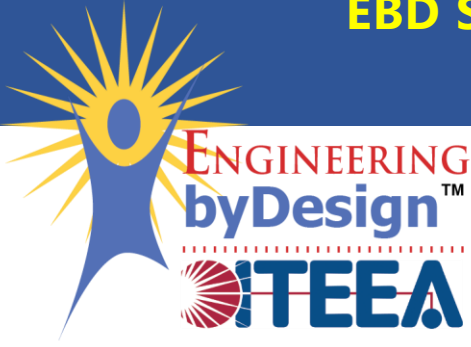


ITEEA STEM CENTER FOR TEACHING AND LEARNING

EBD STRATEGIC PLAN FY 2024-2027



EFFECTIVE SEPTEMBER 1, 2023



**ITEEA STEM CENTER FOR TEACHING AND LEARNING
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ITEEA's STEM Center for Teaching and Learning™ (STEM CTL™) was established in 1998 to strengthen professional development and advance technological literacy. Center initiatives are directed toward four goals: development of standards-based curricula; teacher enhancement; research concerning teaching and learning; and curriculum implementation and diffusion.



ITEEA, AND ITEEA STEM CTL MISSION, AND VISION

Vision: ITEEA is the foremost professional organization promoting technology and engineering education and leading Integrative STEM.

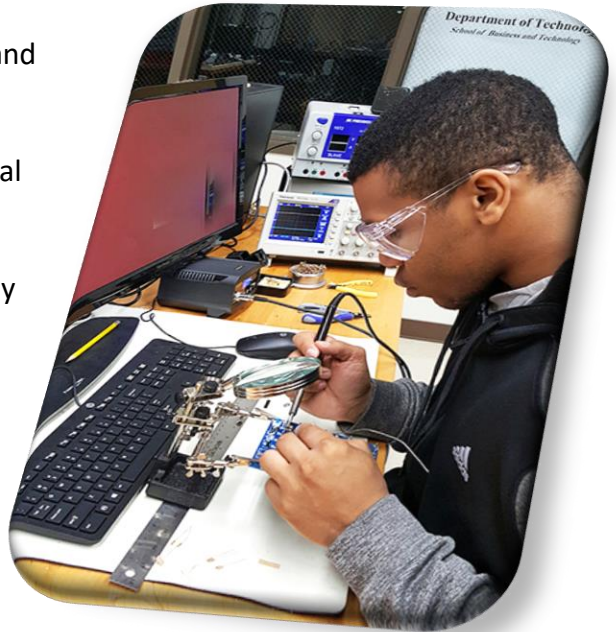
Mission: The *International Technology and Engineering Educators Association* (ITEEA) is the professional organization for technology, innovation, design, and engineering educators. Our mission is to advance technological and engineering capabilities for all, by nurturing professionalism, growth, and opportunities in the education community. ITEEA strengthens the profession through leadership, professional development, membership services, publications, and classroom activities.

STEM CTL Vision: The ITEEA STEM Center for Teaching and Learning™ (CTL™) advances technological and engineering literacy for all students while ensuring that they are college, and career-ready.

STEM CTL Mission: Delivering technology and engineering curricula that empowers learners for their future.

STEM CTL Organizing Principles: The STEM CTL™ program is organized around six principles. These principles are concepts that identify content organizers for the program and are identified below:

1. The process of Engineering Design through *Standards for Technological and Engineering Literacy* continues to affect everyday life.
2. Technological and Engineering literacy drives invention and innovation through the thinking and the doing process.
3. Career and Technical Education thrives with Technological and Engineering Literacy.
4. Technological and Engineering Literacy innovates the way people live and interact.
5. Technology and Engineering use inquiry, design and systems thinking to produce solutions.
6. Technological applications create the designed world.



