

*Massachusetts Department of Elementary & Secondary Education*

Office for Career/Vocational Technical Education



## *Vocational Technical Education Framework*



### Health Services Occupational Cluster

### ***Dental Assisting (VDENTL)***

CIP Code 510601

June 2014

**Massachusetts Department of Elementary and Secondary Education**

**Office for Career/Vocational Technical Education**

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# Table of Contents

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Acknowledgements.....	1
Commissioner’s Letter .....	4
Introduction .....	5
<i>Health Services Occupational Cluster</i> .....	14
<i>Dental Assisting Framework (VDENTL)</i> .....	14
Strand 1: Safety and Health Knowledge and Skills.....	14
<i>Selected Websites</i> .....	16
Strand 2: Technical Knowledge and Skills .....	17
Strand 3: Embedded Academics .....	25
Strand 4: Employability and Career Readiness .....	26
<i>Selected Websites</i> .....	29
Strand 5: Management and Entrepreneurship Knowledge and Skills .....	31
<i>Selected Websites</i> .....	33
<i>Glossary</i> .....	33
Strand 6: Technology Literacy Knowledge and Skills .....	35
Appendices.....	37
Embedded Academic Crosswalks.....	38
Embedded English Language Arts and Literacy .....	38
Embedded Mathematics.....	39
Embedded Science and Technology/Engineering.....	41
<i>Life Science (Biology)</i> .....	41
<i>Physical Science (Chemistry)</i> .....	43
<i>Physical Science (Physics)</i> .....	45
<i>Technology/Engineering</i> .....	45
DESE Statewide Articulation Agreements.....	47
Industry Recognized Credentials (Licenses and Certifications/Specialty Programs).....	48
Other .....	49
Reference Materials.....	49
Related National, Regional, and State Professional Organizations .....	49
Student Organizations.....	49
Selected Websites.....	49

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## Commissioner's Letter

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# **Massachusetts Department of Elementary and Secondary Education**

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Mitchell D. Chester, Ed.D.  
Commissioner

July 2014

Dear Colleagues,

I am pleased to present to you the *Massachusetts Vocational Technical Education Frameworks*, adopted by the Department of Elementary and Secondary Education in June 2014. These frameworks, one for each of the 44 vocational technical programs, include standards in multiple strands representing all aspects of the industries that students in the vocational technical education program are preparing to enter.

The frameworks also include a crosswalk between the technical standards and relevant standards in Massachusetts Curriculum Frameworks to support effective integration of academic and technical content.

The comments and suggestions received during revision of the 2007 *Massachusetts Vocational Technical Education Frameworks* have strengthened these frameworks. We will continue to work with schools and districts to implement the 2014 *Massachusetts Vocational Technical Education Frameworks* over the next several years, and we encourage your comments.

I want to thank everyone who worked with us to create challenging learning standards for Massachusetts students. I am proud of the work that has been accomplished.

Sincerely,

Mitchell D. Chester, Ed.D.  
Commissioner of Elementary and Secondary Education

# Introduction

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## Overview & Organization and Key Changes

### Overview

The Massachusetts Department of Elementary and Secondary Education understands the necessity of maintaining current Vocational Technical Education Frameworks which ensure career/vocational technical education students across the Commonwealth are taught the most rigorous standards aligned to the needs of business and industry.

With the advent of the Massachusetts Teaching & Learning System the Office for Career/Vocational Technical Education (CVTE) recognized the significance of including career/vocational technical education in the system and developed a comprehensive plan for including vocational technical education. The plan was designed in a Two Phase Process. Phase One included the revision of strands two, three, and six, of all of the Vocational Technical Education Frameworks. Phase Two consisted of three major components (projects) all equally crucial;

1. The revision of Strands One, Four, and Five to complete the revision of all six strands of the Vocational Technical Education Frameworks;
2. Statewide Professional Development on all revised strands, with training on strands two, three, and six delivered fall 2013, and training on strands one, four, and five delivered spring 2014;
3. The creation and development of additional Model Curriculum Unit (MCU) Teams.

The Office for Career/Vocational Technical Education Framework Team, with support from consultants, began Phase One in the 2012-2013 school year, to revise three of the six strands contained in all of the Vocational Technical Education (VTE) Frameworks. The state was organized into “Collaborative Partnerships” comprised of teams of project administrators, highly qualified subject matter educators, and business and industry partners, whose task was to revise Strand Two – Technical, Strand Three – Embedded Academics, and Strand Six – Technology Literacy. Each team met with a vocational advisory committee which included business and industry representatives and postsecondary education professionals, whose mission was to review and revise the team’s draft document during the revisionary process. Once strand two was revised, academic teachers (typically one English Language Arts teacher, one Mathematics teacher, and one Science teacher) worked with the technical subject matter teachers to develop a crosswalk between academic curricula standards and the technical standards, and provided examples of embedded academic content.

The Office for Career/Vocational Technical Education solicited statewide input from technical and academic teachers and administrators at the annual Massachusetts Association of Vocational Administrators (MAVA)/Massachusetts Vocational Association (MVA) - Connecting for Success Conference. Each framework team met with their content colleagues and reviewed the draft revisions and obtained

valuable feedback. Additionally, all drafts were reviewed and revised by the Massachusetts Vocational Technical Teacher Testing Program, to ensure appropriate measurable language.

Project consultants designed a new template to ensure all framework teams entered new standards and additional resources in a consistent manner. The framework teams created an “Appendix” listing potential industry recognized credentials attainable by secondary students; lists of professional, student, and relevant government organizations; and useful resources and websites. *\* It is important to note that although most Framework Teams provided information for the “Appendix”, not all teams did. Therefore, sub-headings within the “Appendix” without information have been deleted. Disclaimer: Reference in the Appendices Section to any specific commercial products, processes, or services, or the use of any trade, firm or corporation name is for the information and convenience of the public, and does not constitute endorsement or recommendation by the Massachusetts Department of Elementary and Secondary Education.*

The Office for Career/Vocational Technical Education facilitated a comprehensive vetting process throughout the Commonwealth. During the fall of 2012 districts throughout Massachusetts solicited feedback from each Vocational Program’s Advisory Committee members at the Fall Board meetings. Additionally, the Office for Career/Vocational Technical Education met with various licensing boards at the Massachusetts Division of Professional Licensure and provided the applicable draft framework to each board for review. All framework drafts were posted on the CVTE website for public comment. Comments and suggested revisions received were shared with each framework team for response and edits, as appropriate.

The Phase I Process was completed on an accelerated timetable and resulted in all Vocational Technical Education Frameworks; Strand Two and Strand Six, revised with current, rigorous, relevant standards. Strand Three has been redesigned into a crosswalk which directly correlates academic and technical standards. An appendix of useful material for technical teachers recommended by their peers was added to each framework.

Phase II of the Framework Revision Process consisted of three major projects;

1. The Strands One, Four & Five Project, to complete the revision of all six strands of the Vocational Technical Education Frameworks;
2. Statewide Professional Development on all revised strands, with training on strands two, three, and six delivered fall 2013, and training on strands one, four, and five delivered spring 2014;
3. The creation and development of additional Model Curriculum Unit (MCU) Teams.

The Strands One, Four, & Five Project began in the fall of 2013 with the formation of a leadership team and three work groups. Co-Managers led the leadership team comprised of three Strand Coordinators who facilitated work teams and reviewed, researched, and revised these common strands. All skills specific to the vocational technical program have been included into Strand Two Technical.

The Strand One Team revised the safety knowledge and skills that all students need to acquire. The team included relevant issues (i.e., bullying, climate), laws, regulations, guidelines and policies pertaining to safety.

The Strand Four Team revised the Employability Knowledge and Skills that all students need to acquire. Teams considered current research on career readiness, including the work of the College Career Readiness Task Force convened by the Department, changes in workplace, technological changes that impact how people perform their work (i.e., communications methods), and included standards that emphasize the need for lifelong learning and adaptability given the multiple career changes over and an individual's working life. The team recommended this strand be renamed to: Career Readiness.

The Strand Five Team revised the Management & Entrepreneurship Knowledge and Skills that all students need to acquire. All business owners and employees must possess management and financial skills to be productive members of society. Skills included financial knowledge and basic business management skills.

All Strand One, Four and Five Project Teams worked collaboratively with staff from the Department of Elementary and Secondary Education and the Advisors of the Massachusetts Career and Technical Student Organizations to crosswalk standards to national Career & Technical Student Organizations Curricula, as applicable.

The Office for Career/Vocational Technical Education contracted the MAVA Consultant Team to work closely with the office to complete all of the work accomplished during Phase II of the Project.

A remarkable amount of work was accomplished through the efforts of hundreds of professionals who collaborated and diligently supported this work. The Office for Career/Vocational Technical Education is grateful for all the support received from the field, particularly all of the teachers (technical and academic), administrators, advisory committee members, business and industry representatives, the Division of Professional Licensure - boards, the Massachusetts Association of Vocational Administrators, the MAVA Consultants, and the Massachusetts Vocational Association, whose contributions were tremendous.

Special thanks to all staff in the Office for Career/Vocational Technical Education and the CVTE Framework Revision Team who provided guidance and numerous contributions during Phase One of the project.

## Organization and Key Changes

This section contains the following:

- Highlights of Changes to the Vocational Technical Education Frameworks; which includes a summary of changes made to each strand.
- Organization of the Frameworks – Strand Two illustrates structure of topic headings, standards and objectives, and performance examples.

### Highlights of Changes to the Vocational Technical Education Frameworks:

#### Strand One:

Safety and Health Knowledge and Skills have been revised to contain the safety standards that are common to all programs. The Strand One Team worked collaboratively with staff from the Department of Elementary and Secondary Education and the Advisors of the Career and Technical Student Organizations (CTSO) to crosswalk standards to national CTSO Curricula, as applicable.

- No objectives were deleted, only modified.
- Language and wording was clarified.
- Additions included a focus on maintaining a safe school and workplace in terms of creating a positive climate/environment.
- Student safety credential program has been revised.
- Safety attire has been revised.
- Emergency equipment and fire safety has been revised.
- Many new Performance Examples have been included.
- Within each strand, standards and objectives were grouped under Topic Headings, which are displayed in bold. Each standard is followed by a performance example. See the section below titled: "Organization of the Frameworks – Strand Two". All strands were organized in that manner, with the exception of the former Strand Three.

#### Strand Two:

The Technical Standards Knowledge and Skills have been revised to reflect business and industry changes since the adoption of the 2007 Vocational Technical Education Frameworks (VTEF). There are additional changes to Strand Two below:

- The Technical Knowledge and Skills (Strand Two) section contains standards specific to the particular vocational program; suffix "a" (as common to all programs) and suffix "c" (as common within a cluster) have been removed.
- Each VTEF Strand Two begins with safety and health knowledge and skills specific to the particular vocational program.
- Within each strand, standards and objectives were grouped under Topic Headings, which are displayed in bold. Each standard is followed by a performance example. See the section below

titled: “Organization of the Frameworks – Strand Two”. All strands were organized in that manner, with the exception of the former Strand Three.

- Strand Two of the Frameworks for Animal Science, Environmental Science and Technology, and Horticulture, begin with core standards required for all participants in the programs, followed by a series of standards organized in concentrations. See the section below titled: “Organization of the Frameworks – Strand Two” for more information.
- An update to some of the vocational programs framework is the addition of advanced or supplemental standards which are noted in Strand Two by an asterisk (\*). *These standards are not required, but are provided as suggestions that districts may choose to use to increase the depth of a particular topic, or add additional topics, particularly for advanced students or for those seniors who do not participate in cooperative education.* See the section below titled: “Organization of the Frameworks – Strand Two” for more information.

### Strand Three:

Since the purpose of Strand Three was to correlate academic content that was *embedded* in the knowledge and skills necessary to perform certain technical skills, it was logical to highlight those connections through a crosswalk between the academic curriculum standards and the technical standards (Strand Two). The crosswalk directly correlates the English Language Arts (2011) and Mathematics (2011) Frameworks, incorporating the Common Core Standards and the Science and Technology/Engineering Frameworks. The crosswalk can be found in the appendix of each vocational framework. The crosswalk also includes performance examples which illustrate integrated academic and technical content.

