“Leadership Academy” Syllabus

Description
Do you need to improve your relationship with local business and industry leaders, strengthen your curriculum, develop new classroom models to better engage and retain students, communicate more effectively with colleagues, and support your work with strategic thinking? And do you need to do all of this with little to no budget money, a huge work load, and a small support staff? You’ve come to the right place! Find the answers you and your students need as Working Connections’ “Leadership Academy” helps you develop skills and strategies to take your program to the next level.

Learn more about yourself, meet your peers, and hear best practices. Work in groups, use role-playing and workbook activities, master new strategies. Discover essential resources and tools. This material is not just for IT instructors and administrators. These processes can work across all technical disciplines and beyond.

Prerequisites
None.

Lead Coaches

Ann Beheler
Principal Investigator, National Convergence Technology Center
Executive Director of Emerging Technology Grants, Collin College

Ann Beheler has been in the Information Technology industry for over 30 years, and she is now responsible for Emerging Technology grants at Collin College. In that capacity she leads the National Convergence Technology Center, a $4.4 million National Science Foundation grant which was recently renewed for $4M starting in July 2017 to June 2022 to continue the work and add emerging technologies. Previously she led the National Information, Security, and Geospatial Technologies Consortium, an almost $20 million DOL TAACCCT grant.

Ann has corporate experience, has led her own consulting firm, has created and taught in one of the first networking degree programs in Texas, and has previously managed IT-related divisions and grants ranging $1-
$20 million in community colleges in Texas and California. Prior to her current position, she was Vice President of Academic Affairs for Porterville College, responsible for all instruction at the college, and prior that she was a Dean at both Orange Coast College in California and at Collin College.

Among other things, Ann is known for effectively bringing together business and industry using a streamlined process to identify with them the knowledge, skills, and abilities (KSAs) they predict will be needed by “right-skilled” job candidates in the future. She then works with faculty to align curriculum such that those who complete certificates and degrees in IT have the knowledge, skills, and abilities that will make them readily employable in high-paying IT positions. Ann holds a PhD in Community College Leadership from Walden University, a MS in Computer Science from Florida Institute of Technology, and a BS in Math from Oklahoma State University.

Mark Dempsey

Assistant Director, National Convergence Technology Center

Mark Dempsey joined Collin College in 2012 as program manager for the National Convergence Technology Center. In his current position, he plans and manages the CTC’s special programs and events as well as provides administrative and operational support to the CTC Director.

Prior to Collin College, Mark worked for eight years at UCLA Extension, the continuing education division of UCLA. There, he worked first as an assistant to the director of UCLA Extension's Entertainment Studies & Performing Arts department, helping coordinate academic projects and special events, and later as a program representative, managing domestic and international custom-designed seminar programs. For several years during his tenure at UCLA Extension, Mark also served as a co-instructor for the capstone online class “The Business of Hollywood,” which employed a unique role-playing element to explore strategies of film financing and negotiation.

Before joining UCLA Extension, Mark was a development executive at an independent feature film production company, Echo Lake Productions. He has also worked as a freelance script analyst for Silver Pictures. Mark holds a BA in Cinema from Southern Methodist University and an MFA from Loyola Marymount University.
Three Objectives
1. Understand strategies to maximize your relationship with business and keep them engaged and active in your program
2. Learn best practices to improve your program by introducing new strategies in recruiting and retention
3. Strengthen your interpersonal communication skills and ability to work with different personality types

Agenda

Monday, July 10

**Ann Beheler**
* Introduction
* Overview of “Leadership Academy”
* Overview of the Convergence Technology Center
* The BILT Process (Business and Industry Leadership Team)
  Lunch break (12:00 to 1:00)

**Ann Beheler/Mark Dempsey**
* The KSA Process (Knowledge, Skills, and Abilities) – Ann Beheler and Mark Dempsey
* “Daily Takeaways” and report-out

Tuesday, July 11

**Ann Beheler**
* The KSA/Course Crosswalk
  Lunch break (12:00 to 1:00)

**Helen Sullivan**
* Strategic thinking – Helen Sullivan
* “Daily Takeaways” and report-out

Wednesday, July 12

**Martha Germann**
* DiSC workshop
  Lunch break (12:00 to 1:00)
* DiSC role-playing
  * “Daily Takaways” and report-out

Thursday, July 13

**Pam Silvers and Beth Quinn**
* Diversity Workshop
  Lunch break (12:00 to 1:00)
* Diversity Workshop – Beth Quinn and Pam Silvers
  * “Daily Takeaways” and report-out

Friday, July 14

* Wrap-up and report-out Diversity Workshop – **Pam and Beth**
* Wrap-up and report-out BILT – **Ann Beheler**
* Action plans

This material is based upon work supported by the National Science Foundation under Grant No. 1205077 and Grant No. 0903239. Any opinions, findings and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.
**CAREER BUILDER 2015 HIRING FORECAST**

**DOES YOUR COMPANY, AT YOUR LOCATION, PLAN TO INCREASE, DECREASE OR MAKE NO CHANGE TO ITS NUMBER OF FULL-TIME, PERMANENT EMPLOYEES IN ALL OF 2015 COMPARED TO 2014?**

- **Increase**: 36%
- **Decrease**: 9%
- **No change**: 48%
- **Undecided**: 8%

http://careerbuildercommunications.com/pdf/careerbuilder-q1-2015-forecast.pdf originally presented by John Colburn, Director, Skills for America’s Future, Aspen Institute 01/20/15
96 percent of college and university chief academic officers said they are extremely or somewhat confident in their institution's ability to prepare students for success in the workforce. Just 11 percent of business leaders strongly agree today's college graduates have the skills and competencies that their business needs.

John M. Eger, “Business and Education Executives Just Don't See Eye to Eye”, Huffington Post, 04/12/2014 originally presented by John Colburn, Director, Skills for America’s Future, Aspen Institute 01/20/15
Setting the Context for BILT

Developed by National Convergence Technology Center National Science Foundation (NSF) Advanced Technological Education (ATE) Center led by Collin College

- 2004 forward
- Consortium with 40+ college and university partners
- Primarily in the area of networking infrastructure/mobility/data communications
- Developed to address the downturn in IT in the early 2000’s
- Designed with lock-step cooperation with regional and now national business to ensure employment for graduates
BILT Processes developed under the NSF grant spread throughout the National Information Security and Geospatial Technologies DOL TAACCCT consortium (Round 1)

Four IT specialties:
- Programming/Mobile App Development
- Networking/Data Communications
- Cyber security
- Geospatial Technologies

Approach with businesses applies to creating/maintaining/reinvigorating any technology program
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THE TYPICAL BUSINESS ADVISORY COUNCIL

Might meet 1 or 2 times per year, sometimes the only time the reps are on campus

May have a mixed level of knowledge in membership

Advises regarding a program, sometimes just reviewing rather than leading

BAC members often find their time split between colleges because each college has its own council
TYPICAL RESULTS FOR BUSINESSES/GRADUATES

May be more of a “rubber stamp” relationship

May or may not be truly engaged

May or may not be people at the right level to really help with your program

May result in programs that produce graduates that are not tightly aligned with business need
SUGGESTED ENGAGED BILT MODEL

Business and Industry *Leadership* Team (BILT)

Regional Council (ours is both national and local) advising multiple colleges

Meets *quarterly*, not 1-2 times per year

Right people on the council

- High-level *technical* executives
- First line managers
- Technicians
- HR representatives as long as they are not the sole reps for a company
MORE THAN AN ADVISORY COUNCIL

Businesses LEAD the work and are part of the leadership team.

Appropriate name is Business & Industry Leadership Team (BILT) – *Leadership*, not Advisory.
BASIC MODEL FOR BILT MEETINGS

Meets 4 x per year, 1 face to face, 3 x via webinar

Less than quarterly can mean “out of sight, out of mind”
ONE FACE-TO-FACE MEETING ANNUALLY

Curriculum aligned based on solid business-driven process originated in the U. S. Air Force

- Modified DACUM to identify Knowledge, Skills, and Abilities needed from graduates (4-6 hr. process)
- Faculty determine how to address KSAs through curriculum by cross-referencing desired KSAs to existing courses and developing new modules or courses to fill gaps
THREE VIRTUAL MEETINGS ANNUALLY

Trends identified to get ahead of curricular changes

Informal forecast of future employee need

Program review for multiple colleges (certificates/degrees)

Review/approval of major grant activities/progress

Other topics as appropriate
Differentiators between a business advisory council vs. BILT

- Industry Advised
- Suggested KSA
- Business is suggesting enhancements to curriculum
- Business is not vested in long-term success of programs
- Ignored advice erodes business commitment

- Industry Led
- Required KSA
- Curriculum must be recognized by the BILT
- Business has “skin-in-the-game”
- Business has the opportunity to reduce OJT (On-the-Job-Training)
- Business has the ability to “Give Back” to the community in a multi-generational life changing way
SERVING ON BILT – DRIVING REAL VALUE

We are in the business of employing the future of America.

BILT - What is in it for me?