STEM Center for Teaching and Learning™ Initiatives' Focal Areas:

1. DEVELOPMENT AND IMPLEMENTATION OF ASSESSMENTS

ITEEA's STEM Center for Teaching and Learning™ (STEM CTL™) develops high quality assessments to inform curriculum rigor, validity, teacher effectiveness, and student growth achievement.

To this end, the Engineering byDesign™ (EbD™) assessments reflect the growth of student knowledge, capabilities, and ways of thinking and acting. Highlights include:

- Develop innovative performance assessments that focus on what students know and are able to do.
- Deliver real-time data on student learning via a flexible Teacher Assessment Dashboard.
- Link STEM subjects through integrative STEM pedagogical approach and strategies.
- Build assessment items upon the six levels of the revised version of Bloom's taxonomy.
- Provide summative assessment reports that focus on student growth and contribute towards identifying teacher effectiveness.

Engineering byDesign™ Summative Assessments

ITEEA's STEM Center for Teaching and Learning™ has developed the only standards-based national model, Engineering byDesign™ (EbD™), for Grades PreK-12 courses that delivers technological and engineering literacy in an integrative STEM context.

The EbD summative student assessment is included with the EbD StandardEdition™ (SE™) and occurs at the end of each course. The EbD SE™ Assessment identifies what students have learned and also assesses student performance against previously identified standards. The EbD SE™ Summative student assessment is most often thought of as the *final exam* of the course, but it may also be a portfolio of student work.

The SE™ courses are downloadable pdf versions exclusively available to participating consortium states. r

Engineering byDesign™ BUZZ Assessments and Data Analytics

Engineering byDesign™ BUZZ (EbD™ BUZZ), the online learning management system (LMS), offers EbD™ courseware with a robust data analytics system. The pre- and post-assessments used in the LMS courses are designed specifically to measure achievement of *Standards for Technological and Engineering Literacy (STEL)* content standards and corresponding benchmarks.

Students complete the pre- and/or post-assessment for an LMS course(s) and the results are processed in real time. Administrators and teachers can access the results immediately by generating Test Analytics for the assessment.

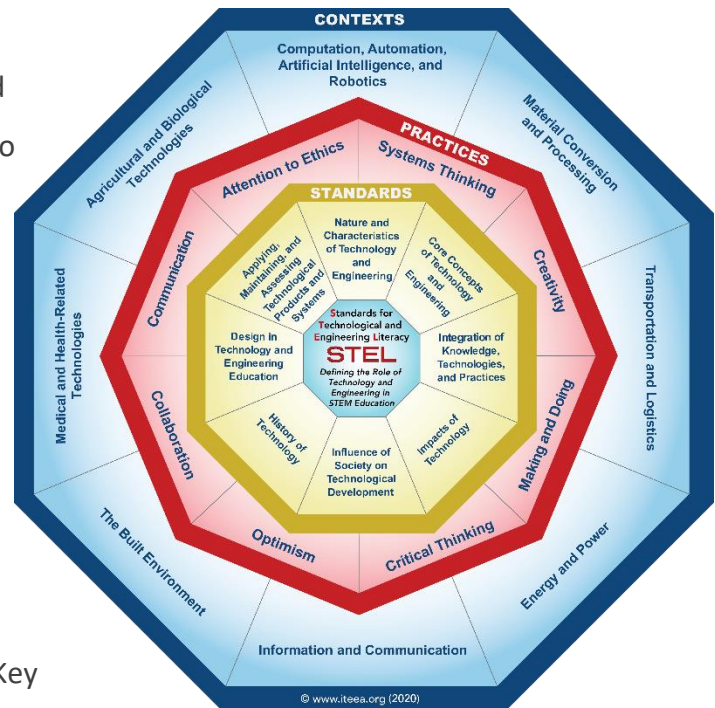
2. PROFESSIONAL LEARNING

ITEEA's STEM Center for Teaching and Learning™ builds a community of STEM Education leaders through face-to-face professional learning, webinars, and an online learning community, all of which prepare educators to be Integrative STEM Education professionals. Professional Learning Opportunities include:

- Create a Collaborative Learning Community: for teachers, by teachers.
- Deliver Summer Professional Learning on Engineering byDesign™ courses.
- Execute Authorized Teacher Training (ATI) to develop Authorized Teacher Effectiveness Coaches (ATECs) through a train-the-trainer model.
- Deliver on-site workshops (school/district/state) that develop STEM pedagogy and practice through a facilitated learning opportunity.
- Offer a broad range of options for developing Integrative STEM Education professionals, such as customized webinars and a Learning Library for convenient, self-paced personal learning.

3. STANDARDS-BASED CURRICULUM

STEM CTL™ has developed the Premier Standards-based Integrative STEM (I-STEM) Curriculum Model designed to be flexible, affordable, and accountable. The Engineering byDesign™ (EbD) curriculum was initially developed to address the need for a standards-based curriculum using *Standards for Technological Literacy*, and now revised/re-written using the *Standards for Technological and Engineering Literacy*, EbD™ has since undergone several iterations ensuring that the courseware is relevant, and current to advancing Technological and Engineering literacy for all students. Key attributes are:



- Develop all students' broad Engineering and Technological Literacy using the 6E Learning byDESIGN™ Instructional Model.
- Ensure alignment to the *Standards for Technological and Engineering Literacy*, *Next Generation Science Standards (NGSS)*, *Common Core State Standards (CCSS-Mathematics/English-Language Arts)* and the *National Academy of Engineering's (NAE) Engineering Habits of Mind*.
- Provide crosswalks to the *International Society of Technology Education* and the *National Assessment of Educational Progress Technology and Engineering Literacy standards*.

Offer a problem-/project-based learning model within the context of the Grand Challenges for Engineering (NAE), based on Constructivist theory.

For a comprehensive overview of I-STEM Curricula Engineering byDesign™, please visit:

<https://www.iteea.org/engineering-bydesign>.

4. RESEARCH ON TEACHING AND LEARNING

ITEEA's STEM CTL™ engages in validating the Technology and Engineering of STEM through research, and partnerships that focuses on integrative STEM education and data-driven discovery.

Research Focus

The STEM CTL™ in T/E and I-STEM education conducts, and draws on extensive research in the field to make informed decisions to inform curriculum development, and how to adequately deliver specific/individualized professional learning. The STEM CTL™ seeks, develops, and fosters relationships with several stake holders (ex. State Directors, Businesses, Colleges/Universities) that aide in advancing T/E and I-STEM educational instructional practices, and policies. Through research, and collaboration with partnering stakeholders, the STEM CTL™ seeks every opportunity to ensure that T/E, and I-STEM educational practices/policies are implemented/followed to ensure that all students are Technologically, and Engineering literate.

Partnerships

The aim of partnerships is to provide data-driven evidence of integrative STEM learning for all students. Collaborations with higher education institutions have resulted in several research projects, such as *Soft Robotics to Broaden the STEM Pipeline* (Purdue University) and *Engineering for All* (Hofstra University), where ITEEA's STEM CTL™ personnel serve as the Co-PI or Expert Specialist. The STEM CTL™ fosters partnerships, and actively seeks out other opportunities to advance T/E literacy for all.

STEM CTL™ welcomes opportunities for collaboration!

For more information about the research focus of the STEM CTL™, prospective partnerships, and potential projects, email rnovitski@iteea.org.



STEM Center for Teaching and Learning™ Initiatives Governance:

Beginning in 1999, states have had the opportunity to join a consortium for support as resources at the local levels have declined over recent years.

