



PROJECT ARES®

Teaching Cyber Security Remotely:

Learning with Project Ares in Higher Education

Note: This paper is designed to introduce cyber security, information security, and computer science educators to Circadence's **Project Ares cyber learning tool** to support distance learning initiatives. Project Ares can support immediate needs for Emergency Remote Teaching (ERT) and serve as a platform to provision future online course design. To speak directly to a Circadence representative about direct implementation, [schedule an information call](#) at your convenience.

It's no secret that remote learning has overnight become a challenging 'new norm' for academic institutions worldwide. The recent COVID-19 events have dictated a rapid shift to remote or distance learning as the next best option to slow the spread. Government organizations are responding to this shift to support and enable instructors in their efforts to keep learning effective and engaging for students. For example, [the Los Angeles Times](#) reported that Governor Gavin Newsom issued an executive order to direct funding to support remote learning opportunities for students in California. The Education Stabilization Funding within the federal CARES (Coronavirus Aid, Relief, and Economic Security) ACT can also assist institutions with infrastructure and technology for distance learning.

And, when the immediate remote learning requirements for pandemic mitigation eventually recede, there is a growing awareness that successes and lessons learned during this time will likely accelerate online course and curriculum design. Online and blended learning options in Higher Education curriculum will be a strategic part of the new, post-pandemic norm.

"Every faculty member is going to be delivering education online. Every student is going to be receiving education online. And the resistance to online education is going to go away as a practical matter," James N. Bradley, chief information officer at Texas Trinity University, wrote [in a LinkedIn post](#).



While current societal and economic changes have resulted in a heightened public focus on remote learning options, it certainly isn't a 'new' approach to teaching the next generation of professionals entering the workforce. In fact, the discipline of online learning has been researched for decades. A 2002 study from the University of California on ["The Role of U.S. Higher Education in the Global E-Learning Market"](#) describes the current climate of knowledge acquisition in today's culture:

"The emergence of the knowledge economy, in which economic productivity and growth is increasingly dependent on the development and application of new knowledge, creates a growing demand for a highly educated and flexible work force, leading to a further massification of higher education and to an increasing need for lifelong learning opportunities."

To effectively meet the "growing demand for a highly educated and flexible workforce" as mentioned in the study, remote and distance learning options will become of increased value, especially as advancements in digital technology continue to open doors for learners to access swaths of information at a greater pace and frequency than ever before.

More digital, collaborative tools are readily available for use in the online classroom. Everything from video conferences (e.g. Zoom, Webex) to online chat apps (e.g. Microsoft Teams) to communal file sharing systems and libraries (e.g. DropBox, SharePoint, Google Drive) have helped students and teachers partake in remote learning and distance teaching (without ever leaving their home). And it's great! As life-long learners, we can grow our knowledge base from anywhere, anytime.

The [Center for Studies in Higher Education \(CSHE\)](#) at the University of California, Berkeley further notes that information communication technologies (ICT's) allow "...higher education providers to accommodate the specific needs of students in terms of mode, pace, place and time of study and to cater to different and new target groups and (niche) markets both locally and globally (CHEPS, 2000)."

Meeting New Learning Demands and Developments

We are seeing the higher education market adapt 'on the fly' to embrace new technology as tools for distance learning evolve and are utilized more during pandemic crises like COVID-19. Likewise, learners are seeking more diverse educational opportunities that utilize these technologies and meet their on-the-go, albeit multi-career lifestyles. We anticipate these learning demands and tech developments will accelerate post-pandemic to support and grow the below current online learning landscape as it sits today:



- There are more than **13,000,000** distance education courses within undergraduate and postbaccalaureate programs, according to the [National Center for Education Statistics](#)
- And more than **6,600,000** students were enrolled in distance education courses, according to the [National Center for Education Statistics](#) in 2017.
- Benefits of e-learning are vast and include [higher retention rates among students](#), and online student assessments are more frequent and improve overall engagement.

The rate and pace of distance learning is evolving, now more than ever. When we think about the role remote learning plays in the context of the dynamic cyber security industry, we have great opportunity to advance and support the changes higher education institutions are making and will continue to in order to support today's learners.

Distance Learning And the IT / Cyber Security Discipline

Emergency Remote Teaching and the anticipated post-pandemic growth of online course development will affect academic disciplines in different ways. At Circadence, we specialize in cyber security learning, specifically through an immersive learning platform that delivers hands-on experience to students working towards careers in the field of cyber security.

