

PENNSYLVANIA CTE *Best Practices Initiative*

Implementation Guide for “Enhancing Literacy and Numeracy in CTE”

Developed by the Professional Learning Community (PLC) on:
“Academic and CTE Integration”



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Section One: Overview of Professional Learning Communities /Academic and CTE Integration

A. Introduction

To help expand and sustain the implementation of the strategies identified through the *Pennsylvania CTE Best Practices Initiative*¹ (BPI), the Bureau of Career and Technical Education (BCTE) and Meeder Consulting initiated five virtual Professional Learning Communities (PLCs) in 2011. Through these PLCs, administrators and other designated teacher-leaders from throughout the Commonwealth met virtually for six months to focus activity and learning around one of five overarching strategies identified in the BPI.

To further sustain collaboration and peer-to-peer learning, each PLC developed an Implementation Guide on a particular strategy element. These guides are intended to serve as practical, step-by-step resources for CTE leaders and stakeholders throughout the Commonwealth as they evaluate how to improve school and student performance.

The material presented in this guide, collected and edited by consultants from Meeder Consulting, draws upon the collective professional experience and knowledge of the Instructional Support and Guidance PLC members as presented during PLC meetings and in online discussion forums. The guide captures the information and considerations that PLC members identified as being key enrollment and recruitment strategies.

B. Overview of Academic and CTE Integration

Note: In an ideal situation, academic and CTE integration is a “two-way street” strategy, through which academics are incorporated into the CTE curriculum and CTE content is included within the academic context. For purposes of this implementation guide, the PLC focused primarily on strategies designed to enhance literacy and numeracy strategies in CTE. (Terms referring to academic integration and enhancing literacy and numeracy in CTE are used to discuss such strategies.) This focus stems largely from the fact that the majority of CTCs in Pennsylvania operate on a half-day basis, and many offer limited academic courses. In addition,

¹ In 2010, the Pennsylvania Department of Education’s Bureau of Career and Technical Education (BCTE), with the support of the Meeder Consulting Group, launched the Pennsylvania CTE Best Practices Initiative. After conducting site visits and phone interviews with CTCs across Pennsylvania, Meeder Consulting documented 13 strategies used by CTCs to create standards aligned systems and to support those systems with people, processes and partnerships. All of these strategies are discussed in detail in case studies and profiles available on the BCTE website.

many CTCs are not located in close proximity with their partner (academic) sending schools. Discussion of strategies to bring CTE content into the academic setting is addressed in more detail in Section Four of this guide.

The integration of academics into CTE successfully occurs when academic content is incorporated into the CTE curriculum through a strategic, explicit and consistent process. As a first step, academic and CTE integration requires that instructors and other key staff members review academic standards in order to identify how they may relate to and align with the CTE curriculum.

From the results of this alignment process, instructors can develop lesson plans that explicitly address both technical skills and the relevant identified academic standards. Typically, these lesson plans incorporate strategies designed to strengthen students' literacy and numeracy skills. These strategies may include:

- Word walls
- Think-aloud reading strategies
- Note-taking strategies
- Math journals
- Writing journals

In order for the integration of literacy and numeracy skills to become a sustainable practice and one that is consistently implemented on a school-wide basis, rather than in an ad hoc fashion or by just a handful of instructors, a comprehensive approach to implementing integration strategies should be developed. Key stakeholders must understand what integration looks like in practice and what resources are required to promote integration and its educational value. They should commit to supporting integration efforts over the long term so that, as one PLC member noted, the adopted approach to integration is like "a puzzle with no missing pieces." That is, the essential components of academic and CTE integration are identified, evaluated and implemented collectively on an ongoing basis. When the integration of literacy and numeracy skills occurs consistently, students experience rigorous and relevant learning.

C. Benefits of Academic and CTE Integration

Integrating literacy and numeracy strategies into CTE produces several benefits. These benefits, listed below, apply not only to students but also to key stakeholders such as administrators, instructors and the community at large.

- Prepares students to be college and career ready
Academic and CTE integration helps students develop both their academic and technical skills. Students receive an education that is academically rigorous and geared toward helping them meet the demands of post-secondary education. At the same time, students develop the relevant technical skills that are required for a successful transition into the workforce.
- Improves the rigor of CTE programs
By infusing the CTE curriculum with relevant academic content, the overall “rigor” of CTE programs may improve. Integration creates learning experiences that challenge students academically but that also maintain their “real world” relevance for students. The increased rigor that stems from integration may improve misperceptions regarding the purpose, quality and educational value of CTE programs.
- Improves student performance in academic and technical areas
Both research and the personal experiences of instructors suggest that students who receive integrated instruction show gains in both their academic and technical skill achievement. These gains are observed both on standardized tests as well as in classroom performance.
- Improves teacher effectiveness
Instructors who implement integration strategies address the learning needs of students as they relate to both their academic and technical content knowledge and skills. Instructors develop a more thorough understanding of how academic content and technical skills overlap and relate to each other, and this insight, along with the relevant vocabulary, is passed on to their students.
- Increases student motivation
Integration strategies highlight the relevance of academic content in students’ everyday lives and experiences. They reveal to students that numeracy and literacy are lifelong skills required for most employment situations and reinforce the value of the math and English taught in the academic environment.

When students observe and experience the connection between academics and CTE content, they may become more engaged in their learning. In many cases, it is easier for a student to comprehend the practical application of math and reading instruction in the CTE classroom because the application is immediate and practical and is observed in everyday terms.

