North Dakota Graphic Communications Education

Content Standards

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North Dakota Technical Education Standards Process

This set of standards was reviewed by the North Dakota Graphic Communications secondary teachers.

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Career and Technical Education Standards Introduction

Mission

The mission of the State Board for Career and Technical Education (CTE) is to work with others to provide all North Dakota citizens with the technical skills, knowledge, and attitudes necessary for successful performance in a globally competitive workplace.

Vision

The State Board for Career and Technical Education (CTE) is committed to providing career awareness, work readiness skills, occupational preparation, and retraining of workers throughout the state. Career and technical education will span all educational levels, providing youth with exploration opportunities and the foundation skills needed to enter the world of work while providing adults with skills needed to enter, re-enter, or advance in the workforce.

Goal

North Dakota Career and Technical Education's goal is to create a competitive and knowledgeable work force. This is accomplished through a variety of educational program areas that are organized to prepare students for careers in their chosen fields, to take leadership roles, and balance their multiple roles in life. CTE programs prepare students with the knowledge and skills to make informed career choices, to integrate and apply academic concepts, to prepare for successful participation in a global society, and to engage in lifelong learning.

Standards Development Process

Standards development is a multi-phase process. Existing and/or industry standards are the basis for the North Dakota Program Standards. A team of expert secondary and postsecondary teachers, business and industry representatives, and the state program supervisor draft the standards document. Once the document is finalized, the State Board for Career and Technical Education approves and adopts the standards.

Course Frameworks are also developed by the writing team. A framework includes a brief overview of the course content, topical units of study, and identifies the standards recommended for inclusion within the course. The frameworks are tailored to prepare young people for the opportunities in North Dakota. School Districts will use the frameworks as a guide for developing curriculum that reflects local needs.

Key Principles of Career and Technical Education

We believe that Career Technical Education:

1. **Draws its curricula, standards, and organizing principles from the workplace.**
   The workplace provides the context, objectives, and organizing constructs for instruction and assessment. The workplace also defines the standards of performance necessary, including those required for academic, technical, and employability skills.

2. **Is a critical and integral component of the total educational system, offering career-oriented benefits for all students.**
   CTE classes offer educational benefits to students pursuing careers requiring specific technical skills as well as providing a strong foundation for those pursuing a traditional four-year (or more) degree.

3. **Is a critical and integral component of the workforce development system, providing the essential foundation for a thriving economy.**
   Preparation of a well-prepared, qualified workforce requires solid academics, good work ethics, and specific technical skills as well as the ability to communicate, work with others, solve problems, and use information. CTE contributes directly to this preparation by providing a curriculum tied to specific workplace requirements.

4. **Maintains high levels of excellence supported through identification of academic and workplace standards, measurement of performance (accountability), and high expectations for participant success.**
   Career Technical Education is committed to continuous improvement, attention to industry certification, and the development of highly qualified teachers.

5. **Is robust and flexible enough to respond to the needs of the multiple educational environments, customers, and levels of specialization.**
   CTE involves a large and complex delivery system that (1) integrates career exploration, (2) provides effective tools for organizing all curricula, (3) facilitates the teaching and use of technology, (4) is integrated into the total learning experience, (5) enhances the learning of academic subjects, (6) teaches broad occupational skills, (7) includes all aspects of the industry, (8) teaches how to balance family and work responsibilities, (9) provides job-specific training, (10) is offered at multiple levels of the educational continuum, and (11) is delivered through a variety of educational environments.

Table of Contents

Standard 1	*GRAPHIC COMMUNICATIONS INDUSTRY OVERVIEW*	
Topic 1.1	**Graphic Communications Industry**	
	Student Competencies	
	1.1.1	Define the graphic communications industry.
	1.1.2	Describe the size and economic value of the industry as in employees, number of establishments, revenue, and profit levels.
	1.1.3	Identify the types of businesses and organizations that comprise the industry.
	1.1.4	Review the types of products and services provided by the industry.
	1.1.5	Evaluate the use and value of different types of printing to a customer.
	1.1.6	Describe the markets that use printing, as in direct mail, books, magazines, stationery, and packaging
	1.1.7	Compare the role (cost and effectiveness) of print compared to other communication mediums, like television, radio, the internet, and social media.
	1.1.8	Assess examples of different types of communications mediums.
	1.1.9	Identify local and national graphic communications associations.
	1.1.10	Describe the purpose of local and national graphic communications associations.
Topic 1.2	**Printing Process**	
	Student Competencies	
	1.2.1	Describe common printing processes, such as flexography, gravure, letterpress, offset lithography, screen printing, and digital.
	1.2.2	List common products produced by each printing process.
	1.2.3	Identify samples of each printing process.
	1.2.4	Discuss advantages and disadvantages of each printing process: a. Economic b. Delivery timeframe c. Physical characteristics of printed piece
	1.2.5	Define counterfeiting, copyright, and intellectual property infringement.
	1.2.6	Identify the issues and challenges associated with counterfeiting, copyright and intellectual property infringement in the printing industry.
	1.2.7	Discuss technologies related to printing (ex. 3D printing, nanography, production inkjet, quick response codes (QR), cross-media communications, augmented reality (AR), data driven print, cloud based composition, etc.)