- Embedded Academics has been replaced with a crosswalk between the academic curriculum standards and the technical knowledge and skills standards. The crosswalk is located in the Appendices.

### Strand Four:

Employability (and Career Readiness) Knowledge and Skills focused on providing students with general knowledge and skills to be college and career ready. The Strand Four Team worked collaboratively with staff from the Department of Elementary and Secondary Education and the Advisors of the Career and Technical Student Organizations to crosswalk standards to national CTSO Curricula, as applicable.

- Language and wording were clarified.
- Additions included a focus on providing students with skills for employability/career readiness.
- Modifications included Career Exploration & Navigation, Communication in the Workplace, and Work Ethic & Professionalism.
- New Performance Examples have been included.
- Within each strand, standards and objectives were grouped under Topic Headings, which are displayed in bold. Each standard is followed by a performance example. See the section below titled: “Organization of the Frameworks – Strand Two”. All strands were organized in that manner, with the exception of the former Strand Three.

### Strand Five:

Strand Five contains Management and Entrepreneurship Knowledge and Skills that are general for all students. The Strand Five Team worked collaboratively with staff from the Department of Elementary and Secondary Education and the Advisors of the Massachusetts Career and Technical Student Organizations to crosswalk standards to national Career & Technical Student Organizations Curricula, as applicable.

- Language and wording were clarified and organized into a logical format.
- The Strand Five Team felt that the 2007 curriculum remained valid.
- Additions included a focus on providing students with skills for management and entrepreneurship applicable to all vocational programs.
- Modifications included Starting and Managing a Business, Marketing, and Financial Concepts & Applications in Business, and Legal/Ethical/Social Responsibilities.
- New Performance Examples have been included.
- Within each strand, standards and objectives were grouped under Topic Headings, which are displayed in bold. Each standard is followed by a performance example. See the section below titled: "Organization of the Frameworks – Strand Two". All strands were organized in that manner, with the exception of the former Strand Three.

### Strand Six

Strand Six Technology Literacy Knowledge and Skills has been replaced with the 2008 Massachusetts Technology Literacy Standards and Expectations Framework.

## Appendix<sup>1</sup>

Each framework contains an “Appendix” section which includes an Embedded Academic Crosswalk, Industry Recognized Credentials, Statewide Articulation Agreements, Professional, Governmental, and Student Organizations, Resources, and relevant websites.

The Appendix<sup>2</sup> contains:

- Embedded Academic crosswalks for English Language Arts, Mathematics, and Science & Technology/Engineering.
- Statewide Articulations: Current statewide Articulation Agreements and/or Apprenticeship Programs available to the specific vocational program are listed on this page. The development of new statewide articulations continues, and therefore these pages will be revised as new agreements are finalized.
- Industry-Recognized Credentials: Technical Teacher Teams generated lists of credentials for the vocational programs. Program Advisory Committees throughout the state reviewed and provided recommendations through the validation process. *The credential list has been provided as a resource only and districts are not obligated to provide all of the specified credentials for students.*
- Other: These pages provide lists of reference materials, government agencies, professional and student organizations, and useful websites created by each framework team. These are intended as helpful resources for technical teachers, identified by peers. These are not recommended or required by the Department of Elementary & Secondary Education.

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<sup>1</sup> *Note: Although most Framework Teams provided information for the “Appendix”, not all teams did. Therefore, sub-headings within the “Appendix” without information have been deleted.*

*Disclaimer: Reference in the Appendices Section to any specific commercial products, processes, or services, or the use of any trade, firm or corporation name is for the information and convenience of the public, and does not constitute endorsement or recommendation by the Massachusetts Department of Elementary and Secondary Education.*

## Organization of the Frameworks – Strand Two

The Vocational Technical Education Frameworks contain knowledge and skills covering all aspects of industry, reflected in six strands: Safety and Health, Technical, Embedded Academics, Employability, Management and Entrepreneurship, and Technological.

Within each strand, standards and objectives were grouped under topic headings, which are displayed in bold. Each standard is followed by a performance example. In the excerpt below, 2.A is the topic; 2.A.01 is the first standard and 2.A.01.01 and 2.A.01.02 are the objectives under that standard.

### **2.A Automotive Technology Specific Safety Practices**

- 2.A.01 Identify and describe safety procedures when dealing with different types of automotive lifts according to current industry standards.
- 2.A.01.01 Demonstrate procedures for safe lift operations.
  - 2.A.01.02 Demonstrate safe use, placement and storage of floor jacks and jack stands.

2.A.01 Performance Example:

- Student will set up lift using manufacturer’s suggested lift points.

- 2.A.02 Demonstrate and describe safety procedures when dealing with high pressure systems including necessary ventilation according to current industry standards.
- 2.A.02.01 Describe and demonstrate the importance of safety procedures to be used when servicing high pressurized systems (fuel systems, brakes, air conditioning, suspension, hydraulic systems, etc.).
  - 2.A.02.02 Describe and demonstrate safe use of oxygen/acetylene torches and electric welding equipment.
  - 2.A.02.03 Demonstrate ventilation procedures to be followed when working in the lab/shop area.

2.A.02 Performance Example:

- Student will relieve fuel system pressure to perform necessary repairs.

- 2.A.03 Identify and describe safety procedures when dealing with electrical circuits according to current industry standards.
- 2.A.03.01 Describe safety procedures to be followed when servicing supplemental restraint systems.
  - 2.A.03.02 Demonstrate safety awareness of high voltage circuits of electric or hybrid electric vehicles and related safety precautions.

2.A.03 Performance Example:

- Safely disable Supplemental Restraint System (SRS) air bag for repair using manufacturer’s recommendations.

There are additional changes to some of the Frameworks Strand Two (Technical Knowledge and Skills). Specifically, Strand Two of the Frameworks for Animal Science, Environmental Science and Technology and Horticulture begin with core standards required for all participants in the programs, followed by a series of standards organized in concentrations. For example, Strand Two of the Horticulture Framework begins with the core standards required of all Horticulture students

(Topics 2.A through 2.I). These standards are followed by the three concentrations: Arboriculture (Topics 2.J through 2.L), Greenhouse Management and Floriculture (Topics 2.J. through 2.L) and Landscape and Turf Management (Topics 2.M through 2.Q).

### **Advanced / Supplemental Standards (Not Required)**

Another variation that is new to the revised Strand Two Frameworks is the addition of advanced or supplemental standards which are noted with the use of an asterisk (\*). *These standards are not required, but are provided as suggestions that districts may choose to use to increase the depth of a particular topic, or add additional topics, particularly for advanced students or for those seniors who do not participate in cooperative education.*

The following is an example from Automotive Technology, where entire topics were added:

#### ***Advanced Automotive Technology Technical Knowledge and Skills***

*Note: The following competencies are optional, supplementary competencies suitable for advanced students. These are not required.*

### **2.CC Demonstrate appropriate engine repair techniques.**

2.CC.01 Perform appropriate cylinder Head Repair.

2.CC.01.01\* Diagnose, remove and replace cylinder head(s).

2.CC.01.02\* Clean and visually inspect a cylinder head for cracks; check gasket surface areas for warpage and surface finish; check passage condition; determine necessary action.

The following is an example from the Strand Two Radio and Television Broadcasting Framework that shows the addition of an advanced objective, 2.B.04.08\*:

2.B.04 Explain concepts fundamental to shooting in cinema and video.

- 2.B.04.01 Compare and contrast a single-camera and a multiple-camera production.
- 2.B.04.02 Explain the importance of shooting for the edit (i.e., match on action, sequencing, coverage).
- 2.B.04.03 Explain the importance of continuity.
- 2.B.04.04 Explain the 180° Rule line, and its application in various cinema scenarios.
- 2.B.04.05 Identify and establish a specific point-of-view when shooting from a script.
- 2.B.04.06 Analyze the methods in which specific shots can evoke emotion from an audience.
- 2.B.04.07 Define drop frame and non-drop frame code shooting and explain how to account for both when preparing for an edit.
- 2.B.04.08\* Describe various cinematographic methods necessary when shooting scenes that incorporate post-production visual effect

2.B.04 Performance Examples:

- Students will list similarities and differences of single-camera and multiple-camera shoots.
- Students will describe multiple shooting considerations that are useful in streamlining the editing process.

# Health Services Occupational Cluster

## Dental Assisting Framework (VDENTL)

### Strand 1: Safety and Health Knowledge and Skills

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#### 1.A Fundamentals of Health and Safety

- 1.A.01 Describe and apply health and safety regulations.
- 1.A.01.01 Identify, describe and apply health and safety regulations that apply to specific tasks and jobs. Students must complete a safety credential program, e.g., Occupational Safety and Health Administration 10, CareerSafe and ServSafe.
  - 1.A.01.02 Identify, describe and apply Environmental Protection Agency (EPA) and other environmental protection regulations that apply to specific tasks and jobs in the specific occupational area.
  - 1.A.01.03 Identify, describe and apply Right-To-Know (Hazard Communication Policy) and other communicative regulations that apply to specific tasks and jobs in the specific occupational area.
  - 1.A.01.04 Explain procedures for documenting and reporting hazards to appropriate authorities.
  - 1.A.01.05 Identify and describe potential consequences for non-compliance with appropriate health and safety regulations.
  - 1.A.01.06 Identify and list contact information for appropriate health and safety agencies and resources.

1. A.01 Performance Examples:

- List and define OSHA Health and Safety Regulations, EPA and other environmental protection regulations to occupational area.
- List and define Right-to-Know regulations and reporting of hazards and contact information for appropriate health and safety agencies.
- List the laws and rules of regulatory agencies governing sanitation and safety.
- Utilize OSHA as well as health and safety websites for purposes of research.

- 1.A.02 Demonstrate appropriate health and safety practices based on the specific occupational area.
- 1.A.02.01 Identify, describe and demonstrate the effective use of Safety Data Sheets (SDS).
  - 1.A.02.02 Read and interpret chemical, product and equipment labels to determine appropriate health and safety considerations.
  - 1.A.02.03 Identify, describe and demonstrate personal, shop and job site safety practices and procedures.
  - 1.A.02.04 Demonstrate safe dress and use of relevant safety gear, personal protective equipment (PPE) and ergonomics, e.g., wrist rests, adjustable workspaces, equipment, gloves, proper footwear, earplugs, eye protection and breathing apparatus.
  - 1.A.02.05 Demonstrate appropriate safe body mechanics, including appropriate lifting techniques and ergonomics.

- 1.A.02.06 Locate emergency equipment, first aid kit, SDS information directories and emergency action/response plan/escape routes in your lab, shop and classroom, including labels and signage that follow OSHA Hazard Communication Program (HAZCOM), eyewash stations, shower facilities, sinks, fire extinguishers, fire blankets, telephone, master power switches and emergency exits.
- 1.A.02.07 Demonstrate the safe use, storage, and maintenance of every piece of equipment in the lab, shop and classroom, e.g., the OSHA Lockout/Tagout Program (LOTO).
- 1.A.02.08 Describe safety practices and procedures to be followed when working with and around electricity, e.g., ground fault circuit interrupter (GFCI) and frayed wiring.
- 1.A.02.09 Handle, store, dispose of and recycle hazardous, flammable and combustible materials, according to EPA, OSHA and product specifications.
- 1.A.02.10 Demonstrate appropriate workspace cleaning, sanitation, disinfection and sterilization procedures required in specific occupational areas, e.g., Workplace Housekeeping OSHA Regulations.

1. A.02 Performance Examples:

- Identify, describe and demonstrate the use of SDS.
- List and demonstrate shop dress code, safety procedures and location of emergency equipment in labor classroom.
- Define and demonstrate safe storage and maintenance of equipment and proper disposal or recycling of hazardous, flammable and combustible materials.
- Identify, describe and demonstrate the Universal Precautions set of guidelines.

