



Austin Competency Analysis Profile

Database Development and Administration

Conducted

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Validation Panel

Kevin A. Harris, Independent Consultant
Austin, Texas

Greg Morrow, Database Administrator
Texas Health and Human Services Commission, Austin, Texas

Richard Jaeschke, Automation Manager
Texas Department of Health, Austin, Texas

Agustin Gonzalez-Tuchmann, Ph.D., Software Architect
Datajunction Corporation, Austin, Texas

Weizhen Bao, Systems Analyst/Automation Manager
Texas Department of Health, Austin, Texas

Jorge F. Garza, Sr., Software Developer and Database Architect
Austin, Texas

Ken Peterson, Senior Programmer
Texas Department of Public Safety, Austin, Texas

Jim Lyons, Operation Systems Specialist
University of Texas, Austin, Texas

Carmen Rusu, Database Administrator V
Austin, Texas

Ranleigh Hirsh, Senior Computer Scientist
Computer Sciences Corporation, Austin, Texas

Facilitated by:

Teresa S. Moore and Lynn Persyn Schmitz
Curriculum Development Specialists/Job Profilers
Austin Community College, Austin, Texas



ACC Database Development and
Administration ACAP
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Preface

Austin Community College would like to express our sincere appreciation to our business, industry, labor, and community partners who donated their time and expertise toward the identification and validation of competencies in the following Austin Competency Analysis Profile.

Introduction

The ACAP (Austin Competency Analysis Profile) initiative comes out of the Curriculum Development Office of Instructional Technology and Faculty Development at Austin Community College. This initiative is ACC's primary source for Competency-Based Curriculum development, providing a connection between our academic and workforce programs and the needs of business and industry.

The ACAP is a process for analyzing an occupation to develop curriculum. The product is a competency list, employability skills, and academic skill levels that have been developed and validated by subject matter experts who perform the occupation. This list will be used to develop programs that address the needs of business and industry by equipping our students with the entry skills required in a workplace environment.

A CAP Process Overview

What are Austin Competency Analysis Profiles (ACAPs)?

Austin Competency Analysis Profiles (ACAPs) are competency lists for academic and workforce programs verified by expert workers, or Subject Matter Experts. These lists evolve from a well-established job analysis process involving business, industry, labor, and community agency representatives from throughout the Austin area.

How is an Austin Competency Analysis Profile used?

Each ACAP identifies the occupational, academic, and employability skills (or competencies) needed to enter a given occupation or occupational area. The ACAP not only lists the competencies but also clusters those competencies into broader units and details the knowledge, skills, and attitudes (competency builders) needed to perform each competency.

Within the competency list are two levels of items: core and advancing. Core items, which are essential for entry-level employment, are required to be taught—only the concept of advancing items will be introduced to students. Advancing items are those needed beyond entry level in a given occupation, and are designated as “Advanced.” If core competencies or competency builders are present in an “Advanced” unit, then they are designated as “Core.”

Educational institutions may add as many units, competencies, and/or competency builders as desired to reflect local employment needs, trends, and specialties. Local advisory committees are actively involved in the identification and verification of additional items. Faculty members formulate their courses of study using the varied contents of the ACAP. Faculty also monitor gains using many forms of assessment.

Target Job Titles

ACAP: Database Development and Administration

Database Administrator
Programmer
Data Analyst
Business Analyst
Administrative Technician
Database Developer

Occupational Competencies

The following Occupational Competencies have been identified and verified by a panel of subject matter experts currently employed in the field of Database Development and Administration. This panel of experts has determined that these skills will adequately prepare students for *entry level* positions in this field. The *Competencies* are grouped into units. *Competency Builders* are included to help identify the knowledge, skills and attitudes students need to perform each competency. These *Competencies* and *Competency Builders* are designed to be the basis for curriculum development to ensure business and industry input that is relative and meaningful to the workplace. These *Competencies* are intended to include all basic, necessary skills for this occupational area, but may be supplemented with additional competencies as faculty and advisory committee members see the need to do so.

Key Terms:

Competency—an observable and measurable behavior that has a definite beginning and end; can be performed within a limited amount of time; consists of two or more competency builders; and leads to a product, service, or decision.

Competency Builders—the skills, knowledge, and attitudes (written in measurable terms) needed to perform a given competency.

Entry Level—position of employment that requires no previous experience, but may require some training and/or specific skills, knowledge, or attitudes.

ACAP: Database Development and Administration

Unit 1	Analyze Requirements and Design Database
Unit 2	Develop and Implement Database
Unit 3	Perform Administration and Maintenance
Unit 4	Perform Security Administration
Unit 5	Provide Client Services

Source: *Building a Foundation for Tomorrow: Skill Standards for Information Technology*. The Millennium Edition. National Workforce Center for Emerging Technologies, through Bellevue Community College. Bellevue, WA: Bellevue Community College Printing Services, 1999.

Unit 1 Analyze Requirements and Design Database

Competency 1.1 Analyze requirements and perform research

Competency Builders:

- 1.1.1 Identify the business objectives and goals for the project with stakeholders
- 1.1.2 Document business/technical requirements (including third party tools, hardware and software)
- 1.1.3 Review documentation with stakeholders for approval/agreement
- 1.1.4 Complete the gathering of information necessary for the project accurately and free of conflicting requirements
- 1.1.5 Document final set of requirements in an accurate, complete and succinct form
- 1.1.6 Present complete final set of requirements to stakeholders to attain approval

Competency 1.2 Create and refine conceptual and logical data models

Competency Builders:

- 1.2.1 Document conceptual model accurately and completely
- 1.2.2 Identify entities, attributes and relationships in a complete and accurate form within scope
- 1.2.3 Define entities attributes, and relationships in a complete and accurate form within scope
- 1.2.4 Construct conceptual model using a modeling tool
- 1.2.5 Consult clients/users during conceptual data modeling process as appropriate

