment to the creation of a journal that publishes original archival research papers and critical survey papers, on topics within the scope of technology advances in learning systems, educational games and software applications, ontologies for learning systems, etc. This is how TLT came into being in 2007, with its first issue published in January 2008, with the IEEE Computer Society as the financial cosponsor and the IEEE Circuits and Systems Society as the technical cosponsor. Later, the Education Society replaced the Computer Society as the financial sponsor and it has supported TLT ever since.

Dr. Tovar remarked that –“TLT has had an impressive growth trajectory despite being one of the youngest SCIE/SSCI, and Scopus-indexed journals in the field of educational technology.” Currently, TLT is a cross-disciplinary and highly sought-after journal in both computer science and educational research. It may be the only journal with a unique focus on new and emerging technologies for teaching and learning. My editorial preface of the latest regular issue (September 2022) reported on its impact factor (4.255/5 years) and successful entering into multiple indexing (SSCI, SCI, and EI) that are embraced by many higher educational institutions around the globe [2].

Crystal is the traditional symbol for a 15-year anniversary, whereas a glass or a watch is the modern epitome of the time a couple has spent together. For a journal, I would pick a watch and look forward to its next 15 years. Considering the fierce competitions among publishing agencies and similar journals, TLT embarked on an amazing adventure to reach where it is today.

When the world is recovering from a historical pandemic, TLT has also recovered from a brief set-back and is sailing forward with full momentum. As Professor Alexandra I. Cristea

(Durham University) commented in her email, “It was my distinct pleasure to serve as an Associate Editor for the IEEE TLT. Now that my term is finished, including also the troubled times during COVID-19 and the change of editorship, I am happy to leave the TLT in a better place: embracing more structure and especially striving for more clarity in the message – which helps submitters and reviewers alike.” Here we want to dedicate the December issue to this Anniversary and celebrate the journal's accomplishment during this holiday season.

II. REFLECTION ON GROWTH FROM THE SOCIETY'S PRESIDENT

At short notice, President Tovar sacrificed his weekend to write a detailed reflection on TLT's growth and future challenges. We are very grateful for his dedication to the Education Society and his tremendous care for publishing. We include his analysis in its entirety with minor editorial changes in the following. You will also find the quotations of his words in several other sections of this editorial.

As Dr. Tovar wrote, the following factors have contributed to TLT's development over the years.

- 1) The journal has found a nice niche in its publishing. Similar journals either target particular geographical regions or are limited to education or technology. Some of the others, by contrast, are broader in scope but are not Journal Citation Report impact factor journals. In this context, TLT distinguishes itself as a top-quality international journal that focuses specifically on innovative learning technologies with a strong computer science emphasis, yet represents this focus and emphasis across a wide range of technologies and across the full span of learning—including all educational levels as well as learning in workplace, community, and formal/ informal contexts. Since its establishment, it has surpassed the vast majority of its competitors.
- 2) Complementing other IEEE Education Society periodicals, such as the TRANSACTIONS ON EDUCATION (ToE), which focuses on education in electrical and electronics engineering, computer engineering, computer science, and other fields within the scope of interest of IEEE. ToE also publishes papers reporting on the use of technologies to support learning and teaching within these aforementioned fields, but the emphasis is on the educational aspects (e.g., pedagogy, instructional design, curriculum, and learning assessment) rather than on the learning technologies themselves or their design/ development.

- 3) TLT also has a relatively large editorial board, because of the broad, diverse, and interdisciplinary nature of the field of learning technologies. Accordingly, the Associate Editors' (AE) collective expertise covers a wide array of technical and nontechnical subject areas, research methodologies, and various educational contexts. In addition, TLT made an effort to recruit AEs from geographical areas that previously were not represented or underrepresented on its editorial board.
- 4) In the past decade, TLT has passed two reviews (in 2015 and 2020) by the IEEE Periodicals Review and Advisory Committee (PRAC). PRAC has examined the journal's conduct, content, scope, and quality of papers, in compliance with IEEE policies and procedures. The financial health of this publication is another consideration. Most importantly, they provided suggestions for improvements and shared best practices in publishing from other Societies within the IEEE. The feedback received from PRAC has been immensely helpful and will no doubt go a long way towards helping TLT improve its operation, review process, and performance in the coming years.

