

EDT 5375: Technology, Assistive Tools, and Issues of Access

Spring 2019 Syllabus

Course Information

Class meeting time: Thursdays, 5:30 PM - 8:20 PM
Classroom: Education Building, Room 201
Section: 001

Course Instructor

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Office hours: Wednesdays, 1:10 PM – 3:20 PM, and by appointment

Email is the best way to contact me. Please send all your queries regarding the course to my UTEP Email (datillman@utep.edu). Use of the Blackboard mailing system to reach me is not recommended. I answer emails within 48 hours of receiving them. Please include “EDT 5375” in your subject line.

Course Description

Students will learn about assistive technology tools and techniques for the classroom teacher, as well as legal issues regarding technology access and equity. Students will also develop further understanding of the principles of educational technology for prospective and inservice teachers, including terminology, historical development, social and ethical implications, proficiency in the application of technology tools, and integration of technology in school curricula and instructional design. This course is designed to help prepare preservice and inservice teachers to meet national and state standards for using technology to improve productivity and integrating technology into teaching as an instructional tool.

Course Objectives

By the end of the class, students should have developed an understanding of learning theories relevant to educational technology, as well as demonstrated proficiency with several technical skills relevant to the themes of the class. The learning theories with connections to course topics that we will examine are

- 1) Employ concepts from the TPACK framework, constructivist learning, diffusion of innovations, and situated cognition to develop skills in using assistive technology tools and techniques for the classroom teacher.

- 2) Employ concepts from research-based curricula and cognitive load theory to develop knowledge and skills pertaining to legal issues regarding technology access and equity.
- 3) Employ the entertainment-education strategy to develop further understanding of the principles of educational technology for prospective and inservice teachers.
- 4) Employ authentic learning theory, embodied cognition theory, and Papert's constructionism, to become better prepared to meet national and state standards for using technology to improve productivity and integrating technology into teaching as an instructional tool.

In addition to demonstrating proficiency with application of relevant learning theories to course topics, by the end of the class, students will also have demonstrated basic proficiency with several interrelated technical skills, including

- 1) Develop skills in using word processing, spreadsheet, presentation and publishing tools to improve productivity and instruction (NSTE-T¹ 3a, 3c, MTTS² 1, 4)
- 2) Develop knowledge and skills in using Web 2.0 tools for instruction (NSTE-T 1d, 3a, 3d, MTTS 3)
- 3) Understand how to design technology-rich lessons (NSTE-T 2a, 2b, MTTS 2)
- 4) Understand how to use technology tools for continuing professional development. (NSTE-T 5a, 5c, MTTS 2)

¹ National Educational Technology Standards for Teachers, Second Edition, 2008 ISTE (International society for Technology in Education), www.iste.org.

² The Texas State Board of Educator Certification standards for a "Master Technology Teacher." <http://www.sbec.state.tx.us/sbeconline/mtp/mtt/standards.pdf>

Course Schedule (subject to change)

Week	Class	Assignment Due	Discussion Topic and Reading
1	1/24/2019 [LIVE]	None.	Overview of syllabus, defining educational technology.
2	1/31/2019 [LIVE]	Assignment 1 due.	Topic: TPACK framework Reading: Mishra & Koehler (2006)
3	2/7/2019 [VIRTUAL]	Assignment 2 due.	Topic: Self-efficacy theory Reading: Bandura (1977)
4	2/14/2019 [VIRTUAL]	Assignment 3 due.	Topic: Constructivist learning Reading: DeLay (1996)
5	2/21/2019 [LIVE]	Assignment 4 due.	Topic: Diffusion of innovations Reading: Singhal & Law (1997)
6	2/28/2019 [VIRTUAL]	Assignment 5 due.	Topic: Situated cognition Reading: Choi & Hannafin (1995)
7	3/7/2019 [VIRTUAL]	Assignment 6 due.	Topic: Research-based curricula Reading: Clements (2007)
8	3/14/2019 [LIVE]	Assignment 7 due.	Topic: Cognitive load theory Reading: Paas, Renkl, & Sweller (2004)
9	3/21/2019	<i>Spring Break</i>	<i>No Class</i>
10	3/28/2019 [VIRTUAL]	Assignment 8 due.	Topic: Entertainment-education strategy Reading: Singhal & Rogers (2002)
11	4/4/2019 [VIRTUAL]	Assignment 9 due.	Topic: Applied entertainment-education Reading: Robertson & Lesser (2013)
12	4/11/2019 [LIVE]	Assignment 10 due.	Topic: Embodied cognition theory Reading: Wilson (2002)
13	4/18/2019 [VIRTUAL]	Assignment 11 due.	Topic: Papert's constructionism Reading: Ackermann (2001)
14	4/25/2019 [VIRTUAL]	Assignment 12 due.	Topic: Authentic learning theory Reading: Hill & Smith (2005)
15	5/2/2019 [LIVE]	Final Project due.	Topic: Synthesis of previous topics Reading: Review articles from semester
16	5/13/2019 [VIRTUAL]	Final Exam due.	Topic: The future of educational technology Reading: No reading this week

Course Readings

There is no required textbook for this course. All course materials will be posted on Dropbox for you to download. You should read required readings and prepare for discussion in class. Links to multimedia materials will also be provided.