Competency 1.3 Create and refine the logical data model

Competency Builders:

- 1.3.1 Construct logical model based on conceptual model
- 1.3.2 Select identifiers including primary and foreign keys
- 1.3.3 Document identifiers, primary and foreign keys
- 1.3.4 Apply normalization techniques to achieve at least 3rd Normal Form

Competency 1.4 Determine high-level business rules for data model

Competency Builders:

- 1.4.1 Identify/Define pertinent business rules during modeling
- 1.4.2 Document high-level business rules
- 1.4.3 Define data ownership clearly
- 1.4.4 Develop data definitions fully
- 1.4.5 Ensure agreement upon data definitions in accordance with company procedures
- 1.4.6 Integrate high-level business rules within the data model
- 1.4.7 Identify validation rules in documentation

Competency 1.5 Integrate data models to enterprise model

Competency Builders:

- 1.5.1 Ensure consistency with enterprise model in conceptual and logical data models
- 1.5.2 Consider possible adaptations of enterprise model
- 1.5.3 Follow company data and objects standards and standardization policies thoroughly
- 1.5.4 Apply Denormalization techniques to ensure adequate performance

Competency 1.6 Validate conceptual and logical data models with clients

Competency Builders:

- 1.6.1 Present data model clearly and completely
- 1.6.2 Secure approval as appropriate
- 1.6.3 Resolve issues
- 1.6.4 Feed back recommendations into the modeling process
- 1.6.5 Reconcile conceptual and logical models with appropriate level process models
- 1.6.6 Secure client validation of conceptual and logical data models
- 1.6.7 Document all changes or modifications to all models and validation process and outcomes accurately, concisely and completely
- 1.6.8 Validate data ownership and reuse properly

Competency 1.7 Determine target environment/platform

Competency Builders:

- 1.7.1 Research available options
- 1.7.2 Analyze available options
- 1.7.3 Document research and analysis of available options
- 1.7.4 Base decisions on technical and business information, resources and strategies
- 1.7.5 Secure agreement by key people for target environment/platform
- 1.7.6 Select database technology properly
- 1.7.7 Review platforms and environments for options and recommendations
- 1.7.8 Communicate options and recommendations effectively to appropriate personnel

Competency 1.8 Design distributed model

Competency Builders:

- 1.8.1 Supply each site with the appropriate datasets
- 1.8.2 Assure site autonomy
- 1.8.3 Ensure replication remains consistent
- 1.8.4 Ensure seamless access to fragments
- 1.8.5 Meet client/user needs with accuracy of data and response
- 1.8.6 Meet security concerns with distribution model

Unit 2 Develop and Implement Database

Competency 2.1 Develop physical database characteristics

Competency Builders:

- 2.1.1 Follow naming conventions in table and file names
- 2.1.2 Use consistent data types between attributes
- 2.1.3 Reconcile physical design according to logical design
- 2.1.4 Define relationships throughout the database structure
- 2.1.5 Document physical database model

Competency 2.2 Identify access and concurrency requirements

Competency Builders:

- 2.2.1 Ensure requirements are specific to database in documentation
- 2.2.2 Include input, output and volume of every user view in access requirements
- 2.2.3 Integrate access plan with backup and recovery plan
- 2.2.4 Categorize user views by type of transaction
- 2.2.5 Document access to date by type of access
- 2.2.6 Select record locking mechanism that provides maximum data integrity and acceptable performance
- 2.2.7 Examine locking alternatives
- 2.2.8 Analyze locking alternatives
- 2.2.9 Document locking alternatives
- 2.2.10 Document locking granularity
- 2.2.11 Justify locking granularity
- 2.2.12 Consult users appropriately regarding access and concurrency procedures
- 2.2.13 Educate users regarding access and concurrency procedures

Competency 2.3 Identify backup and recovery requirements

Competency Builders:

- 2.3.1 Identify backup and recovery requirements that are consistent with corporate policy and business needs
- 2.3.2 Ensure that requirements are specific to database in documentation
- 2.3.3 Consult users appropriately
- 2.3.4 Educate users regarding backup and recovery methods

Competency 2.4 Create database

Competency Builders:

- 2.4.1 Create database
- 2.4.2 Apply best practices and/or company procedures when creating database
- 2.4.3 Meet user requirements and usability specifications in database

Competency 2.5 Develop and validate database implementation plan

Competency Builders:

- 2.5.1 Involve key team members in implementation plan development
- 2.5.2 Complete database implementation in a timely manner
- 2.5.3 Consult clients/users as required
- 2.5.4 Meet user specifications and timeline in implementation plan
- 2.5.5 Implement transition plan with minimal impact on overall productivity

Competency 2.6 Populate database

Competency Builders:

- 2.6.1 Enter data completely and accurately
- 2.6.2 Convert data completely and accurately
- 2.6.3 Use third-party vendors to solve problems when applicable
- 2.6.4 Inform users of new database content

Competency 2.7 Implement high-level business rules

Competency Builders:

- 2.7.1 Implement database triggers and procedures to reflect business rules
- 2.7.2 Support high-level business rules in database code

Competency 2.8 Test database

Competency Builders:

- 2.8.1 Complete acceptance testing and regression testing
- 2.8.2 Benchmark in accordance with requirements
- 2.8.3 Test components systematically and thoroughly
- 2.8.4 Follow company guidelines in testing methods
- 2.8.5 Document testing process
- 2.8.6 Complete testing according to schedule
- 2.8.7 Identify technical issues
- 2.8.8 Resolve technical issues

Competency 2.9 Deploy database into production

Competency Builders:

- 2.9.1 Answer user questions about conversion completely and professionally
- 2.9.2 Ensure that new database management system is fully operational
- 2.9.3 Ensure users have proper access to data
- 2.9.4 Ensure accessibility to database through the network where applicable
- 2.9.5 Conduct post-implementation reviews thoroughly in accordance with company procedures
- 2.9.6 Document nonpressing issues for next design upgrade