Section Two: Key Elements to Enhance Literacy and Numeracy in CTE

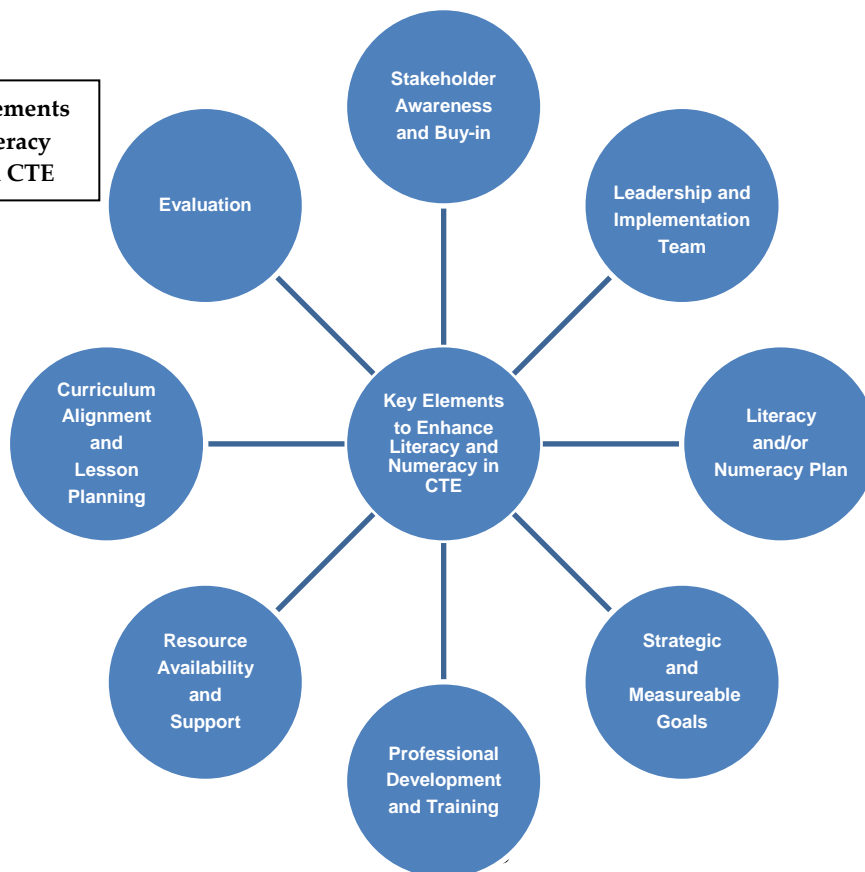
To help guide CTCs that decide to focus on implementing literacy and numeracy strategies, PLC members identified eight key components of integration:

- Stakeholder Awareness and Buy-in;
- Leadership and Implementation Team;
- Literacy and/or Numeracy Plan;
- Strategic and Measureable Goals;
- Professional Development and Training;
- Resource Availability and Support;
- Curriculum Alignment and Lesson Planning; and
- Evaluation.

These components highlight some of the critical action steps to be considered when planning for integration. They address the roles and responsibilities of key stakeholders, as well as resources and planning tools that might help to prepare CTCs for a large-scale and long-term commitment to using literacy and numeracy strategies.

It is important to note, however, that this list of components is not intended to be an exhaustive one, nor should it be considered as a one-size-fits-all model for integration. The components themselves are intended to be flexible and scalable in nature so that CTCs may adopt, implement and customize them to best meet their specific needs and goals.

Figure A: Key Elements of Enhancing Literacy and Numeracy in CTE



Element 1: Building Awareness and Buy-in Among Key Stakeholders

Securing the support and buy-in of stakeholders helps to ensure that integrating literacy and numeracy strategies into CTE becomes part of a CTC's instructional culture. Without the full buy-in of leadership and instructional staff, as well as other stakeholders, integration efforts may be implemented on an ad hoc, inconsistent basis, rather than in a sustainable and comprehensive manner.

There are five key stakeholder groups on which to focus awareness and buy-in efforts:

- Administrators,
- CTC instructional staff,
- Partner sending school staff (administrators, guidance counselors and teachers),
- Parents and community members, and
- Students.

For each of these groups, a first step to secure their support for literacy and numeracy integration should be to educate them about what integration looks like in practice and its potential value. This approach may be differentiated based on the role of the stakeholders. The following sections detail some processes that can be implemented to develop buy-in.

Administrators

Convincing administrators of the value of integration and securing their support is vital for the success of long-term integration. Administrators must be open to the changes and embrace them even if classrooms don't "appear" to be as they were in the past. To help accomplish this, administrators can be made aware of data that indicates the positive impact integration may have on student academic and technical performance. Administrators also can be made aware of school-based data that illustrates student academic and technical performance. This data will indicate areas in need of improvement that may be addressed through integration.

Administrators also may benefit from training on the "how-to's" of integration as an instructional strategy and on how to support instructors as they implement integrated instruction strategies.

CTC Instructional Staff

Instructional staff could benefit from training on how the implementation of literacy and numeracy strategies affects student achievement. They also could benefit from

professional development on how to effectively implement literacy and numeracy strategies into their lessons.

As with administrators, sharing and discussing student performance data with instructional staff can help raise their awareness about the value of and need for academic and CTE integration. Instructors also would benefit from hearing from their colleagues about their successes and experiences with integrated instruction. Informal presentations by instructors for their peers provide low-risk, high-impact opportunities to garner support for integration. It may prove beneficial to schedule such presentations early on in the implementation process as a means to highlight some “quick wins” and immediate feedback on integration.

Instructors may find value in professional development that focuses on how to integrate academic content into the CTE curriculum. This is discussed in greater detail later in this implementation guide. Such training and support should be offered on an ongoing basis and be modified to meet needs and goals as they arise.

Partner sending school staff (administrators, guidance counselors and teachers)

It is important to educate and inform partner sending school staff about academic and CTE integration efforts both before and while such efforts are implemented. One way to build this awareness is for CTC administrators and faculty to attend or host meetings with their colleagues from the home schools. Discussions during these meetings could serve a dual purpose: educate partner sending school colleagues about CTE content and inform CTC staff of particular academic areas and needs on which to focus integration strategies.

As curriculum is developed and integrated lessons plans are created at the CTC, it might be helpful to share these documents with staff from the partner sending schools. This would provide an additional opportunity for feedback and insight, leading to greater collaboration.

These efforts to reach out to partner sending schools and solicit their input help to build a community, which benefits both the CTC and the home school.

Parents and Community Members

As with all stakeholders, educating parents and community members on the value of integration and what it looks like in practice is important to obtaining their support. To secure their buy-in, CTCs might implement some of the following practices:

- Organize a “Parent Day” – Parents shadow students during the school day to observe how academics and CTE are addressed

- Host Open Houses
- Submit articles to local newspapers about CTC success stories that highlight integration

Students

Administrators and instructors are often the most effective spokespeople for building awareness among students about academic and CTE integration. Leaders who understand and embrace the importance of academic learning can serve as role models. In addition, CTCs may want to consider bringing in speakers from industry who can highlight the importance of both academic and technical skills in employees.

School-wide contests that incorporate math and reading, such as weekly math challenges, may also motivate students and heighten their awareness of how academic skills and technical skills are interdependent.