Consortium benefits include:

- Access a group of National Teacher Effectiveness Coaches (TECs) provide high quality, consistent professional development opportunities for states on a cost-recovery model.
- Provided unlimited* distribution of EbD/STEM materials within consortium states or districts (*as defined by the Consortium State/District).
- Support Professional Development opportunities at the ITEEA Annual Conference including travel funds for the Consortium Director and a lead trainer.
- Attend Strategic Initiatives Meeting twice per year, including the Fall Leadership Forum (September) and Annual ITEEA Conference (typically March).
- Access to the LMS for limited Network Schools, which include pre-and post-tests and the EbD online professional learning community (Collaborate byDesign™).

The STEM Center for Teaching and Learning™ is governed by and collaboratively works with several states/affiliates. Through consistent and collective collaboration among state leaders, universities/colleges, and national/international research initiatives, the STEM Center for Teaching and Learning™ is positioned to best support all Integrative STEM Instructional educational needs.

STEM Center for Teaching and Learning™ Goals:

- Provide a standards-based Integrative PreK-12 program that ensures that all students are Science, Technology, Engineering, and Mathematically literate.
- Establish Career and Technical Student Organization partnerships and standards alignments for Grades 6-12.
- Provide equitable opportunities for all students.
- Provide clear standards for student achievement in STEM.
- Provide leadership that will produce continuous improvement and innovation in STEM programs.
- Lead learners to become the next generation of engineers, technologists, innovators, and designers.
- Include STEM Data Sets on this page to include
 - Achievement gaps
 - STEM initiatives
 - Industry certification pass rates, and advancement placement passing rates
 - Articulations, and dual credit opportunities

Focus Areas with Benchmarks, Measurable Objectives, and Focus Areas

Description:

Over the 2022-2023 fiscal year, ITEEA's STEM CTL™ and the Consortium Directors worked collaboratively on specific goals with benchmarks, measurable objectives, and focus areas. Throughout the duration of several focus group meetings and individual feedback, several focus areas toward overarching goals had been established as a focus for the 2023-2027 fiscal years. These focus areas include Marketing, Engagement, ITEEA membership, Industry Alignment, Curriculum, and Professional Learning.

Within each focus area are benchmarks that aid in guiding direction with objectives that are specific, measurable, achievable, reachable, and can be reached in a timed construct. These objectives and benchmarks guide the way toward the work conducted on the specific focus area towards the achievement of the aforementioned goals.

Focus Areas with Benchmarks and Measurable Objectives:

Focus Area: Marketing

Description:

Define, and communicate all STEM CTL services and products broadly and internationally to ensure educational professionals have equitable access to delivering technology and engineering curricula that empowers all learners.

Benchmarks:

The LISTT Newsletter: The LISTT, ITEEA's weekly newsletter, is sent to all ITEEA members, affiliates, and other STEM education stakeholders to promote what is most urgent/important in ITEEA STEM news. Include at least one project by STEM CTL™ in each weekly issue of The LISTT, prioritizing those with upcoming registration or participation deadlines

Social Media: Share STEM CTL™ content from *The LISTT* weekly on the primary ITEEA Facebook, Twitter, and LinkedIn sites and ITEEA's satellite pages. Special projects with particular longevity and recurrence could get their own campaign on the major social media sites

Direct Email: Target specific and relevant demographics for projects by STEM CTL™ via direct email

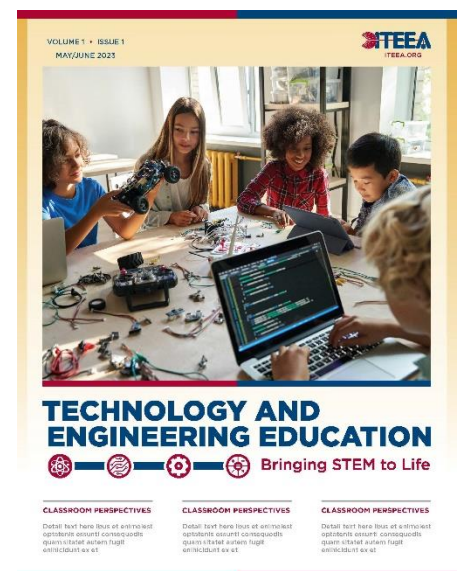
Journal Advertisements: Secure ITEEA journal advertising for long-term and regularly recurring projects.