Competency 2.10 Produce business and technical documents

Competency Builders:

- 2.10.1 Document business and technical aspects accurately and completely
- 2.10.2 Meet user requirements in documents
- 2.10.3 Create documents according to company procedures
- 2.10.4 Store documents according to company procedures
- 2.10.5 Distribute documents according to company procedures
- 2.10.6 Update and disseminate documents as needed

Unit 3 Perform Administration and Maintenance

Competency 3.1 Develop Requirements for Performance

Competency Builders:

- 3.1.1 Establish performance goals
- 3.1.2 Validate goals against current hardware and software capability
- 3.1.3 Educate stakeholders about performance goals
- 3.1.4 Validate performance goals with stakeholders

Competency 3.2 Develop Monitoring Plan

Competency Builders:

- 3.2.1 Identify performance measurement goals
- 3.2.2 Identify additional hardware or software requirements for monitoring
- 3.2.3 Secure agreement with stakeholders on additional hardware and software
- 3.2.4 Create monitoring plan

Competency 3.3 Analyze monitoring data

Competency Builders:

- 3.3.1 Identify problem areas
- 3.3.2 Implement solutions in a timely manner with minimal disruption to productivity
- 3.3.3 Document error, performance and availability metrics accurately so that a trend of ongoing improvement is demonstrated

Competency 3.4 Manage backup and recovery plan

Competency Builders:

- 3.4.1 Document on-site and off-site storage requirements per Backup and Recovery Plan
- 3.4.2 Implement backup procedures on a regular schedule according to plan
- 3.4.3 Resolve unforeseen outages and data loss effectively
- 3.4.4 Conduct disaster recovery test per disaster recovery plan
- 3.4.5 Conduct periodic recovery tests
- 3.4.6 Improve backup recovery plan per outages and incident reports

Competency 3.5 Create and implement maintenance plan

Competency Builders:

- 3.5.1 Document procedures for updates and upgrades in maintenance plan
- 3.5.2 Check database integrity according to plan
- 3.5.3 Secure agreement for correcting integrity problems
- 3.5.4 Identify integrity correction procedures

Competency 3.6 Maintain physical organization of database objects

Competency Builders:

- 3.6.1 Address fragmentation of database in a timely manner
- 3.6.2 Measure integrity errors
- 3.6.3 Document integrity errors
- 3.6.4 Ensure a trend of improvement in integrity errors
- 3.6.5 Update database organization as necessary
- 3.6.6 Measure index usage
- 3.6.7 Document changes

Competency 3.7 Apply software upgrades and fixes

Competency Builders:

- 3.7.1 Plan and communicate upgrades and fixes to test platform
- 3.7.2 Apply upgrades and fixes to production platform
- 3.7.3 Retire production system after upgrade
- 3.7.4 Evaluate costs and benefits to clients and business in software upgrade selection
- 3.7.5 Develop and upgrade backout plan
- 3.7.6 Document all upgrades and fixes

Competency 3.8 Plan and manage resource requirements

Competency Builders:

- 3.8.1 Define resource requirements as appropriate to performance goals (CPU, memory, disc space)
- 3.8.2 Risk analysis (hardware failure)
- 3.8.3 Optimize utilization
- 3.8.4 Measure resource usage
- 3.8.5 Document usage and report trends

Competency 3.9 Administer and enforce standards

Competency Builders:

- 3.9.1 Identify system and data standards
- 3.9.2 Ensure agreement upon standards by applications design groups
- 3.9.3 Document standards clearly in a readily accessible form
- 3.9.4 Educate clients and users regarding the standards

- 3.9.5 Review data, process, procedures and environment configuration to comply with standards
- 3.9.6 Use automated controls whenever possible

Competency 3.10 Audit database systems

Competency Builders:

- 3.10.1 Determine what needs to be audited
- 3.10.2 Communicate with stakeholders
- 3.10.3 Identify existing tools for auditing
- 3.10.4 Identify external auditing tools
- 3.10.5 Secure acquisition of external tools
- 3.10.6 Perform audit
- 3.10.7 Document audit plan and results
- 3.10.8 Present audit results and trends to stakeholders

Unit 4 Perform Security Administration

Competency 4.1 Gather and document security requirements

Competency Builders:

- 4.1.1 Derive security requirements from system requirements and specifications
- 4.1.2 Address security concerns of all participants
- 4.1.3 Identify/resolve potential security risks
- 4.1.4 Document security requirements
- 4.1.5 Present security requirements for review and approval to appropriate authorities

Competency 4.2 Design and document security plan

Competency Builders:

- 4.2.1 Analyze strategies
- 4.2.2 Select security design and features to meet client, user and business needs
- 4.2.3 Develop security plan
- 4.2.4 Ensure security plan is accessible to appropriate personnel/administrators

Competency 4.3 Implement and enforce security requirements

Competency Builders:

- 4.3.1 Identify levels of access and security clearly
- 4.3.2 Standardize levels of access and security
- 4.3.3 Communicate levels of access and security
- 4.3.4 Consider overall plan in implementation and enforcing security requirements
- 4.3.5 Minimize unauthorized access with implementation of security measures
- 4.3.6 Address security tradeoffs and risks in implementation of security
- 4.3.7 Notify users about changes in their security access in accordance with company procedures
- 4.3.8 Audit accounts properly to determine that security requirements are being met

- 4.3.9 Identify security breaches
- 4.3.10 Communicate security breaches to appropriate personnel effectively

Competency 4.4 Maintain and improve security in response to industry developments and user experience

Competency Builders:

- 4.4.1 Analyze user input and practices to assess security issues
- 4.4.2 Document user input and practices to assess security issues
- 4.4.3 Train users in security awareness to provide continuous improvement
- 4.4.4 Forecast security needs
- 4.4.5 Incorporate forecasts in recommendations for system upgrades and/or redesign
- 4.4.6 Monitor industry and technology trends
- 4.4.7 Incorporate trends to support system security

Unit 5 Develop Database Applications and User Support

Competency 5.1 Support application development

Competency Builders:

- 5.1.1 Communicate and enforce database application methodology and technique
- 5.1.2 Enforce change management
- 5.1.3 Implement solutions that improve functionality/performance

Competency 5.2 Provide application programmer training

Competency Builders:

- 5.2.1 Design training to meet programmer needs, such as coding SQL
- 5.2.2 Develop training materials for programmer
- 5.2.3 Conduct programmer training classes
- 5.2.4 Get feedback from attendees for future classes

Competency 5.3 Design and implement applications

Competency Builders:

- 5.3.1 Design applications using application design tools
- 5.3.2 Use the conceptual, logical, and physical models as the basis of the design
- 5.3.3 Incorporate good database application techniques such as stored procedures, user developed functions, and triggers in the design
- 5.3.4 Translate the application design into a completed, efficient application
- 5.3.5 Test the application
- 5.3.6 Document the application
- 5.3.7 Put the application into production

Competency 5.4 Maintain applications

Competency Builders:

- 5.4.1 Monitor applications including end-user feedback
- 5.4.2 Design and make changes where necessary
- 5.4.3 Document changes made

Unit 6 Provide End-User Support

Competency 6.1 Determine end-user functions within the system

Competency Builders:

- 6.1.1 Describe end-user utilization of the applications
- 6.1.2 Document end-user utilization
- 6.1.3 Provide documentation to end-user
- 6.1.4 Set up end-user support

Competency 6.2 Plan user training

Competency Builders:

- 6.2.1 Design training to meet end-user needs
- 6.2.2 Assess end user skill levels
- 6.2.3 Develop training materials to meet end-user specifications

Competency 6.3 Deliver end-user training

Competency Builders:

- 6.3.1 Schedule end-user training sessions
- 6.3.2 Conduct end-user training sessions according to client/user plan
- 6.3.3 Present training sessions in a clear, concise and user-friendly manner
- 6.3.4 Gather feedback to determine additional training and support needs

Competency 6.4 Develop change management strategies

Competency Builders:

- 6.4.1 Meet evolving user needs in additional requirements
- 6.4.2 Document new requirements
- 6.4.3 Compare new requirements to current specifications
- 6.4.4 Identify new transactional needs
- 6.4.5 Incorporate new transactional needs

Competency 6.5 Adapt existing structure to new business environments (advanced competency)

Competency Builders:

- 6.5.1 Assess current database for ability to support changes
- 6.5.2 Analyze upgrade schedules
- 6.5.3 Forecast upgrade schedules
- 6.5.4 Evaluate/update client services and vendor reviews continually
- 6.5.5 Conduct cost/benefit, ROI and risk analysis to support recommendations
- 6.5.6 Educate client/users regarding requirements, technology and tools

Employability Competencies

Employability Competencies are underlying skills, including work habits and ethics, essential to the workplace and personal growth. SCANS (Secretary's Commission on Achieving Necessary Skills) are the basis for these competencies and are included in all programs based on an ACAP (Austin Competency Analysis Profile). These skills are taught with the intention of providing the student with a well-rounded understanding of workplace expectations in areas not specific to a particular occupation, in an attempt to develop a valuable employee.

ACAP: Database Development and Administration

Unit 1:	Resources
Unit 2:	Interpersonal
Unit 3:	Information
Unit 4:	Systems
Unit 5:	Technology
Unit 6:	Basic Skills
Unit 7:	Thinking Skills
Unit 8:	Personal Qualities

Unit 1: Resources

Competency 1.1 Manage time effectively

Competency Builders:

- 1.1.1 Select relevant, goal-related activities.
- 1.1.2 Rank activities in order of importance.
- 1.1.3 Allocate time to activities
- 1.1.4 Identify tasks to be completed
- 1.1.5 Develop and follow an effective, workable schedule based on accurate estimates of such things as importance of tasks, time to complete tasks, time available for completion, and task deadlines, without wasting time
- 1.1.6 Identify possible impact of schedules on other activities
- 1.1.7 Evaluate and adjust a schedule

Competency 1.2 Manage money effectively

Competency Builders:

- 1.2.1 Prepare or use budgets including making cost and revenue forecasts
- 1.2.2 Record details to track budget performance.
- 1.2.3 Adjust budget appropriately when needed.
- 1.2.4 Allocate money to include accurately preparing and using a budget according to a consistent and orderly accounting method
- 1.2.5 Calculate future budgetary needs based on projected costs and revenues
- 1.2.6 Track the extent to which actual costs and revenues differ from the estimated budget, and take appropriate and effective action

Competency 1.3 Manage material and facility resources effectively

Competency Builders:

- 1.3.1 Store resources such as materials, supplies, parts, equipment, space or final products in an order that makes the best use of them
- 1.3.2 Allocate materials and facility resources to include carefully planning the steps involved in the acquisition, storage, and distribution of resources
- 1.3.3 Acquire, transport, and store material and facility resources safely and efficiently
- 1.3.4 Maintain material and facility resources in good condition
- 1.3.5 Distribute material and resources to the end user

Competency 1.4 Manage human resources efficiently

Competency Builders:

- 1.4.1 Assess people's knowledge, skills and potential
- 1.4.2 Identify present and future work load
- 1.4.3 Match individual talents and workload effectively

- 1.4.4 Monitor performance and provide feedback actively

Unit 2: Interpersonal Skills

Competency 2.1 Participate as a member of a team

Competency Builders:

- 2.1.1 Work cooperatively with others
- 2.1.2 Contribute to group with ideas, suggestions, and efforts
- 2.1.3 Complete personal share of tasks necessary to complete a project
- 2.1.4 Encourage team members by listening and responding appropriately to their contributions
- 2.1.5 Build on individual team members' strengths
- 2.1.6 Resolve differences for the benefit of the team
- 2.1.7 Take personal responsibility for accomplishing goals
- 2.1.8 Challenge existing procedures, policies, or authorities responsibly

Competency 2.2 Teach others

Competency Builders:

- 2.2.1 Coach or otherwise teach others to apply related concepts and theories to tasks
- 2.2.2 Convey job information to allow others to see its applicability and relevance to tasks
- 2.2.3 Identify training needs of others
- 2.2.4 Assess performance of others
- 2.2.3 Provide feedback on others' performance in a constructive manner
- 2.2.4 Provide solutions to observed problems.