- Delivering relevant, industry sought after skills
- Students more prepared to enter the workforce
- Early business engagement exposes students with business perspective & taxonomy (Mentoring, internships, externships and business graded capstone courses)

- Entry-level employees with “hit-the-ground-running” skills
- Ability to tangibly give back to the community
- Ability to tap eager talent in transitioning to the workforce
- Time value realized and appreciated

“If opportunity doesn’t knock, build a door.” ~ Milton Berle
NATIONAL BILT SETS STAGE FOR CONSORTIUM

National BILT – Laying the foundation

- Guide Knowledge, Skills, and Abilities (KSAs) for mapping curriculum
- Maps KSAs based on Industry and National needs
- Members participate virtually & annually in person
  • Mentoring students / Participating in Capstone courses
  • Leading virtual internships / externships
  • Speaking at conferences
- Provides a framework for New Regional BILTs to leverage

Regional BILT – Crafting education to critical markets

- Focused on regional industry needs (similar regions share)
- Curriculum mapping transferred to local/regional BILT constructed similarly for validation/modification
- Members participate virtually
  • Mentoring students
  • Participating in Capstone courses
  • Leading virtual internships / externships
FROM THE LOCAL PERSPECTIVE

Diversity of BILT Members – IT plus
- Government sector
- Health care sector
- Finance Sector
- Manufacturing

How Local BILT Functions
- In person/virtual
- Local perspective versus national

Approach to prioritizing KSAs
- Directly address workforce need while leveraging prior work
- Focus on comprehensive approach

Students interaction and engagement
- Competitions
- Internships
- Placement
STUDENTS BENEFIT

- Level of engagement (student centric approach)
- Employment readiness activities
- Classroom support (adjuncts, speakers)
- Internships, residencies and hiring
- Access to a broader employment network
- Co-ownership of courses, certificates, and degrees
Purpose for Involving Business?

- Specifically, why do you want businesses to be involved in your work?
How To Recruit Business Partners?

- Specifically, **how** do you recruit businesses to be involved in your work?
What Will Business Partners Do?

- Specifically, what do you want them to do?
What is business engagement, and what does it mean to have it?
What makes a business partner want to participate in helping in your work, and what keeps them involved?
Balancing Your Business Team?

- What about balancing your business team? Do you do that, and how do you do it if you do?
What Results Can Be Expected?

What are some of the results of active business engagement?
Some Results of Active Business Engagement

- Curriculum aligned to produce workforce-ready grads
- Involvement in recruitment events
- Professional development for faculty
- Provide internships for students; externships for faculty
- Provide business mentoring
- Guest speakers
- Co-author whitepapers
- Evaluate capstone presentations
- Participate in panels at conferences
- Hire graduates
Using draft Letter and Script

- Target those you want
  - Technical front line technicians
  - Technical execs, especially futurists
  - Some HR representatives, but not the only reps for a company

- For each targeted business
  - Draft letter and/or script
  - Draft script
TO BUILD AN ENGAGED BILT

Determine your expectations of the members to bound time commitment

Target specific businesses for membership

Draft printed letter and phone script (not email) customized for each targeted business

Be specific with respect to what you want from the businesses you contact

SHARE YOUR VISION

Emphasize WIN-WIN for the business member

Be prepared to talk with an assistant
Collin is lead for the Centers Collaborative for Technical Assistance (NSF sponsored)

Webinars, best practices, and convenings are provided for DOL and NSF grantees and others leading workforce programs

For more information:
http://www.atecenters.org/ccta
abehele@collin.edu
This material is based upon work supported by the National Science Foundation under Grant No. 1205077. Any opinions, findings and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.
GETTING BUSINESS AND INDUSTRY INVOLVED

Education is a business, and there are consumers for our product – our graduates. These consumers include businesses, industries, government agencies, non-profits, and universities.

An actively engaged business team provides crucial leadership in developing graduates who are prepared to secure employment in the industry. These steps will help you create an active Business and Industry Leadership Team (BILT).

*Let the businesses lead and they’ll have a stake in your program. Involve them and they’ll be so engaged that you can call on them for help, like providing guest speakers or mentoring students to prepare them for interviews. (We know of one school with a business group that continued to list members who were deceased – that’s not engaged.)*

*Give the BILT something they want, they will participate. But they need to believe in the process and the program.*

*Remember this not the traditional “advisory group” that meets once a year to review and approve (or maybe rubber stamp?) what you present and may or may not feel connected to your school. Instead, you want this group to meet regularly, feel integrated with your program, and steer your curriculum.*

1. **Determine which businesses, industries, agencies, non-profits, and universities should be represented in the BILT.**
   - Distribution of size and type.
   - Do not limit to only large companies (unless you have a national focus). Medium and small companies provide perspective and are likely to hire as well.

   *Who do you want involved? Technical leaders from companies that are hiring. Remember that large companies all have IT departments. You don’t have to pursue just IT and tech companies. Invite temp agencies, non-profits, and government agencies. Public schools are good, even if they’re often behind the IT curve. Universities are also good, but they sometimes have a 2-year-school bias.*

   *Remember that you don’t have to stick to your city limits. You can look beyond to neighboring areas. They’ll hire too. In other words, it’s okay to expand your geographic pool.*

   *Human Resources executives have value because they’re the first filter before an applicant sees the hiring manager. So if you have an HR rep on your BILT, that’s okay, but they need to come with the hiring manager. HR may indeed turn down resumes, but they’re often following guidelines set by the hiring managers.*

   *“Regional BILTs” are groups that give guidance and feedback to multiple colleges. If you have more than one community college in your area, don’t make BILT members advise each school individually. That runs the risk of cannibalizing your BILT members. Instead, consolidate your efforts. Then play this angle up to stress to your BILT members that their feedback will impact more schools and more students. You will need a strong facilitator to guide regional BILT and bring everyone together to work collaboratively with the businesses as faculty from different schools can come with their own agendas.*

   *In more rural areas, BILT meetings don’t have to be held at the school, but at least one meeting each year must be face to face. The key is to research labor market demands. That is, find out where students are being hired and target that the area when recruiting your BILT.*
If you already have a BILT-like group, it’s probably already “institutionalized” with faculty and courses set and certificate/degree patterns approved. If so, then the question for you is how the program could be improved with more engagement.

2. Determine what you want to get from the BILT and develop your “sales pitch.”

Adjust your sales pitch as needed for each prospective BILT member. What do you want each member to do? Make a guess at why the prospective member can benefit from the relationship. Use this to help them buy into the premise. Even if you like to sell, create a script with a decision tree on how you might handle objections that might be brought up.

Ideally, you’d assemble one BILT group for each major subject area. If you have one big BILT to cover all computer subjects including programming, hardware, network infrastructure, etc., the members will likely get bored when you are working on areas they do not know, and the needs and priorities for all the constituencies will be blurred.

- Establish expected time commitment per quarter.
- Establish expectations of involvement and activities, including what is required and what are optional contributions the BILT member can consider.
  - Minimal expectation includes 4 BILT meetings annually
    - Job skills validation (annually, face to face)
    - 3 other 1.5 hour BILT meetings (virtual)
  - Optional opportunities
    - Course and curriculum validation and modification
    - Job forecasting – anecdotally and through surveys
    - Internships, both traditional and virtual
    - Job shadowing
    - Providing expertise in the set-up and operation of labs
    - Donating equipment or other resources
    - Providing speakers at student, public, and education events
    - Helping with recruitment
    - Teaching case study courses
    - Consulting with students

Plan to keep tabs on those who aren’t attending. If someone hasn’t attended in two years, that’s a red flag. Ask them “What’s changed?” “How is this working for you?” Maybe they can refer you to someone else at his/her company who’s better suited. But even for those who are attending, you want to call them once a year and find out how it’s going on their end. You cannot just send e-mails. Note also that sometimes a BILT member will disappear for a while because of job duties, then return and rejoin the group.

3. Recruit appropriate business and university partners by starting with your target organization’s President.

- It’s a “high-touch” activity, requiring personal contact, not mass mailings or mass emails.

- Identify businesses and industries, universities and agencies that hire people with the job descriptions representing your curriculum.

What’s a big enough group? That depends on the size of your program and your college. Eight or ten per meeting is a good goal, but you have to typically have twice that many members because BILT members have jobs and can get overcome by events and not be able to attend, even though they want to. If you can get 50 or 70 on your BILT list and then get 20 to attend each meeting, you’re doing great.

Over time, as you get to know the BILT members, you’ll learn that they each have different motives and goals. Smaller companies may want to get engaged with the bigger companies, bigger companies may be interested most in a pipeline of workers.
• Contact the president of the company or university.

*Start with the highest-level executive you can find in your region. You probably can’t get that person on the phone, but you can talk to his/her administrative assistant. And often the admin can refer you to someone else in the company to handle the query. When you contact that person, indicate that (NAME) in the president’s office referred you.*

*Strive for a mix of people and knowledge levels on your BILT: high-level technical executives, first-line managers, technicians, other appropriate Subject Matter Experts.*

  - Share your vision of what the program can mean to the area

*Be excited! Passion is contagious.*

  - Explain the importance of the company having a subject matter expert, usually a first-line manager, involved in the BILT (typically the HR representative can also be involved, but you need to have an SME as well). Focus on the individual to whom you are talking. They will know if they fit the needs and can refer you to someone else as appropriate.

*Talk about the benefits you can provide the business and their worker pipeline.*

*Note also there is often appeal in sharing and discussing trends in a non-proprietary, neutral environment.*

• Mention that you have grants from NSF, DOL, etc. if you have them. This carries a lot of weight.

*Everyone in the Convergence College Network (CCN) is part of the CTC’s NSF grant. The term “federal grant” gets respect. Tell the BILT prospect that you’re part of a network of colleges funded by a grant from the National Science Foundation that includes professional development for faculty.*

• Establish time expectation of BILT members.