Cross Promotion: Work with ITEEA partners to used targeted promotion to reach similar demographics beyond ITEEA's contact list.

Measurable Objectives with Tentative Dates:

The LISTT is released weekly except on weeks when *STEM*

Connections goes out. STEM CTL™ should have a presence in 50 issues yearly and at least 75 mentions for total programs over the year.



Social media mentions should have four per month with a relative target of weekly. Those mentions should be reflected on at least two satellite or partner sites.

Direct email will only be used on a case-by-case basis. It should not be a default and should not be given a target number.

With two journals that come out quarterly, that is twelve opportunities. Because of the nature of the promotions, only long-term and recurring projects should be referenced. STEM CTL or EbD should be referenced in at least two journals per quarter.

While there is no certainty that the cross-promotion will be available, four opportunities should be the target.

Focus Area: Engagement

Description:

Provide leadership that will produce continuous improvement and innovation in STEM programs.

Engagement Through Research

Benchmarks:

- A. Doing Research: Secure partnerships with research institutions with Engineering and Technology Education and independent researchers in Education.
- B. Applying Research: Publish research institutions' evidence in ITEEA Journals. Apply research to update the EbD curriculum to ensure the curriculum stays relevant and instructive for best practices.

Measurable Objectives with Tentative Dates:

- A. Fulfill duties related to all current and future National Science Foundation grants. Note this currently include NRI: Co-Robots to Enhance Motivation and Self-efficacy in Formal STEM Education NSF # 2133028, Learning by evaluating: Engaging students in the evaluation as a pedagogical strategy to improve design thinking NSF # 2101235, and Establishing an Ecosystem for Open-source Educational Computer-Aided Design (CAD) Models NSF # 2229627.
- B. Develop programs that utilize current research in the Engineering and Technology Education field to drive further engagement (e.g., safety microbadging through Safer Engineering and Safety Instruction).

Engagement Through Professional Learning

Benchmarks

- A. Increase participation in educational opportunities like webinars, STEMinars, and microbadging.
- B. Continue to provide professional learning in innovative ways for T&E in relevant STEM Education .

Measurable Objectives with Tentative Dates:

- A. Show a 10% increase in participation of yearly numbers for professional learning. Increase the numbers of professional learning of those involved with STEM CTL by at least 5% by fiscal year 2027.
- B. Offer Professional Learning through in-person, and virtual. Innovate, and/or develop a new course(s) for microbadging that reflects the needs and desires of T/E educational professionals.

Engagement Through Assessment:

Description:

Analyze ways to self-assess instructional practices, and best ways to implement.

Benchmark

A. Educator Assessment: self-assessment through the awards program.

Measurable Objectives with Tentative Dates:

A. Increase Awards participation by 5% each year in STEM School of Excellence programs and develop STEM School of Excellence University program.

Engagement Through Curriculum:

Description:

Provide a standards-based Integrative PreK-12 program that ensures that all students are Science, Technology, Engineering, and Mathematically literate.