Competency 2.3 Serve clients/customers

Competency Builders:

- 2.3.1 Identify customers/clients expectations through surveys, questions, body language, or expressions.
- 2.3.2 Communicate and work with clients/customers to satisfy their expectations
- 2.3.3 Listen actively to customers to avoid misunderstanding and to identify needs
- 2.3.4 Provide alternatives to clients/customers to satisfy their expectations.
- 2.3.5 Provide services and goods in a timely, positive manner
- 2.3.6 Obtain additional resources to satisfy client needs efficiently

Competency 2.4 Exercise leadership

Competency Builders:

- 2.4.1 Communicate thoughts, feelings, and ideas to justify a position
- 2.4.2 Motivate and/or convince individuals or groups through encouragement or persuasion
- 2.4.3 Challenge existing procedures, policies or authorities responsibly.

- 2.4.4 Use rules/values followed by others
- 2.4.5 Justify a position logically and appropriately
- 2.4.6 Consider minority viewpoints in making decisions or taking action

Competency 2.5 Negotiate to arrive at a decision

Competency Builders:

- 2.5.1 Achieve agreement through exchanging specific resources or resolving divergent interests
- 2.5.2 Research opposition and the history of the conflict
- 2.5.3 Set realistic, obtainable goals
- 2.5.4 Present facts and arguments
- 2.5.5 Listen to and reflect upon what has been said
- 2.5.6 Clarify problems and resolve conflicts
- 2.5.7 Propose and examine possible options
- 2.5.8 Make reasonable compromises

Competency 2.6 Work with cultural diversity

Competency Builders:

- 2.6.1 Work with men and women, and a variety of ethnic, social and educational backgrounds
- 2.6.2 Compare one's own culture and that of others
- 2.6.3 Respect the rights of others while helping them make cultural adjustments when necessary
- 2.6.4 Base impression upon individual performance, not stereotypes
- 2.6.5 Understand concerns of members of other ethnic and gender groups

Unit 3: Information

Competency 3.1 Acquire and evaluate information

Competency Builders:

- 3.1.1 Pose analytic questions to determine specific information needs
- 3.1.2 Select appropriate information sources
- 3.1.3 Determine when new information must be created and do so
- 3.1.4 Evaluate data for relevance and accuracy

Competency 3.2 Organize and maintain information

Competency Builders:

- 3.2.1 Organize a variety of information forms or sources in a systemic fashion
- 3.2.2 Maintain written or other forms of information to keep up-to-date information available in a systemic fashion

- 3.2.3 Organize information from computer, visual, oral and physical sources in readily accessible formats, such as computerized data bases, spreadsheets, microfiche, video disks, paper files, etc.
- 3.2.4 Transform data into different formats in order to organize them by the application of various methods such as sorting, classifying, or more formal methods

Competency 3.3 Interpret and communicate information

Competency Builders:

- 3.3.1 Select information to be communicated
- 3.3.2 Identify best methods to present information (e.g., overheads, handouts, etc.)
- 3.3.3 Communicate results to others in desired format
- 3.3.4 Convey information to others through a variety of means including oral, written, graphic, pictorial or multi-media methods

Competency 3.4 Process information using computer

Competency Builders:

- 3.4.1 Acquire information from the internet and other computer based resources
- 3.4.2 Organize information, using spreadsheets, word processor, and data bases effectively
- 3.4.3 Analyze information to identify trends, make projections, etc.
- 3.4.4 Enter, modify, retrieve, store and verify data and other information in a computer
- 3.4.5 Choose format for display (e.g., line graphs, bar graphs, tables, pie charts, narrative)
- 3.4.6 Convey information into the chosen format
- 3.4.7 Communicate information using e-mail, list serves, word processor, or other computer based communication functions

Unit 4: Systems

Competency 4.1 Apply appropriate techniques to function within social, organizational, and technological systems to attain goals effectively and ethically

Competency Builders:

- 4.1.1 Identify dynamics and components of social, organizational and technological systems
- 4.1.2 Recognize acceptable behavior and attitudes within social, organizational and technological systems
- 4.1.3 Communicate through acceptable methods to interact with social, organizational, and technological systems effectively, efficiently, and ethically
- 4.1.4 Recognize how a system's structures relate to goals
- 4.1.5 Recognize the right of people to ask for information and where to get resources

Competency 4.2 Monitor and correct performance of a system

Competency Builders:

- 4.2.1 Distinguish trends
- 4.2.2 Predict impact of actions on system operations
- 4.2.3 Diagnose deviations in the function of a system/organization
- 4.2.4 Correct performance through necessary action
- 4.2.5 Detect deviations from systems intended purpose
- 4.2.6 Troubleshoot the system
- 4.2.7 Make changes to the system to rectify system function and to ensure quality of product

Competency 4.3 Improve and design systems

Competency Builders:

- 4.3.1 Make suggestions to modify or improve existing products or services
- 4.3.2 Implement approved improvements in systems
- 4.3.3 Evaluate the benefits of the improvements
- 4.3.4 Develop/recommend new or alternative system designs based on relevant feedback
- 4.3.5 Communicate the results of the evaluations

Unit 5: Technology

Competency 5.1 Select appropriate technology

Competency Builders:

- 5.1.1 Determine the desired results or outcomes and applicable restraints
- 5.1.2 Visualize the necessary methods and applicable technology
- 5.1.3 Evaluate specifications
- 5.1.2 Judge which procedures, tools, machines or programs will produce the desired results.