Examples

- **Reading Muhlenberg Career and Technology Center (RMCTC)**
The instructional coaches attend weekly meetings with one of RMCTC's partner sending schools during which administrators and faculty from the partner sending school discuss issues related to the Pennsylvania System of School Assessments (PSSA). When they first attended these meetings, RMCTC's instructional coaches focused solely on listening to the topics discussed so as to learn more about the issues and needs of the school. As they became regular attendees at these meetings, the instructional coaches received allotted agenda time to share about RMCTC's integration efforts. The partner sending school now implements some of these ideas in their academics classes.
- **Lancaster County Career and Technology Center (LCCTC)**
During its first year in the Technical Assistance Project (TAP) in 2009, LCCTC focused its improvement efforts primarily on the integration of literacy strategies with the intention of increasing this focus to include numeracy strategies the following year. This focus on integration was a major component of the annual "Professional Development and Student Achievement Plan Including Technical Assistance Program Activities." The plan outlines specific goals and expectations for staff members, professional development opportunities and strategies to help improve program quality and student performance.

To secure buy-in for the main components of the plan, the document was provided to key stakeholders for their input and approval. The plan was presented to the administrative team and the professional development

committee to solicit members' feedback. (Members of this committee include instructors, counselors and instructional coaches.) Once the document was finalized and approved by LCCTC's director it was formally submitted to the Joint Operating Committee for approval.

Element 2: Identifying Leadership

It is important to identify which staff members will assume responsibility for guiding and sustaining efforts to integrate literacy and numeracy strategies. These stakeholders help make sure instructors receive training, identify goals and needs and often serve as the main point of contact and main source of in-house expertise for their colleagues.

In several of the PLC members' schools, leadership for integration initiatives related to literacy and numeracy strategies is assumed by a literacy team and/or numeracy team. (For purposes of this guide, discussion will focus on literacy teams. Much of the information may be adapted and/or modified for numeracy teams.) The chart on the following page details the purpose of and the key activities and responsibilities typically performed by literacy teams.

It may take several years from the point at which the literacy team is established to the point at which there is widespread implementation of literacy strategies. This extended timeline accounts for the challenges of changing faculty attitudes and the overall school culture so that it is receptive of and proficient in academic and CTE integration.

As integration becomes more the rule rather than the exception at a CTC, it may be that the literacy team becomes more informal because of a decreased need among instructors for intensive professional development and training.

Literacy Team		
Purpose	Members	Responsibilities and Activities
<ul style="list-style-type: none"> • Provide leadership to guide and sustain integration efforts. • Identify goals and training needs. • Support instructors as they implement integration strategies. 	<ul style="list-style-type: none"> • Instructors • Instructional coaches • Administrators* <p>Notes:</p> <ul style="list-style-type: none"> • <i>Experience level among members typically varies.</i> • <i>Team leader selected by group members.</i> 	<ul style="list-style-type: none"> • Attend training sessions and become “in-house” experts on integration. • Identify training opportunities for staff. • Share knowledge with staff through in-house in-services and presentations. • Identify useful resources for colleagues to use. • Provide feedback on lesson plans. • Participate in regular literacy team meetings in order to organize and plan efforts to support integration. • Prepare formal literacy plan. • Serve as main point of contact for leadership staff on integration.
<p><i>*If an administrator is not a member of the team, it is important that the team be empowered to make key decisions on its own and/or have the full support of and open communication with administrators so that decisions can be made in a timely manner.</i></p>		

Examples

- **Lancaster County Career and Technology Center (LCCTC)**
 The literacy team at LCCTC comprises an administrator from each of the center’s three campuses, an instructional coach, three instructors from each campus and the director of curriculum. The team attends all Technical Assistance Project (TAP) workshops to learn more about integration strategies. Team members meet by cluster once a month to discuss integration strategies, what is working well, what is not working and recommendations for the staff. Then, once a month, the coaches and the director of curriculum decide on specific strategies to share with other staff members during monthly faculty meetings. During these meetings (which are held at each of the three campuses), the principal at each campus models the selected strategies. Instructors then must use at least one of these strategies in their classroom.

- **Reading Muhlenberg Career and Technology Center (RMCTC)**

The literacy team at RMCTC comprises instructors and two instructional coaches. The team attends training sessions and reports back to the faculty on what it has learned. Often, members of the administration also attend these sessions so that they are informed about the various integration strategies. Members of the literacy team then conduct in-house in-services to model the strategies to the faculty so that instructors can use them in their classroom. All relevant information is then posted on a shared drive that all teachers can access as needed.

Element 3: Literacy and/or Numeracy Plan

In order to increase the effectiveness and sustainability of academic and CTE integration practices on a school-wide basis, CTCs should consider adopting a formal literacy and/or numeracy plan. A literacy and/or numeracy plan outlines how the CTC will adopt and support the integration of literacy and numeracy strategies into CTE coursework.

Figure B on the following page illustrates several of the key components that a literacy/numeracy plan should address.

A cross-section of leadership and instructional staff should collaborate to develop and/or provide input on the literacy/numeracy plan. This approach helps to secure buy-in among faculty and ensures that multiple viewpoints are incorporated in the plan. Members of the plan development team might include:

- Administrators,
- Directors of curriculum,
- Instructional coaches,
- Professional development team members, and
- Literacy/numeracy team members.

Figure B Literacy and/or Numeracy Plan Template
I. Mission Statement (Purpose, focus and overall goal of CTC)
II. Vision (Big picture of what the CTC hopes to accomplish in the future)
III. Goals <ul style="list-style-type: none"> • <i>Immediate, short-term and long-term goals identify strategic and measureable targets for CTCs to achieve.</i> • <i>Goals may focus on:</i> <ul style="list-style-type: none"> ○ School-wide performance, ○ Student achievement (academic and technical), and ○ Instructor growth and professional development.
IV. Action Steps <ul style="list-style-type: none"> • <i>What steps will be taken to help achieve goals?</i> • <i>Who is responsible for each action step?</i> • <i>What is the timeline for each action step?</i>
V. Evaluation <ul style="list-style-type: none"> • <i>How will progress be measured?</i> • <i>How often will evaluation occur?</i>
VI. Revisions and Updates <ul style="list-style-type: none"> • <i>How often will the plan be revised and updated?</i>

To support implementation of the plan’s key elements, various stakeholders should be engaged in the final approval of the plan. Furthermore, as discussed later in this document, professional development should be provided to instructors to help train them on the use of integration strategies.

The literacy/numeracy plan should be reviewed and updated on a regular basis. The review process encourages revisions and modifications to be made on the basis of available data so that the plan acts as a living document that continuously accounts for the achievements and ongoing challenges facing a CTC. At the minimum, the plan should be reviewed on a yearly basis. Optimally, the plan should be reviewed several times throughout the school year.