Topic 1.3	**How Printing is Produced**	
	Student Competencies	
	1.3.1	Describe the function and use of basic production equipment used in a commercial printing plant (ex. a computer workstation, a scanner, a proofing device, a platesetter, an offset lithographic press, a digital press, a paper cutter, a folder, a saddle stitcher, a perfect binder, a paper padding press, a paper drill, etc.)
	1.3.2	Define workflow.
	1.3.3	Review common steps in a typical print workflow, as in digital file preparation, print, and finish
	1.3.4	Describe the purpose of a job ticket.
	1.3.5	Locate key production information on a job ticket.
	1.3.6	Identify departments within printing organization through live or virtual observation.
	1.3.7	Describe the role and responsibilities of departments within printing organization, such as sales, estimating, file preparation, printing, binding, and shipping.
Topic 1.4	**Industry Career and Interpersonal Skills**	
	Student Competencies	
	1.4.1	Review roles and responsibilities of employment positions in the graphic communications industry (ex. sales representative, customer service representative, estimator, designer, database programmer, pre-media technician, press operator, bindery operator, management, etc.)
	1.4.2	Describe work ethic skills that should be exhibited by employees in the graphic communications industry.
	1.4.3	Identify basic salary/wage expectation ranges for major occupations in the graphic communications industry.
	1.4.4	Gather job postings for positions in the graphic communications industry.
Topic 1.5	**Safety Rules and Safety Data Sheets**	
	Student Competencies	
	1.5.1	Review applicable national and local governmental safety regulations.
	1.5.2	Review school graphic lab's safety regulations.
	1.5.3	Explain the use and locations of safety interlocks on machinery.
	1.5.4	Identify safety regulations in place at the school graphic lab as they relate to proper paper movement.
	1.5.5	List the school graphic lab Standard Operating Procedures (SOP) for spills.
	1.5.6	Explain the proper procedures to clean up any spills at school graphic lab.
	1.5.7	List the proper procedures when handling cleaning chemicals.
	1.5.8	Describe a Safety Data Sheet.
	1.5.9	Explain the use of Safety Data Sheet.
	1.5.10	Evaluate Safety Data Sheets in place in the school graphic lab.
Topic 1.6	**Industry Standard Math**	
	Student Competencies	
	1.6.1	Describe English and Metric measurement systems.
	1.6.2	Define Points and Picas.
	1.6.3	Demonstrate the measurement of type in points and line length in picas.

	1.6.4	Calculate reduction or enlargement percentage of original photograph to final size.
	1.6.5	Determine optimum layout for minimizing waste when cutting smaller sheets out of larger parent sized sheet of paper.

Standard 2	*FILE CREATION TO OUTPUT*	
Topic 2.1	**File Creation and Design**	
	Student Competencies	
	2.1.1	Identify common components of a page, such as text, illustrations, and photographs.
	2.1.2	Proofread and edit a page of text, making corrections/adjustments as specified by instructor.
	2.1.3	Define these terms: page layout, image editing, and illustration.
	2.1.4	Review professional software applications, such as page layout, image editing, and illustration.
	2.1.5	Review office/home-based software applications.
	2.1.6	Create a page that includes fonts, styles, margins, indents, tabs, photographs and illustrations using professional layout software.
	2.1.7	Create and print a portfolio to showcase your work.
	2.1.8	Assess the significance of Adobe Acrobat Portable Document Format (PDF) as it pertains to the graphic communications industry.
	2.1.9	Create PDF of page that includes photographs and illustrations.
	2.1.10	Compare the differences between supplying PDF files versus native files for print.
	2.1.11	Define RGB and CMYK color reproduction.
	2.1.12	Discuss the Pantone color process.
	2.1.13	Contrast color reproduction viewed on digital display (Monitor, TV, tablet, smartphone) versus print.
	2.1.14	Show the effect of lighting on printed color perception.
	2.1.15	Identify different types of graphics, such as line art, continuous tone, raster, and vector
	2.1.16	Describe pixels per inch resolution.
	2.1.17	Cite examples of various file formats and their extensions: .doc;.pdf; .tif; .eps; .jpg; .bmp;.indd; .ai;.xls;.ePub.
	2.1.18	Review minimum resolution requirements for different reproduction devices, such as screen display and print.
	2.1.19	Compare use of a scanner versus lens-based image capture (digital camera).
Topic 2.2	**Print Output**	
	Student Competencies	
	2.2.1	Describe Preflighting.
	2.2.2	List common file issues found during preflight.
	2.2.3	Collect examples of four printed color applications (ex. Sunday newspaper retail insert, cereal package, clothing catalog, high end brochure, etc.)
	2.2.4	Compare color quality reproduction requirements of each.
	2.2.5	Define Imposition.
	2.2.6	Define Trapping.
	2.2.7	Define Bleed.