Competency 5.2 Apply technology to task

Competency Builders:

- 5.2.1 Set up tools such as machines, computers, and programming systems, using proper procedures, to get desired results
- 5.2.2 Analyze how different parts of machines interact and how machines interact with broader production systems
- 5.2.3 Install machines including computers
- 5.2.4 Interpret machine output accurately
- 5.2.5 Detect errors from program output

Competency 5.3 Maintain and troubleshoot technology

Competency Builders:

- 5.3.1 Prevent problems in machines, computers, and other technologies
- 5.3.2 Identify problems in machines, computers and other technologies
- 5.3.3 Perform routine maintenance and service of machines, computers, and other technologies
- 5.3.4 Detect more serious problems
- 5.3.5 Generate workable solutions to correct deviations
- 5.3.6 Recognize need for additional help

Unit 6: Basic Skills

Competency 6.1 Read written information in prose and documents, such as manuals, graphs, and schedules with understanding

Competency Builders:

- 6.1.1 Determine the main idea or essential message
- 6.1.2 Identify relevant details, facts, and specifications
- 6.1.3 Infer or locate the meaning of unknown or technical vocabulary
- 6.1.4 Judge the accuracy, appropriateness, style, and plausibility of reports, proposals, or theories of other writers

Competency 6.2 Communicate thoughts, ideas, information, and messages in writing

Competency Builders:

- 6.2.1 Record information completely and accurately
- 6.2.2 Compose and create documents such as letters, directions, manuals, reports, proposals, graphs, and flow charts
- 6.2.3 Use language, style, organization and format appropriate to the subject matter, purpose, and audience
- 6.2.3 Include supporting documentation where appropriate
- 6.2.4 Attend to level of detail
- 6.2.5 Check, edit, and revise for correct information, appropriate emphasis, form, grammar, spelling, and punctuation

Competency 6.3 Perform arithmetic computations and concepts with appropriate technology and/or paper and pencil to solve simple work problems

Competency Builders:

- 6.3.1 Perform basic computations
- 6.3.2 Use basic numerical concepts such as whole numbers and percentages in practical situations
- 6.3.3 Make reasonable estimates of arithmetic results without a calculator

- 6.3.4 Use tables, graphs, diagrams, and charts to obtain or convey quantitative information

Competency 6.4 Perform mathematics in a variety of techniques to approach practical problems appropriately

Competency Builders:

- 6.4.1 Choose appropriate technique to solve problem
6.4.2 Use quantitative data to construct logical explanations for real world situations
6.4.3 Express mathematical ideas and concepts orally and in writing
6.4.4 Predict an event considering the role of chance in the occurrence

Competency 6.5 Listen and react appropriately to verbal messages

Competency Builders:

- 6.5.1 Receive, attend to, interpret, and respond to verbal messages appropriately
6.5.2 Receive, attend to, interpret, and respond to other cues such as body language appropriately
6.5.3 Listen to comprehend, learn, critically evaluate, appreciate, or support the speaker

Competency 6.6 Deliver oral messages appropriately to listeners

Competency Builders:

- 6.6.1 Organize ideas and communicates orally as appropriate for the situation and listeners
6.6.2 Participate in conversation, discussion, and group presentations
6.6.3 Select an appropriate medium for conveying a message
6.6.4 Use verbal language and other cues, such as body language, in a way appropriate in style, tone, and level of complexity to the audience and the occasion
6.6.5 Speak clearly and communicate a message
6.6.6 Respond to listener feedback in a way that indicates understanding
6.6.7 Ask questions when needed

Unit 7: Thinking Skills

Competency 7.1 Generate new ideas using creative thinking

Competency Builders:

- 7.1.1 Change or reshapes goals using nonlinear or unusual connections
7.1.2 Imagine new ideas by combining ideas or information in new ways
7.1.3 Connects seemingly unrelated ideas
7.1.4 Reshape goals in ways that reveal new possibilities

Competency 7.2 Make decisions

Competency Builders:

- 7.2.1 Specify goals and constraints
- 7.2.2 Generate alternatives
- 7.2.3 Consider risks
- 7.2.4 Evaluate and choose best alternatives
- 7.2.5 Analyze how personal, family, and social factors influence decisions, behaviors, and lifestyles
- 7.2.6 Utilize a decision-making process to develop future career goals

Competency 7.3 Apply problem solving skills appropriate to situation

Competency Builders:

- 7.3.1 Recognize a problem exists (i.e., that there is a discrepancy between what is and what should be)
- 7.3.2 Identify possible reasons for the problem
- 7.3.3 Devise and implement a plan of action to resolve the problem
- 7.3.4 Evaluate and monitor progress
- 7.3.5 Revise the plan as indicated by the findings
- 7.3.6 Communicate in both oral and written language while working with others to identify/resolve problems
- 7.3.7 Reason inductively and deductively to solve problems
- 7.3.8 Select and apply problem-solving methods

Competency 7.4 See things in the mind's eye

Competency Builders:

- 7.4.1 Organize and process symbols, pictures, graphs, objects or other information to visualize actual representation (such as a building from blueprints)
- 7.4.2 Visualize possible options
- 7.4.3 Communicate visualized options verbally

Competency 7.5 Apply learning strategies to support life-long learning

Competency Builders:

- 7.5.1 Apply and adapt existing and new knowledge and skills, using learning techniques, in both familiar and changing situations
- 7.5.2 Evaluate learning style (visual, aural, etc.) to make proper selection of learning techniques
- 7.5.3 Identify various learning techniques including formal learning strategies (note taking or clustering items that share some characteristics) and informal learning strategies (awareness of unidentified false assumptions that may lead to faulty conclusions)
- 7.5.4 Make decisions/plans concerning school to work training and future educational needs using relevant resources

Competency 7.6 Apply reasoning to finding solutions or draw conclusions

Competency Builders:

- 7.6.1 Discover a rule or principle underlying the relationship between two or more objects
- 7.6.2 Extract rules or principles from a set of objects or a written text
- 7.6.3 Apply principles to solve problems
- 7.6.4 Draw conclusion from available information using logic
- 7.6.5 Apply rules and principles to a new situation
- 7.6.6 Determine which conclusion is correct when given a set of facts and conclusions
- 7.6.7 Evaluate alternatives and assess consequences to achieve personal and social goals

Unit 8: Personal Qualities

Competency 8.1 Act responsibly

Competency Builders:

- 8.1.1 Persevere toward goal attainment with a high level of effort
- 8.1.2 Set high standards in order to become excellent at doing tasks by setting high standards, paying attention to details, working well and displaying a high level of concentration even when assigned an unpleasant task
- 8.1.3 Display a high standard of attendance, punctuality, enthusiasm, vitality, and optimism in approaching and completing tasks

Competency 8.2 Exhibit effective self-esteem

Competency Builders:

- 8.2.1 Maintain a positive view of self and believes in own self-worth
- 8.2.2 Identify won skill and abilities possessed
- 8.2.3 Recognize own emotional capacity and needs
- 8.2.4 Identify/Apply effective ways to handle emotional capacity and needs
- 8.2.5 Recognize own impression on others

Competency 8.3 Employ appropriate social skills

Competency Builders:

- 8.3.1 Demonstrate understanding, friendliness, adaptability, empathy and politeness in new and on-going group settings
- 8.3.2 Assert self in familiar and unfamiliar social situations
- 8.3.3 Relate well to others
- 8.3.4 Respond appropriately as the situation requires
- 8.3.5 Take an interest in what others say and do

Competency 8.4 Manage self

Competency Builders:

- 8.4.1 Assess own knowledge, skills, and abilities accurately
- 8.4.2 Set well-defined and realistic personal goals
- 8.4.3 Monitor progress toward goal attainment
- 8.4.4 Motivate self through goal achievement
- 8.4.5 Exhibit self-control and respond to feedback unemotionally and nondefensively
- 8.4.6 Initiate action

Competency 8.5 Apply integrity and honesty to all matters

Competency Builders:

- 8.5.1 Recognize situations when faced with making a decision or exhibiting behavior that may break with commonly held personal or societal values
- 8.5.2 Understand the impact of violating these beliefs and codes on an organization, self, and others
- 8.5.3 Choose an ethical course of action

WorkKeys Process Overview

Developed by American College Testing (ACT), the purpose of the Job Profiling process is to identify the level of applied academic skills that, according to business and industry, students must master to qualify for and be successful in their occupation of choice. The results of Job Profile “leveling” can help teachers to better target instruction toward their students’ needs.

The WorkKeys component, developed by ACT, measures students’ applied academic skills. These academic skills include Applied Mathematics, Locating Information, Reading for Information, Listening, Writing, Teamwork, Observation, and Applied Technology. It is determined during the profile which skills apply to the specific job or occupational area.

The ACAP (Austin Competency Analysis Profile) includes the skills described below. A fourth skill may be identified and included if the subject matter experts agree that it is necessary for entry into the position.

- *Applied Mathematics* measures students’ ability to analyze, set-up, and solve math problems typically found in the workplace.
- *Locating Information* measures students’ ability to use graphic documents to insert, extract, and apply information (includes charts, graphs, tables, forms, blueprints, maps, and instrument gauges).
- *Reading for Information* measures students’ ability to read and understand work-related reading materials (text only—does not including charts, graphs, tables, forms, blueprints, maps, or instrument gauges).

Each WorkKeys assessment is further broken down into four to five levels of achievement, with higher numbers indicating higher achievement in the assessed skill. For each academic skill, the Job Profiling process identifies the level required for successful entry into an occupational area as identified by subject matter experts.

A^{.....}CT WorkKeys Skill Levels

<u>Skill Area</u> <u>Rank</u>	<u>Entry Level</u>	<u>Performance Level</u>
1) Reading for Information	5-6	6-7
2) Applied Mathematics	5-7	5-7

Entry Level

Refers to the requirements necessary for someone entering into the occupation (without previous on the job experience).

Performance Level

Refers to the level at which an employee would need to function effectively having gained on-the-job knowledge.

Skill Ranking

Refers to the criticality of the skill to the performance of the occupation with the most critical skill indicated with one (1) and higher numbers indicating lower criticality.

Levels of WorkKeys Defined

The skills needed to achieve each level for WorkKeys academic skills identified in this profile are as follows:

Reading for Information

Reading for Information measures skill in reading and understanding work-related reading materials. There are five levels of complexity, 3 through 7, with Level 3 being the least complex and Level 7 the most complex. Although Level 3 is the least complex, it still represents a level of reading skill well above “no skill at all.” The levels build on each other, each incorporating the skills at the preceding levels.

Level 3

- Identify uncomplicated key concepts and simple details.
- Recognize the proper placement of a step in a sequence of events, or the proper time to perform a task.
- Identify the meaning of words that are defined within a passage.
- Identify the meaning of simple words that are not defined within a passage.
- Recognize the application of instructions, from a passage to situations that are described in the passage.

Level 4

- Identify details that are more subtle than those in Level 3.
- Recognize the application of more complex instructions, some of which involve several steps, to described situations.
- Recognize cause-effect relationships.

