

Standards for the Preparation of Teachers  
of

**Industrial and Technology Education (TE)**



Approved by the Michigan State Board of Education

**April 12, 2011**

(Endorsement Code Updated on November 1, 2013)

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## **Preface**

### **Development of the Proposal**

The Industrial and Technology Education Committee of the Whole met from March 2009 through May 2010. It worked as a collaborative group to address concerns regarding combining the previously approved Industrial Technology (IX) and Technology and Design (TX) into one common set of standards. The Committee of the Whole included representatives from teacher preparation institutions (TPIs), intermediate school districts, leaders in the field with background knowledge in one or both of the content areas, and staff from the Michigan Department of Education's (MDE) Office of Professional Preparation Services, and Office of Career and Technical Education. An Executive Committee was established by the Committee of the Whole to serve as the primary drafters of the document and serve as liaisons to the MDE.

The Committee of the Whole first met to begin the discussion and develop a loose framework giving direction to the Executive Committee, which met for about a year to complete a working draft of the proposed Standards. The Committee of the Whole reconvened in May 2010 to provide feedback, make recommendations, and eventually approve a working draft of the standards. The Committee of the Whole utilized current and future practices, as well as Michigan's policies, to craft these standards to embrace the rich history of these two areas, and also move the field forward to meet the needs of future teacher candidates and ultimately the students in the local classroom. In an effort to ensure that appropriate breadth and depth are met, the Committee of the Whole recommends TPIs offer this endorsement as either a group major of 36 credit hours or a group minor of 24 credit hours.

The Committee of the Whole also chose to utilize the IX endorsement code and eliminate the TX code. The Committee of the Whole chose to show the combining of the subject areas by changing the name to Industrial and Technology Education (IX). For the MDE to present a clear transition and indication of different knowledge, skill and authorization, on November 1, 2013 the MDE gave the revised standards a new code, Industrial and Technology Education (TE).

### **Review of Documentation**

For standard one, TPIs are expected to document how their programs utilize technology in content-specific fields in order to address elements from Michigan's Educational Technology Standards and Expectations. Further, TPIs are expected to document how they utilize technology and other methods to teach all students, thus mirroring techniques for the teacher candidates that enable them to understand and apply the content-specific pedagogy needed to teach all students as described by the Universal Education Vision and Principles.

TPIs are expected to document how teacher candidates are appropriately and adequately prepared to use a depth and breadth of knowledge and skills that support the beginning teacher in addressing all of the elements within the standards. Specific competency levels guide the depth of awareness, knowledge, and skills needed of the teacher candidate to adequately meet the specific standard element. The three levels are Awareness, Basic, and Comprehensive understanding. An Awareness competency level means the teacher has a general understanding of the knowledge. Basic understanding means the teacher candidate has the ability to understand and apply the knowledge and skills beyond the level required in the Michigan Curriculum Framework. A Comprehensive understanding means the teacher candidate has a high level of understanding and is able to effectively apply and continuously reflect on the content and learner connection.

The standards include the following:

- Industrial and Technology Education (TE):
  - Elementary or Secondary comprehensive group major of at least 50 semester hours
  - Elementary or Secondary group major of at least 36 semester hours
  - Elementary or Secondary group minor of at least 24 semester hours
  - Endorsement of at least 24 semester hours

## 1.0 The candidate will

demonstrate comprehensive knowledge, understanding, evaluative skills, critical inquiry, and ability to teach the following content areas: engineering and design, power and energy, engines and power transmission, communication, individual and mass transportation, technological literacy, and problem solving in accordance to the Universal Vision and Principles, and Michigan's Educational Technology Standards and Expectations.

The candidate is able to:

1.1 Demonstrate knowledge of and ability to apply fundamental skills, safety, and efficient use of basic and contemporary processes including laboratory procedures/practices in each of the following content areas:

### 1.1.1 Engineering and Design

Utilize technologies to manipulate materials inclusive of woods and metals and understand concepts of Design, Manufacturing, Fabrication/Construction, and Drafting Technology (i.e. Computer Aided Design (CAD) and Computer Aided Manufacturing (CAM)).

1.1.2 Power and Energy inclusive of electricity and electronics as well as generating and conserving sustainable energy and power.

1.1.3 Engine and power transmission inclusive of any size internal and external combustion engines, electric motors, and fluid power devices.

1.1.4 Communication inclusive of audio, visual, and other forms of communication, specifically creation and transfer of images, and electronic communication.

1.1.5 Individual and mass transportation inclusive of surface, water, air, and space transportation.

1.2 Understand and Utilize the appropriate standards when developing lessons and classroom content inclusive of the Standards for Technological Literacy.

1.3 Understand industrial processes and the practical application of the aforementioned content areas.

1.4 Conduct experiments and research and solve various types of technical problems related to the design, construction, and evaluation of prototypes and services in the above mentioned content areas.

1.5 Utilize problem-solving and creative thinking strategies across the State Recognized Core Content Areas.

1.6 Incorporate and apply a problem-solving model similar to ones used in an industrial setting into Industrial and Technology Education courses incorporating engineering concepts (In the absence of a locally recognized problem-solving model, the following is to be used: Identify the problem, frame the problem, research the problem, identify possible solutions, select and develop a solution, test the solution, and reflect on outcome).

1.6.1 Demonstrate skills and knowledge of how to apply a problem solving model in servicing, repairing, and redesigning products.