*Set your regular meeting time. For the CTC, meetings are usually on Tuesday mornings at 8:30 before the BILT members can get trapped in crises at work. The annual meeting lasts 4-6 hours, and the other three meetings las 90 minutes.*

*After you establish the time commitment up-front, do not exceed the time requested without the businesses volunteering. For example, if you say you’ll end meetings in 90 minutes, end them in 90 minutes. Don’t go long. Anything left to be done can be done via email or on the next meeting. Overall, you’re asking for maybe 10 hours a year total. Later, once they’re engaged, they’ll likely volunteer more time.*

**4. Conduct initial BILT meeting.**

• Invite all faculty to attend the meetings as observers to gain their buy-in to what the BILT wants.

*Faculty attends BILT meetings to hear first-hand what BILT members have to say. The goal is to hear from BILT members, not endure a faculty filibuster. But because some faculty might not believe the BILT summary you provide, it’s good to remove the intermediary and put them in the room with the BILT members.*

*Overall, you don’t want faculty members designing a program, then presenting it to the BILT and saying this is how it is. Faculty members are the skilled implementers and have expertise, but they must follow the business leadership if you want them to hire your graduates. You will lose BILT support if the faculty dominates the discussion.*

*Avoid also putting adjuncts on the BILT because of the appearance of a conflict of interest when voting on curriculum (even if they know industry very well and have valid opinions).*
There can be fear from the faculty. “Oh no, what if they tell me I have to teach something I don’t want to teach?” Change can be scary. The first thing to do is get a Dean on board. Explain why BILT feedback is important so you can strategize together on how to deal with the reluctant and the stubborn. You may also encounter a “What’s in it for me?” attitude from faculty. Remind them that we’re all here to help the students. Maybe recruit a faculty member who’s a leader and can sway his or her peers. Another strategy: avoid doing all of the legwork – present the problem and then ask the faculty “What do you think?” It is important to let them lead, come up with topics, and do the thinking.

- Publicity – invite reporters (if your college has a PR department, they could manage this).
- Refreshments – not elaborate, but important to have, especially in the morning.
- Time – early morning typically works better before BILT members go to the office.

Mornings are better for meetings than afternoons because office schedules change. If BILT members get settled in at work, something may (and often will) come up that prevents them from attending an afternoon meeting.

- Explain how important BILT leadership is to the program and what their companies will get from their involvement.
- Clarify roles and responsibilities between the BILT and educators. (Educators are there to listen, not to present or run the show.) Consider choosing one of your strong business leaders chair the meeting. Do ot ask for volunteers.
- Explain the need for quarterly meetings and establish dates for the year.

If you meet less than quarterly, you run the risk of an “out of sight, out of mind” situation.

- Review opportunities for helping (from your “sales pitch”).
- Ask for feedback on industry trends, which helps you anticipate what your students will need to know in the future.

Community college curriculum is always behind, so ask the BILT for an update on trends that are coming on a quarterly basis. That way, you can start discussing early how to develop new or adapt curriculum for the future. Ignore the BILT’s advice at your peril; they will ask you later what you did with their suggestions. Consider sub-committees (sometimes called Tiger Teams to work on more complex projects like adding a whole new area to the curriculum.

- Stick to the agenda and keep the discussion rolling, limiting those who might want to dominate (both BILT members and faculty.)

Have an agenda for each meeting.

BILT members need to know what’s happening at your college. Discussing your grant/program status is an important agenda item of every BILT meeting. Some BILT members may not care, but gently remind them it’s important because funders expect grants to present their activities and progress against goals to the business community for feedback.

BILT members love student presentations. They enjoy seeing what your program (and their wise counsel) provides students, so make student testimonials a regular agenda item.

- Acknowledge the importance of their time by starting and stopping on time regardless of whether or not you complete your agenda. End early if you have what you need. You can always complete your work later via email.

Acknowledge the BILT, thank them, show your appreciation.
• Take minutes. Publish them. Have the BILT approve at the next meeting, or at minimum, email them out to BILT members and ask for comments.

5. BILT recognition
• News releases/articles
• Thank you emails (personal, not mass emails)
• Thank you letter to the President or their managers
• Certificates
• Plaques

*Businesses enjoy publicity, so invite reporters, get a write-up in the paper or tech blog. You can also post photos and bios on your website.*

6. Reporting
• Quarterly minutes
• Yearly accomplish report – activities, not just head count
• Have students present
• Strive to get at real student impact rather than just numbers

7. Keeping the BILT fresh
• Add at least one new member each quarter and introduce them.

*Keep the BILT fresh. Mix it up. Eventually, existing BILT members will invite new members.*

• Talk with each member individually at least yearly to ask them what they think you could do differently to obtain more from them or the entire BILT.

8. Benefits from following this approach
• Business ownership of your curriculum and your program in general.
• Interest in hiring your students above other applicants because they understand what your students know.
• Faculty recognizes and understands business requirements first-hand.

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National Convergence Technology Center
Collin College 9700 Wade Blvd. #J130
Frisco, TX 75035
www.connectedtech.org
972.377.1582

This material is based upon work supported by the National Science Foundation under Grant No.1205077. Any opinions, findings and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.
BILT SAMPLE INVITE

July 13, 2015

John Businessman
Technology Company
123 High Tech Drive
Dallas, TX  75555

Dear Mr. Businessman:

We need your help to improve our regional economy and your pipeline of right-skilled job candidates.

Attached please find a formal invitation for you to be a leader as part of a national/regional Business and Industry Leadership Team (“BILT”) to help reform IT workforce education within our nation/region.

The first meeting of this team will be held on May 21 from 9:00am-3:00pm at the Preston Ridge campus of Collin College in Frisco, Texas just north of Dallas. Lunch will be served.

This BILT will allow technical top-level thought leaders like you to help us address specific local workforce needs in the IT specialty areas of:

* Networking
* Security
* Storage
* Virtualization

The first step in our working with you will be a rapid response job skills analysis process for each specialty area. This will give our BILT members the opportunity to validate/change a pro-forma list of knowledge, skills, and abilities (“KSAs”) to which we align our curriculum. We want to know what you believe companies will need in a skilled job candidate in the next few years. This information will then be used to enhance existing and develop new innovative
curriculum to appropriately prepare workforce-ready workers.

For this May 21 meeting we need attendees who are able to evaluate and weigh the technical KSAs (knowledge, skills, and abilities) for each specialty, which may mean you’d like to forward this invitation to other colleagues. No one person will be expert on all of this. Please send those names to me (abeheler@collin.edu) at your earliest convenience. We need all RSVPs finalized no later than May 1.

For the job skills analysis process, face-to-face discussion is extremely important. Reasonable travel reimbursement can be made available if this is a need. Please let me know if you have any questions about this. That said, while we strongly encourage people to attend in person, if that is impossible, we will be providing virtual meeting access, but face-to-face participation is best.

We hope you’ll consider joining us on May 21. Your involvement is essential to our success in getting IT students the jobs they need.

Please RSVP to me by May 1 at abeheler@collin.edu or 972.377.1649.

Thank you for your time,

Ann Beheler
Executive Director
National Convergence Technology Center
Hello, X, this is NAME from SCHOOL.

We’re looking for help in the NAME industry help us determine the skills workforce-ready IT graduates 12-36 months from now should have. Specifically, we’d like to invite one of your technical executives to join a special business leadership team that will update SCHOOL on current industry trends and steer our curriculum. The overall goal of this leadership team is to provide expert guidance to make sure our graduates learn the skills that will get them hired.

Would you be interested in helping us?

<<From here, there would be a DECISION TREE based on not just what they say but how they say it. How will you handle possible objections?>>

YOU NEED TO KNOW ABOUT YOU

* The size of your program (number of students and degrees) to make it worth their while; their involvement will have an impact

* Whether you have any federal grants (and if you are a member of the CCN, you are part of the Convergence Technology Center’s NSF grant)

* Mention any other big companies who are already on the leadership team – they’d be in good company

ABOUT YOUR VALUE PROPOSITION FOR THEM

* How often the business team would meet and for how long the meetings will last

* Mention publicity opportunities to make their company look good in the community by volunteering experts to help

* Emphasize that this helps them by helping students; technical education programs can’t succeed without industry involvement – curriculum can’t live in a vacuum; need input to give students the skills they need (no reason to teach a skill that won’t get a graduate a job)
The National Convergence Technology Center

Announces and invites you to the first convening of the National CTC Business and Industry Leadership Team (BILT) meeting

To advance IT workforce and education pathways in IT specialty areas that include:

- Networking
- Security
- Storage
- Virtualization

Location: Collin College, Preston Ridge campus
9700 Wade Blvd., Frisco Texas 75035
Room J116
Date: Monday, May 21, 2012
Time: 9:00am-3:00pm (lunch will be served)

RSVP to Mark Dempsey
mdempsey@collin.edu  972.377.1582

Please RSVP no later than May 15, 2012.
MONDAY WORKSHEET - BILT

* Develop a preliminary phone script and potential decision tree you think would be effective with business and industry in your area.
* Write the first draft of a first invitation (snail mail is usually more effective) you think would be effective with business and industry in your area.
* Brainstorm a list of specific companies or general areas of business and industry you’d like to target for your BILT.
* Build an action plan or timeline for the next steps you’d like to pursue to strengthen your BILT group.
Job Skills Standards Validation

Leadership Academy
Working Connections 2017
Ann Beheler and Mark Dempsey
Two worlds that work together
Working with businesses and faculty is sometimes like:
Tools make this process fun!