Level 5

- Understand the paraphrased definition of specialized words or phrases (jargon or technical terms) defined in these reading materials

- Use jargon or technical terms appropriately in describing situations stated in these reading materials
- Understand the meaning of acronyms defined in these reading materials (an acronym is a work or collection of letters which stands for a longer phrase, such as HMO to mean Health Maintenance Organization).
- Figure out which definition of a word with multiple meanings is appropriate in the context of these reading materials.
- Apply information given in these reading materials to situations that are not directly described, but similar.
- Apply instructions or procedures with a number of steps to described situations. These instructions may include conditional (if X happens, then you should do Y).

Level 6

- Recognize the application of jargon or technical terms to new situations.
- Recognize the application of complex instructions to new situations.
- Recognize the less-common meaning of a word with multiple meanings from context.
- Generalize from a passage to situations not described in the passage.
- Identify implied details.
- Explain the rationale behind a procedure, policy, or communication.
- Generalize from a passage to a somewhat similar situation.

Level 7

- Recognize the definitions of difficult, uncommon jargon or technical terms from context.
- Generalize from a passage to situations neither described in nor completely similar to those in a passage.

Applied Mathematics

Applied Mathematics measures skill in applying mathematical reasoning to work-related problems. There are five levels of complexity, 3 through 7, with Level 3 being the least complex and Level 7 the most complex. The levels build on each other, each incorporating the skills at the preceding levels.

Level 3

- Perform basic mathematical operations (addition, subtraction, multiplication, and division) and conversions from one form to another, using whole numbers, fractions, decimals, or percentages.
- Translate simple verbal problems into mathematical equations.
- Directly apply logical information provided to solve problems, including those with measurements and dollars and cents.

Level 4

- Perform one or two mathematical operations (such as addition, subtraction, or multiplication) on several positive or negative numbers. (Division of negative numbers is not covered until Level 5.)
- Add commonly known fractions, decimals, or percentages (e.g., $\frac{1}{2}$, .75, 25%) or add three fractions that share a common denominator.
- Calculate averages, simple ratios, proportions, and rates, using whole numbers and decimals.
- Reorder verbal information before performing calculations.
- Read simple charts or graphs to obtain information needed to solve a problem.

Level 5

- Look up and calculate single-step conversions within English or non-English measurement systems (e.g., converting ounces to pounds or centimeters to meters) or between measurement systems (e.g., converting centimeters to inches).
- Make calculations using mixed unit (e.g., hours and minutes).
- Determine what information, calculations, and unit conversions are needed to find a solution.

Level 6

- Set up problems and do several steps of calculations or conversions.
- Calculate using negative numbers, fractions, ratios, percentages, or mixed numbers (e.g., $12\frac{1}{8}$).
- Transpose a formula before calculating (e.g., $8X = 20 \Rightarrow X = 20/8$).
- Look up and use two formulas to change from one unit to another unit within the same system of measurement (e.g., 1 cup = 8 fl oz, 1 quart = 4 cups).

- Find mistakes in calculations, such as those required in lower levels.
- Determine the best deal and perform a further calculation with the result.

Level 7

- Solve problems requiring multiple steps of logic and calculation.
- Solve problems involving more than one unknown, nonlinear functions (e.g., rate of change), and applications of basic statistical concepts (e.g., error of measurement).
- Locate errors in multiple-step calculations.
- Solve problems with unusual content or format, or with incomplete or implicit information

Additional Tools

This Job requires knowledge and use of the following tools:

- Computer/Platform (server, client)
- Programming Languages
 - SQL, C, Java, or Perl
- Platform Tools-vendor tools
- Utility Tools
 - Dumps/loads
 - Vendor, 3rd party or platform
- Transaction Monitor
 - EJB Tuxedo

Administration Tools

- Performance Tools
 - Platinum, Performance Monitor

Development Tools

- Data Modeling Tools
 - Oracle
- Test Harness

Glossary

ACAP–*Austin Competency Analysis Profile*–a well-established job analysis process unique to Austin Community College involving business, industry, labor, and community agency representatives from throughout the Austin area.

Advanced Competencies–The occupation and academic competencies needed to advance in a given occupation

Competency–an observable and measurable behavior that has a definite beginning and end; can be performed within a limited amount of time; consists of two or more competency builders; and leads to a product, service, or decision.

Competency Builders–The skills, knowledge, and attitudes (written in measurable terms) needed to perform a given competency.

Core Competencies–The essential occupational and academic competencies needed to enter and remain in a given occupation.

Employability Competencies–Underlying skills, abilities, and knowledge as they relate to work ethics, work habits, and personal growth and development.

Entry Level–refers to the requirements necessary for someone entering into the occupation (without previous on the job experience).

Performance Level–refers to the level at which an employee would need to function effectively having gained on-the-job knowledge.

Skill Ranking–Refers to the criticality of the WorkKeys skill to the performance of the occupation with one (1) indicating the most critical skill.

SME–*Subject Matter Expert*–incumbent worker in a given occupation that is knowledgeable about the job.

Target Job Titles–titles that may be assigned to the types of jobs aligned with an ACAP. Possible titles of jobs for which students would qualify with certificates or degrees in the programs based on an ACAP.

WorkKeys Skills–Eight skills, defined by ACT, referring to underlying, academic skills as they relate to the workplace. The skills include *Applied Mathematics, Applied Technology, Locating Information, Reading for Information, Observation, Teamwork, Listening, and Writing*. Each skill has a very specific definition and levels of each skill can be aligned with specific abilities defined at each level. WorkKeys skills are the basis for an occupational analysis system developed by ACT. The WorkKeys analysis is the final part of the overall ACAP report. All ACAPs include *Reading for Information, Locating Information, and Applied Mathematics*. A fourth skill may be included in the profile if the subject matter experts identify a need for it.