Above all, the journal's success has resulted from the collaborative and voluntary services of distinguished scholars who have held governing positions during these 15 years, such as our Vice Presidents of Publications—Martin Llamas (2011 to 2018), Arnold Pears (2019 to 2022), and the former Editors-in-Chief (Nejdl, Brusilovsky, and Lee). Thanks to the chairs and members of the several steering committees who have guided TLT's establishment and continued growth. Special acknowledgement goes to all authors, AEs, and reviewers who are either actively creating content or tirelessly supporting the journal's day-to-day operation. (The end of Dr. Tovar's reflection).

III. RECENT ACCOMPLISHMENT AND CHALLENGES

In October 2022, TLT's Special Issue on *Designing Technologies to Support Professional and Workplace Learning for Situated Practice* is successfully published. It showcased research from nine international teams and totaled more than 110 pages. Many thanks to the outstanding group of guest editors (Pammer-Schindler, Ley, Kimmerle, and Littlejohn), who patiently worked with three EiCs to complete their editorial work.

A second Special Issue on *Smart Learning Environments* is moving forward smoothly and will publish on schedule. Our latest Special Issue on *Metaverse and the Future of Education* is in progress. Papers published in this Special Issue will discuss and share fundamental research outcomes and innovative application cases of Metaverse in education. Prospective authors are invited to submit their research findings on the state-of-the-art reviews, novel ideas, theoretical frameworks, practical analysis, and emergent applications of Metaverse and education in relevant fields. Visit TLT's website for the detailed Call for Papers.¹

In September 2022, TLT also reconnected with an "old friend"—European Association of Technology Enhanced Learning), to publish an extended version of their top conference papers. The journal is also continuing its partnership with the Education Society's flagship Asia-Pacific conference—Teaching, Assessment, and Learning for Engineering (TALE) 2022 (Hong Kong) and the Immersive Learning Research Network's (iLRN) annual conferences. In addition, the Intelligent Environments (IE) 2023 will be held in Mauritius, with TLT being a publishing partner.

As President Tovar pointed out in this reflection, the journal is facing many new upcoming challenges: updating the scope that will expand the journal's impact and reach beyond the audiences to which it has historically catered, continuing to preserve the core elements that have historically given it a strong competitive edge, maintaining the upward trend in impact factors, engendering greater community engagement around the journal, and also analyzing the implications of IEEE's open-access mandates.

As the new EiC, I will continue building a vibrant editorial board and together we will conquer these challenges. At this moment, TLT's "rescoping" proposal is under the Education Society's internal reviews. With some adaptations, we aim to submit the final version to IEEE's Periodicals Committee by December 2 of this year. The Editorial Board will then present this change proposal at the committee's meeting in mid-February of 2023. In addition, we are planning to establish an advisory board, for former EiCs and AEs to stay involved with the journal and to continue making an impact.

IV. INTRODUCTION TO PAPERS IN THIS ISSUE

This 15th Anniversary Issue kicks off with a paper from Dr. Gustavo Zurita (AE of TLT, Universidad de Chile) and his stellar international team (Mulet-Forteza, Merigó, Lobos-Ossandón, and Ogata). Collaboratively, they conducted a timely bibliometric overview of papers published in this journal from 2008 to July 2022. Their analysis aimed to explore how IEEE-TLT connects researchers across the globe and how it has supported the growth of various scientific communities [A1]. Their findings are indeed encouraging. It confirmed TLT's image as a high-impact journal intersecting several fields: computer science, education, learning design, and technology. Papers published in this journal have also been referenced by a wide range of authors, institutions, and countries worldwide [A1].

Table VI in Zurita et al. [A1] shows the most productive and influential countries in TLT from a publishing perspective. The rankings are revealing, with the USA being top 1, followed by Spain, U.K., Germany, and China. Clearly, Europe has the most countries represented in this Table [3]. This result actually differs from submissions received in 2022, with authors from China and Spain becoming the top contributors, likely spurred by their institutions' policies on reviewing professional development. Even though we cannot influence tenure and promotion criteria, we can take the initiative to reach countries that have not made it to this table. We will

¹ [Online]. Available: <https://iee-edusociety.org/iee-special-issue-metaverse-and-future-education>

also be recruiting AEs from countries that are not represented in the editorial board. TLT is an international journal and this path will not change.