Benchmarks

A. Add additional content to Integrative PreK-12 EbD curriculum.

B. Increase each states usage of EbD Curriculum.

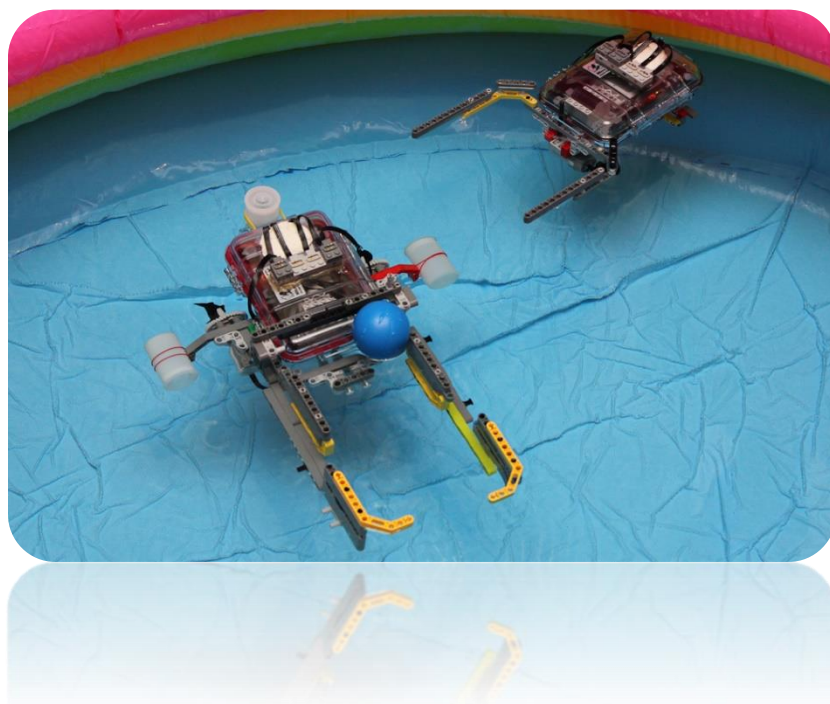
C. Increase consortium membership.

Measurable Objectives with Tentative

Dates:

A. Add additional content to all EbD curriculum PreK-12. to reflect all *STEL* standards for all grade levels while aligning to most current/up-to-date standards.

B. Increase each state's usage of EbD™ Curriculum by 3% each year for each



state.

C. Increase consortium membership by 30%

Focus Areas with Benchmarks and Measurable Objectives:

Focus Area: ITEEA Membership

Description:

Increase membership across all involved in Integrative STEM through valued member benefits.

ITEEA Membership Through Professional Learning (PL):

Provide equitable opportunities for all, including providing PL to teachers and students who can take strategies to help make equitable content in their classrooms.

Benchmarks:

- A. Provide PL to help teachers change the content (Ex. personalize it to make it applicable to their demographic).
- B. Provide mentoring through staff and state champions.
- C. Provide leadership that will produce continuous improvement and innovation in STEM programs. (Ex. Making leaders out of members and encouraging them to innovate in lessons).

Measurable Objectives with Tentative Dates:

- A. Track enrollment in professional learning sessions.
- B. Keep track of learner ability levels, and ensure that PL is scaffold to meet the needs of all learners. This is tracked through portfolios during the PL, and data gathered from the coordinators prior to the PL beginning.
- C. Track number of teachers or schools participating in EbD who are/are not ITEEA members while providing incentives to those who are/are not members to join, and/or continue to remain members

ITEEA Membership Through Curriculum:

Increase membership across all involved in Integrative STEM through valued member benefits.

Benchmarks

- A. Encourage new enrollees into EbD courseware to become members with ITEEA.
- B. Encourage Reach Challenge, and STEM School of Excellence participants (teachers) to become members, and/or school obtains school-based membership.

Measurable Objectives with Tentative Dates:

- A. Increase of 5% each fiscal year to also gain access to become a member if new to EbD.
- B. 100% of teachers or schools become ITEEA members with Reach

Focus Areas with Benchmarks and Measurable Objectives:

Focus Area: Industry Alignment

Description: Pursue and seek partnerships with industries and companies in parallel to updating/creating courseware that is industry/post-secondary education aligned.

Industry Alignment Through Research:

Investigate current, new, and future industry-based certifications.

Benchmarks:

A. Identify applicable current, new, and future certifications to state initiatives

Measurable Objectives with Tentative Dates:

A. Develop a running list of all state-approved industry tests, and pair it with the applicable industry or similar.

Industry Alignment Through Professional Learning:

Maintain positive relationships with industry and the community, creating connections and seeking input on direction.