Notes on the gentle art of herding cats

1. Cats don't like to be herded (in fact, you can't really herd cats)
2. Cats prefer to herd themselves
3. Cats understand that they sometimes need to be herded (that doesn't make them any easier to herd)
4. Cats don't like being reminded that they are being herded
5. Harsh herding has negative consequences
6. Herd gently, but firmly, with affection or fish as a reward. Remember, you are a cat, too; we all need herding, at one time or another
The KSA Process –
framework for getting critical information

- Tool
- Feedback
- Analyze
- Compare
- Change

National Convergence Technology Center
Skills businesses want

• KSA process determines skills expected of entry-level employees
• KSA process gets feedback from businesses
• Consensus is not the goal
• Representative data is the goal
• KSA: Knowledge, Skills and Abilities
Process overview

• Invite Business reps to *meeting*
• Use CTC *spreadsheet as basis*
• Assign *roles*
• Get feedback (*ratings*) on *KSAs*
• Determine *minimum number average* for rating (for KSA to be included in curriculum)
• *Crosswalk* from KSAs to course outcomes (to be covered Tuesday)
Roles

• Industry Subject Matter Experts
  *Participate* in validation ratings and discussion

• Faculty Subject Matter Experts
  Attend as *observer*
  (participate only if called on)

• Facilitator
  *Process* expert responsible for efficiency & effectiveness of meeting

• Recorder
  *Records* discussion & prepares meeting minutes
Ground Rules

• Please **turn off** cell phones or put on silent/vibrate mode

• Recognize that SMEs come from **variety** of business environments

• Respect **differing opinions**

• Participate **fully in:**
  – Validation ratings
  – Discussion - your input is VERY IMPORTANT
Validation Process

- **Explain** Rating Scale and Process
- **Rate** each KSA (line by line):
  - Rating Criteria
    - Importance
    - Level
    - Time Spent
    - Difficulty
  - Rate Each by counting the # of 4s, # of 3s, # of 2s, # of 1s (or Number Cards can be used)
Importance

• How **important** is it for entry level employees to know or do this skill?

• 4 – **Highest** (*Crucial* and highest priority)

• 3 – **High** (*Lack of knowledge might* impact quality of service)

• 2 – **Low** (*Lack of knowledge might not* impact quality of service)

• 1 – **Lowest** (*Lack of knowledge will not have direct impact on quality of service*)
Level

• How **good is good enough** for entry-level employees to know or do the skill?

• 4 – **Highest** (*Can recall and apply complex info with no supervision.*)

• 3 – **High** (*Can recall and apply many facts with spot checks.*)

• 2 – **Low** (*Can recall some facts but requires help.*)

• 1 – **Lowest** (*Can recognize facts but needs close supervision.*)
Time Spent

• How frequently are entry-level employees expected to know the skill?

• 4 – Highest (Spends much more time doing this skill than most.)

• 3 – High (Spends a little more time doing this skill than most.)

• 2 – Low (Spends somewhat less time doing this skill than most.)

• 1 – Lowest (Spends much less time doing this skill than most.)
Difficulty

• How difficult is it for entry-level employee to know or do the skill?
  • 4 – Highest (Much more difficult to learn.)
  • 3 – High (Somewhat more difficult to learn.)
  • 2 – Low (Somewhat easier to learn.)
  • 1 – Lowest (Much easier to learn and perform.)
Ratings for each skill:

considers Importance, Level, Time, Difficulty

• Put number of people who voted “4” in cell on spreadsheet
• Put number of people who voted “3” in cell on spreadsheet
• Put number of people who voted “2” in cell on spreadsheet
• Put number of people who voted “1” in cell on spreadsheet
## National Business and Industry Leadership Team Knowledge Domains

<table>
<thead>
<tr>
<th>Operating System Maintenance</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>Avg</th>
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<tr>
<td>Includes topics such as account mgmt, installing apps, command line, directory, file structures, os scripting, config modification, backup/restore, os admin, scheduler, stopping/starting services, change control, documentation, awareness of KPI and SLA/OLA</td>
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<tr>
<td>Includes topics such as topologies, transmission media, Ethernet specs, CSMA/CD, operation of hubs, switches, routers, OSI model, TCP/IP protocols, IPv4, IPv4, CIDR addressing, subnetting, gateways, routing and routing protocols, transport protocols, IPv6, IPv4/6 integration, IPv6 tunnelling, hybrid environment, SDN/OpenFlow</td>
<td>9</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>3.9</td>
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</tbody>
</table>
Context and Wrap-up

• Capture ratings for all KSAs
• Write down summarized discussion
• Prepare minutes that capture the full discussion
• Update list of KSAs and their definitions
• Perform crosswalk (covered tomorrow)
• Report actions to BILT at future meeting
Recap: KSA process brings results

This material is based upon work supported by the National Science Foundation under Grant No. 1205077. Any opinions, findings and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.
One of the most important tasks your Business and Industry Leadership Team (BILT) will perform is the validation of specific IT/convergence job knowledge areas and skills. The CTC often refers to this list as the “KSAs” – knowledge, skills, and abilities. The BILT ranking of these KSAs represents what they expect job-ready graduates to know 12-36 months into the future. Faculty will use these rankings to cross reference the list to coverage in existing curriculum for KSAs ranking high and to identify curriculum gaps.

This KSA job skills validation process is just a formalized way to have a discussion.

Getting Started

Use the existing job skills “KSA” spreadsheet provided by the National Convergence Technology Center (CTC). This will be the base set of skills that your BILT will add to, subtract from, or modify.

It’s better to start with the CTC’s baseline KSA list (see Attachment A). A standard DACUM (Design a Curriculum process) starts from scratch and asks each BILT member what an entry level person does. This process typically can take 2-3 8-hour days. The CTC process is a modified DACUM that starts with the baseline (or proforma) list of KSAs and then adds or subtracts as directed by your BILT members.

The CTC originally started with a list of KSAs from two areas supported by the National Skills Standards, and eventually it had 450 lines of detail (in under 50 categories) after years of additions and a few deletions by BILT members. Recently, at the direction of the BILT, the CTC eliminated the detail and summarized what the detailed lines represented in the “Topics” column of the KSA spreadsheet into a description of each category. This shorter list provides broad topics for ranking and allows for more discussion time in the 4-6 hours allocated for the process. With 450 detailed topics to rank, the BILT spent too much time on the detail lines and not enough time on the bigger discussions.

Contact your BILT to schedule a job skills validation meeting and explain how the process will work. BILT members will rank the IT/convergence KSAs from 1 to 4, with 1 being the least important and 4 being the most important. These are skills they are looking for in an entry-level employee coming out of your program 12-36 months into the future. This process will result in a better trained talent pool for their businesses to draw from when hiring new employees or training existing employees.

(Note: if you don’t yet have a BILT, you’ll need to assemble IT/convergence subject matter experts, also known as Subject Matter Experts (SMEs). The job skills validation meeting is a vital and mandatory function for your new BILT.

Validating the KSAs

At the in-person job skills validation meeting you will work through the job skills “KSA” spreadsheet line by line. Your BILT will rate the skills which are related to performance indicators, technical knowledge, and employability skills.

The point behind this process is to identify what KSAs the BILT desires in a new hire coming out of a two-year certificate or degree program. This is not about hiring someone with a lot of experience. In evaluating the list, the BILT has to assume that an employer who hires a new employee will do the more specific fine-tuning. Be clear on this. Colleges cannot create six
different ways to teach the same topic. For the purposes of the KSA list and your job skills validation, the BILT members have to agree on a generalized approach that can open as many job doors as possible for your graduates.

Focus only on technical skills. You can do a separate assessment later for soft skills. Soft skills are critical, but it’s hard to map them to courses. Professionalism, of course, should be a part of every class and project. The hope is that faculty will integrate soft skills throughout the program. Having at least one major project per technical course allows students to build soft skills, and develop a nice portfolio for the student. So it may be better to work with the BILT to create a separate list of desired soft skill “characteristics,” with the understanding that they cannot all be covered in just a single capstone class.

Participants at the meeting should include:

**Business & Industry Subject Matter Experts (SMEs),** who participate in validation ratings and discussion (i.e. your BILT members)

**Faculty Subject Matter Experts (SMEs),** who attend as active listeners and can ask questions, but not participate in the ranking

**Facilitator,** who as the process expert and is responsible for the efficiency and effectiveness of the meeting. This person must keep the discussion focused.

**Recorder,** who records the rankings, records the discussion and prepares meeting minutes

The “Recorder” tallies the votes and enters the results into a spreadsheet. The Recorder should be someone different from the “Facilitator.” You want the Facilitator free to manage the discussion without worrying about entering everything into the spreadsheet.

As an aside, faculty members are asked to actively listen during the meeting. They can ask some questions, but it is imperative that they not be active participants. It’s important to have faculty in the room because they need to hear the BILT’s rationale for rating the skills as they do. The discussion is often as important as the actual rankings.

In general, ask the faculty to actively listen without talking. After the faculty hears the BILT talk about KSAs, then they will have their own meeting to map the existing courses to the KSAs to identify gaps. Specifically, you (and the faculty) will need to determine in which courses do those KSAs reside. That process should help illuminate the gaps.