The year of 2022 also witnessed the rapid growth of Metaverse and the explosion of new tools and technologies supporting Metaverse. IEEE has sponsored one congress (September 2022) focusing on developing and deploying Metaverse and an international conference (December 2022) addressing the entire gamut of research issues related to Metaverse. In order to present TLT as a leading journal in this Metaverse wave, I turned my summer research effort into a coauthored paper on the Ecosystem of Education Metaverse (Edu-Metaverse) [A2]. In this theoretical article, we defined several of the key terms and proposed a new framework to help guide emerging research and development on the applications of Metaverse in teaching and learning. As the paper reports, E-learning has been making breakthroughs every seven years, with the last one being the age of personalization (2015) [A2]. Coincidentally or by design, we have entered the Era of Edu-Metaverse (2022) after another seven years [A2]. In addition, this article will serve as a launch pad for TLT's Special Issue on *Metaverse and the Future of Education*. We anxiously await submissions from stellar researchers and developers and will do our best to showcase your work.

The rest of the papers in this December issue reflect great geographic diversity of our contributors. In addition, most of the papers resulted from international and cross-disciplinary collaborations. The lead authors of these papers are from the USA, China, Canada, Brazil, Israel, Belgium, Italy, and Spain. Content coverage of these papers is also quite diverse, from data mining in MOOCs to immersive virtual field experiences for Geoscience education, from serious game design in health education to supporting design students in 3-D modeling. Singer and colleagues' paper on accommodating students with learning impairments aligns with TLT's new focus on publishing more research about underserved and disadvantaged populations. All research projects are united by TLT's mission, which is to advance the development of learning technologies and to be a trailblazer in publicizing research efforts associated with new and inspiring technologic innovations.

V. ACKNOWLEDGEMENTS OF AES

On this 15th anniversary, we want to thank all previous Chief Editors (i.e., EiCs) and AEs who have contributed to TLT's growth. We also want to acknowledge the existing reviewers and nearly 200 new reviewers who volunteered through the self-nomination form on our website. Many of the new reviewers came from our collaborative conferences and are eager to take on assignments. Your altruistic spirit in helping peers publish has greatly improved TLT's efficiency in reviewing and making timely making. Your tireless comments and suggestions have helped many authors improve their research until reaching the publishing stage. Here I want to share with you an inspiring message from professor Cristea: "Having myself fought hard to find good reviewers for all papers, I wish to encourage the community, but especially the

young researchers, to take up such reviewing, which in time leads to further recognition and editorships, and helps in promoting their career."

In the coming year (2023), we will start recognizing reviewers through periodical awards and/or promotions into the editorial board when there are vacancies. In this editorial, I want to highlight several AEs who recently retired and a handful of AEs who have served for almost four years. I have tremendous respect for your individual accomplishment as prolific scholars and your long-time service to this journal.



Jonathan Rowe received the B.S. degree in computer science from Lafayette College, Easton, PA, USA, and the M.S. and Ph.D. degrees in computer science from North Carolina State University, Raleigh, NC, USA.

He is currently a Research Scientist with the Center for Educational Informatics and an Adjunct Assistant Professor with the Department of Computer Science, North Carolina State University, Raleigh, NC, USA. He is also the Managing Director of the National Science Foundation AI Institute for Engaged Learning. He was retired in 2022. His research focuses on artificial intelligence in adaptive learning technologies, with an emphasis on game-based learning, interactive narrative generation, intelligent tutoring systems, multimodal learning analytics, affective computing, and user modeling.



Sergey Sosnovsky received the M.Sc. degree in information systems from Kazan State Technological University, Kazan, Russia, and the Ph.D. degree in information sciences from the University of Pittsburgh, Pittsburgh, PA, USA.