As one PLC member noted, once a plan is created its contents “must be communicated well to all who are involved in order to direct the actions of many in what can become a

very complicated effort.” If faculty and administration commit to such a plan in writing and consistently monitor progress toward meeting the goals of the plan, then integration efforts stand a better chance of being successful than random, non-documented efforts.

Example

- **Lancaster County Career and Technology Center (LCCTC)**

LCCTC created the “Professional Development and Student Achievement Plan Including Technical Assistance Program Activities” to establish specific student achievement goals and to document the strategies to be implemented in order to help meet these goals. As discussed earlier, the plan was presented to several stakeholders including administrative team members, instructional staff and the Joint Operating Committee to solicit their feedback and approval.

The plan includes several key components:

- Introduction;
- Purpose;
- Goals;
- Specific activities and strategies to help meet those goals, such as
 - Types of professional development to be provided to administrative and instructional staff;
 - The requirement that instructors submit one “teaching plan” (lesson plan) a month that builds upon school-wide goals;
- Timelines, and
- Evaluation and assessment measures.

Element 4: Strategic and Measureable Goals

CTCs should establish strategic and measureable goals to guide their integration efforts. *(Note: For those CTCs that develop literacy/numeracy plans, they typically set goals as part of the plan development process.)* Goals help to direct the types of actions taken and the strategies adopted by leadership and faculty. They also outline a concrete vision for change and define the purpose and target of efforts to integrate literacy and numeracy strategies. Finally, goals incorporate accountability into the change process and make it possible to have meaningful evaluation. For example, the leadership team at RMCTC established the goal that “Students performing at the proficient or advanced level on the PSSA will increase 2% per year.”

As indicated in the section on developing a literacy/numeracy plan, goals can focus on several areas of growth. These may include, but are not limited to:

- School-wide achievements
- Individual student performance (both technical and academic)
- Instructor growth and professional development
 - Improvements in comfort level, confidence and proficiency with using integration strategies
 - Raising instructor awareness about the value of integration
 - Increasing the frequency with which instructors integrate

The establishment of immediate, short-term and long-term goals is essential to guide the implementation of literacy and numeracy strategies. Immediate goals are those that cover a brief increment, such as one month or a grading period. They are the goals that might produce quick gains for a CTC. Short-term goals might cover a time period of several months or a year. Long-term goals typically cover a time period of one year to several years.

Change, as outlined in the goals, should occur through a progression of incremental steps. It is not realistic to expect the full implementation of integration strategies to occur over one year. Such change requires a significant shift in school culture as well as in community and sending school perceptions.

Examples

- **Upper Bucks County Technical School (UBCTS)**
UBCTS established five literacy goals. For each of these goals, the timeline, staff responsible and available support resources were identified. Strategies to help achieve each goal as well as accountability measures also were identified.
- **Lancaster County Career and Technology Center (LCCTC)**
As part of its “Professional Development and Student Achievement Plan Including Technical Assistance Program Activities,” LCCTC established the following goal:
Progress is defined as a 13% increase over the baseline in students achieving proficiency on the NOCTI end of program occupational assessment, a 10.2% increase over the baseline in student achievement levels on the reading PSSA using STAR literacy testing and an 11.5% increase over the baseline in students achievement levels on the mathematics PSSA using STAR numeracy testing.

Element 5: Ongoing Professional Development and Training for Instructors

In order for academic and CTE integration to become part of the instructional culture, instructors must be provided with targeted and sustained professional learning opportunities. It is not realistic to expect an integration initiative to take hold if instructors are not educated and supported. Targeted professional development is that which is linked directly to school and individual goals. Sustained professional development refers to ongoing and continuous learning about and growth in using literacy and numeracy strategies. It requires follow-up and moves away from looking at professional development as a one-time workshop or conference.

As the knowledge and expertise of instructors grows with their participation in professional development opportunities, it is more likely that integration strategies will be implemented effectively and consistently across the CTC. Furthermore, instructors create a common language and a shared understanding about what defines quality integration.

Several considerations should be accounted for when planning for quality professional development, three of which are detailed in the section below.

1. Address a Range of Strategies

A range of integration strategies should be shared with instructional staff members so that they may adopt and modify those that best meet their needs, learning styles and comfort level. Instructors that have a variety of integration strategies in their instructional toolkit can select those that best meet the needs of their students and that they are most confident in implementing. This level of choice provides instructors with a voice in and ownership over how they will integrate.

2. Employ Different Delivery Models

Professional development and training opportunities may be provided through a variety of delivery models that utilize external resources or internal resources. These models may vary in terms of who provides the information to participants and how information is presented. Workshops and conferences offered off-site by experts in the field can provide valuable information to participants. For examples, PLC members discussed the professional development they received through attending the Governor's Institute and training for the Technical Assistance Project (TAP).

Professional development and training also may be provided by CTC faculty through a collaborative approach. Peer-to-peer learning is a valuable manner by which colleagues

can share information with each other and learn with and from one another. For example, instructors may present to their colleagues on training they have received, their classroom experiences with integration or other knowledge related to integration. These presentations may take place during in-services, faculty meetings or informal after-school sessions.

Collaborative learning among colleagues can be extended to address needs within the greater CTC community. For example, instructors and instructional coaches from one CTC may share their knowledge and experience with staff at another CTC that has requested additional help but does not have the resources to contract professional presenters. RMCTC instructional coaches presented an in-service activity for another CTC on integration strategies that RMCTC instructors use. This sharing of information opened a valuable communication network between the CTCs and could assist in promoting integration.

Additional examples of peer-to-peer learning include:

- **Professional Learning Committees**—Team of instructors meet on a regular basis to discuss integration strategies. Team members may read and discuss relevant resources.
- **Learning Walks**—Instructors observe in colleagues' classrooms to see how different instructional strategies are implemented.

3. Use Instructional Coaches

Instructional coaches represent another valuable resource for providing professional development and ongoing support for instructors. Instructional coaches (or math and literacy coaches) may present workshops on integration strategies, consult with individual instructors on integrated lesson planning, model integrated lessons, or observe in classrooms and provide constructive feedback to instructors. They often are considered literacy and math “experts” and focus on being responsive to what instructors tell them they need and on making professional development job-embedded.