- 1.A.03 Demonstrate appropriate responses to situations that may threaten health and safety.
  - 1.A.03.01 Describe First Aid procedures for potential injuries and other health concerns in the specific occupational area.
  - 1.A.03.02 Describe the importance of emergency preparedness and an emergency action/response plan.
  - 1.A.03.03 Describe procedures used to handle emergency situations, defensive measures and accidents, including identification, reporting, response, evacuation plans and follow-up procedures.
  - 1.A.03.04 Identify, describe and demonstrate safety practices in specific occupational areas used to avoid accidents.
  - 1.A.03.05 Identify and describe fire protection, protection, precautions and response procedures.
  - 1.A.03.06 Discuss the role of the individual and the company/organization in ensuring workplace safety including transportation to and from school, school activities and the workplace.
  - 1.A.03.07 Discuss ways to identify, prevent and report school and workplace violence, discrimination, harassment and bullying.
  - 1.A.03.08 Demonstrate positive and appropriate behavior that contributes to a safe and healthy environment in school and the workplace.

1. A.03 Performance Example:

- Define first aid procedures and protocols used to handle emergency situations and practices used to avoid accidents.
- View safety videos and discuss the role of workplace safety.
- Attend or participate in a human rights alliance organization presentation.
- Observe and/or demonstrate the appropriate use of a fire extinguisher using the (PASS) technique: Pull, Aim, Squeeze, Sweep.
- Review and discuss specific policies, procedures and protocols regarding discrimination, harassment and bullying.
- Discuss and/or role-play proper and respectful behavior that contributes to a positive climate.
- Discuss and/or demonstrate behavior that contributes to a collaborative/teamwork environment.

### *Selected Websites*

- Bullying Prevention and Intervention Resources : [www.doe.mass.edu/bullying](http://www.doe.mass.edu/bullying)
- Centers for Disease Control and Prevention: [www.cdc.gov](http://www.cdc.gov)
- Environmental Protection Agency : [www.epa.gov](http://www.epa.gov)
- “Lost Youth – Four Stories of Injured Young Workers” – WorkSafeBC:  
<http://www2.worksafebc.com/Publications/Multimedia/Videos.asp?reportid=34291>
- Massachusetts Department of Elementary and Secondary Education. (2011). Career/Vocational Technical Education Safety Guide: [www.doe.mass.edu/cte](http://www.doe.mass.edu/cte)
- Massachusetts Department of Elementary and Secondary Education: [www.doe.mass.edu](http://www.doe.mass.edu)
- Massachusetts Emergency Management Agency: [www.mass.gov/eopss/agencies/mema](http://www.mass.gov/eopss/agencies/mema)
- Massachusetts General Law: [www.malegislature.gov](http://www.malegislature.gov)
- Massachusetts Health and Human Services: [www.mass.gov/dph](http://www.mass.gov/dph)
- Massachusetts Right to Know Law Summary:  
<http://www.mass.gov/lwd/docs/dos/mwshp/hib397.pdf>
- Safety Data Sheet: [www.sdsonline.com](http://www.sdsonline.com)
- National Fire Protection Association: [www.nfpa.org](http://www.nfpa.org)
- Protection of Student Rights: Massachusetts General Law:  
<https://malegislature.gov/Laws/GeneralLaws/PartI/TitleXII/Chapter76/Section5>
- Occupational Safety and Health Administration: [www.osha.gov](http://www.osha.gov)
- Readiness and Emergency Management for Schools: [www.rems.ed.gov](http://www.rems.ed.gov)
- Safe and Healthy Learning Environments: [www.doe.mass.edu/ssce/safety.html](http://www.doe.mass.edu/ssce/safety.html)

## Strand 2: Technical Knowledge and Skills

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### **2.A Safety and Infection Control Policies and Practices**

- 2.A.01 Apply patient and dental healthcare worker safety education.
  - 2.A.01.01 Describe infectious diseases and their relationship to patient safety and occupational risk.
  - 2.A.01.02 Explain the need for immunization against infectious diseases, such as Hepatitis B.
- 2.A.02 Apply universal precautions in the prevention of disease transmission.
  - 2.A.02.01 Use barrier techniques, masks, gloves, protective eyewear, dental dam, hand hygiene and disposable items according to current industry and OSHA standards.
- 2.A.03 Maintain aseptic conditions.
  - 2.A.03.01 Identify the modes of disease transmission.
  - 2.A.03.02 Identify and dispose of biohazardous waste generated in the dental office according to current industry and OSHA standards.
- 2.A.04 Perform sterilization procedures.
  - 2.A.04.01 Prepare dental instruments and equipment for sterilization.
  - 2.A.04.02 Use the appropriate method for sterilization/monitoring of sterilization for dental instruments, equipment and supplies.
- 2.A.05 Demonstrate environmental asepsis.
  - 2.A.05.01 Disinfect environmental surfaces including the treatment area, laboratory, darkroom, instrument processing and equipment areas according to current industry and OSHA standards.
  - 2.A.05.02 Maintain dental water unit lines.
- 2.A.06 Describe and apply occupational safety standards.
  - 2.A.06.01 Follow regulations described in the OSHA Bloodborne Pathogens Standard and OSHA Hazard Communication Standards.
  - 2.A.06.02 Incorporate engineering and work practice controls.
  - 2.A.06.03 Perform appropriate first aid procedures, document and report all incidents, such as cuts/punctures from instruments, needle sticks, or chemical exposures.
- 2.A.07 Incorporate all safety measures when using chemical and physical hazards, such as, but not limited to mercury, nitrous oxide, caustic agents and other chemicals.
- 2.A.08 Maintain and document a quality assurance (quality improvement) program for infection control and safety throughout the dental office.

- 2.A Performance Example:
  - The student will demonstrate infection control procedures before, during and after treatment according to current industry and OSHA standards.

### **2.B Fundamental Knowledge of the Healthcare Industry**

- 2.B.01 Identify the types of health care facilities with dental access.
- 2.B.02 Outline the organizational structure of the dental/health care team.
- 2.B.03 Explain the role of the dental assistant on the dental/healthcare team.
- 2.B.04 Explain the legal standards practiced by the dental assistant.
  - 2.B.04.01 Summarize the Dental Practice Act, Health Insurance Portability and Accountability Act (HIPAA) and Patient's Bill of Rights.
  - 2.B.04.02 Describe the role of the mandated reporter.

- 2.B.05 Identify professional dental assistant organizations.
- 2.B.06 Explain the credentialing pathways for dental assistants.
  - 2.B.06.01 List and describe state required certifications.
  - 2.B.06.02 List and describe national requirements for certification.

2.B Performance Example:

- The student will successfully complete a written essay demonstrating their knowledge of Dentistry, including but not limited to the identification of the roles and responsibility of the Dental Assistant.

## 2.C Fundamentals of Tooth Morphology, Dental and Head and Neck Anatomy

- 2.C.01 Apply knowledge of tooth morphology and dental anatomy.
  - 2.C.01.01 Identify surfaces, arches and quadrants using correct terminology.
  - 2.C.01.02 Identify structures and tissues of a tooth.
  - 2.C.01.03 Identify the primary and permanent teeth using the Palmer and Universal methods.
- 2.C.02 Apply knowledge of the landmarks of the oral cavity.
  - 2.C.02.01 Identify the various landmarks of the oral cavity and salivary glands.
- 2.C.03 Apply knowledge of the landmarks of the face.
  - 2.C.03.01 Recognize and label the various landmarks of the face.
- 2.C.04 Apply knowledge of the bones of the cranium and the face and identify the landmarks of the maxilla and mandible.
- 2.C.05 Identify parts of the temporomandibular joint and describe how the joint works.
- 2.C.06 List and identify the muscles of mastication, facial expression, the tongue, and the floor of the mouth.
- 2.C.07 List and identify the nerves of the maxilla and the mandible.
- 2.C.08 Identify the arteries and veins of the head and neck.

2.C Performance Example:

- The student will create a project on which they will illustrate the bones of the skull and face, muscles, and trigeminal nerve.

## 2.D Procedures Used When Responding to Client Needs

- 2.D.01 Demonstrate client/patient identification.
- 2.D.02 Explain importance of responding to client/patient in a timely, compassionate and professional manner.
- 2.D.03 Demonstrate all forms of communication skills in the workplace.
  - 2.D.03.01 Demonstrate verbal and non-verbal communication skills.
  - 2.D.03.02 Complete a verbal /written client report.
  - 2.D.03.03 Use medical terms and abbreviations.
  - 2.D.03.04 Demonstrate telephone techniques appropriate to a health care setting.
  - 2.D.03.05 Identify the components of and complete an incident/variance report.
- 2.D.04 List strategies used to maintain client dignity at all times.
- 2.D.05 Provide respect for diverse orientations.
- 2.D.06 Demonstrate basic assessment techniques.
  - 2.D.06.01 Measure and record accurate vital signs.
  - 2.D.06.02 Demonstrate procedures used to position and drape clients/patients.
  - 2.D.06.03 Explain procedures used with patients with special needs.
  - 2.D.06.04 Demonstrate safe transfer techniques.
  - 2.D.06.05 Describe observation skills used in the workplace.
  - 2.D.06.06 Recognize abnormal oral pathology.

2.D.07 Recognize and assist with medical emergencies in the dental office.

2.D Performance Example:  
▪ The student will demonstrate the ability to greet and seat a patient in a professional manner.

## 2.E Basic Chair Side Dental Procedures

- 2.E.01 Prepare the operatory for patient treatment.
- 2.E.02 Prepare all necessary armamentarium to deliver anesthetic according to doctor's orders.
  - 2.E.02.01 Apply topical anesthetic to the injection site.
- 2.E.03 Obtain a medical and dental history.
  - 2.E.03.01 Recognize medications, their usage and contraindications.
- 2.E.04 Demonstrate the proper patient/assistant/operator positions during a specified treatment.
- 2.E.05 Assist in clinical oral examination and dental charting.
- 2.E.06 Place and remove a dental dam.
  - 2.E.06.01 Apply Young frame, U-frame, and Otsby frame techniques.
  - 2.E.06.02 Produce accurate quadrant and single tooth isolations using the appropriate clamps/ widgets.
- 2.E.07 Maintain a clear operating field.
  - 2.E.07.01 Demonstrate oral evacuation.
  - 2.E.07.02 Achieve optimum moisture control.
  - 2.E.07.03 Provide tissue retraction.
- 2.E.08 Demonstrate proper instrument transfer.
- 2.E.09 Provide pre-operative and post-operative care instructions for all dental procedures.
- 2.E.10 Explain procedures used when dismissing the patient after treatment.
- 2.E.11 Identify and assemble hand pieces and rotary instruments.

2.E Performance Example:  
▪ The student will prepare all necessary armamentarium for a given chair-side procedure.

## 2.F Knowledge of Dental Materials

- 2.F.01 Explain the properties of dental materials.
- 2.F.02 Demonstrate the manipulation, preparation and application of impression materials.
- 2.F.03 Demonstrate the manipulation, preparation and application of gypsum products.
- 2.F.04 Demonstrate the manipulation, preparation and application of all restorative materials.
- 2.F.05 Demonstrate the preparation and application of abrasives and polishing agents.
- 2.F.06 Demonstrate the manipulation, preparation and application of sedative/palliative materials.
- 2.F.07 Demonstrate the manipulation, preparation and application of whitening materials.
- 2.F.08 Demonstrate the preparation and mixing of dental cements.

2.F Performance Example:  
▪ The student will produce quality impressions of various materials, and fabricate models using gypsum products.

## 2.G Restorative Procedures

- 2.G.01 Prepare armamentarium and manipulate dental materials for restorative procedures.
- 2.G.02 Demonstrate four-handed dentistry concepts.
  - 2.G.02.01 Assist with amalgam procedures.
  - 2.G.02.02 Assist with composite procedures.
- 2.G.03 Demonstrate and prepare given matrices.

- 2.G.03.01 Assemble prescribed matrices.
- 2.G.04 Explain laser technology and related safety concerns.

2.G Performance Example:

- The student will assemble and place a Tofflemire retainer/matrix band for assigned quadrant/tooth number.

## 2.H Prosthodontic Procedures

- 2.H.01 Prepare armamentarium and manipulate dental materials for prosthodontic procedures.
  - 2.H.01.01 Fabricate and obtain all forms of bite registrations.
  - 2.H.01.02 Assist with Computer-Aided Design (CAD)/Computer-Aided Manufacturing (CAM) technology related to dental materials.
  - 2.H.01.03 Fabricate custom impression trays.
  - 2.H.01.04 Fabricate temporary/provisional crowns.
- 2.H.02 Assist with fixed prosthodontics procedures.
- 2.H.03 Assist with removable prosthodontics procedures.
  - 2.H.03.01 Summarize procedures for construction of a full or partial denture.
- 2.H.04 Assist with the adjustment of fixed and removable prosthetics.
  - 2.H.04.01 Polish removable appliances and prostheses.