He is currently an Assistant Professor of software technology for learning and teaching with the Department of Information and Computing Sciences, Utrecht University, Utrecht, The Netherlands. Before joining Utrecht University, he was as a Principal Researcher, the Head of the E-Learning Lab, German Center for Artificial Intelligence (DFKI), and a Senior Researcher with Saarland University, Saarbrücken, Germany. He was retired in 2022 after consecutive terms of service. His research interests include various aspects of designing, developing, and evaluating adaptive educational systems and personalized information systems in general.

Dr. Sosnovsky is the recipient of the EU Marie-Curie International Incoming Fellowship.



Alexandra Cristea is currently a Professor, Deputy Executive Dean of the Faculty of Science, Director of Research, and Founder of the Artificial Intelligence in Human Systems Research Group with the Department of Computer Science, Durham University, Durham, U.K. Especially, her work on frameworks for adap-

tive systems has influenced many researchers and is highly cited (with the top paper with more than 220 citations). He was retired in 2022. She has authored or coauthored more than 300 papers in the areas of her research fields, which include web science, learning analytics, user modeling and personalization, semantic web, and social web, authoring.



Tony Lucey is currently a John Curtin Distinguished Emeritus Professor in mechanical engineering and the former Head of the School of Civil and Mechanical Engineering, Curtin University, Bentley WA, USA. He is internationally recognized for his fundamental research in fluid-structure interaction and its applications in engineering and biomechanics.

He was retired in 2022. His research interests include appropriate technology and engineering education.

Prof. Lucey has been (2012–2014, 2019–2020, and 2020–2021) a Member of the Australian Research Council College (Chair of the PME panel in 2014) and currently the President of the Australasian Fluid Mechanics Society.



Michail Giannakos is currently a Professor of interaction design and learning technologies with the Department of CS, Norwegian University of Science and Technology (NTNU), Trondheim, Norway. He is the Head of the Learner-Computer Interaction Lab. He recently co-edited *The Multimodal Learning Analytics Handbook* (Springer) and authored a book

on *Experimental Studies in Learning Technology and Child-Computer Interaction* (Springer). His research focuses on the design and study of emerging technologies and on developing new ways for humans to interact with interactive learning systems.

Prof. Giannakos was the recipient of the Marie Curie Fellowship, the Norwegian Young Research Talent Award, and one of the Outstanding Academic Fellows of NTNU (2017–2022).



Phil Vahey is currently the Director of applied learning sciences with Houghton Mifflin Harcourt (HMH), one of the world's largest educational technology companies. As the Director, he provides guidance throughout HMH to ensure that products are based on scientifically sound learning principles. He also leads the effort to connect

HMH products through a common skills-based infrastructure. Before joining HMH, he was the Director of Strategic Research and Innovation, SRI Education, where he led more than \$20M in educational research projects for foundations, federal agencies, and industry leaders. His projects focused on cross-institutional collaboration to create scalable solutions used by families, districts, and commercial clients.



Hui-Chun Chu is currently a Distinguished Professor with the Department of Computer Science and Information Management, Soochow University, Suzhou, China, where she is also the Chairman. She has authored or coauthored more than 150 academic papers, including 65 academic journal papers, in which 36 papers are published

in well-recognized SSCI journals. Her research interests include mobile and ubiquitous learning, game-based learning, flipped learning, technology-assisted health care education, AI in medical diagnosis and education, and knowledge engineering in education.

Dr. Chu is an editorial board member and a reviewer for more than 15 academic journals.



Elvira Popescu is a Full Professor with Computers and Information Technology Department, University of Craiova, Craiova, Romania. She authored and coauthored more than 100 publications, including two books, journal articles, book chapters, conference papers, coedited six journal special issues, and 20 international conference proceedings. Her research

interests include technology-enhanced learning, adaptive educational systems, learner modeling, computer-supported collaborative learning, learning analytics, and intelligent and distributed computing.

Prof. Popescu is the Vice Chair for the IEEE Women in Engineering Romania Section Affinity Group and is a Board Member for the IEEE Technical Committee on Learning Technology and the International Association of Smart Learning Environments.