At RMCTC, the literacy and numeracy coaches work with individual instructors and the faculty as a whole to support integration efforts. They provide individual support to classroom instructors throughout the year by modeling and helping to create program-specific lessons that address NOCTI- and PSSA-related numeracy and literacy skills. The coaches also conduct school-wide learning activities such as a Word of the Day program and a school-wide reading program. They also present on successful integration strategies during faculty in-services.

Examples

- **Upper Bucks County Technical School**

During most training sessions, instructors are trained in a new integration strategy/technique. They are provided with time during the session (while information is fresh in their mind and the trainer is available for consultation) to create a lesson plan or activity that incorporates the strategy/technique. Lessons in which these strategies are embedded become the focus area for quarterly observations by the principal.

- **Lancaster County Career and Technology Center (LCCTC)**

LCCTC leadership and instructional staff members provide much of the professional development during a series of structured monthly meetings. The leadership team organizes the staff meetings to foster peer-to-peer learning opportunities as well as to ensure that instructors implement the strategies on which they receive training. (LCCTC comprises three separate campuses, each of which has its own principal.)

- Staff Development Meetings

At each staff development meeting, the instructional coach presents five to six integration strategies to administrators and instructional staff members. Instructors are expected to implement one of the strategies. Each campus runs its own staff development meeting, but the three coaches all present the same strategies.

- Faculty Meetings

One week after the staff development meetings, the principals conduct a faculty meeting at their campus. During these sessions, the principals model how to use one of the literacy strategies presented earlier by the instructional coach. (The principals at each campus present the same strategy.) The leadership team believes that instructors are more willing to attempt integrating literacy and numeracy strategies when they observe their supervisors learning along with them.

- Center Meetings

Instructors from across all three campuses meet with their program cluster colleagues. During these meetings, they share their successes and challenges in implementing particular literacy strategies.

Element 6: Resource Availability and Support

The collection and sharing of resources among colleagues can lead to the creation of a rich repository of integration resources and help support efforts to integrate literacy and numeracy strategies on a school-wide basis. These resources may include sample lesson plans and templates, relevant articles, books and artifacts from conferences.

There are several ways by which these resources may be gathered and shared so that they are accessible to all staff members. Resources may be generated and shared by administrators, instructors and professional support staff. For example, instructional coaches may create customizable lesson plan templates that instructors can modify for their particular courses. Instructors may submit lesson plans they have implemented successfully. After attending a workshop or conference, faculty members may submit a summary of the key takeaways or share copies of the presentation materials.

There are several options for compiling the materials and making them accessible to the faculty. These options include:

- Storing resources on the public server or shared drive;
- Using a designated resource room in the school; and/or
- Posting them to the school website.

To encourage faculty members to access resources, it is important to raise awareness about their availability. The following list includes suggestions for accomplishing this.

- Introduce and possibly model how to use new materials at in-services or faculty meetings.
- Bring resources to instructors' classrooms.
- E-mail resources to staff with suggestions for use.
- Provide administrative reviews of new resources.
- Request staff to submit relevant resources after any professional development sessions they may attend.
- Organize and categorize the resources in an easy-to-use format. For example, one CTC categorizes materials as Literacy or Numeracy. Materials are then sub-categorized by a particular strategy such as Writing to Learn, which could have several sub-components that lead to materials related to that particular strategy.

Examples

- **Upper Bucks County Technical School**
Resources are stored on the school server and are transferred to the school website. Administrators, instructors, professional support staff and instructional

facilitators have access. Resources are added at the time at which they are presented at professional development trainings. If relevant resources are located and not presented to staff, they are sent by the instructional coaches to all staff with suggestions for use.

- **Lancaster County Career and Technology Center**

The director of curriculum, instructional coaches, administrators, special education staff (Intermediate Unit personnel) and outside organizations help to create resources. Resources are put on the school server and in a resource room located at the CTC. All faculty members have access to them. To encourage the use of these resources, the leadership team promotes them during staff development sessions and administrative reviews.

- **Reading Muhlenberg Career and Technology Center**

The resources are created by instructional coaches and instructors, and they are pulled from other areas such as MAX teaching toolkits and Southern Regional Education Board (SREB) workshops. Some material is modified by instructors to fit the needs of their program area.

All staff can send items to a curriculum secretary who edits and places resources onto a shared server that anyone in the building can access. The strategies and other materials are categorized as either Literacy or Numeracy activities. They also are broken down even further by particular strategy such as Writing to Learn, which could have six to eight sub-categories that lead to materials related to that particular strategy.

All instructors were trained on most of the strategies, utilizing coaches and peers for a variety of assistance. Instructors and coaches also plan customized strategies together and use a team teaching approach. Many instructors network with each other and share materials throughout their career cluster area. For example, a newly developed strategy for teaching how to read a ruler could be utilized by all instructors in the construction trades cluster.

Documents on the shared server are managed by the curriculum secretary, and hard copy files are kept with the instructional coaches. As outlined above, documents are supplied by the coaches, instructors and outside materials such as MAX teaching and SREB as well as websites and books.

Element 7: Curriculum Alignment and Lesson Planning

To integrate relevant literacy and numeracy skills effectively into the CTE curriculum, instructors may want to consider completing a curriculum alignment process. Through this process, instructors identify and analyze academic skills and standards that are naturally embedded in the CTE curriculum. In addition, they identify potential areas in the CTE curriculum in which additional academic skills and standards (outside of those naturally embedded) could be addressed and aligned.

At its most basic level, the curriculum alignment process often includes a thorough cross-walking of the CTE curriculum with the academic anchors of the Pennsylvania System of School Assessments (PSSA). More advanced curriculum alignment practices include the creation of curriculum maps and learning guides that document the specific academic standards and concepts to be integrated and how often they will be addressed.

When possible, instructional coaches and/or directors of curriculum should assist instructors in the curriculum alignment process. The process may need to be revisited every few years or more often as changes to the CTE curriculum occur due to Occupational Advisory Committee reviews, NOCTI or program of study modifications.

In addition to the curriculum alignment process, some CTCs require instructors to create and submit for review formal lesson plans that document how literacy and numeracy skills will be addressed and assessed. The formal lesson plan can help ensure that integration practices are implemented at the classroom level in a consistent and thought-out manner. Such a requirement holds instructors accountable for integrating academic skills and standards effectively.

There is a wide spectrum in terms of how this requirement is implemented. For example, variations may exist in terms of how often such lessons plans should be submitted, how administrative feedback is provided on the lesson plans and what elements should be included in the lesson plans. An alternative to requiring instructors to submit lesson plans is to have them submit formal “learning modules” or units of study that indicate where and how literacy and numeracy skills will be addressed.