2.H Performance Example:

- The student will assemble prescribed armamentarium and obtain a bite registration.

## 2.I Preventive Measures

- 2.I.01 Select and prepare armamentarium and dental materials for preventive procedures.
- 2.I.02 Assist with preventive procedures.
  - 2.I.02.01 Explain the purpose of preventive dentistry.
  - 2.I.02.02 Select the appropriate materials for a fluoride treatment.
- 2.I.03 Prepare armamentarium and demonstrate rubber cup polishing.
- 2.I.04 Apply anticariogenic agents.
  - 2.I.04.01 Identify the modes of fluoride therapy, topical and systemic.
- 2.I.05 Prepare and assist with the application of dental sealants.
  - 2.I.05.01 Describe the clinical indications and contraindications for dental sealants.
- 2.I.06 Provide oral hygiene/health instruction.
  - 2.I.06.01 Evaluate the patient's oral health care status and habits.
- 2.I.07 Summarize dietary analysis for dental disease control.

2.I Performance Example:

- The student will select armamentarium for preventive procedures, and provide post-operative instructions.

## 2.J Procedures Relating to Radiation Safety

- 2.J.01 Apply the principles of radiation protection, health physics and hazards in the operation of radiographic equipment.
  - 2.J.01.01 List and describe the factors affecting x-ray production, including kVp, mA, and exposure time.
  - 2.J.01.02 Describe the characteristics of x-radiation.
  - 2.J.01.03 List and describe the x-ray machine factors that influence radiation safety, including concepts of filtration, shielding, collimation, and PID (cone) length.
  - 2.J.01.04 Explain the x-radiation physics principles of primary and scatter (secondary) radiation.
  - 2.J.01.05 Describe protocol for suspected x-ray machine malfunctions.

- 2.J.02 Practice patient safety measures to provide protection from x-radiation.
  - 2.J.02.01 Identify major causes of unnecessary x-radiation exposure.
  - 2.J.02.02 Explain the effects of x-radiation on the human body.
  - 2.J.02.03 Identify ways to reduce x-radiation exposure to patients.
  - 2.J.02.04 Identify guidelines that determine frequency of exposure (As Low As Reasonably Achievable - ALARA).
- 2.J.03 Practice operator safety measures to provide protection from x-radiation.
  - 2.J.03.01 Identify sources of x-radiation to operators/other staff while exposing radiographs.
  - 2.J.03.02 Identify safety measures to reduce operator x-ray exposure.
  - 2.J.03.03 Explain the principles of x-radiation physics and biology pertaining to operator exposure.
- 2.J.04 Describe techniques for monitoring individual x-radiation exposure.
  - 2.J.04.01 Describe the ALARA principle as related to operator safety.
  - 2.J.04.02 Explain the function of a personal monitoring device.

2.J Performance Example:

- The student will list the properties of radiation and explain the biological effects of radiation exposure and safety precautions needed.

**2.K Equipment and Practices Relating to Dental Radiography**

- 2.K.01 List the characteristic properties of x-ray beam and ionizing radiation.
  - 2.K.01.01 Describe how x-rays are produced.
  - 2.K.01.02 List and describe the possible interactions of x-rays with matter.
- 2.K.02 Identify the component parts of the x-ray machine.
- 2.K.03 Expose and evaluate radiographs.
  - 2.K.03.01 Describe the use and purpose of various intraoral and extraoral radiographs.
  - 2.K.03.02 Select appropriate radiographic film to examine, view, or survey conditions, teeth or landmarks.
- 2.K.04 Select appropriate equipment for radiographic techniques.
  - 2.K.04.01 Describe the purpose and advantage of accessories for radiographic techniques.
  - 2.K.04.02 Select appropriate film size and film speed (sensitivity) depending on patient characteristics and indicated exposure technique.
  - 2.K.04.03 Describe the purpose and advantage of dual (double) film packets.
- 2.K.05 Maintain proper storage of radiographs.
  - 2.K.05.01 Inspect and evaluate film storage areas for recommended temperature, humidity, radiation protection and inventory control.
  - 2.K.05.02 Identify and correct errors related to improperly stored, exposed and unexposed radiographic film.
- 2.K.06 Select patient management techniques before, during, and after radiographic exposure.
  - 2.K.06.01 Address patient concerns about radiation, including patient refusal of radiography.
  - 2.K.06.02 Describe techniques for patient management while exposing radiographs, including patients with special needs.
- 2.K.07 Select infection control techniques and barriers to minimize cross contamination in the operatory according to American Dental Association (ADA)/Centers for Disease Control (CDC) and OSHA guidelines.
- 2.K.08 Expose dental films, using various techniques.

- 2.K.08.01 Describe radiographic exposure concepts.
- 2.K.09 List factors that influence quality of exposure, including mA settings and kVp.
- 2.K.10 Compare paralleling and bisecting angle techniques, including advantages and disadvantages of each.
- 2.K.11 Name the parts and functions of a radiograph film packet.
- 2.K.12 Describe the function and maintenance of film cassettes and intensifying screens.
- 2.K.13 Describe techniques for exposing (patient positioning) during panoramic and cephalometric radiographs according to ADA guidelines.
- 2.K.14 Demonstrate basic knowledge of digital radiography and other modern imaging techniques.
  - 2.K.14.01 Explain the advantages/disadvantages of digital radiography.
  - 2.K.14.02 Demonstrate proper handling of image receptors.
  - 2.K.14.03 Demonstrate infection control protocol for digital equipment use.
- 2.K.15 Evaluate radiographs for diagnostic value.
  - 2.K.15.01 Describe features of a diagnostically acceptable radiograph.
  - 2.K.15.02 Identify and correct errors related to exposing intraoral radiographs.
  - 2.K.15.03 Identify and correct errors related to exposing panoramic radiographs, including patient positioning errors.
- 2.K.16 Prepare, maintain, and replenish radiographic solutions for manual and automatic processors.
  - 2.K.16.01 Describe functions of processing solutions.
  - 2.K.16.02 Describe procedures for maintaining the integrity of processing solutions.
- 2.K.17 Process exposed intraoral and extraoral radiographs by use of manual and automatic techniques.
  - 2.K.17.01 Identify optimum conditions and procedures for processing radiographs.
  - 2.K.17.02 Identify and correct errors related to radiographic processing.
- 2.K.18 Identify and correct errors due to improper film handling.
- 2.K.19 Demonstrate and apply infection control for radiographic processing, following ADA/CDC and OSHA guidelines.
- 2.K.20 Store chemical agents used in radiography procedures according to the local regulatory agency, in compliance with the OSHA Hazard Communication Standard.
- 2.K.21 Dispose of all chemical agents and other materials used in dental radiography procedures in compliance with the OSHA Hazard Communication Standard.
- 2.K.22 Implement quality assurance procedures (e.g., daily recording of solution temperatures, dates of solution changes, test film runs, clean and maintain equipment, knowledge of periodic inspections).
- 2.K.23 Mount radiographs using buccal (facial) view.
  - 2.K.23.01 Identify anatomical landmarks that aid correct mounting.
  - 2.K.23.02 Match specific tooth views to specified tooth mount windows.
  - 2.K.23.03 Demonstrate appropriate technique for optimum viewing.
- 2.K.24 Identify anatomical structure and dental materials on radiographs, including differentiating between radiolucent and radiopaque. Verify patient information on all radiographs.
  - 2.K.24.01 Prepare radiographs for legal requirements, viewing, and duplication.
  - 2.K.24.02 Describe and demonstrate methods for duplicating radiographs.
  - 2.K.24.03 Identify information that must legally appear on the mount label.
  - 2.K.24.04 List reasons for exposing and retaining radiographs.
  - 2.K.24.05 Identify and correct errors related to exposing panoramic radiographs, including patient positioning errors.

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|-----|---|
| 2.K | Performance Example: <ul style="list-style-type: none"> <li>▪ The student will explain exposure, processing, mounting, and labeling of a full mouth series of radiographs (FMX).</li> </ul> |
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**2.L Approved Externship**

- 2.L.01 Complete a supervised student practicum.
- 2.L.02 Demonstrate professional behavior in clinical practice.
- 2.L.03 Assist with and perform procedures as stated in the state Dental Practice Act.

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| 2.L | Performance Example: <ul style="list-style-type: none"> <li>▪ The student will participate in an approved externship while upholding professional conduct and standards.</li> </ul> |
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**2.M Certifications for Students in a Dental Assisting Program**

- 2.M.01 Obtain Cardiopulmonary Resuscitation (C.P.R.) certification for the Healthcare Provider.
- 2.M.02 Obtain Radiology Certification – Dental Assisting National Board.
- 2.M.03 Obtain Infection Control Certification – Dental Assisting National Board.
- 2.M.04 Obtain Occupational Safety Health Administration (OSHA) certification.

**Advanced Dental Assisting Technical Knowledge and Skills**

Note: The following competencies are optional, supplementary competencies suitable for advanced students. These are not required.

**\*2.N Fundamentals of healthcare office management**

- \*2.N.01 Manage patient files.
  - \*2.N.01.01 Maintain patient confidentiality.
  - \*2.N.01.02 Demonstrate organization, and write technical information in a patient chart.
  - \*2.N.01.03 Demonstrate how to process the correction of an error.
- \*2.N.02 Demonstrate the effective use of alphabetical, numerical, subject, and color-coded filing system.
- \*2.N.03 Utilize electronic medical/dental records.
  - \*2.N.03.01 Describe and carry out the process of scheduling appointments.
  - \*2.N.03.02 Summarize the steps in receiving patient payments.
  - \*2.N.03.03 Explain the steps involved in filing insurance claims.
  - \*2.N.03.04 Record patients personal, medical and dental information.
  - \*2.N.03.05 Record conditions of the teeth and surrounding periodontium.

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| *2. N | Advanced Performance Example: <ul style="list-style-type: none"> <li>▪ The student will demonstrate proper maintenance, handling, and filing of patient records, as well as; recording patient data and conditions using electronic dental records.</li> </ul> |
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**\*2.0 Oral surgery and/or periodontal surgery**

- \*2.0.01 Prepare armamentarium and dental materials for oral/periodontal surgical procedures.
  - \*2.0.01.01 Identify specialized instruments used for basic surgical procedures.
- \*2.0.02 Assist with implant procedures.
  - \*2.0.02.01 Discuss the indications for and contraindications to dental implants.

- \*2.0.03 Assist with placement and removal of sutures.
- \*2.0.04 Perform mixing and placement of surgical dressing.
- \*2.0.05 Assist with surgical procedures.

\*2.0 Advanced Performance Example:

- Students will successfully obtain armamentarium for a surgical procedure.

**\*2.P Orthodontic procedures**

- \*2.P.01 Understand the importance of occlusion, and the development, classifications, and possible results of malocclusion.
- \*2.P.02 Identify oral habits and conditions that affect the dentition.
- \*2.P.03 Observe/record symptoms of temporomandibular joint disorders.
- \*2.P.04 Prepare for and assist with the collection of diagnostic data.
- \*2.P.05 Prepare armamentarium and manipulation of any dental materials for orthodontic procedures.
- \*2.P.06 Understand, perform and/or assist with orthodontic procedures.
- \*2.P.07 Recognize various fixed and removable orthodontic appliances and their uses.

\*2. P Advanced Performance Example:

- The student will demonstrate the proper technique for placing and removing ligature wires and elastomeric ties on an orthodontic typodont.

**\*2.Q Endodontic procedures**

- \*2.Q.01 Prepare armamentarium and manipulate any dental materials for endodontic procedures.
  - \*2.Q.01.01 Assist during endodontic extirpation and obturation procedures.
  - \*2.Q.01.02 Describe surgical endodontic procedures.

\*2. Q Advanced Performance Example:

- Students will prepare all necessary armamentarium needed for prescribed endodontic therapy, and transfer instruments in correct sequence.