Note also that skills validating skills by email after the meeting is not efficient nor is it effective because the ranker does not hear the discussion.

The ranking process uses the 1-4 ranking method, each skill is ranked according to importance, level of proficiency, time spent doing the skill, and how difficult the skill is to learn. The CTC earlier went through the KSAs with the BILT 4 times for each ranking purpose; however, since importance is ranked most heavily, the CTC asks the BILT to consider all 4 ranking purposes and give a ranking that best represents all 4.

*BILT members can vote with color-coded cards, numbered 1 to 4. Adding colors to the numbers can help the vote counting go faster. That is, you can count colors from across the room without having to always see the printed number on the card. Alternatively, the facilitator can ask for how many “4’s”, how many “3’s”, etc.*

The ranking purposes are defined as follows:

**Importance** - How important is it for entry-level employees to know or to do the performance criteria statement (i.e., job skill)?

**Level of Proficiency** - How good is good enough for entry-level employees to know or to do the performance criteria statement?

**Time Spent** - How frequently are entry-level employees expected to know or do the performance criteria statement?

**Difficulty** - How difficult is it for entry-level employees to know or to do the performance criteria statement?

Each rating ranges from 1 for the lowest to 4 the highest.
It is not necessary for the BILT to reach consensus on each rating. However, if there is a wide difference in ratings, the facilitator must ask for a discussion of the differences, which can be captured in the minutes of the meeting. Each person’s rating of each skill is captured on the job skills “KSA” spreadsheet.

The CTC keeps everything in the same spreadsheet to avoid confusion later.

This line-by-line discussion is key: the BILT is determining what stays, what goes, what’s added. Most of the discussion will arise when there’s a disagreement about a KSA’s score, and that is often a matter of misunderstanding the category definitions. The facilitator should try to resolve the discrepancy (maybe big company has niche needs and small company wants a guy who can do everything) if it is a matter of misunderstanding; otherwise, the discrepancy stands are representative of what the BILT wants.

Your first job skills validation meeting will likely last 4-6 hours. But once you established your baseline, reviewing skills at subsequent meetings likely won’t require as much time. Plan for 4-6 hours every time; no one ever complained about a meeting that ends early.

A average rating of 3.0 or greater should generally be considered significant, based upon the 1 to 4 ratings.

However, some BILT groups may rank items lower or higher, so that 3.0 cut off if not firm.

Skills and Curriculum Crosswalk

The next step in the process is to gather IT/convergence faculty representatives to conduct a “crosswalk” between the list of highly-ranked 3.0+ KSAs needed and existing courses in your program. The exception is when a new program is being created. If this is the case, the faculty will determine how to group the KSAs that are ranked high into courses.

The faculty SMEs should work through the job skills “KSA” spreadsheet and mark which skills appears in which courses. Columns on the right of the spreadsheet are available for notes.

(Please note that for the National CTC’s job skills validation, we use Texas WECM courses because they are more pertinent to the skills required and cover more areas of skills trained. In Texas, “WECM” is the Workforce Education Course Manual, which are state-wide workforce education courses leading to certification and/or an applied associate degree.)

When working through the list, faculty should consider the following:

1. If there’s insufficient time in the program; if the task was rated by the BILT as low; if targeted students are likely entering the program already possessing a skill, then that specific skill may be omitted.

2. Gaps in the curriculum may exist because a highly-ranked skill either has not been included in any course or module or has not yet been taught to the expected exit proficiency level.

3. Redundancies may exist where highly-ranked skills are taught in more than one course or module; or taught to the same level of proficiency in more than one course or module. Obviously, some degree of redundancies is okay.

4. If there are courses or modules that don’t appear to cover enough highly-ranked skills, perhaps they should be deleted or combined with other courses or modules.

5. Some gaps in curriculum might be provided by on the job training. For this reason, you may want to alert your BILT to any gaps you discover. It could be that the BILT believes the gaps you found will be filled by
the hiring company. Otherwise, gaps will need to be filled by locating or creating curriculum to cover the KSAs that are important but not currently covered in any course.

After completing this exercise, the faculty group will ensure that designated highly-ranked skills are covered in at least one course. If gaps exist, the faculty determines if the gap can be filled by adding or updating a course or adding or updating a module.

Next Steps

The final step in this validation process is to communicate the findings back to the BILT so BILT members know how the college plans to use the work they did on the KSAs. The BILT should confirm that the college approach is appropriate, especially with respect to plans to fill gaps. The college then starts the process of updating or adapting courseware as appropriate.

This process must be repeated yearly with your BILT to ensure that the program is current with business needs. It changes too rapidly to allow more than a year lapse between job skills analysis meetings.

At the next meeting, you can report to the BILT all the KSA gaps you’ve found in the curriculum and present solutions for filling gaps.
## Knowledge Domains

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>H</th>
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<tbody>
<tr>
<td><strong>National Business and Industry Leadership Team Knowledge Domains</strong></td>
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<td><strong>KSA Reef</strong></td>
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<td><strong>Knowledge Domains</strong></td>
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<td><strong>Topics</strong></td>
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<tr>
<td><strong>K1</strong></td>
<td>Unix / Linux</td>
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<tr>
<td><strong>K2</strong></td>
<td>Windows</td>
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<tr>
<td><strong>K3</strong></td>
<td>Mac OS</td>
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<tr>
<td><strong>K4</strong></td>
<td>Operating System Maintenance</td>
<td>Includes topics such as account mgmt, installing apps, command line, directory, file structures, os scripting, config modification, backup/restore, os admin, scheduler, stopping/starting services, change control, documentation</td>
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<tr>
<td><strong>K5</strong></td>
<td>Ethernet, OSI Basics, Datalink, Network, Transport, TCPIP</td>
<td>Includes topics such as topologies, transmission media, Ethernet specs, CSMA/CD, operation of hubs, switches, routers, OSI, TCPIP protocols, IPv4, IPv4, CIDR(Classless Inter-Domain Routing) addressing, subnetting, gateways, routing and routing protocols, transport protocols</td>
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<tr>
<td><strong>K6</strong></td>
<td>Convergent Network Technologies</td>
<td>Includes such topics as PSTN and telecommunications basics as well as computer networking/telephone integration, voice over IP protocols and details of protocols and implementation</td>
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<tr>
<td><strong>K7</strong></td>
<td>Network Devices-Connectivity Components</td>
<td>Includes such topics as Nics, Hubs, Switches, Routers, Gateways, Cables and connectors, wireless access points, DTE, CTE, modems</td>
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<tr>
<td><strong>K8</strong></td>
<td>MAN and WAN Technologies</td>
<td>Includes such topics as packet and circuit switching, T and E carrier systems for data communication, multiplexing and concentrating, ATM or Frame relay?, Sonet/Synchronous Digital Hierarchy, ISDN, etc.</td>
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<tr>
<td><strong>K9</strong></td>
<td>Wireless Infrastructure and WLANs</td>
<td>Includes such topics as cellular telephone, Personal area networks, Satellite data communications, microwave point to point, Broadcast Mobile access/LTE, Wireless spectrum, Wireless IEEE 802 standards</td>
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<tr>
<td><strong>K10</strong></td>
<td>Troubleshooting and Equipment Repair</td>
<td>May include use of diagnostic software and use of hardware including hand tools as well as knowledge of troubleshooting methodology</td>
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<tr>
<td><strong>K11</strong></td>
<td>Network Infrastructure Monitoring and Restoration</td>
<td>Includes such topics as backup and recovery, centralized log monitoring and correlation, types of alarms, network monitoring and provisioning software, fault tolerance, mass storage and backup devices, network and computer system redundancy including storage, power, connectivity and hot swapping, disaster recovery planning</td>
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<td><strong>K12</strong></td>
<td>Network Security</td>
<td>Includes at least overview knowledge of topics such as knowledge of firewalls, password practices and procedures, encryptions, network virus protection, anti-theft and tamper proof devices, biometrics, security protocols, SSL, IPSEC, WEP, SSH, Security tools, Trojan horses, DMZ, Hack attacks, social engineering, public, private, symmetric, and secret keys, virus, worm, honey pot, and back-door concepts, digital certificates, physical security, authentication, vulnerability scanners, intrusion detection systems, ACL</td>
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<tr>
<td><strong>K13</strong></td>
<td>Virtualization - VMware or Citrix</td>
<td>Includes such topics as installation of server and desktop virtualization solutions, management of virtualization solutions</td>
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<td><strong>K14</strong></td>
<td>Storage Devices and Mgmt</td>
<td>Includes such topics as evaluation of storage architectures such as DAS, SAN, NAS, CAS; understanding backup, recovery, disaster recovery, business continuity, and replication; understanding logical and physical components of an information storage infrastructure.</td>
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<td><strong>K15</strong></td>
<td>Infrastructure as a Service/Cloud computing</td>
<td>Includes such topics as server virtualization as a services desktop virtualization as a services, storage virtualization as a services, I/O virtualization as a services, public/private cloud issues, security in the cloud</td>
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<td><strong>Others added by business group</strong></td>
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<tr>
<td><strong>C1</strong></td>
<td>A+ Certification</td>
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<td><strong>C2</strong></td>
<td>Network + Certification</td>
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<td><strong>C3</strong></td>
<td>Linux+ Certification</td>
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<td><strong>C4</strong></td>
<td>Security + Certification</td>
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<td>CCNA Voice Certification</td>
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<td>CCNA Wireless</td>
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<td><strong>C9</strong></td>
<td>Wireless Certification CWNA</td>
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<td><strong>C10</strong></td>
<td>VMware Certification</td>
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<tr>
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<td>Microsoft Windows 7 Certification (or client OS)</td>
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<td><strong>C15</strong></td>
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<td><strong>C16</strong></td>
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* Be sure ITIL (change management and root/cause analysis) elements are covered as needed in every course. ISO 9000/9001 Quality Management criteria.
* Consider on-site tours.