	2.2.8	Gather samples of full bleed and no bleed printed examples.
	2.2.9	Explain the purpose of proofing.
	2.2.10	Compare hard and soft proofs.
Topic 2.3	**Digital Output**	
	Student Competencies	
	2.3.1	Review how content may be published digitally, such as publishing to the web, social media, and mobile devices.
	2.3.2	Define e-publishing / e-books.
	2.3.3	Compare the advantages / disadvantages of e-publishing/e-books versus traditional books.

Standard 3	*OFFSET PRESS & DIGITAL PRESS*	
Topic 3.1	**Components of Offset Lithographic Press**	
	Student Competencies	
	3.1.1	Discuss the imaging process of an offset lithographic press.
	3.1.2	Describe the use of color bars.
	3.1.3	Review components of an offset press: a. Describe a Printing Unit i. Inking System ii. Water System iii. Plate Cylinder iv. Blanket Cylinder v. Impression Cylinder b. Describe an offset printing plate c. Describe an offset blanket
	3.1.4	Compare feeding system of a sheet fed press (roll, sheetfed).
Topic 3.2	**Components of Digital Press**	
	Student Competencies	
	3.2.1	Discuss the imaging process of a digital press.
	3.2.2	Review components of digital presses: a. Digital Front End Raster Image Processor (RIP) b. Print Engine i. Toner based (Electrophotography) ii. Inkjet c. Delivery systems i. Roll to roll ii. Stacker iii. In-line finishing

Standard 4	*MATERIALS & PRODUCTION*	
Topic 4.1	**Substrates**	
	Student Competencies	
	4.1.1	Discuss the impact that substrates have on a printed project.
	4.1.2	Identify wood pulp-based paper substrates.
	4.1.3	Review common paper types, weights, grades and classifications commonly used in the printing industry.
	4.1.4	List common page and sheet sizes used in United States and Europe.
	4.1.5	Describe Parent Sheet.
	4.1.6	Identify non-traditional specialty substrates.
	4.1.7	Gather examples of pulp, plastic and metal-based substrates.
	4.1.8	Discuss sustainability / recyclability of pulp-based substrates.
	4.1.9	Debate sustainability of print versus digital media.
	4.1.10	Describe Forest Stewardship Council (FSC) certified papers.
Topic 4.2	**Bindery and Finishing**	
	Student Competencies	
	4.2.1	Determine grain direction of paper.
	4.2.2	Explain the importance of grain direction.
	4.2.3	Describe a folded signature.
	4.2.4	Describe bindery and finishing options (ex. loose leaf, saddle stitch, perfect bind, case binding, lay-flat binding, die cutting, embossing / debossing, foil stamping, etc.).
	4.2.5	Contrast use and benefits of each bindery option.
	4.2.6	Create multi-page saddle stitch booklet.
Topic 4.3	**Finishing Equipment**	
	Student Competencies	
	4.3.1	Describe in-line, near-line and off-line finishing.
	4.3.2	Identify commonly used finishing and binding equipment and supplies (ex. Padding, stapling, stitching, punching / drilling, folding, collating, etc.)

Career Ready Practices

1. Lead as a Contributing & Professional Employee

Career-ready individuals understand the role and responsibilities of their position and demonstrate this understanding by regularly contributing to the success of their organization. They are reliable and lead by example through work ethic and professionalism, as defined by the standards set by their workplace. This Career Ready Practice includes understanding and exhibiting the core values of their organization and modeling strong morals, motivation, excellence, and consistency.

2. Communicate Clearly, Effectively, & with Reason

Career-ready individuals are able to communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. This Career Ready Practice includes actively listening to peers and colleagues regardless of level and ensuring that diverse perspectives are heard, considered, and fostered. Regardless of communication method, individuals understand the needs of a specific audience and are able to tailor their message or style to meet these needs. Proficiency in communication helps build strong relationships, facilitates collaboration, and ensures that information is accurately exchanged.