**\*2.R Pediatric patient needs**

- \*2.R.01 Discuss childhood development stages and behavior management techniques
- \*2.R.02 Identify the oral aids specific to the pediatric patient

\*2. R Performance Example:

- The student will demonstrate a behavior management technique for a pediatric patient.

## Strand 3: Embedded Academics

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Strand 3: Embedded Academics, a critical piece of a Vocational Technical Education Framework, are presented as Crosswalks between the Massachusetts Vocational Technical Education Frameworks and the Massachusetts Curriculum Frameworks. These Crosswalks are located in the Appendix of this Framework.

### **Academic Crosswalks**

[Appendix A:](#) [English Language Arts](#)

[Appendix B:](#) [Mathematics](#)

[Appendix C:](#) [Science and Technology/Engineering](#)

Earth and Space Science

Life Science (Biology)

Physical Science (Chemistry and Physics)

Technology/Engineering

## Strand 4: Employability and Career Readiness

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### 4.A Career Exploration and Navigation

- 4.A.01 Develop a career plan and portfolio.
  - 4.A.01.01 Develop and revise career plan annually based on workplace awareness and skill attainment.
  - 4.A.01.02 Assess personal strengths and interest areas to determine potential careers, career pathways and career ladders.
  - 4.A.01.03 Examine potential career field(s)/discipline(s) and identify criteria to select, secure and keep employment in chosen field(s).
  - 4.A.01.04 Research and evaluate a variety of careers utilizing multiple sources of information and resources to determine potential career(s) and alternatives.
  - 4.A.01.05 Identify training and education requirements that lead to employment in chosen field(s) and demonstrate skills related to evaluating employment opportunities.
  - 4.A.01.06 Explore and evaluate postsecondary educational opportunities including degrees and certifications available, traditional and nontraditional postsecondary pathways, technical school and apprenticeships, cost of education, financing methods including scholarships and loans and the cost of loan repayment.
  - 4.A.01.07 Create a portfolio showcasing academic and career growth including a career plan, safety credential, resume and a competency profile demonstrating the acquisition of the knowledge and skills associated with at least two years of full-time study in the Chapter 74 program.
  
- 4.A.02 Demonstrate job search skills.
  - 4.A.02.01 Conduct a job search and complete written and electronic job applications, resumes, cover letters and related correspondence for a chosen career path.
  - 4.A.02.02 Explore and evaluate postsecondary job opportunities and career pathways specific to career technical areas.
  - 4.A.02.03 Identify role and use of social media and networking for staying current with career and employment trends as well as networking, job seeking and career development opportunities.
  - 4.A.02.04 Demonstrate ability to use social media and networking to develop useful occupational contacts, job seeking and career development opportunities.
  
- 4.A.03 Demonstrate all phases of the job interview process.
  - 4.A.03.01 Gather relevant information about potential employer(s) from multiple print and digital sources, assessing the credibility and accuracy of each source.
  - 4.A.03.02 Identify employment eligibility criteria, such as drug/alcohol free status, clean driving record, etc.

- 4.A.03.03 Practice effective interviewing skills: appearance, inquiry and dialogue with interviewer, positive attitude and evidence of work ethic and skills.
- 4.A.03.04 Explore and evaluate employment benefit packages including wages, vacation, health care, union dues, cafeteria plans, tuition reimbursement, retirement and 401K.

4. A Performance Examples:
- Conduct research to analyze and present on specific careers within a cluster.
  - Conduct web-based job search using sites such as Monster.com, CareerBuilder.com, Indeed.com, Snagajob.com, Simplyhired.com and others.
  - Create profile on social media/networking site such as LinkedIn and/or LinkedIn University for postsecondary research and employment opportunities.
  - Complete online job application.
  - Conduct and videotape practice interviews for instructor and student analysis.
  - Provide students with sample employment and benefit packages for evaluation.

#### **4.B Communication in the Workplace**

- 4.B.01 Demonstrate appropriate oral and written communication skills in the workplace.
  - 4.B.01.01 Communicate effectively using the language and vocabulary appropriate to a variety of audiences within the workplace including coworkers, supervisors and customers.
  - 4.B.01.02 Read technical and work-related documents and demonstrate understanding in oral discussion and written exercise.
  - 4.B.01.03 Demonstrate professional writing skills in work-related materials and communications (e.g., letters, memoranda, instructions and directions, reports, summaries, notes and/or outlines).
  - 4.B.01.04 Use a variety of writing/publishing/presentation applications to create and present information in the workplace.
  - 4.B.01.05 Identify, locate, evaluate and use print and electronic resources to resolve issues or problems in the workplace.
  - 4.B.01.06 Use a variety of financial and data analysis tools to analyze and interpret information in the workplace.
  - 4.B.01.07 Orally present technical and work-related information to a variety of audiences.
  - 4.B.01.08 Identify and demonstrate professional non-verbal communication.
- 4.B.02 Demonstrate active listening skills.
  - 4.B.02.01 Listen attentively and respectfully to others.
  - 4.B.02.02 Focus attentively, make eye contact or other affirming gestures, confirm understanding and follow directions.
  - 4.B.02.03 Show initiative in improving communication skills by asking follow-up questions of speaker in order to confirm understanding.

4. B Performance Examples:
- Read and analyze technical instructions to learn what makes them effective.
  - Read and analyze technical instructions to follow directions and/or solve a problem.
  - Examine a technical document and use it to write a set of instructions for another student to follow and evaluate.
  - Analyze websites for effective technical writing and design.
  - Create brochures and presentations using software and/or Web 2.0 tools to convey technical information.
  - Conduct research using the Internet, print documents, observations and interviews to create a technical guide.

#### **4.C Work Ethic and Professionalism**

- 4.C.01 Demonstrate attendance and punctuality.
- 4.C.01.01 Identify and practice professional time-management and attendance behaviors including punctuality, reliability, planning and flexibility.
- 4.C.02 Demonstrate proper workplace appearance.
- 4.C.02.01 Identify and practice professional appearance specific to the workplace.
- 4.C.02.02 Identify and practice personal hygiene appropriate for duties specific to the workplace.
- 4.C.02.03 Identify and wear required safety gear specific to the workplace.
- 4.C.03 Accepts direction and constructive criticism.
- 4.C.03.01 Demonstrate ability (both verbally and non-verbally) to accept direction and constructive criticism and to implement solutions to change behaviors.
- 4.C.03.02 Ask appropriate questions to clarify understanding of feedback.
- 4.C.03.03 Analyze own learning style and seek instructions in a preferred format that works best for their understanding (such as oral, written or visual instruction).
- 4.C.04 Demonstrate motivation and initiative.
- 4.C.04.01 Evaluate assigned tasks for time to completion and prioritization.
- 4.C.04.02 Demonstrate motivation through enthusiasm, engagement, accurate completion of tasks and activities.
- 4.C.04.03 Demonstrate initiative by requesting new assignments and challenges.
- 4.C.04.04 Explain proposed solutions to challenges observed in the workplace.
- 4.C.04.05 Demonstrate the ability to evaluate multiple solutions to problems and challenges using critical reasoning and workplace/industry knowledge and select the best solution to the problem.
- 4.C.04.06 Implement solution(s) to challenges and/or problem(s) observed in the workplace.
- 4.C.04.07 See projects through completion and check work for quality and accuracy.
- 4.C.05 Demonstrate awareness of workplace culture and policy.

- 4.C.05.01 Display ethical behavior in use of time, resources, computers and information.
- 4.C.05.02 Identify the mission of the organization and/or department.
- 4.C.05.03 Explain the benefits of a diverse workplace.
- 4.C.05.04 Demonstrate a respect for diversity and its benefit to the workplace.
  
- 4.C.06 Interact appropriately with coworkers.
  - 4.C.06.01 Work productively with individuals and in teams.
  - 4.C.06.02 Develop positive mentoring and collaborative relationships within work environment.
  - 4.C.06.03 Show respect and collegiality, both formally and informally.
  - 4.C.06.04 Explain and follow workplace policy on the use of cell phones and other forms of social media.
  - 4.C.06.05 Maintain focus on tasks and avoid negative topics or excessive personal conversations in the workplace.
  - 4.C.06.06 Negotiate solutions to interpersonal and workplace conflicts.

4. C Performance Examples:

- Complete a learning style analysis tool.
- Develop a rubric to assess work ethic and professionalism as detailed in the standards above.

### Student Organizations

Business Professionals of America

[www.bpa.org](http://www.bpa.org)

### *Selected Websites*

- 5 Ways to Ace a Job Interview: [http://kidshealth.org/teen/school\\_jobs/jobs/tips\\_interview.html](http://kidshealth.org/teen/school_jobs/jobs/tips_interview.html)
- America’s Career Resource Network: <http://acrn.ovae.org/teachers/careerexpclassrm.htm>
- Career Cruiser – Florida Department of Education: <http://www.fldoe.org/workforce/pdf/cruiser.pdf>
- Career Development Guide and Glossary: <http://www.doe.mass.edu/connect/cde.html>
- Career One Stop: <http://www.careeronestop.org/>
- Career Plan: <http://www.doe.mass.edu/cd/plan/intro.html>
- Career Plan Model: [http://www.doe.mass.edu/ccr/epp/samples/cpmodel\\_11x17.pdf](http://www.doe.mass.edu/ccr/epp/samples/cpmodel_11x17.pdf)
- Checklist: <http://www.doe.mass.edu/cd/plan/checklist.pdf>
- Career Tech: [http://www.okcareertech.org/cac/Pages/resources\\_products/ethics\\_web\\_sites.htm](http://www.okcareertech.org/cac/Pages/resources_products/ethics_web_sites.htm)
- Ethics Resource Center: <http://www.ethics.org/>
- Interaction in the Workplace: <http://hrweb.berkeley.edu/guides/managing-hr/interaction/communication>

- Individual Learning Plans: How-to Guide: “Promoting Quality Individualized Learning Plans: A How to Guide on the High School Years” <http://www.ncwd-youth.info/ilp/how-to-guide>
- ILP Fact Sheet: <http://www.ncwd-youth.info/fact-sheet/individualized-learning-plan>
- ILP Policy Brief: <http://www.ncwd-youth.info/ilp/produce-college-and-career-ready-high-school-graduates>
- ILP Resources Home Page: <http://www.ncwd-youth.info/ilp>
- Interview Skills Lesson Plans:  
<http://www.amphi.com/media/1220281/interview%20skills%20lesson%20plan.doc>
- Labor and Workforce Development: <http://www.mass.gov/lwd/employment-services/preparing-for-your-job-search/>
- Maine Community College System – Center for Career Development:  
[http://www.ccd.me.edu/careerprep/CareerPrepCurriculum\\_LP-6.pdf](http://www.ccd.me.edu/careerprep/CareerPrepCurriculum_LP-6.pdf)
- Massachusetts Work-Based Learning: <http://skillspages.com/masswbl>
- North Dakota Association of Agriculture Educators:  
[http://www.ndaae.org/attachments/File/Preparing\\_students\\_for\\_a\\_Job\\_Interview.pptx](http://www.ndaae.org/attachments/File/Preparing_students_for_a_Job_Interview.pptx)
- NY CTE Learning Standards—Career Development and Occupational Studies (CDOS) Resource Guide with Core Curriculum : <http://www.p12.nysed.gov/cte/cdlearn/cdosresourceguide.html>
- Occupational Outlook Handbook: <http://www.bls.gov/ooh/>
- Purdue OWL Job Search Resources (for writing resumes, applications, and letters):  
<https://owl.english.purdue.edu/engagement/34/>
- Soft Skills to Pay the Bills — Mastering Soft Skills for Workplace Success:  
<http://www.dol.gov/odep/topics/youth/softskills/>
- US Department of Labor: <http://www.dol.gov/dol/audience/aud-unemployed.htm>
- Workplace Communication:  
<http://www.regionalskillstraining.com/sites/default/files/content/WC%20Book%201.pdf>
- Your Plan For the Future: <http://www.yourplanforthefuture.org>

## Strand 5: Management and Entrepreneurship Knowledge and Skills

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### 5.A Starting a Business

- 5.A.01 Demonstrate an understanding of the practices required to start a business.
  - 5.A.01.01 Define entrepreneurship and be able to recognize and describe the characteristics of an entrepreneur.
  - 5.A.01.02 Compare and contrast types of business ownership (i.e., sole proprietorships, franchises, partnerships, corporations).
  - 5.A.01.03 Identify and explain the purpose and contents of a business plan.
  - 5.A.01.04 Demonstrate an understanding of the principles and concepts of a business's supply chain (i.e., suppliers, producers and consumers).