The cyber security industry has already been facing a significant talent gap and enterprises of all sizes have struggled to fill open cyber professional jobs. In November 2019, ISC² calculated that [the cyber workforce would need to increase by more than 145%](#) to fill gaps in talent across the U.S. And now, in a post-pandemic world, the gap is likely to grow exponentially as unexpectedly 'proven' activities like distance learning, tele-medicine, online grocery shopping and more push digital transformation boundaries and cyber security moves ever closer to the frontlines of mission-critical skill sets.

How do we address the need for more skilled cyber professionals? In many regards the quantity and quality of professionals entering the workforce tomorrow is only as strong as the individual students who graduate from academic institutions today. Enterprise IT and Security Operations teams need young professionals to graduate with a strong foundational IT knowledge base and applied cyber skills, so that they enter the field with enthusiasm built on strong problem solving skills.

However, more needs to be done in Higher Education to foster a new community of cyber professionals. [Cyber Crime Magazine](#) reports that only 3% of U.S. Bachelor's Degree graduates have cyber security skills. And 35% of UK employers hiring candidates report [vacancies are 'hard to fill'](#) according to a report from the [Department of Digital, Culture, Media and Sport](#) "Cyber security skills in the UK Labour Market 2020". From a U.S. perspective, in a 2019 report, [Burning Tree Technologies](#) asked the question, did American employers have the cyber security talent they needed? One data point indicated that while federal data showed the number of postsecondary programs in key cyber security areas had increased 33%, the ratio of currently employed cyber security workers to job openings, had hardly budged since 2015. In other words, the pool of available talent has remained proportionally the same. What we can learn as a community of professionals dedicated to meeting these challenges, is that student learning and education can and should evolve so that we are effectively preparing students to enter the workforce with confidence and cyber competency.



Project Ares: An Online Cyber Learning Platform for Instructor Use

Today's educators, who are tasked with running virtual classrooms, need engaging activities for students that teach designated core curriculum topics to meet learning objectives. Further, instructors are challenged to keep pace with the evolving trends and technologies in the cyber industry, making curriculum updates an effort every term to keep course material relevant to industry needs. Being able to assess student's comprehension of learned material and measure progress is critical for instructors to understand the effectiveness of their curriculum and teaching approach.



Project Ares leaderboard elements give professors intel into how students are progressing through activities, while igniting a sense of healthy competition among students.

These challenges can be met head-on with Circadence's [Project Ares](#) in the online classroom. Project Ares is a browser-based learning platform specifically designed for teaching cyber security in a hands-on, applied manner. It can help transform existing cyber security curriculum to support current distance learning challenges as well as integrate into future course design. Individual, self-paced activities alongside team-based peer collaboration can be strategically balanced to help cyber educators support students. The gamified elements of the platform are reminiscent of video game environments so logging on and playing becomes 'natural' to many students who grew up playing online games.

- The built-in learning exercises can augment existing syllabi
- Anytime access enables flexible asynchronous delivery to support current circumstances for instructors and students
- Self-directed student learning is supported through hints, Q&A chat bot, and session playback and review.
- Optional live observation or interaction within the exercises supports tutoring as well as assessment.
- Immersive, gamified environment sustains student engagement with scores and leaderboards to incent practice and improvement
- Global chat enables peer-to-peer community and support for students



Some of the Project Ares features available to cyber professors and teachers include:

- **A Trainer View** feature allows instructors to watch session playbacks and drill down to the individual learning progress of each student if desired. Single player reports and work role learning path data is available in the Project Ares Organizational Subscription option.
- **In-Game advisor** provides support to instructors during teaching. Students can ask questions and gain in-game help from advisor “Athena” to help users progress through activities. Her suggestions are based on common questions asked across the Project Ares community of users.
- **A Media Center** provides pre-built-in resources (100+ hours of material) available in a curated collection of cyber-related research.

Project Ares: An Online Cyber Learning Platform for Students

Project Ares provides cyber security students with the opportunity to learn tangible cyber skills and put their knowledge to the test in a series of increasing complex scenarios.



Project Ares cyber learning games teach foundational cyber security concepts through arcade-style games.