Dragan Gašević is currently a Professor of learning analytics with the Faculty of Information Technology and the Director of the Centre for Learning Analytics, Monash University, Clayton, VIC, Australia. He is a Founder and the President (2015–2017) of the Society for Learning Analytics Research (SoLAR). He has also held several honorary

appointments in Asia, Australia, Europe, and North America. In 2019–2021, he was recognized as the National Field Leader in educational technology in *The Australian's Research Magazine*. In 2022, he received the Lifetime Member Award, the highest distinction of SoLAR. His research focuses on the computational and design methods that can advance understanding of self-regulated and collaborative learning.



Joel S. Mtebe is currently an Associate Professor of informatics with the University of Dar es Salaam, Tanzania. In December 2021, he was appointed as the Principal of the College of Information and Communication Technologies (CoICT), University of Dar es Salaam. He was a Consultant for the EdTechHub supporting the use of technology in teachers' continuous professional development project for primary education in Tanzania. He has been involved in several educational technology projects and innovations, such as data mining from online learning systems in schools (the Halostudy system), games-based learning, interactive physics experiments, and the use of digital diaries for parental engagement.

VI. WORDS FROM THE SOCIETY'S PRESIDENT, OPERATIONS TEAMS, TLT COLLABORATORS, AND AEs

The future is promising and exciting for the IEEE Education Society and our academic community. TLT is now under the leadership of Minjuan Wang, EiC and Professor of Learning Design and Technology (LDTech) at San Diego State University. She is highly qualified and I have full confidence in her leadership. Congratulations TLT! And my best wishes for all.

—Dr. Edmundo Tovar, President of IEEE Education Society.

It has been a privilege serving on the editorial board of IEEE TLT over the past several years, which have been a period of transition for the journal. Throughout this time, the journal has seen several exciting developments and enjoyed steadily increasing indicators of its scholarly impact, which are testaments to the hard work of the editorial board, reviewers, and many authors who contribute to the journal. I wish the very best to the new EiC—Professor Minjuan Wang and the rest of the editorial team as they carry the journal forward into the future. I look forward to continuing to follow TLT as an author and a reader!

—Jonathan Rowe, Managing Director of NSF AI Institute for Engaged Learning, on behalf of AEs from North America.

As an important IEEE Region, the Asia and Pacific Region (i.e., Region 10) has many dedicated educators and researchers. Indeed, one of the flagship education conferences of the IEEE Education Society, IEEE TALE is held annually in Region 10. We congratulate the 15th anniversary of the *IEEE Transactions on Learning Technologies (TLT)* and look forward to collaborating with TLT by organizing special issues for top papers published in TALE conferences.

—Dr. Henry Chan, Hong Kong Polytechnic University, Chair of TALE 2022 conference.

On behalf of the Associate editors in Spain, we wish to express our gratitude to all the authors, reviewers and editors who have made IEEE-TLT a high-quality and high-impact journal. TLT has been the most important publication venue for Spanish researchers working in learning technologies with a technologic background, and it has also attracted scholars

from other fields for its interdisciplinary nature. We hope that the journal will continue to grow its impact, and that it will remain one of the main references for the international scientific community in the field of computer science and learning technologies.

—Dr. Alejandra Martínez-Monés and Miguel L. Bote Lorenzo, Universidad de Valladolid, representing AEs from Spain.

Congratulations to TLT for its productive 15 years. We wish TLT will continue to inspire researchers and developers from all Continents, accelerating technological innovation to improve teaching and learning at a global level.

—Dr. Víctor Manuel Zamudio Rodríguez, Instituto Tecnológico de León, on behalf of AEs from Mexico.

Researchers in the Latin America and Caribbean (LAC) region have been contributors to TLT since its first volume in 2008. The mean share of articles published by the region has increased from 5% in the first five volumes (2008-2012) to 9% in the last five (2017-2021). We highly respect the research merit and productivity of scholars in this region, considering LAC countries account for approximately 8.5% of the worldwide population. This region is also endowed with about a sixth of the researchers per capita there are in the OECD member countries, according to World Bank statistics. As the editorial members of TLT, we hope to see more submissions from the LAC region. With active AEs from LAC, TLT will continue to showcase these researchers' scientific and scholarly achievement in the realm of computer science and educational technologies.