#### 5. A Performance Examples:

- Develop a presentation pertaining to an entrepreneur and their business.
- Communicate with a business owner and discuss the pros and cons of starting and owning a business. Summarize the main points of the discussion.
- Choose a product or service and describe the process leading to distribution.
- Write a business plan for a business in your community.

### 5.B Managing a Business

- 5.B.01 Demonstrate an understanding of managing a business.
  - 5.B.01.01 Formulate short- and long-term business goals.
  - 5.B.01.02 Demonstrate effective verbal, written and visual communication skills.
  - 5.B.01.03 Utilize a decision-making process to make effective business decisions.
  - 5.B.01.04 Identify a business's chain of command and define its organizational structure.
  - 5.B.01.05 Identify and apply effective customer service skills and practices.
  - 5.B.01.06 Identify, interpret and develop written operating procedures and policies.
  - 5.B.01.07 Track inventory, productivity and labor cost.
  - 5.B.01.08 Demonstrate business meeting skills.
  - 5.B.01.09 Identify professional organizations and explore their benefits.

#### 5. B Performance Examples:

- Working as a team, role-play situations that an entrepreneur might face in dealing with customers or employees.
- Contact a relevant professional organization and request information about its benefits, membership requirements and costs.
- Plan and conduct a business meeting.
- Identify companies that are known for customer service and list the practices that help differentiate themselves from all others in their industry.

### 5.C Marketing a Business

- 5.C.01 Demonstrate an understanding of marketing and promoting a business.
  - 5.C.01.01 Explain the role of business in the economy.
  - 5.C.01.02 Describe the relationship between business and community.
  - 5.C.01.03 Describe methods of market research and identifying target markets.

- 5.C.01.04 Describe and apply the concepts of a marketing mix (the 4Ps of marketing: product, price, place and promotion).
- 5.C.01.05 Compare and contrast the promotional tools and techniques used to sell products, services, images and ideas.
- 5.C.01.06 Describe the impact of supply and demand on a product or business.
- 5.C.01.07 Identify direct and indirect competition on a business.
- 5.C.01.08 Identify and use sales techniques to meet client needs and wants.
- 5.C.01.09 Discuss strategies to acquire and retain a customer base.

5. C Performance Examples:
- Research reliable sources to identify marketing and industry data related to a business.
  - Conduct market research by developing a survey and presenting the results.
  - Create a promotional campaign using a variety of media.
  - Write a marketing plan for a product.

## **5.D Financial Concepts and Applications in Business**

- 5.D.01 Demonstrate an understanding of financial concepts and applications.
  - 5.D.01.01 Identify essential financial reports and understand their purpose (i.e., budget, balance sheet and income statement).
  - 5.D.01.02 Describe payroll practices (i.e., deductions – federal, FICA and state taxes and insurances).
  - 5.D.01.03 Identify the importance of maintaining accurate records.
  - 5.D.01.04 Apply practices related to pricing, purchasing and billing.
  - 5.D.01.05 Maintain and reconcile a checking account.
  - 5.D.01.06 Identify the options for funding a business.

5. D Performance Examples:
- Given an employee time card and rate of pay, calculate gross pay, taxes, deductions and net pay.
  - Develop a budget for a simulated business or project.
  - Analyze and discuss financial documents from a company.
  - Research various methods of funding a business.

## **5.E Legal/Ethical/Social Responsibilities**

- 5.E.01 Demonstrate an understanding of legal, ethical and social responsibility for businesses.
  - 5.E.01.01 Identify state and federal laws and regulations related to managing a business.
  - 5.E.01.02 Describe and identify ethical business practices.
  - 5.E.01.03 Demonstrate an understanding of business contracts.
  - 5.E.01.04 Explain the role of diversity in the workplace.
  - 5.E.01.05 Explain the role of labor organizations.
  - 5.E.01.06 Identify practices that support clean energy technologies and encourage environmental sustainability.
  - 5.E.01.07 Demonstrate an understanding of how technology advancements impact business practices.

- 5.E Performance Example:
- Read and interpret a contract.
  - Complete an application for a license, permit or certificate.
  - Research federal, state and local regulations and laws required for a business.
  - Participate in and summarize a discussion with a member of a labor or civil rights organization.

### *Selected Websites*

- CVTE Strand 1, 4, and 5 Resources: <https://sites.google.com/a/mccanntech.org/cvte-strands-1-4-and-5-resources/>
- Entrepreneur: <http://www.entrepreneur.com>
- Inc. Magazine: <http://www.inc.com/>
- Junior Achievement “Be Entrepreneurial Program”: <https://www.juniorachievement.org/web/ja-usa/home>
- Kahn Academy Interviews with Entrepreneurs: <https://www.khanacademy.org/economics-finance-domain/entrepreneurship2/interviews-entrepreneurs>
- Kauffman Founders School: <http://www.entrepreneurship.org/en/founders-school.aspx>
- National Federation of Independent Business: [www.nfib.com](http://www.nfib.com)
- National Foundation for Teaching Entrepreneurship (NFTE): [www.nfte.com](http://www.nfte.com)
- SBA Loans: <http://www.sba.gov>
- SkillsUSA Professional Development Program Competency List: <http://www.skillsusa.org/downloads/PDF/lessons/professional/PDPPreview.pdf>
- Small Business Administration: [www.sba.gov](http://www.sba.gov)

### *Glossary*

<b>Term</b>	<b>Definition</b>
Balance sheet	A statement of the assets, liabilities and capital of a business at a particular point in time.
Budget	An estimate of income and expenditure for a set period of time.
Business Ownership	Types of business ownership refer to the legal structure of an organization. Legal structures include: Sole Proprietorship, Partnerships, Corporations and Limited Liability Companies.
Business Plan	A written document that describes in detail your business goals and how you are going to achieve them from a marketing, operational and financial point of view.

**Term**

Chain of Command and Organizational Structure

**Definition**

Refers to the management structure of an organization. It identifies lines of authority, lines of communication, and reporting relationships. Organizational structure determines how the roles, power and responsibilities are assigned and coordinated and how information flows between the different levels of management. (A visual representation of this structure is called an org chart).

FICA

Federal Insurance Contributions Act requires taxes deducted from pay for supporting Social Security.

Income Statement

A financial statement providing operating results for a specific time period showing a business's revenues, expenses and profit or loss.

Market Research

- Primary: Surveys, Focus Groups, Observation
- Secondary: Websites, Internet

Marketing Mix

A set of controlled variables that formulate the strategic position of a product or service in the marketplace. These variables are known as the 4 P's of marketing and include product, place, price and promotion.

Methods to Track Inventory, Productivity and Labor Cost

Refers to the processes a business uses to account for: 1) the inflows and outflows of inventory and materials related to inventory; 2) the efficiency of operations and 3) the cost of labor including salary and benefits.

Promotional Tools and Techniques

The six elements of a promotional mix are: advertising, visual merchandising, public relations, publicity, personal selling and sales promotion.

Supply Chain

The supply chain, or channel of distribution, describes how the product is handled and/or distributed from suppliers with materials, to the manufacturer, wholesaler or retailer and finally to the consumer.

Target Market

Those who are most likely to buy your product or service.

## Strand 6: Technology Literacy Knowledge and Skills

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### 6.A Technology Literacy Knowledge and Skills (Grades 9 through 12)

- 6.A.01 Demonstrate proficiency in the use of computers and applications, as well as an understanding of the concepts underlying hardware, software, and connectivity.
  - 6.A.01.01 Use online help and other support to learn about features of hardware and software, as well as to assess and resolve problems.
  - 6.A.01.02 Install and uninstall software; compress and expand files (if the district allows it).
  - 6.A.01.03 Explain effective backup and recovery strategies.
  - 6.A.01.04 Apply advanced formatting and page layout features when appropriate (e.g., columns, templates, and styles) to improve the appearance of documents and materials.
  - 6.A.01.05 Use editing features appropriately (e.g., track changes, insert comments).
  - 6.A.01.06 Identify the use of word processing and desktop publishing skills in various careers.
  - 6.A.01.07 Identify the use of database skills in various careers.
  - 6.A.01.08 Define and use functions of a spreadsheet application (e.g., sort, filter, find).
  - 6.A.01.09 Explain how various formatting options are used to convey information in charts or graphs.
  - 6.A.01.10 Identify the use of spreadsheet skills in various careers.
  - 6.A.01.11 Use search engines and online directories.
  - 6.A.01.12 Explain the differences among various search engines and how they rank results.
  - 6.A.01.13 Explain and demonstrate effective search strategies for locating and retrieving electronic information (e.g., using syntax and Boolean logic operators).
  - 6.A.01.14 Describe good practices for password protection and authentication.
- 6.A.02 Demonstrate the responsible use of technology and an understanding of ethics and safety issues in using electronic media at home, in school, and in society.
  - 6.A.02.01 Demonstrate compliance with the school's Acceptable Use Policy.
  - 6.A.02.02 Explain issues related to the responsible use of technology (e.g., privacy, security).
  - 6.A.02.03 Explain laws restricting the use of copyrighted materials.
  - 6.A.02.04 Identify examples of plagiarism, and discuss the possible consequences of plagiarizing the work of others.
- 6.A.03 Design and implement a personal learning plan that includes the use of technology to support lifelong learning goals.
  - 6.A.03.01 Evaluate the authenticity, accuracy, appropriateness, and bias of electronic resources, including Web sites.
  - 6.A.03.02 Analyze the values and points of view that are presented in media messages.
  - 6.A.03.03 Describe devices, applications, and operating system features that offer accessibility for people with disabilities.

- 6.A.03.04 Evaluate school and work environments in terms of ergonomic practices.
- 6.A.03.05 Describe and use safe and appropriate practices when participating in online communities (e.g., discussion groups, blogs, social networking sites).
- 6.A.03.06 Explain and use practices to protect one's personal safety online (e.g., not sharing personal information with strangers, being alert for online predators, reporting suspicious activities).
- 6.A.03.07 Explain ways individuals can protect their technology systems and information from unethical users.
- 6.A.04 Demonstrate the ability to use technology for research, critical thinking, problem solving, decision making, communication, collaboration, creativity, and innovation.
  - 6.A.04.01 Devise and demonstrate strategies for efficiently collecting and organizing information from electronic sources.
  - 6.A.04.02 Compare, evaluate, and select appropriate electronic resources to locate specific information.
  - 6.A.04.03 Select the most appropriate search engines and directories for specific research tasks.
  - 6.A.04.04 Use a variety of media to present information for specific purposes (e.g., reports, research papers, presentations, newsletters, Web sites, podcasts, blogs), citing sources.
  - 6.A.04.05 Demonstrate how the use of various techniques and effects (e.g., editing, music, color, rhetorical devices) can be used to convey meaning in media.
  - 6.A.04.06 Use online communication tools to collaborate with peers, community members, and field experts as appropriate (e.g., bulletin boards, discussion forums, listservs, Web conferencing).
  - 6.A.04.07 Plan and implement a collaborative project with students in other classrooms and schools using telecommunications tools (e.g., e-mail, discussion forums, groupware, interactive Web sites, video conferencing).