Benchmarks

A. Explore developing a task force of industry leaders to get input on the direction of ITEEA. These should include companies and corporations that benefit from a STEM-literate populace, companies, corporation, professional organizations (e.g., NAM, ASPE) in the STEM education field, and educators.

B. Include industry trainings to develop professional development that can inspire educators.

Measurable Objectives with Tentative Dates:

A. Discuss the Task Force with the board to determine need and, if positive, set up objectives and timetables.

B. Schedule two Consortium meetings to discuss training needs and how industry might be able to provide PD that connects to needs. Provide data from industry-based training on passing rates while discussing

how to increase them.

Industry Alignment Through Assessment:

Determine industries' needs and coordinate with standards. Develop assessment that is aligned to standards and reflects the specific needs of industry.

Benchmarks

- A. Connect, and/or develop with an Industry Task Force contingent upon Board approval.
- B. Schedule a comprehensive meeting with set objectives with industry connections and partnership.

Measurable Objectives with Tentative Dates:

- A. Develop a task force by end of fiscal year 2024 to grow and set forth guidelines each subsequent year with work expectations.
- B. Gather and track data with those who get access to courseware, take applicable PL, and pass the test annually.

Industry Alignment Through Curriculum:

Determine industries' needs and coordinate with standards. Review curriculum that is aligned to standards and reflects the specific needs of the industries

Benchmarks

- A. Connect, and/or develop with an Industry Task Force contingent upon Board approval.
- B. Have a comprehensive meeting with set objectives with industry connections and partnership.
- C. Develop and provide TSA crosswalks.

Measurable Objectives with Tentative Dates:

- A. Describe the task force within the curricula, and clearly label how this is to support the growth/development within the courseware by FY 2025.
- B. Gather and track data with those who get access to courseware, take applicable PL, and pass the test annually.
- C. Develop and provide TSA crosswalks for all public viewing as well as in all courseware each fiscal year.



Professional Learning:

Description:

Provide clear standards for student achievement in STEM, including ensuring Technological and Engineering literacy. Engage and seek leadership that will produce continuous improvement and innovation in STEM programs.

Benchmarks:

- A. Increase the capacity of educators to effectively use EbD and Integrative STEM curriculum at the state (consortium), district, and school levels.
- B. Increase the number, diversity, and capacity of trained coaches to facilitate effective teacher training and best support scale ups.
- C. Provide diverse, year-round professional development opportunities for educators and consistently evaluate them for ways to increase effectiveness and accessibility.

Measurable Objectives with Tentative Dates:

- A. Increase amount of PL to occur annually by 5% per year.
- B. Seek out certified and qualified T/E professionals who embrace the mission/vision of ITEEA in support of DEI among all National Teacher Effectiveness Coaches. Train five new National Coaches.
- C. Reach out to all areas within a state providing equitable opportunities to all STEM professionals internationally each fiscal year via email, and social media outlets.

Curriculum:

Design and develop assessments that are aligned to national/international standards and are equitable/achievable for the students within the applicable grade band.

Benchmarks:

- A. Develop resources and share best practices to support consistent and effective curriculum implementation.
- B. Regularly review and revise all assessments to ensure they reflect the most current and up-to-date standards.
- C. Embed industry alignment throughout EbD courseware.
- D. Include Advanced Placement and career-focused content throughout EbD courseware.

Measurable Objectives with Tentative Dates:

- A. Develop resources that allow delivery of all courseware in any type of PreK-12 learning environment for each fiscal year (e.g., flipped classroom, audio).
- B. Annually review and reaffirm or revise assessments for all courseware PreK-12.
- C. Annually review and reaffirm or revise all courseware with industry focus to ensure courseware modifications meet the needs of new industry demands.
- D. Annually review and reaffirm or revise all Advanced Placement and career-focused content to ensure it meets College Board requirements.

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