<table>
<thead>
<tr>
<th>Knowledge, Skill, Ability</th>
<th>Topics</th>
<th># votes (4 = most important)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 K1 Unix / Linux OS</td>
<td>Current within 3 years</td>
<td>8 3 2 1 3.73</td>
</tr>
<tr>
<td>9 K2 Windows Server OS</td>
<td>Current within 3 years</td>
<td>3 2 2 1 2.88</td>
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<td>10 K3 Operating System Maintenance</td>
<td>Includes topics such as account mgmt, installing apps, command line, directory, file structures, os scripting, config modification, backup/restore, os admin, scheduler, stopping/starting services, change control, documentation, awareness of KPI and SLA/OLA, log files and patches.</td>
<td>2 4 5 2.73</td>
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<tr>
<td>11 K4 OSI Model</td>
<td>Layer 1: physical layer&lt;br&gt;Layer 2: data link layer&lt;br&gt;Layer 3: network layer&lt;br&gt;Layer 4: transport layer&lt;br&gt;Layer 5: session layer&lt;br&gt;Layer 6: presentation layer&lt;br&gt;Layer 7: application layer&lt;br&gt;Provide basic framework for how it all works, including how cloud computing has impacted the conceptualization of the seven layers. Plus and awareness of IP multimedia services.</td>
<td>9 1 3.90</td>
</tr>
<tr>
<td>12 K5 Collaboration Technologies</td>
<td>Includes such topics as&lt;br&gt;  * PSTN and telecommunications basics as well as computer networking/telephone integration&lt;br&gt;  * voice over IP protocols and details of protocols and implementation&lt;br&gt;  * video telepresence&lt;br&gt;  * presence&lt;br&gt;  * instant messaging and text messaging&lt;br&gt;  * mobility&lt;br&gt;  * IMS overview&lt;br&gt;  * SDN/OpenFlow</td>
<td>4 4 3 3.09</td>
</tr>
</tbody>
</table>
* Be sure ITIL (change management and root/cause analysis) elements are covered as needed in every course. ISO 9000/9001 Quality Management criteria.

* Consider on-site tours.

<table>
<thead>
<tr>
<th>Knowledge, Skill, Ability</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>K6 Network Devices-Connectivity Components</td>
<td>Includes such topics as NICs, Switches, Routers, Gateways, Cables and connectors, WAPs, DTE, CTE, modems, sensors, wireless LAN controllers (includes teaching MAC and ARP).</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>* Note: this runs on K5 &quot;Collaboration Technologies&quot; above - K6, K7, and K8 will be merging together over time.</td>
<td></td>
</tr>
<tr>
<td>K7 WAN Technologies</td>
<td>Includes such topics as packet and circuit switching, T and E carrier systems for data communication, multiplexing and concentrating, Sonet/Synchronous Digital Hierarchy, ISDN, etc., SDN, PRI ISDN, MPLS; SIP and Web RTC protocols.</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>* Note: this runs on K5 &quot;Collaboration Technologies&quot; above - K6, K7, and K8 will be merging together over time.</td>
<td></td>
</tr>
<tr>
<td>K8 Wireless Infrastructure and WLANs</td>
<td>Includes such topics as cellular telephone, Personal area networks, Satellite data communications, microwave point to point, Broadband Mobile access/LTE, Wireless spectrum, Wireless IEEE 802 standards, near-field communications, WiFi, Bluetooth</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>* Note: this runs on K5 &quot;Collaboration Technologies&quot; above - K6, K7, and K8 will be merging together over time.</td>
<td></td>
</tr>
<tr>
<td>K9 Troubleshooting and Equipment Repair</td>
<td>May include use of diagnostic software (such as cloud-based monitoring, listening, and remediating systems - e.g. Data Dog and New Relic and VictorOps) and use of hardware including hand tools as well as knowledge of troubleshooting methodology, critical thinking, situation assessment, documentation, inspection routines, fiber and fiber splicing awareness</td>
<td>8</td>
</tr>
</tbody>
</table>
# National Business and Industry Leadership Team Knowledge Domains

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<tbody>
<tr>
<td><strong>K10</strong></td>
<td><strong>Infrastructure Monitoring and Restoration</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Includes such topics as backup and recovery, centralized log monitoring and correlation, types of alarms, network monitoring and provisioning software, fault tolerance, mass storage and backup devices, network and computer system redundancy including storage, power, connectivity and hot swapping, disaster recovery planning, business continuity, MDM (mobile device management) exposure but not required, sensors, automated tools (e.g. HP OpenView, SolarWinds, SystemCenter), optimizing performance. This should cover both physical and virtual infrastructures - students need hands-on in either physical or virtual or their education is incomplete.</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td><strong>Network Security</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Includes at least overview knowledge of topics such as knowledge of firewalls, password practices and procedures, encryptions, network virus protection, anti-theft and tamper proof devices, biometrics, security protocols, SSL, IPSEC, WPA2, SSH, Security tools, Trojan horses, DMZ, Hack attacks, social engineering, public, private, symmetric, and secret keys, virus, worm, honey pot, and backdoor concepts, digital certificates, physical security, authentication, vulnerability scanners, intrusion detection systems, ACL, risk analysis, information security, data security, VPN</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Basic hardening do's and don't's</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Certificate management</td>
<td></td>
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<tr>
<td></td>
<td>DNS</td>
<td></td>
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<tr>
<td></td>
<td>Application interactions</td>
<td></td>
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<tr>
<td></td>
<td>Managing environments at scale</td>
<td></td>
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<tr>
<td></td>
<td>Configuration management</td>
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</tr>
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<tr>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>K12</td>
<td>Password management</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Change control process</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Staying current with security advisories (how/where to find them)</td>
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<tr>
<td></td>
<td>Concept of network security should be woven into all other IT courses; take a moment at key points in all curriculum to ask &quot;Is this secure? Why or why not?&quot; and &quot;What would you do you make it more secure?&quot;; add to the class tests these questions, concepts, and elements - build it up, open it up, secure it</td>
<td></td>
</tr>
<tr>
<td>K13</td>
<td>Virtualization Technologies (Network Function Virtualization NFV)</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Includes such topics as installation of server and desktop virtualization solutions, management of virtualization solutions, administer/install/patch/recovery, virtual network and hypervisor configuration and optimization, identify solution. This should also include a high level of cloud.</td>
<td></td>
</tr>
<tr>
<td>K14</td>
<td>Storage Management</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Includes such topics as evaluation of storage architectures such as DAS, SAN, NAS, CAS; understanding backup, recovery, disaster recovery, business continuity, and replication; understanding logical and physical components of an information storage infrastructure, tiered storage</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Understanding what the cloud is, what are public/private cloud services, what is in a hybrid cloud, and what are the challenges and difficulties of using the cloud. Plus also awareness of mashups and API (application programming interface).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Includes such topics as server virtualization as a services desktop virtualization as a services, storage virtualization as a services, I/O virtualization as a services, security in the cloud, awareness of and exposure to different &quot;X as a service&quot; aaS types (differences between them).</td>
<td></td>
</tr>
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| K15 - Soft Skills         | Team building, project management, and time management concepts interwoven into classes likely through projects - ideally, each student has a different job working toward a common goal. (Don't wait until the final capstone to address these.)  
                          | Oral Communication, written communication, leadership, teamwork, appreciation of diversity, conflict management, customer service, work ethic, professionalism, integrity, attention to detail, adaptability, organization, stress management, multi-tasking, problem solving, decision-making, intellectual risk-taking, thoughtful reflection, initiative, creativity, dedication, perseverance, pride in work, numerical and arithmetic application, following directions, information gathering, resource allocation, time management, technology and tool usage, critical thinking, willingness to continue learning, technical writing, presentation | 11                          | 4.00                          |
| K16 - Basic Project Management | Basic understanding of principles including the individual's role in the process, accountability. Specifically, PMLC, ITIL, and SDLC as a framework of understanding                                      | 10                          | 3.91                          |
| K17 - Script Automation and Application Programming Interfaces | Global automation in a single push; writing, executing and debugging (Python, Java, etc). This can be a differentiator: understanding the basics/benefits of combining scripting and API will help students. Open source is one cost/free approach. This is used throughout all of the Ks above. | no votes - new K added       |