## Appendices

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The framework teams created an “Appendix” listing potential industry recognized credentials attainable by secondary students; lists of professional, student, and relevant government organizations; and useful resources and websites. ***\* It is important to note that although most Framework Teams provided information for the “Appendix”, not all teams did. Therefore, sub-headings within the “Appendix” without information have been deleted.***

***Disclaimer: Reference in the Appendices Section to any specific commercial products, processes, or services, or the use of any trade, firm or corporation name is for the information and convenience of the public, and does not constitute endorsement or recommendation by the Massachusetts Department of Elementary and Secondary Education.***

## Embedded Academic Crosswalks

### Embedded English Language Arts and Literacy

CVTE Learning Standard Number	Strand Coding Designation Grades ELAs Learning Standard Number	Text of English Language Arts Learning Standard
2.A. 2.B 2.C	R.10	<p>By the end of grade 9, read and comprehend literary nonfiction in the grades 9-10 text complexity band proficiently, with scaffolding as needed at the high end of the range.</p> <p>By the end of grade 10, read and comprehend literary nonfiction at the high end of the grades 9-10 text complexity band independently and proficiently</p> <p>By the end of grade 11, read and comprehend literary nonfiction in the grades 11-CCR text complexity band proficiently, with scaffolding as needed at the high end of the range. By the end of grade 12, read and comprehend literary nonfiction at the high end of the grades 11-CCR text complexity band independently and proficiently.</p>
<p>Performance Examples:</p> <ul style="list-style-type: none"> <li>Utilizing research and education in the classroom students will present their findings about various health care facilities with dental access. Examples of presentations include: but is not limited to PowerPoint and other media presentations.</li> <li>Students will illustrate their knowledge of implementing infection control policies and practices using a media presentation, role playing-demonstration.</li> <li>Students will identify, and apply the fundamentals of tooth morphology, dental as well as head and neck anatomy through activities such as matching from two columns, discussing orally in class. Other strategies include GIVE ONE-GET ONE.</li> </ul>		
2.A. 2.B, 2C 2.D.02 2.D.03 2.D.06 2.N.01 2.N.03 2.E.10 2.E.11 2.F.01 2.F.02.04 2.F.04.02 2.G, 2.H 2.I, 2.O 2.P.02 2.P.06 2.Q, 2.R.02 2.J, 2.K	RI.4	<p>Pioneers in microbiology</p> <p>G9-10 Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the cumulative impact of specific word choices on meaning and tone.</p>
<p>Performance Example:</p> <ul style="list-style-type: none"> <li>Students could be asked to present, describe, or instruct using proper terminology to identify dental and medical terminology and make the connection with anatomy. Some strategies include students sharing with their learning partners, matching the terminology, presenting with various multimedia such as PowerPoint or Slide Rocket or creating a video and posting to YouTube.</li> </ul>		
2.A.01-02 2.B.03.01-	W2d	G9-10 Use precise language, domain-specific vocabulary to manage the complexity of the topic.

02 2.B.05,08 2.C, 2.D.03 2.D.04 2.N, 2.I.07 2.O.02 2.P.02 2.P.06 2.R.02 2.J,2.P, 2.R		
<p>Performance Examples:</p> <ul style="list-style-type: none"> <li>• Students could write an informative/explanatory essay including a well-developed topic using facts, definitions, and concrete details and quotations as examples for clarification.</li> <li>• Students could role play scenarios from the dental office such as using a dentist, receptionist, patient and dental assistant the various ways in which to work with clients such as verbal and non-verbal skills, giving a patient report (oral or written), working in a healthcare office, and basic chair-side dental procedures.</li> <li>• Students could write an informative/explanatory essay, present using multi-media programs to review various procedures.</li> <li>• Students could create a poster, diorama, or multimedia presentation explaining the protocols of radiation safety, or explaining equipment and practices relating to dental radiography.</li> <li>• Students should keep a portfolio that shows learning through externship, co-op, or clinical placements that reflect competencies and real world experiences.</li> </ul>		
2.A, 2.B 2.C, 2.D 2.N, 2.E.10 2.F.02.04 2.F.04.02 2.G.03, 2.H 2.I.07, 2.O 2.P, 2.Q 2.R, 2.J 2.K	SL4	<p>G9-10 Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.</p> <p>G11-12 Present information, findings, and supporting evidence, conveying a clear and distinct perspective; such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.</p>
<p>Performance Examples:</p> <ul style="list-style-type: none"> <li>• Students could present to the class, or in expert groups, aspects of dental procedures. Other strategies include role playing, media, and oral reporting/testing.</li> <li>• Students could also create a tri-fold patient pamphlet for the “client” to better understand the procedure.</li> </ul>		

## Embedded Mathematics

CVTE Learning Standard Number	Math Content Conceptual Category and Domain Code Learning Standard Number	Text of Mathematics Learning Standard
2.A.04.02 2.A.05 2.D.06.01 2.F.02.03 2.F.03 2.F.04.04 2.F.04.05 2.F.04.06 2.F.04.07 2.F.06	6.RP.1 5.MD.1	<p>Understand the concept of a ratio &amp; use ratio language to describe a ratio relationship between two quantities.</p> <p>Convert among different sized standard measurement units within a given measurement system, and use these conversions in solving multi-step real world problem</p>
<p>Performance Examples:</p>		

<ul style="list-style-type: none"> <li>• The student will prepare an ultrasonic solution for instrument cleaning. Example – one ounce of solution to one gallon of water.</li> <li>• Student will use increments of time for obtaining a patients pulse &amp; respiration.</li> <li>• Student will dispense and mix gypsum products to produce a study model.</li> <li>• The student will dilute sodium hypochlorite solution in equal parts of sterile water for use as an irrigating solution.</li> </ul>		
2.N.03.02 2.N.03.03 2.I.06.01 2.I.07	6.RP.3c 6.G.4 9-12.S.IC.1 9-12.S.MD.7(+)	<p>Find a percent of a quantity as a rate per 100 (e.g., 20% of a fee means 20/100: solve problems involving finding the whole given a part and the percent.</p> <p>Represents three dimensional figures using nets made of rectangles and triangles and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real world mathematical problems.</p> <p>Understand statistics as a process for making inferences about population parameters based on a random sample from the population.</p> <p>Analyze decisions and strategies using probability concepts (e.g., diet analysis)</p>
<p>Performance Examples:</p> <ul style="list-style-type: none"> <li>• Student will calculate the patient’s plaque index score.</li> <li>• Using a 24 hour diet analysis, the student will determine the percentage of time in which the patient is exposed to acidic pH levels.</li> </ul>		
2.Q.01.03	3.MD.4	Generate measurement data measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units – whole numbers, halves or quarters
<p>Performance Example:</p> <ul style="list-style-type: none"> <li>• Student will prepare files to predetermined working length in millimeters.</li> </ul>		
2.J.01.01 2.J.03.03 2.J.01.02	9-12.A-SSE.1	<p>Interpret expressions that represent a quantity in terms of its context.*</p> <p>Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.*</p> <p>Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.*</p> <p>Use units as a way to understand problems and to guide the solution of multistep problems; choose and interpret units consistently in formulas, choose and interpret the scale and the origin</p> <p>Apply concepts of dentistry based on area and volume in modeling situations (e.g. persons per square mile, BTU per cubic foot). *Inverse square law</p>
<p>Performance Examples:</p> <ul style="list-style-type: none"> <li>• Student will adjust kVp and exposure time based on the patient’s physical stature.</li> <li>• Student will calculate the maximum accumulated dose for a 50-year old operational/non-occupational operator using the correct formula.</li> <li>• Using the inverse square law the student will determine the exposure time when changing the PID length.</li> </ul>		
2.K.10	9-12.G.CO.1	Know precise definitions of angle, circle, perpendicular line, parallel

	9-12.G.CO.12	<p>line, and line segment, based on the undefined notions of point, line distance along a line, and distance around a circular arc.</p> <p>Make formal geometric constructions with a variety of tools and methods (beam-alignment devices and various film holders) <i>Use a Snap-a-Ray to achieve a proper bisecting angle</i></p>
<p>Performance Example:</p> <ul style="list-style-type: none"> <li>• Student will expose a radiograph utilizing the bisecting techniques.</li> </ul>		

## Embedded Science and Technology/Engineering

### *Life Science (Biology)*

CVTE Learning Standard Number	Subject Area, Topic Heading and Learning Standard Number	Text of Biology Learning Standard
2.A.01.01 2.A.01.03 2.A.02 2.A.03 2.A.04 2.A.05 2.A.06.01 2.A.06.04 2.K.07 2.K.14 2.K.19 2.M.01	2.2, 2.3, 4.2	<p>Compare and contrast, at the cellular level, the general structures and degrees of complexity of prokaryotes and eukaryotes.</p> <p>Use cellular evidence (e.g. cell structure, cell number, cell reproduction) and modes of nutrition to describe the six kingdoms (Archaeobacteria, Eubacteria, Protista, Fungi, Plantae, Animalia).</p> <p>Explain how the circulatory system (heart, arteries, veins, capillaries, red blood cells) transports nutrients and oxygen to cells and removes cell wastes. Describe how the kidneys and the liver are closely associated with the circulatory system as they perform the excretory function of removing waste from the blood. Recognize that kidneys remove nitrogenous wastes, and the liver removes many toxic compounds from the blood.</p>
<p>Performance Example:</p> <ul style="list-style-type: none"> <li>• The students will maintain aseptic conditions.</li> </ul>		
2.C.01 2.C.02 2.C.04 2.C.05 2.C.06 2.C.07 2.C.08	4.1, 4.2, 4.4, 4.5	<p>Explain generally how the digestive system (mouth, pharynx, esophagus, stomach, small and large intestines, rectum) converts macromolecules from food into smaller molecules that can be used by cells for energy and for repair and growth.</p> <p>Explain how the circulatory system (heart, arteries, veins, capillaries, red blood cells) transports nutrients and oxygen to cells and removes cell wastes. Describe how the kidneys and the liver are closely associated with the circulatory system as they perform the excretory function of removing waste from the blood. Recognize that kidneys remove nitrogenous wastes, and the liver removes many toxic compounds from the blood.</p> <p>Explain how the nervous system (brain, spinal cord, sensory neurons, motor neurons) mediates communication among different parts of the body and mediates the body's interactions with the environment. Identify the basic unit of the nervous system, the neuron, and explain generally how it works.</p> <p>Explain how the muscular/skeletal system (skeletal, smooth and cardiac muscles, bones, cartilage, ligaments, tendons) works with</p>

		other systems to support the body and allow for movement. Recognize that bones produce blood cells.
<b>Performance Example:</b> <ul style="list-style-type: none"> <li>The student will apply knowledge of the landmarks of the oral cavity through demonstration on a model of the human head and neck.</li> </ul>		
2.D.06.01 2.D.06.07 2.D.07	4.1, 4.2, 4.3, 4.4, 4.5, 4.7	<p>Explain generally how the digestive system (mouth, pharynx, esophagus, stomach, small and large intestines, rectum) converts macromolecules from food into smaller molecules that can be used by cells for energy and for repair and growth.</p> <p>Explain how the circulatory system (heart, arteries, veins, capillaries, red blood cells) transports nutrients and oxygen to cells and removes cell wastes. Describe how the kidneys and the liver are closely associated with the circulatory system as they perform the excretory function of removing waste from the blood. Recognize that kidneys remove nitrogenous wastes, and the liver removes many toxic compounds from the blood.</p> <p>Explain how the respiratory system (nose, pharynx, larynx, trachea, lungs, alveoli) provides exchange of oxygen and carbon dioxide.</p> <p>Explain how the nervous system (brain, spinal cord, sensory neurons, motor neurons) mediates communication among different parts of the body and mediates the body's interactions with the environment. Identify the basic unit of the nervous system, the neuron, and explain generally how it works.</p> <p>Explain how the muscular/skeletal system (skeletal, smooth and cardiac muscles, bones, cartilage, ligaments, tendons) works with other systems to support the body and allow for movement. Recognize that bones produce blood cells.</p> <p>Recognize that communication among cells is required for coordination of body functions. The nerves communicate with electrochemical signals, hormones circulate through the blood, and some cells produce signals to communicate only with nearby cells.</p>
<b>Performance Example:</b> <ul style="list-style-type: none"> <li>The student will assess patient oral health upon visual examination of oral cavity.</li> </ul>		
2.E.02.01 2.F.02 2.F.03 2.F.04 2.F.05 2.F.06 2.F.07 2.H.01 2.H.02 2.H.03 2.H.04 2.I.05 2.I.07 2.O.03 2.O.04 2.P	4.1, 4.5	<p>Explain generally how the digestive system (mouth, pharynx, esophagus, stomach, small and large intestines, rectum) converts macromolecules from food into smaller molecules that can be used by cells for energy and for repair and growth.</p> <p>Explain how the muscular/skeletal system (skeletal, smooth and cardiac muscles, bones, cartilage, ligaments, tendons) works with other systems to support the body and allow for movement. Recognize that bones produce blood cells</p>