## 2.0 Career Cluster knowledge

The candidate will demonstrate knowledge and skills in researching and presenting National Career Clusters in each content area specified in standard 1.0.

The candidate is able to:

2.1 Demonstrate knowledge of National Career Clusters organizational structure.

2.2 Demonstrate knowledge and awareness of the Career and Employability Skills Content Standards and Benchmarks as approved by the State Board of Education.

## 3.0 Instruction

The candidate will demonstrate the ability to design, present, and assess instruction for diverse learners in accordance to Universal Education Vision and Principles and utilize innovative technology in accordance to Michigan's Educational Technology Standards and Expectations.

The candidate is able to:

3.1 Design, implement, and manage safe learning environments.

3.2 Apply various teaching methods, including the ability to organize curriculum and instructional materials, and manage resources appropriate to the content area.

3.3 Demonstrate knowledge of and ability to construct learning environments inclusive of collaborative teaching methods that engage students with multiple learning styles, diverse needs, multiple intelligences, varying cultural and socio economic backgrounds, and special needs.

- 3.4 Demonstrate knowledge of appropriate instructional technology, especially content-specific technology, to engage all learners inclusive of assistive and adaptive technology.
- 3.5 Design and implement instructional strategies that promote higher order thinking skills, knowledge depth, substantive conversations, the enhancement of intercultural competence, and connections to the world beyond the learning environment.
- 3.6 Successfully complete early and ongoing structured field experiences, prior to and including student teaching, in diverse learning environments.
  - 3.6.1 Complete a full-time student teaching experience in an Industrial and Technology Education content setting under the supervision of an endorsed cooperating/mentor teacher(s) in the content area, university coordinator, and/or university program faculty with knowledge in Industrial and Technology Education content.
- 3.7 Identify and incorporate appropriate National Common Core State Standards and the Michigan Curriculum Framework for both elementary and secondary education into the Industrial and Technology Education program for the following core areas:
  - 3.7.1 English and Language Arts
  - 3.7.2 Science
  - 3.7.3 Mathematics
  - 3.7.4 Social Studies
  - 3.7.5 Visual performing and applied arts
- 3.8 Demonstrate knowledge of work based student experiences, job shadow, internship and apprenticeships.
- 3.9 Demonstrate knowledge of and ability to establish and advise student organizations.
- 3.10 Demonstrate the importance of continually improving the attitudes, knowledge, and skills of Industrial and Technology Education students.

#### 4.0 Assessment, Skills, and Practices

The candidate will demonstrate knowledge of and ability to utilize various levels of formal and informal assessment strategies to help ensure continuous intellectual, social, and physical development of learners.

The candidate is able to:

4.1 Demonstrate the ability to use formative and summative assessment data to improve instruction, student learning, and curriculum planning for continuous program improvement.

4.2 Demonstrate knowledge of and ability to implement a variety of formative and summative assessment strategies appropriate to Industrial and Technology Education.

4.3 Demonstrate the ability to interpret assessment results and communicate assessment data to students, parent(s)/guardian(s), and other school personnel.

4.4 Demonstrate knowledge of appropriate assessment tools to formulate measurable student growth goals, and implementation strategies with appropriate accommodations that align with state expectations, as exhibited through state assessment and policy documents.

4.5 Demonstrate knowledge of a variety of assessment tools allowing students to evaluate their own academic progress and set goals.

#### 5.0 Professionalism

Teacher preparation institutions provide candidates with opportunities to develop the dispositions and characteristics of a reflective practitioner who continually evaluates the effects of his/her choices and actions on others (students, parent(s)/guardian(s), and other professionals in the learning community), and who actively seeks out opportunities to grow professionally to include continued enhancement of instructional and content related knowledge and skills.

The candidate is able to:

5.1 Articulate a program's mission and an emerging direction.

5.2 Develop, manage, and assess an Industrial and Technology Education program.

5.3 Demonstrate knowledge of current research and best practice in Industrial and Technology Education.

5.4 Demonstrate knowledge of current curricular requirements, issues, and trends in the content areas at the state and national level.

5.5 Demonstrate knowledge of professional organizations and resources to support and improve teaching, and to encourage professional development.

5.6 Demonstrate appropriate communication and collaboration skills to interact with educational colleagues, parent(s)/guardian(s), and others in the larger community to support student learning and growth (i.e. Educational Development Program).

## 6.0 Technology

Teacher preparation institutions provide candidates with the opportunities to develop and demonstrate application of the technology competencies of the Professional Standards for Michigan Teachers, and prepare candidates to assist students to meet the Michigan's Educational Technology Standards and Expectations for the appropriate grade level.

The candidate is able to:

6.1 Identify, evaluate, and apply current and emerging technology in the content areas that include using appropriate technology tools for research, data acquisition and analysis, communications, and presentation.

6.2 Knowledge of and ability to apply a wide array of content specific, adaptive and assistive technological resources, and evaluate for accuracy and effectiveness in the learning environment.

6.3 Demonstrate and support the ethical, legal, and responsible use of technology.

6.4 Use technology to develop higher order skills such as critical thinking, problem solving, self-direction, and collaborative learning.

6.5 Use technology to address diverse student needs and learning styles including utilizing assistive and adaptive technologies.

6.6 Use technology to facilitate effective formative and summative assessment strategies.

6.7 Create and evaluate content-specific online learning experiences to enhance student learning.