### Certifications to Consider

- **C1 - A+ Certification**

  BILT polled - is this certificate important when hiring? 2 voted "yes."
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<tr>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>C2</td>
<td>Network + Certification</td>
<td>BILT polled - is this certificate important when hiring? 1 voted &quot;yes.&quot;</td>
</tr>
<tr>
<td>C3</td>
<td>Linux+ Certification</td>
<td></td>
</tr>
<tr>
<td>C4</td>
<td>Security + Certification</td>
<td>BILT polled - is this certificate important when hiring? 8 voted &quot;yes.&quot;</td>
</tr>
<tr>
<td>C5</td>
<td>CCNA Certification</td>
<td>BILT polled - is this certificate important when hiring? 8 voted &quot;yes.&quot;</td>
</tr>
<tr>
<td>C6</td>
<td>CCNA Voice Certification</td>
<td>Cisco, Avaya, etc</td>
</tr>
<tr>
<td>C7</td>
<td>CCNA Security</td>
<td>BILT polled - is this certificate important when hiring? 6 voted &quot;yes.&quot;</td>
</tr>
<tr>
<td>C8</td>
<td>Wireless Certification CWNA (Enterprise Wireless)</td>
<td>BILT polled - is this certificate important when hiring? 2 voted &quot;yes.&quot;</td>
</tr>
<tr>
<td>C9</td>
<td>Virtualization (VMware, Citrix, Hyper-V)</td>
<td>BILT polled - is this certificate important when hiring? 1 voted &quot;yes.&quot;</td>
</tr>
<tr>
<td>C10</td>
<td>Microsoft Windows 10 Certification (or client OS)</td>
<td></td>
</tr>
<tr>
<td>C11</td>
<td>MCSE Server Administration or equivalent 2012</td>
<td>BILT polled - is this certificate important when hiring? 1 voted &quot;yes.&quot;</td>
</tr>
<tr>
<td>C12</td>
<td>MCSE Active Directory Certification or equivalent 2012</td>
<td>BILT polled - is this certificate important when hiring? 1 voted &quot;yes.&quot;</td>
</tr>
<tr>
<td>C13</td>
<td>EMC Information and Storage Management Certification</td>
<td>BILT polled - is this certificate important when hiring? 1 voted &quot;yes.&quot;</td>
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<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>C14</td>
<td>EMC Cloud Infrastructure and Services</td>
<td></td>
</tr>
</tbody>
</table>

**Acronym Glossary**

- ACL (K11) access control list
- API (K14) application programming interface
- ARP (K6) address resolution protocol
- BILT business and industry leadership team
- CAS (K13) content-addressable storage
- CCNA (Cs 5-7) Cisco Certified Network Associate
- CTE (K6) computer telephony engine
- CWNA (C8) Cisco Wireless Network Administrator
- DAS (K13) direct-attached storage
- DMZ (K11) demilitarized zone, or perimeter network
- DNS (K11) domain name system
- DTE (K6) data terminal equipment
- I/O virtualization (K14) input/output virtualization
- IEEE (K8) Institute of Electrical and Electronics Engineers
- IPSEC (K11) internet protocol security
- IMS (K5) information management system
- ISDN (K7) integrated services for digital network
- ISO (header) International Organizatio for Standardization
- ITIL (header and K17) Information Technology Infrastructure Library
- KPI (K3) key performance indicator
- LAN (K6) local area network
- LTE (K8) long-term evolution (4G wireless)
- MAC (K6) media access control
- MCSE (C11 and C12) Microsoft Certified Solutions Expert

BILT polled - is this certificate important when hiring? 1 voted "yes."
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<tbody>
<tr>
<td>MDM (K10) master data management</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>MPLS (K7) multiprotocol label switching</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>NAS (K13) network-attached storage</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>NICs (K6) network interface controller</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>OSI model (K4) open systems interconnection</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>PMLC (K16)</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>PRI (K7) primary rate interface</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>PSTN (K5) public switch telephone network</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>SAN (K13) storage area network</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>SDN (K4, K7) software-defined networking</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>SDLC (K16) systems development life cycle</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>SIP (K5) session initiation protocol</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>SLA/OLA (K3) service-level agreement, operational-level agreement</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>SSH (K11) secure shell</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>SSL (K11) secure shell</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>VPN (K11) virtual private network</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>WAN (K7) wide area network</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>WAP (K6) wireless access point</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Web RTC (K5) real time communications</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>WLANs (K8) wireless local area network</td>
<td></td>
<td>1</td>
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</tbody>
</table>
INSTRUCTIONS:
Please circle the appropriate number (1, 2, 3, 4) on the Performance Criteria Analysis (PCAL) List provided for every performance criteria statement (PCS) you expect of an entry level employee. Please cross any PCS off the list that you do not expect of an entry level employee.

IMPORTANCE  (How important is it for entry level employees to know or do the PCS?)

4 = Highest  Much higher priority than other PCSs on the list. CRUCIAL and highest priority. Inadequate knowledge or performance of PCS would adversely impact quality or safety of products/services.
3 = High Somewhat higher priority than other PCSs on the list. Inadequate knowledge or performance of PCS might adversely impact quality or safety of products/services to some degree.
2 = Low Somewhat lower priority than other PCSs on the list. Inadequate performance of PCS may not directly impact quality or safety of products/services.
1 = Lowest Much lower priority than other PCSs on the list. Inadequate performance of PCS would not have a direct impact on quality or safety of products/services, but must be performed.

LEVEL  (How good is good enough for entry level employees to know or do the PCS?)

4 = Highest Can recall and apply complex facts and principles and resolve problems. Can evaluate conditions and make proper decisions using complex facts and principles. Can do all elements of PCS quickly and accurately with no supervision.
3 = High Can recall and apply many facts and principles to different situations. Can analyze facts and principles and draw some appropriate conclusions. Can do all elements of PCS. Only needs spot checks of work.
2 = Low Can recall some facts and principles. Can state general principles about the subject. Can do many elements of the PCS but requires help on the hardest parts.
1 = Lowest Can recognize only simple facts and terms. Can do only simple parts of PCS and must be closely supervised.

TIME SPENT  (How frequently are entry level employees expected to know or do the PCS?)

4 = Highest Spends much more time doing this than most other PCSs on the list.
3 = High Spends a little more time doing this than other PCSs on the list.
2 = Low Spends somewhat less time doing this than other PCSs on the list.
1 = Lowest Spends much less time doing this than other PCSs on the list.

DIFFICULTY  (How difficult is it for entry level employees to know or do the PCS?)

4 = Highest Much more difficult to learn and perform than other PCSs on list.
3 = High Somewhat more difficult to learn and perform than other PCSs on list.
2 = Low Somewhat easier to learn and perform than other PCSs on list.
1 = Lowest Much easier to learn and perform than other PCSs on the list.

Performance Criteria Analysis (PCAL) is a registered title for a process developed by Richland College, Dallas, Texas, to systematically identify skills that students need to be successful.
BILT MEETING CHECKLIST

Done To Do

☐ ☐ Determine which businesses, industries, agencies, non-profits, and universities should be added to your BILT.

☐ ☐ Establish specific expectations for your BILT.

☐ ☐ Decide on minimum BILT member commitments and options.

☐ ☐ Create your sales pitch.

☐ ☐ Contact potential BILT members and invite them to participate.

☐ ☐ Ensure you add one new BILT member per quarter to keep it fresh.

☐ ☐ Schedule your meeting and book a room.

☐ ☐ Six weeks out from your meeting, send a “Save the Date” notice.

☐ ☐ Send out invitations and track RSVPs.

☐ ☐ Plan simple meeting refreshments.

☐ ☐ Make conference call and/or webinar screen-sharing arrangements for those who cannot be there face-to-face.

☐ ☐ Prepare meetings handouts and/or presentations.

☐ ☐ At the meeting, thank the BILT for participating and go over any meeting guidelines.

☐ ☐ Have a plan for recognizing the BILT through media/press, letters, or certificates.

☐ ☐ Once a year, call each member to check in and get feedback. You need to know what’s in it for them.
“LEADERSHIP ACADEMY” DAILY TAKE AWAYS

This exercise will help with the completion of your action plans on Friday. Please write down below the three strategies, best practices, and/or suggestions that made an impression on you on this day.

1. 

2. 

3. 
Chapter 5
Developing Performance-Based Instruction

There are numerous excellent texts and manuals available on the subject of developing curriculum. There would be no added value in us addressing that subject in general. Therefore, we have limited the contents of this chapter primarily to how PCAL data can be utilized to enhance the development of instruction.

Performance-Based Instruction

The term, performance-based instruction, may not be recognized by all. There are several other terms that have been used to mean essentially the same thing; for example, Criterion Referenced Instruction (CRI), Outcome Based Education (OBE), Competency Based Education (CBE), and Competency Based Instruction (CBI). So what do these similar terms really mean?

They all focus on behavioral statements that describe something that an educator can observe and measure to verify success of the student. Student progress is based on mastery of specified objectives rather than class attendance and passing tests. These objectives may be referred to by a variety of names, such as outcomes, competencies, or performance criteria. All of them contain, as a minimum, a behavioral statement with an active voice, present tense verb and object.

The Performance Criteria Statements (PCSs) in the PCAL are written in the same way. See the Sample Draft PCAL in Appendix D for examples of PCSs.

Steps in Curriculum Development

1. The instructional designers have been doing most of the work prior to this step in the process. At this point the faculty SMEs should take on most of the responsibility and rely on the instructional designers for advice and assistance only. The faculty SMEs develop a list of proposed courses or modules. This should be based on a careful review of the PCAL data along with a review of existing programs that are successful. In colleges there are certain requirements of accreditation and state agencies that must also be considered.

2. Develop a validation crosswalk form (see instructions and sample Curriculum Crosswalk - Appendix E). List all the PCAL skills that were validated by the focus group on the vertical axis of the matrix. List the potential or actual courses on the horizontal axis of the matrix.