3. Think Critically to Make Sense of Problems & Persevere in Solving Them

Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and effectively plan to solve the problem in an efficient way. Individuals can analyze information and evaluate various courses of action for future success. This Career Ready Practice prepares individuals to tackle complex challenges, innovate solutions, and contribute to strategic planning and operational efficiency. Individuals should also use lessons learned from previous projects to improve future projects, systems, or processes through continuous improvement.

4. Collaborate Productively while Using Cultural & Global Competencies

Career-ready individuals are able to work effectively in diverse teams to successfully accomplish a goal in both in-person and virtual environments. This Career Ready Practice includes understanding team dynamics, respecting diverse perspectives, demonstrating empathy, and contributing positively to team outcomes. Effective collaboration leverages the strengths of team members, enhances problem-solving, and leads to innovative solutions by recognizing that each team member has something unique to contribute. Preparing to work in diverse teams ensures readiness for the collaborative nature of modern workplaces and requires recognizing biases and advocating for inclusive practices. Cultivating an inclusive environment not only enhances team dynamics but also drives innovation and reflects positively on organizational culture.

5. Use digital Skills & Technologies to Enhance Productivity & Make Data-informed Decisions

Career-ready individuals are digitally literate—proficient with the digital skills and technology that are regularly used in their evolving workplace. This Career Ready Practice involves using digital tools to enhance productivity, understanding the impact of technology on one's work, and staying updated with technological advancements that may have future impacts for a given industry area. Individuals can use technology and digital tools to analyze and report data, helping to make decisions that are data informed and data driven. Digitally literate individuals are also able to understand digital security and privacy and are able to use social media professionally and responsibly.

6. Remain Resilient in a Changing Workplace & World of Work

Career-ready individuals have the ability to adjust to change and remain resilient in the face of challenges, both within a workplace and throughout their careers. This Career Ready Practice involves maintaining a positive attitude despite challenges and being open to new ideas and feedback. Individuals seek to act in ways that contribute to the betterment of themselves and their teams, families, community, and workplace. Developing adaptability, flexibility, and resilience helps individuals navigate career transitions, embrace new opportunities, and maintain productivity and well-being under pressure. This Career Ready Practice also includes attending to one's own mental well-being and developing an appropriate work-life balance to sustain productivity, reduce stress, and enhance overall quality of life, which directly affects professional performance and satisfaction.

7. Manage Time & Space Effectively

Career-ready individuals are able to effectively manage their time and use organizational skills to prioritize tasks and meet deadlines. This Career Ready Practice includes planning, delegating tasks effectively, and maintaining a well-organized workspace in both physical and virtual environments. Developing these skills leads to increased efficiency, better project outcomes, and a balanced workload.

8. Demonstrate a Creative & Innovative Mindset

Career-ready individuals are able to use innovation and creativity to think outside the box and develop new ideas and solutions. This Career Ready Practice encourages a mindset of continuous improvement and adaptability and fosters a spirit of curiosity, experimentation, and calculated risk-taking. It prepares individuals to improve systems, drive change, create value, and stay competitive in a rapidly evolving workplace.

9. Act as a Good Steward of Organizational & Personal Finances & Resources

Career-ready individuals are financially literate and can demonstrate their ability to make cost effective decisions on behalf of themselves and their workplace. This Career Ready Practice includes managing personal finances, understanding financial documents, and making informed financial decisions. Financial literacy empowers individuals to make sound investments, budget effectively, and contribute to the financial health of their organization.

10. Navigate an Education & Career Path Aligned to Strengths, Work Style, Interests, & Goals

Career-ready individuals are self-aware about their strengths and working style and can understand how to leverage these traits effectively to maximize their careers. They are also aware of their areas for improvement, seeking opportunities for growth and acting on feedback to continuously improve. This Career Ready Practice is essential for setting realistic career goals, pursuing professional development opportunities, reskilling and upskilling to keep skills and knowledge relevant, and achieving personal and professional fulfillment.

11. Consider the Environmental & Social Impacts of Decisions

Career-ready individuals understand the interrelated nature of their actions and regularly make decisions that positively affect and/or mitigate negative impact on other people, their communities, and the environment. They make decisions with integrity by considering the moral and ethical consequences of their decisions and actively planning for the long-term success of projects, systems, and processes. Developing sustainability and environmental literacy skills prepares individuals to also contribute to a greener future and address global challenges.

12. Apply appropriate academic & technical skills

Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be effective and productive employees. They have the technical proficiency to use the language, tools, technologies, and methodologies that are relevant to their specific industry sector. They make connections between abstract concepts and real-world applications, and they make correct determinations about when applying an academic skill is appropriate in a workplace situation. This Career Ready Practice includes staying updated about industry advancements and continuously improving technical skills aligned with the changing needs of their sector.