—Claudio Álvarez Gómez (Universidad de los Andes, Chile) and Gustavo Zurita Alarcón (Universidad de Chile), on behalf of AEs from the Latin America and Caribbean (LAC) region.

IEEE TLT is celebrating its fifteenth birthday - a moment we have all been waiting for. In the past decade, the journal has become a well-respected, prestigious venue for researchers, educators, and computer scientists to disseminate their latest research findings. It is my privilege to join the editorial board under the highly effective leadership of Professor Wang, who provides tremendous guidance and support to new AEs whenever we need it. Meanwhile, I am truly humbled by our authors' dedication to innovating and augmenting the processes and outcomes of learning and teaching. Thank you for your continued support of this journal and enjoy reading this special anniversary edition!

—Dr. Gavin Wu, Shenzhen Technology University, on behalf of AEs from the Asia-Pacific Region.

On behalf of the Education Society Operations Team we welcome Dr. Wang as Editor-in-Chief of TLT. We are so pleased to have her on board and are excited about the future of the journal under her leadership.

—Madison Musselman and Margaret Raabe, IEEE Education Society.

IEEE TLT has grown into a renowned publication in the past 15 years. We at IEEE are proud that we get to publish

TLT and we look forward to many more years of bringing its esteemed papers to the engineering community.

—IEEE Publishing Operations Staff.

MINJUAN WANG, *Editor-in-Chief*
San Diego State University
San Diego, CA 92182 USA

APPENDIX RELATED ARTICLES

- [A1] G. Zurita, C. Mulet-Forteza, J. M. Merigó, V. Lobos-Ossandón, and H. Ogata, "A bibliometric overview of the IEEE Transactions on Learning Technologies," *IEEE Trans. Learn. Technol.*, early access, Sep. 05, 2022, doi: 10.1109/TLT.2022.3204457.
- [A2] M. Wang, H. Yu, Z. Bell, and X. Chu, "Constructing an edu-metaverse ecosystem: A new and innovative framework," *IEEE Trans. Learn. Technol.*, early access, Sep. 29, 2022, doi: 10.1109/TLT.2022.3210828.

ACKNOWLEDGMENT

I would like to thank our peer-review coordinator Joyce Arnold and Journals Production Manager Brian M. Johnson for their tremendous work toward publishing the first two issues since my appointment. Kudos to Katie Sullivan, Senior Manager–Journals Production, for her work in publishing this December issue. Together with all my amazing group of associate editors and reviewers, we wish everyone a Merry Christmas and a prosperous new year!

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- [1] Wikipedia, "IEEE Transactions on Learning Technologies," 2022. Accessed: Aug. 3, 2022. [Online]. Available: https://en.wikipedia.org/wiki/IEEE_Transactions_on_Learning_Technologies
- [2] M. Wang, "Editorial preface: New leadership new era," *IEEE Trans. Learn. Technol.*, vol. 15, no. 4, pp. 434–438, Aug. 2022, doi: 10.1109/TLT.2022.3197345.



Minjuan Wang (Member, IEEE) was born in Lingbao, Henan Province, China. She received the B.A. degree in Chinese literature from Beijing/Peking University, Beijing, China, in 1995, the M.A. degree in comparative literature from Penn State University, State College, PA, USA, in 1997, and the Ph.D. degree in information science and learning technologies from the University of Missouri-Columbia, Columbia, MO, USA, in 2021.

She is currently a Professor and a Program Chair of learning design and technology with San Diego State University, San Diego, CA, USA. She is an internationally recognized Scholar and has keynoted about 30 international conferences. She has authored or coauthored more than 100 peer-reviewed articles published in indexed journals and books, and is a coauthor of the highly influential cybergogy model. She is considered a high-impact author in online and blended learning. Her research interests are multidisciplinary, focusing on using new and emerging technologies in teaching and training, extended reality (XR) and immersive learning, the Metaverse for K12 and higher education, and the design and implementation of artificial intelligence for teaching and learning.

Dr. Wang is a proud Member of the IEEE Education Society. She Co-Chairs the Education Society's new technical committee for immersive learning, which is also fast growing. She is a Member of several other leading organizations, including the Association for Talent Development (ATD) and the Association for Educational Communications and Technology (AECT).