Example

- **Lancaster County Career and Technology Center (LCCTC)**
As a means to bridge the potential gap between professional learning and actual application of integration strategies, the LCCTC leadership team established

specific lesson plan requirements. Instructors must submit one formal lesson plan each month to their supervisor. The lesson plan should incorporate both a literacy and a numeracy strategy.

Supervisors are required to use a rubric developed by LCCTC to score and provide feedback on each submitted lesson plan. Using a scale from zero (“Beginning”) to three (“Exemplary”), the rubric evaluates the extent to which the lesson addresses literacy and numeracy skills and the reading and math eligible content of the Pennsylvania System of School Assessment (PSSA).

Element 8: Evaluation

To help document progress and determine next steps, CTCs should consider using evaluation tools to measure the extent to which goals are met and integration efforts impact student performance. As PLC group members noted, “What gets measured, gets done.”

There is a wide variety in terms of the availability and focus of evaluation tools and assessment data. Regardless of which tools a CTC uses, it is important that what is assessed is linked to any goals the CTC may have established.

It also is important that the extent of progress is evaluated at multiple points in time. To this end, both formative and summative assessments can be used. In addition, both formal and informal assessments can play important roles in evaluating progress. Informal assessments typically include those created by instructors and implemented at the classroom level. Formal assessments may include:

- PSSA,
- NOCTI (pre-test as well),
- 4Sight, Gates-MacGinitie Reading Test
- STAR testing, and
- Study Island.

Example

- **Lancaster County Career and Technology Center (LCCTC)**
In 2009, LCCTC began to administer the Renaissance Learning STAR assessment four times a year to measure reading and math achievement in students. (The use of this assessment also provides documentation for how LCCTC is meeting

the requirements of the Carl D. Perkins Career and Technical Act of 2006 regarding the improvement of student academic and technical skills. Since LCCTC only serves 12th grade students, the 11th grade PSSAs are not a relevant measure of student academic attainment.) STAR performance data are reported to instructors for all the students in their CTE program as an aggregate, rather than by individual student scores. Each instructor uses the aggregated data about the students they teach to make adjustments in their instructional strategies as they relate to literacy and numeracy skills.

Section Three: Challenges and Solutions

As CTCs introduce the concept of enhancing literacy and numeracy strategies in CTE and commit to making such integration a cornerstone of their instructional culture, there are several challenges that may need to be addressed. Furthermore, because the integration of literacy and numeracy strategies may reflect a new mindset and require a new set of skills for many of our instructors, some consideration must be given for mistakes and the lack of embracing these ideas immediately. Change is difficult for many people, and it may take some period of adjustment both for the instructors as well as the administrators before they commit to fully implementing these strategies.

Some of the challenges to implementing integration strategies on a school-wide basis, as well as possible ways to address these challenges, are discussed in this section.

- Challenge: Instructor attitude and willingness to change. “I’m not an academic teacher.”

Some instructors may not see the “big picture” related to why integration is valuable and what their role is in teaching academic content to their students. They may ask, “Why are we doing this?”

Suggestions for How to Address Challenge:

- *CTC leadership should inform instructors why integration is important, how it affects students and why there is a need for it.*
- *Identifying “quick wins.”*
- *“Showcasing” instructors who embrace the strategies and having them model for in-service.*
- *Coaches, support for instructors help to alleviate.*
- *Presenting different types of training (finding strategy to match instructor personality).*

- **Challenge: Finding time in curriculum to address academics**

Instructors may be overwhelmed with trying to incorporate academics into the CTE curriculum. They may perceive integration as simply “adding on” to their course loads and workloads.

Suggestions for How to Address Challenge:

- *Help instructors recognize where they are already integrating academics.*
- *Provide support to instructors through instructional coaches or colleagues who have experience with integrating.*
- *Provide resources for instructors to use, such as rubrics on how to grade research projects.*
- *Partner instructors up or have them work in instructional clusters. These teams can develop materials together.*
- *Introduce instructional strategies and practices in small doses and spaced out over time.*

- **Challenge: Building instructor comfort level with teaching academic content.**

Many CTE instructors come to education directly from business and industry. While they may excel at teaching technical skills, they may find teaching academic skills to be a daunting task. For them to do so requires practice, exposure to exemplars and the opportunity to work with their peers. Any instructor, regardless of their teaching experience, may be hesitant to try new strategies for fear of appearing unsure or not confident in front of their students.

Suggestions for How to Address Challenge:

- *Provide on-the-job training to address instructors' needs.*
- *Use instructional coaches to model lessons and provide ongoing and job-embedded support.*
- *Make available and encourage participation at professional development/training sessions.*
- *Create exemplar lesson plans.*
- *Establish peer-to-peer learning opportunities (to learn from experienced and proficient instructors).*
- *Develop or access demonstration DVDs.*

- **Challenge: Funding for training**

In the current climate of budgetary restraint it may be difficult for CTCs to fund expensive resource needs such as professional development.

Suggestions for How to Address Challenge:

- *Choose integration strategies and training models that require minimal resources.*

Examples include:

- *Use “in-house” experts, such as instructional coaches to provide on-the-job training.*
 - *Encourage “turn around training” among staff members. After attending a training session, participants report back to their colleagues and share what they learned.*
-
- **Challenge: Using a common math vocabulary**
CTE instructors may need to build their awareness of the math terms that are used on the PSSAs or in academic math classes so that they can use it in addition to the vocabulary used in the field.

Suggestions for How to Address Challenge:

- *Create vocabulary crosswalks.*
- *Use math T-charts to identify key words.*

Section Four: Taking Integration to the Next Level

There are several strategies that may help to scale up and sustain academic and CTE integration efforts once a CTC has implemented some of the eight components discussed in the previous section. Most of these strategies, which are listed in Table 1, focus on improving communication and collaboration between CTCs and their partner sending schools. By bringing academic partners into the fold, academic and CTE integration may become more of a two-way street, with CTE and academic instructors sharing lesson plans and providing insight on how to effectively bring academics into the CTE classroom and relevant technical applications into the academic classroom.

Table 1
Building Communication and Collaboration with Partner Sending Schools

- Invite partner sending school teachers to observe in CTC classrooms.
- Create a plan for academic and CTC instructors to share lesson plans.
- CTC staff attend joint planning meetings between schools.
 - *Example: The literacy and math instructional coaches at Reading Muhlenberg Career and Technology Center (RMCTC) meet weekly with one of RMCTC's sending schools for a "PSSA Review" meeting. The coaches are given time to provide relevant updates.*
- Invite sending school instructors to participate in TAP activities.
- Host an after school "Open House" at the CTC for counselors and learning support staff from partner sending schools. Participants may visit classrooms, meet instructors and have an opportunity to ask questions of CTC staff.