2.Q 2.K.03 2.K.23		
<p>Performance Example:</p> <ul style="list-style-type: none"> <li>The student will assist in a variety of oral procedures ranging from extractions and implants in oral surgery to collection of diagnostic data with orthodontic procedures.</li> </ul>		
2.J.02 2.J.03	2.6, 2.7, 3.1, 3.2, 3.3	<p>Describe the cell cycle and the process of mitosis. Explain the role of mitosis in the formation of new cells, and its importance in maintaining chromosome number during asexual reproduction.</p> <p>Describe how the process of meiosis results in the formation of haploid cells. Explain the importance of this process in sexual reproduction, and how gametes form diploid zygotes in the process of fertilization.</p> <p>Describe the basic structure (double helix, sugar/phosphate backbone, linked by complementary nucleotide pairs) of DNA, and describe its function in genetic inheritance.</p> <p>Describe the basic process of DNA replication and how it relates to the transmission and conservation of the genetic code. Explain the basic processes of transcription and translation, and how they result in the expression of genes. Distinguish among the end products of replication, transcription, and translation.</p> <p>Explain how mutations in the DNA sequence of a gene may or may not result in phenotypic change in an organism. Explain how mutations in gametes may result in phenotypic changes in offspring.</p>
<p>Performance Example:</p> <ul style="list-style-type: none"> <li>The student will utilize proper safety measures to ensure protection for both operator and patient during x-ray exposure.</li> </ul>		

### *Physical Science (Chemistry)*

CVTE Learning Standard Number	Subject Area, Topic Heading and Learning Standard Number	Text of Chemistry Learning Standard
2.A.04 2.A.05 2.I.05 2.K.14.03 2.K.19	1.2, 7.1, 7.2	<p>Explain the difference between pure substances (elements and compounds) and mixtures. Differentiate between heterogeneous and homogeneous mixtures.</p> <p>Describe the process by which solutes dissolve in solvents.</p> <p>Calculate concentration in terms of molarity. Use molarity to perform solution dilution and solution stoichiometry.</p>
<p>Performance Example:</p> <ul style="list-style-type: none"> <li>The student will prepare chemical agents according to manufacturer's instructions.</li> </ul>		
2.A.07 2.E.02.01 2.E.03.01 2.G.02 2.G.03	1.1, 1.2, 1.3, 2.2, 2.5	<p>Identify and explain physical properties (e.g. density, melting point, boiling point, conductivity, malleability) and chemical properties (e.g. the ability to form new substances). Distinguish between chemical and physical changes.</p>

2.H 2.I.01 2.I.02.02		<p>Explain the difference between pure substances (elements and compounds) and mixtures. Differentiate between homogeneous and heterogeneous mixtures.</p> <p>Describe the three normal states of matter (solid, liquid, gas) in terms of energy, particle motion, and phase transitions.</p> <p>Describe Rutherford’s “gold foil” experiment that led to the discovery of the nuclear atom. Identify the major components (protons, neutrons, electrons) of the nuclear atom and explain how they interact.</p> <p>Identify the three main types of radioactive decay (alpha, beta, and gamma) and compare their properties (composition, mass, charge, and penetrating power).</p>
<p>Performance Example:</p> <ul style="list-style-type: none"> <li>The student will handle all chemicals using proper safety measures and protocols in monitoring chemical and physical hazards.</li> </ul>		
2.F 2.G.01	1.1, 1.2, 1.3, 7.1, 7.2, 8.3	<p>Identify and explain physical properties (e.g. density, melting point, boiling point, conductivity, malleability) and chemical properties (e.g. the ability to form new substances). Distinguish between chemical and physical changes.</p> <p>Explain the difference between pure substances (elements and compounds) and mixtures. Differentiate between homogeneous and heterogeneous mixtures.</p> <p>Describe the three normal states of matter (solid, liquid, gas) in terms of energy, particle motion, and phase transitions.</p> <p>Describe the process by which solutes dissolve in solvents.</p> <p>Calculate concentration in terms of molarity. Use molarity to perform solution dilution and solution stoichiometry.</p> <p>Explain how a buffer works.</p>
<p>Performance Example:</p> <ul style="list-style-type: none"> <li>The student will manipulate, prepare and apply whitening materials.</li> </ul>		
2.K.01	2.2, 2.5	<p>Describe Rutherford’s “gold foil” experiment that led to the discovery of the nuclear atom. Identify the major components (protons, neutrons, electrons) of the nuclear atom and explain how they interact.</p> <p>Identify the three main types of radioactive decay (alpha, beta, and gamma) and compare their properties (composition, mass, charge, and penetrating power)</p>
<p>Performance Example:</p> <ul style="list-style-type: none"> <li>The student will describe the history of the first x-ray photograph and the essential nature of a lead apron’s use in receiving an x-ray.</li> </ul>		
2.K.16 2.K.20	1.1, 1.2, 1.3, 7.1, 7.2, 7.3, 7.4	<p>Identify and explain physical properties (e.g. density, melting point, boiling point, conductivity, malleability) and chemical properties (e.g. the ability to form new substances). Distinguish between chemical and physical changes.</p> <p>Explain the difference between pure substances (elements and</p>

		<p>compounds) and mixtures. Differentiate between homogeneous and heterogeneous mixtures.</p> <p>Describe the three normal states of matter (solid, liquid, gas) in terms of energy, particle motion, and phase transitions.</p> <p>Describe the process by which solutes dissolve in solvents.</p> <p>Calculate concentration in terms of molarity. Use molarity to perform solution dilution and solution stoichiometry.</p> <p>Identify and explain the factors that affect the rate of dissolving (e.g. temperature, concentration, surface area, pressure, mixing).</p> <p>Compare and contrast qualitatively the properties of solutions and pure solvents (colligative properties such as boiling point and freezing point).</p>
<p>Performance Example:</p> <ul style="list-style-type: none"> <li>The student will prepare solutions needed for manual radiographic processing.</li> </ul>		

### *Physical Science (Physics)*

<b>CVTE Learning Standard Number</b>	<b>Subject Area, Topic Heading and Learning Standard Number</b>	<b>Text of Physics Learning Standard</b>
2.F.04 2.J.01 2.J.03 2.J3	4.1, 4.2, 6.1, 6.2	<p>Describe the measurable properties of waves (velocity, frequency, wavelength, amplitude, period) and explain the relationship among them. Recognize examples of simple harmonic motion.</p> <p>Distinguish between mechanical and electromagnetic waves.</p> <p>Recognize that electromagnetic waves are transverse waves and travel at the speed of light through a vacuum.</p> <p>Describe the electromagnetic spectrum in terms of frequency and wavelength, and identify the location of radio waves, microwaves, infrared radiation, visible light (red, orange, yellow, green, blue, indigo, and violet), ultraviolet rays, x-rays, and gamma rays on the spectrum.</p>
<p>Performance Example:</p> <p>Students will summarize the history of laser technology and its uses in modern dentistry.</p> <p>Students will create a graph representing the guidelines for frequency of exposure according to ALARA.</p>		

### *Technology/Engineering*

<b>CVTE Learning Standard Number</b>	<b>Subject Area, Topic Heading and Learning Standard Number</b>	<b>Text of Technology/Engineering Learning Standard</b>
2.H.01 2.H.03 2.H.04	7.1, 7.2	<p>Describe the manufacturing processes of casting and molding, forming, separating, conditioning, assembling, and finishing.</p> <p>Identify the criteria necessary to select safe tools and procedures for a manufacturing process (e.g. properties of materials, required</p>

		tolerances, end-uses).
Performance Example: Students will summarize the procedure for construction of a full or partial denture.		

## DESE Statewide Articulation Agreements

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No Statewide Articulation Agreements at this time.

## Industry Recognized Credentials (Licenses and Certifications/Specialty Programs)

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Certifications available within a Chapter-74 Dental Assisting Program or following graduation with additional documented working hours include:

Infection Control (ICE) Certification	ICE course completion - (within a 2 -year Chapter-74 Dental Assisting Program )	<a href="http://www.danb.org/">www.danb.org/</a>
Radiology Health And Safety (RHS)	RHS course completion - (within a 2-year Chapter-74 Dental Assisting Program)	<a href="http://www.danb.org/">www.danb.org/</a>
C.P.R. certification for the Healthcare Provider	Course Completion – 4.5 hours	<a href="http://www.redcross.org">www.redcross.org</a> CPR-Training <a href="http://www.americanheartcl asses.com/cpr">www.americanheartcl asses.com/cpr</a>
OSHA	Course Completion – 10 hours	<a href="https://www.osha.gov/index.html">https://www.osha.gov /index.html</a>
<b>Available with Documented Work Hours and Experience – see DANB site for Complete Details</b>		
Certified Dental Assistant (CDA)	Course completion (DA) and 3,500 documented employment hours	<a href="http://www.danb.org/">www.danb.org/</a>
General Chairside (GC)	Course completion (DA) and 3,500 documented employment hours	<a href="http://www.danb.org/">www.danb.org/</a>
Certified Othodontic Assistant (COA)	Course completion (DA) and 3,500 documented employment hours	<a href="http://www.danb.org/">www.danb.org/</a>
Certified Preventative Functions Dental Assistant (CPFDA)	Course completion (DA) and 3,500 documented employment hours	<a href="http://www.danb.org/">www.danb.org/</a>

Certifications should be attainable by students as a culminating activity, where appropriate. Additions and deletions will be made according to changes within the dental care industry.

## Other

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### Reference Materials

- Certified Dental Assistants (CDA) Exam Blueprints
- Dental Assisting A Comprehensive Approach 3rd Edition
- Dental Radiography Principles and Techniques 4th Edition
- Modern Dental Assisting 10th Edition
- Pearson's Comprehensive Dental Assisting
- Board of Registration in Dentistry
- 234 CMR: Board of Registration in Dentistry (Certified Dental Assistant (CDA) Exam Blueprints, 2012, p. 37)
- (2007). Vocational Technical Education Framework Health Services Cluster Dental Assisting. Malden: Massachusetts Department of Education.
- Certified Dental Assistant (CDA) Exam Blueprints. (2012, June 20). Retrieved June 20, 2012, from Dental Assisting National Board, Inc.: <http://www.danb.org/>
- Halstead, P. a. (2008). Dental Assisting A Comprehensive Approach 3rd edition. Clifton Park: Delmar Cengage Learning.
- Howerton, I. a. (2012). Dental Radiography Principles and Techniques 4th edition. St. Louis: Elsevier Saunders.
- Torres, B. a. (2012). Modern Dental Assisting 10<sup>th</sup> edition. W.B. Saunders Company.
- Tyler, L. (2009). Pearson's Comprehensive Dental Assisting. Upper Saddle River: Pearson.

### Related National, Regional, and State Professional Organizations

- Massachusetts Dental Assistant Association
- Massachusetts Dental Society
- DANB – Dental Assisting National Board
- American Dental Assisting Association
- Massachusetts Dental Assistant Association

### Student Organizations

- American Dental Assisting Association
- Massachusetts Dental Assistant Association
- Skills USA [www.maskillsusa.org](http://www.maskillsusa.org)

### Selected Websites

- Dental Assisting National Board, Inc. - [www.danb.org/](http://www.danb.org/)
- Massachusetts Dental Assistants Association - [www.massdentalassistants.org/](http://www.massdentalassistants.org/)
- Massachusetts Dental Society - [www.massdental.org/](http://www.massdental.org/)
- Board of Registration in Dentistry (BORID)  
<http://www.mass.gov/eohhs/gov/departments/dph/programs/hcq/dhpl/dentist/licensing/#>

- Massachusetts Dental Hygienists Association (MDHA) - [www.massdha.org](http://www.massdha.org)
- American Dental Assistants Association - [www.dentalassistant.org/](http://www.dentalassistant.org/)
- American Dental Association - [www.ada.org/](http://www.ada.org/)
- [www.massdental.org/publications/classified-ads](http://www.massdental.org/publications/classified-ads)
- [www.heart.org](http://www.heart.org)
- [www.osha.gov/index.html](http://www.osha.gov/index.html)