3. Conduct the validation crosswalk. This is one of the most critical parts of the development process. The validation crosswalk is an effective method that will automatically reveal if there are certain problems in the curriculum design. Faculty SMEs should place Xs (or numbers for proficiency level) in appropriate boxes to indicate in which courses each
performance criteria statement (PCS) will be covered. You may use numbers to represent
the level to which each PCS is taught in different courses, which would be more difficult to
do but would provide more valuable information. Remember that by the end of every
instructional program, every PCS must be taught to the level of proficiency identified in the
PCAL.

When all the Xs or numbers have been placed appropriately, it becomes very obvious if
some courses have too few or too many PCSs to accomplish in the allotted time. If too
many PCSs are listed for one course or module, a choice must be made. The three possible
choices are: to increase the length of the course or module, to move some of the PCSs to
other courses or modules, or to eliminate some of them. Conversely if a proposed course or
module has too few PCSs listed, the choices are: to move them to other courses or modules,
to combine two similar courses or modules with only a few PCSs, to make a very short
course or module, or to eliminate that course or module.

The decisions mentioned above are not often easy to make. The data that was obtained in
the PCAL validation can help you make those difficult decisions about what to do with
performance criteria statements.

4. Write course descriptions. Course descriptions should be based on the PCSs assigned to
each course in the Curriculum Validation Crosswalk.

5. Develop Objectives. This is a topic that could take an entire book. Since there are many
excellent texts on the subject, we will focus only on how the PCAL data can be used in
constructing objectives. Remember, behavioral objectives contain three elements: a
statement of behavior (something observable and measurable), a standard of how good is
good enough to demonstrate mastery, and a condition in which the behavior is performed.
Each PCAL performance criteria statement (PCS) provides the first two elements. Each
PCS is written as a behavior statement and can be the root of a behavioral objective, as is.
The standard is easily interpreted from the Proficiency Level column for each PCS. Using
the average proficiency level rating identified in the validation meeting and the PCAL Rating
Scale you can easily determine what the standard should be for the objective. The only thing
that is not in the PCAL data is the condition element of the objective. It takes a faculty
subject matter expert to determine in what conditions to observe and measure each behavior
in a learning environment. Condition statements may be things like:
   • “Given a calculator . . .”
   • “Without reference material . . .”
   • “Given an equipment trainer with appropriate malfunctions programmed in . . .”
   • “Given a realistic scenario . . .”
   • “Given a schematic . . .”

6. Prepare and submit documentation for program approval. This will involve different forms
and bureaucratic procedures depending on the college/corporate state requirements. The
P-BID Checklist in the Appendix A lists steps Richland College follows to get new programs approved by our college district and state agencies.

7. File program documentation. Training divisions should have as much of the data as they want and will use, but should not be relied on for future reference. It is surprising how many requests for information we receive years after a new program has been approved and implemented. We suggest maintaining archive records of all P-BID projects for at least five years in a central location.

How To Use All That Validation Data

Remember that for every performance criteria statement (PCS) the SMEs validate, they make four important ratings. They rate the importance, proficiency level, frequency, and difficulty for each PCS. If you had 150 PCSs and 10 participants in the Validation Meeting, you will now have 6,000 data items (150 PCSs * 4 criteria * 10 participants = 6,000).

That much data can be overwhelming; therefore, we average the ratings and create a summary column. The detail data is available but is only utilized when the summary data raises a question. Anyone who knows anything about statistics will undoubtedly point out that an average without other data can be misleading. That is true but we have found that most faculty prefer not to get too complex. Since the college target audience for this data is faculty SMEs who will use it for curriculum decisions, we usually do not calculate things like the standard deviation, mean, mode, and range.

We summarize all the ratings for each PCS and average them. For example, consider the PCS below. For sake of simplicity let's assume there were only four SMEs participating in the validation.

<table>
<thead>
<tr>
<th>Performance Criteria</th>
<th>Group Participants</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintain safety shields on equipment</td>
<td>1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>Ratings</td>
<td></td>
<td></td>
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<tr>
<td>Importance</td>
<td>4 4 4 4</td>
<td>4.0</td>
</tr>
<tr>
<td>Proficiency Level</td>
<td>2 2 2 3</td>
<td>2.3</td>
</tr>
<tr>
<td>Frequency</td>
<td>1 1 2 2</td>
<td>1.5</td>
</tr>
<tr>
<td>Difficulty</td>
<td>1 2 1 1</td>
<td>1.3</td>
</tr>
</tbody>
</table>

**Importance Rating:** In the above real world example the SMEs agree that this task is very important because they gave it a rating of 4 on a scale of 1 to 4. To interpret the meaning of the ratings you need to refer to the Rating Scale in Appendix D. The average rating (4.0) means that the SMEs consider it much higher in importance than other PCSs on the list. Perhaps an individual’s failure to do the task correctly would lead to dangerous work conditions. So what can curriculum developers learn from the importance rating on this PCS? They can see that SMEs
who participated in the validation believe this is a very important skill for entry level workers, so the curriculum developers will ensure that it is adequately covered in the class.

**Proficiency Level Rating**: Notice that the average SME rating for the proficiency level on this PCS is only 2.3. In fact, 75% of the validation group participants only gave it a rating of 2, which is a low proficiency rating. That means they expect an entry level worker to be able to do many elements of the PCS and may require help. What difference does this make in training decisions? Obviously this information determines to what level of competence a curriculum needs to develop students.

**Frequency/Time Spent**: The average rating is 1.5 on this PCS. In other words, the SMEs have indicated that this is something that is done infrequently. What difference does that make in training decisions? By itself the frequency rating is almost meaningless; however, when it is coupled with the other data, it becomes more meaningful. This is true of all of this data. It is not meant to be used in isolation. It is meant to provide a broad perspective for making training decisions. See discussion that follows.

**Difficulty**: The average SME rating concerning how difficult it is to learn this PCS is 1.3. They are in agreement that this PC is not difficult to learn. In fact, 75% of the validation participants rate it as “Much easier to learn and perform than other PCSs on the list.” How should a curriculum developer use this information? This indicates that it will not be difficult or time consuming to teach students this PCS in class; however, as mentioned earlier, this data should not be used in isolation. It should be considered along with the other data. See the discussion that follows.

**Should the curriculum include this PCS?** Let’s look at the entire data picture for the PCS. There is no doubt that this PCS is very important for entry level workers to perform because of safety implications. However, it is very easy to learn, and it may be on equipment that a college would not have for training purposes. Therefore, a decision would have to be made by the faculty SMEs concerning whether or not this should be taught in the college classroom/lab or left up to an employer to provide training. If this PCS is taught in a college class, it may have to be taught on something that is not the same equipment as the employee would use on the job, but would be representative of such equipment in the workplace. Other information would have to be considered in this case. Is the curriculum already so full that it is nearly impossible to accomplish everything in a two year period? If so, something may have to be omitted. This might be a likely candidate for deletion from the college curriculum; however, a better candidate for deletion may be a PCS that is rated low in importance, proficiency, and difficulty. On the other hand, if there is plenty of time to include all the PCs, than the only question is whether it can be accomplished to a high enough level of proficiency on equipment the college has available. If the college does not have appropriate equipment, than maybe it can be taught through simulation, slides, or video. These are all decisions the faculty SMEs can make more wisely if they utilize all the PCAL data available.
Sometimes we use an algorithm to calculate a rank ordering of skills based on weighted factors. With this algorithm we are able to sort the skills with the ones that should receive highest priority for curriculum decisions on top. We do this by giving Importance a weighting factor of four and Difficulty a weighting factor of 2. The reasons may not be obvious and the formula certainly is not fool-proof, but it helps organize the data to some extent. The algorithm we use is \[
\frac{(#\text{of respondents to a skill} \times \text{total # of respondents})}{0.25} + \text{Importance} \times 4 + \text{Proficiency} + \text{Frequency} + \text{Difficulty} \times 2 \bigg) / 8.
\]

**Making It All Work**

The most important components of any process or model are the competence and professionalism of the practitioners using it. The PCAL Process, like any other, can be misapplied and result in erroneous and misleading data. However, we have experienced many successes using this process and we are hearing from a growing body of practitioners who are using it successfully. We wish the best to all who choose to use it and want to make it clear that the only reason the process is copyrighted is to protect ourselves and the reputation of the process.
CROSSWALK INSTRUCTIONS

1. Using the vertical column on the left, fill in with knowledge/skill statements from the Performance Criteria Analysis.

2. Fill-in the course/module identifications in the boxes across the top.

3. Place X's (or proficiency levels) in appropriate boxes to indicate in which course/module the knowledge/skill will be taught.

4. Consider whether any tasks should be omitted because:
   
   a) There is insufficient time in the program, and task is rated low in importance, difficulty, proficiency, or frequency.
   
   b) Targeted students should enter the program with this skill/knowledge.

5. Are there gaps in the curriculum because a task has not been:
   
   a) Included in any course/module?
   
   b) Taught to the expected exit proficiency level?

6. Are new courses/modules required?

7. Are there redundancies in knowledge/skills that are:
   
   a) Taught in more than one course/module?
   
   b) Taught to the same level of proficiency in more than one course/module?

8. Are there courses/modules that don’t have enough competencies?
   
   a) Need to delete them?
   
   b) Need to combine courses/modules?
<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>M</th>
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<tr>
<td>2</td>
<td></td>
<td>CTC National Business and Industry Leadership Team Knowledge Domains</td>
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<td>How will you address the gap?</td>
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<td>3</td>
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