Appendix: Resources

This section contains lists and summaries of and links to reports, articles and other resources that may be useful to those interested in learning more about academic and CTE integration.

Reports, Articles and Handbooks

- Bottoms, G. & Sharpe, D. (1996). *Teaching for Understanding through Integration of Academic and Technical Education*. Atlanta, GA: Southern Regional Education Board.
- [Career Academies as a Professionally Engaging and Supportive Teaching Experience](#)

Education and Urban Society
2005

This research paper examines the collaborative teaching aspect of career academies through a look at the National Academy Foundation's teacher professional development, curriculum materials, technical assistance and linkages to industry-specific employers. It found that "NAF's resources uniquely influence outcomes for participating teachers, demonstrating the added benefit

of intermediary support in fostering instructional coherence, student-centered instruction, and teacher effectiveness.”

- [Career and Technical Education Today, Hope for the Future or More of the Same?](#)
SEEN Magazine (SouthEast Education Network); Dr. Willard R. Daggett
March 31, 2010
This article notes the need to prepare students for success in a global and hi-tech economy. To do this, education must “blur the distinction between academics and CTE.”
- [Crafting A New Vision for High School: How States Can Join Academic and Technical Studies to Promote More Powerful Learning](#) ([Click on this link to go to the SREB publication page. Paste “Crafting a New Vision for High School” into the search box.](#))
Southern Regional Education Board
2008
This report outlines results of a forum of state education chiefs, CTE leaders and other education decision makers from 12 states who gathered to explore more deeply the significant contributions career/technical education can make to high school reform. It outlines challenges states face in combining technical and academic studies for improved learning, provides actions states can take to overcome these challenges and highlights current best practices and policies. You can also download related state and district assessment tools.
- [CTE’s Role in Adolescent Literacy](#)
Association for Career and Technical Education Issue Brief
November 2009, pp. 1–8
This article highlights the important role that CTE programs play in improving adolescent literacy skills. CTE programs can include content-specific reading and writing strategies that help students strengthen their literacy skills.
- [Integrated Academic and Career/Technical Learning Shows Real-Life Applications of Education](#) ([Click on this link to go to the SREB publication page. Paste “Integrated Academic and Career/Technical Learning Shows Real-Life Applications of Education” into the search box.](#))
Southern Regional Education Board
2008
This newsletter from High Schools that Work provides examples of projects using real-life approaches and hands-on projects to blend academic and

career/technical content in making learning more authentic for students. A sampling of projects profiled includes:

- Baking Instructor Cooks Up a Batch of Literacy Skills
- Mathematics Adds Up at Career/Technical School
- Immersing Academic Teachers in Career/Technical Programs
- Curriculum Project Integrates Academics Into Career/Tech

- **[Integrating CTE and Academics](#)**

Techniques Magazine – Association for Career and Technical Education
November/December 2008

The theme of this issue of *Techniques* magazine was “Integrating CTE and Academics.” Articles include:

- A Vision for High Schools: Joining Academic and Technical Studies to Promote More Powerful Learning
- ACE TECH: the Fourth Year of CTE and Academic Integration
- Kentucky Beefs Up Its CTE Programs
- Academics in CTE Programs: Fully Preparing Students for Their Next Step
- Aligning Classroom Instruction with Workplace Skills: Equipping CTE Students with the Math Skills Necessary for Entry-level Carpentry
- Using Storytelling to Hone Language Skills
- Integrating CTE and Academics: One Teacher's Account
- Integrating CTE and Academics: One Student's Account

- **[International Center for Leadership in Education](#)**

The International Center for Leadership in Education focuses on “assisting schools and districts in implementing organizational changes that translate into world-class curriculum, instruction, and assessment systems.” The Center emphasizes the need for schools to prepare students for success in a world that is changing dramatically.

- **[Academic Excellence Through Career and Technical Education: A Resource Kit Incorporating the CTE Curriculum Matrix](#)**

International Center for Leadership in Education
2007

This kit provides a lexile analysis of occupational reading materials.

- **[Designing Literacy Initiatives for Whole School Improvement in Grades 7–12](#)**

International Center for Leadership in Education

2010

- [Strategic Writing Across the Curriculum in Grades 7–12](#)
International Center for Leadership in Education

2006

- [Math-in-CTE](#)

National Research Center for Career and Technical Education

The Math-in-CTE project of the National CTE Research Center has expanded from the original scientifically based research study into a full-scale professional development program. The Math-in-CTE model is a curriculum integration model designed to enhance mathematics that is embedded in career and technical education (CTE) content. This website provides in-depth information on the project and its related professional development.

- a. Link to research brief regarding the Math-in-CTE study:

<http://136.165.122.102/UserFiles/File/Math-in-CTE/Math-in-CTEResearchSummary.pdf>

- b. Link to the original study, *Building Academic Skills in Context: Testing the value of Enhanced Math Learning in CTE (Final Report)*:

<http://136.165.122.102/UserFiles/File/Math-in-CTE/MathLearningFinalStudy.pdf>

- [MAX Teaching with Reading and Writing](#)

This teaching approach—an acronym for Motivation, Acquisition, and eXtension—is a framework that systematically uses reading and writing in *all* classes. Applicable to students from the first grade through the thirteenth, this method of teaching is geared toward schools interested in improving reading, writing and learning skills. Supported by the High Schools that Work network of schools, it is also being incorporated into the newer Tech Centers that Work program.

- [Ready or Not: Creating a High School Diploma that Counts](#)

Achieve, Inc.

February 2004

This early report launching the American Diploma Project provides benchmarks in English and math, as well as an action agenda to ensure every high school graduate is prepared for post-secondary education and work. The report suggests that states and local entities should anchor academic standards in the real world, require all students to take a quality college and workplace readiness curriculum, measure what matters and make it count and bridge the gap

between high school and college. Sample assignments and workplace tasks linked to the benchmarks are included.