The platform offers three tiers to learn cyber concepts and tactics holistically:

- **Cyber learning games** perfect student's understandings of the basics. Foundational concepts like ports and protocols, understanding the cyber-attack sequence, and regular expression are topics addressed via game-like activities inspired by arcade style games (think Solitaire and Matching Games).
- **Foundational Scenarios** are the next level of learning. They provide hands-on virtualize range experience to students who want to learn cyber tools, tactics, and procedures (TTPs). Multi-level learning challenges reinforce cyber skills including Linux, scripting, and forensics.
- **Specialized Scenarios** develops the critical thinking students need to defeat real threats. Students build confidence in their ability to detect and defend against adversarial threats by solving complex problems in mission scenarios (inspired by real-world attacks). Individual and team-based play includes network recon and confronting threats like botnets, phishing and exfiltration, ransomware, and more.



Circadence has partnered with several computer science and cyber security professors at institutions around the world who have already implemented Project Ares in the classroom (both physical and virtual) to help students learn concepts in an engaging manner.



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“It provides tangible experience and solidified concepts learned in class. It gave me great confidence being able to implement these skills, which I think would be extremely valuable for students in the future.”

~ Student testimonial

“I believe the best way to learn something is through practice and patience, and the training environment offered within Project Ares is an outstanding way to achieve this.”

~ Student testimonial

“I do enjoy learning from a visual and hands-on approach, so playing Cylitaire [a Project Ares game] has helped me greatly in understanding the different types of the Cyber Kill Chain.”

~ Student testimonial

“It was surreal being able to perform a computer hack. I support having the tool available to cyber security students and computer security students on a permanent basis so they can familiarize themselves with what real-world exercises look like.”

~ Student testimonial

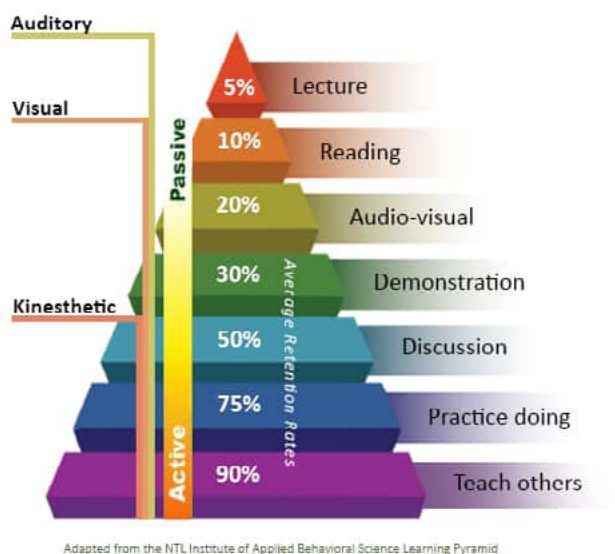


To get a look 'inside' Project Ares, an on-demand webinar demonstration of the platform is available.

SCHEDULE A CALL TODAY

Hands On, Active Learning

Project Ares is considered an active-learning platform as it invites users to interact and complete activities to meet certain objectives and obtain points as a result. According to the [National Training Laboratory](#), “practice by doing” activities (kinesthetic) increases learning retention to 75% Project Ares is designed to augment cyber instruction and improve student learning by applying concepts and building skills in real-world threat scenarios.



“...wherever possible, create active learning experiences -- ones in which there is synchronous communication, required class sessions, frequent opportunities for students to answer questions and defend answers, debate their peers, tackle problems, and the like.”

~ [Michael Horn](#), head of strategy at Entangled Group and author of [Choosing College](#) (2019, Jossey Bass)

If I had to put money on the single genuinely revolutionary effect of the Great Remote Learning Hack of 2020, it would be the fact that instructors finally understand that teaching is something they can engage in as a collective activity, an activity that is more pleasurable and much more intellectually interesting when we participate in it in the company of others.

~ [Jody Greene](#), associate vice provost for teaching and learning, dean, Center for Innovations in Teaching and Learning, and professor of literature, University of California, Santa Cruz

Conclusion

As instructors shift to deliver, proctor, and advise online, we anticipate teaching strategies continuing to adapt to use new and immersive tools that enable alternative online courses to positively impact student learning now and into the future. Circadence is excited to be a part of this shift in learning and proud to partner with today's cyber security educators through an immersive learning tool that prepares tomorrow's much needed workforce of cyber defenders. For more information on Circadence's Project Ares platform and related subscription models, visit circadence.com/project-ares

ⁱ an educational course that is delivered remotely, meaning that students can complete some or all of their coursework without having to be physically present in a classroom on any campus.