Books to Support Academic Integration

- Dorfman, L. R. & Cappelli, R. (2009). *Nonfiction Mentor Texts: Teaching Informational Writing through Children's Literature*. Portland, ME: Stenhouse Publishers.
- Forget, M. A. (2004). *MAX Teaching With Reading and Writing: Classroom Activities for Helping Students Learn New Subject Matter While Acquiring Literacy Skills*. Victoria, BC: Trafford Publishing.
- Harvey, S. & Goudvis, A. (2007). *Strategies That Work: Teaching Comprehension for Understanding and Engagement*. Portland, ME: Stenhouse Publishers.
- International Center for Leadership in Education. (2005). *Reading Strategies for Career Academies and Career-Technical Education*. Rexford, NY: International Center for Leadership in Education.
- Keene, E. O. & Zimmermann, S. (2007). *Mosaic of Thought: The Power of Comprehension Strategy Instruction*. Portsmouth, NH: Heinemann.
- Kenney, J. M. (2005). *Literacy Strategies for Improving Mathematics Instruction*. Alexandria, VA: The Association for Supervision and Curriculum Development.
- Lyons, C. A. & Pinnell, G. S. (2001). *Systems for Change in Literacy Education: A Guide to Professional Development*. Portsmouth, NH: Heinemann.
- Schoenbach, R., Greenleaf, C., Cziko, C. & Hurwitz, L. (1999). *Reading for Understanding: A Guide to Improving Reading in Middle and High School Classrooms*. San Francisco, CA: Jossey-Bass.
- Southern Regional Education Board. *Literacy across the Curriculum: Setting and Implementing Goals for Grades Six through 12, Site Development Guide*. Atlanta, GA: Southern Regional Education Board.
- Toll, C. A. (2005). *The Literacy Coach's Survival Guide: Essential Questions and Practical Answers*. Newark, DE: International Reading Association.

Websites

- *Education Week*
www.edweek.org
Online updates are available from *Education Week*.
- *Jim Burke: English Companion*
www.englishcompanion.com
This site provides classroom resources and tools for teachers.
- *The Lexile Framework for Reading*
www.lexile.com
This site includes a tool to determine lexile level.
- *Literacy Coaching Clearinghouse*
www.literacycoachingonline.org
- *Library of Congress*
www.loc.gov
- *Math Council*
Pennsylvania Department of Education; Bureau of CTE
http://www.portal.state.pa.us/portal/server.pt/community/instructional_resources/7392/math_council/527482
This site provides several resources to support the integration of math into CTE. Sample lessons plans, vocabulary lists and t-charts are available.
- *Multiple Pathways Model*
ConnectEd
<http://www.connectedcalifornia.org/pathways/index.php>
This website outlines California's multiple pathways model. *Pathways* are programs of high school study that connect learning in the classroom with real-world applications outside of school. They integrate rigorous academic instruction with a demanding technical curriculum and field-based learning—all set in the context of one of California's 15 major industry sectors. The site includes an implementation toolkit, as well as information on model programs and other research and information.

- *National Writing Project*
<https://www.nwp.org>
- *The New York Times (Student Version)*
www.nytimes.com/learning
- *PBS Teachers*
www.pbs.org/teachersource
- *Rigor and Relevance Framework*
International Center for Leadership in Education
<http://www.leadered.com/rrr.html>
This website provides information on the “Rigor and Relevance Framework,” a key component of the Model Schools Program. According to the site, “The Rigor/Relevance Framework is a tool developed by staff of the International Center for Leadership in Education to examine curriculum, instruction, and assessment. The Rigor/Relevance Framework is based on two dimensions of higher standards and student achievement.” The site provides basic information on using the framework and links to numerous publications that can be accessed for more resources.
- *Science NetLinks*
www.sciencenetlinks.com
- *Study Stack*
www.studystack.com
This site allows teachers to create digital flashcards.
- *Teachers’ Domain*
<http://www.teachersdomain.org>
This site provides digital media for the classroom and professional development.
- *WordSift*
<http://wordsift.com>
This site provides academic word lists.

Case Studies

Researchers from Meeder Consulting conducted one-day site visits at 11 CTCs selected by the Pennsylvania Department of Education's Bureau of Career and Technical Education (BCTE) and prepared detailed case studies based on the promising practices identified during these visits. The following resource provides overview information on those practices relating to the subject matter around which the PLC is focused. For the comprehensive summary of these practices, see the case studies at:

http://www.portal.state.pa.us/portal/server.pt/community/best_practices/7683/case_studies/794984#link5.

Central Montco Technical High School (CMTHS)

- CMTHS instructors collaborated with academic instructors from the sending schools to design integrated lessons.

Erie County Technical School (ECTS)

- CTE instructors collaborate with math and reading coaches to make academic subjects more relatable to CTE content.
- "Reader Response" days and a "Word Wall" give literacy a prominent presence.
- Plans of Study, Program Guides and Course Sequences provide valuable tools for students, parents and partners.

Greater Altoona Career and Technology Center (GACTC)

- Literacy and math committees are tasked with developing formal integration plans to expand on and codify integration efforts.

Indiana County Technology Center (ICTC)

- Full-time reading and math instructors provide individualized, program-specific instruction.
- Development of curriculum frameworks ensures consistency and alignment with industry and occupational standards.

Jefferson County-DuBois AVTS (Jeff Tech)

- STAR (Stop Everything and Read) used on a school-wide basis.
- Math instructors work with CTE instructors to create linkages between their courses.
- CTE and academic colleagues collaborate to link academic math and its technical applications.

- "Integration Day" incorporates academic and technical skills while engaging the entire school and all disciplines around a central theme.

Lancaster County Career and Technology Center

- Instructors submit one formal lesson plan a month to their supervisor that incorporates both a literacy and numeracy strategy. Supervisors evaluate the extent to which the lesson plans address literacy and numeracy skills.
- The literacy coach presents integration strategies to staff during monthly staff development meetings. At follow-up faculty meetings, the administrators demonstrate how to use one of these strategies.

Lehigh Career & Technical Institute (LCTI)

- Math and literacy coaches provide job-embedded professional development on how to integrate academic and CTE content.
- LCTI developed a curriculum development, delivery and evaluation process that emphasizes integrated curriculum that aligns to college-readiness skills and industry certifications.

Lenape Tech

- "MAX Teaching" literacy strategies emphasize comprehension and engaging interactive learning.
- "Integrated Thematic Instruction" links together CTE and academic disciplines through special projects like the prototype partnership with local company KPM.

Reading Muhlenberg Career & Technology Center

- Instructors are required to integrate numeracy, literacy and writing activities in their daily lessons.

Upper Bucks County Technical School (UB Tech)

- Full-time literacy coach and part-time math coach provide support for instructors to incorporate math and literacy into their curriculum.

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