Some of the readings that will be covered in this class are listed below, and they are itemized in the order that we will analyze and critique them during class:

- Mishra, P., & Koehler, M. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record* 108(6), 1017-1054.
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, 84(2), 191-215.
- DeLay, R. (1996). Forming knowledge: Constructivist learning and experiential education. *Journal of Experiential Education*, 19(2), 76-81.
- Singhal, A. & Law, S. (1997). A research agenda for diffusion of innovations scholars in the 21st century. *Journal of Development Communication*, 8(1), 39-47.
- Choi, J. I., & Hannafin, M. (1995). Situated cognition and learning environments: Roles, structures, and implications for design. *Educational technology research and development*, 43(2), 53-69.
- Clements, D. H. (2007). Curriculum research: Toward a framework for “Research-Based Curricula.” *Journal for Research in Mathematics Education*, 35-70.
- Paas, F., Renkl, A., & Sweller, J. (2004). Cognitive load theory: Instructional implications of the interaction between information structures and cognitive architecture. *Instructional Science*, 32, 1-8.
- Singhal, A. & Rogers, E. (2002). A theoretical agenda for entertainment-education. *Communication Theory*, 12(2), 117-135.
- Robertson, W., & Lesser, L. M. (2013). Scientific skateboarding and mathematical music: Edutainment that actively engages middle school students. *European Journal of Science and Mathematics Education*, 1(2), 60-68.
- Wilson, M. (2002). Six views of embodied cognition. *Psychonomic bulletin & review*, 9(4), 625-636.
- Ackermann, E. (2001). Piaget’s constructivism, Papert’s constructionism: What’s the difference. *Future of learning group publication*, 5(3), 438.
- Hill, A. M., & Smith, H. A. (2005). Research in purpose and value of the study of

technology in secondary schools: A theory of authentic learning. *International Journal of Technology and Design Education*, 15, 19-32.

Assignments

Daily hand-in (15 points)

Each required live class session begins with turning in your daily hand-in. The daily hand-in is collected at the beginning of class; a daily hand-in received after the beginning of class will receive half credit. Daily hand-ins will not be accepted via email or after the end of the class period unless approval has been obtained from the instructor. The daily hand-in should include your name and the date, and then a single sentence or a single question related to the topic of educational technology.

Assignments (50 points)

Each class, students will be given an assignment to practice the skills or reflect on the ideas taught. Instructions on assignments will be provided in class and posted online afterwards. It is important that students complete assignments in a timely manner. Missing one or two assignments will drastically decrease your chance to get a desirable grade in this class.

Unless instructed otherwise, each assignment is due prior to the beginning of the class period scheduled time. Assignments should use the following name format: *YourFirstName_YourLastName.filetype* (Example: *Daniel_Tillman.jpg*)

Final project (20 points)

The final project will be a culmination of the work you did in the assignments. So long as you complete all of the assignments then you should not have any difficulties with the final project. The final project will include four components, all of which will be submitted via your Dropbox account, and the specific criteria for which will be articulated through the assignment descriptions.

Final exam (15 points)

At the end of the course, a final exam will be conducted to test students on the content that was taught in the first and second half of the semester. The final exam will be primarily open-ended short essay questions.

Grading

Total possible: 100 points

A: 90-100 points / B: 80-89 points / C: 70-79 points / D: 60-69 points / F: 0-59 points

Late Assignments

Late assignments are accepted, but 10% will be deducted for each week of late submission.

Bonus Points

Sometimes volunteers will be given the option to help fellow students who are having difficulty with class exercises. When this occurs, the volunteers will receive bonus points at the discretion of the instructor.

Class Attendance

Attendance and participation in class sessions are required. If a student has to miss a class due to an emergency, a notice to the instructor is required as soon as possible. The instructor may request proper documentation, such as doctor's notes, as justification. If you are absent from class three or more times, you may be dropped from the course (see UTEP student handbook for details).

Time Commitment

The standard workload for a university course requires a minimum of two hours of study time for every class hour. All course work, both in and outside class, should be of high quality and reflect your development as an aspiring technology-savvy teacher.

Course Requirements

Students are expected to adhere to a social contract of common decency. Stealing or academic cheating will not be tolerated.

Course Schedule Changes

The course instructor reserves the right to adjust the course syllabus or change assignments as needed. I will give you ample notice prior to any changes.

Technical Assistance

If you have technical problems, please contact the UTEP Helpdesk: M-F: 7AM-8PM, Sat: 9AM-1PM, Sun: 12-4PM. On-campus phones: 915-747-5257 Off-campus phones: 915-747-4357. If you are on-campus, you may also visit the ATLAS lab located within the Undergraduate Learning Center or the Technology Support Center in Room 300, Library.

Disabled Student Statement

Section 504 of the Vocational Rehabilitation Act of 1973 and the Americans with Disabilities Act (ADA) of 1990, states that if a student needs an accommodation then the Center for Accommodations and Support Services (CASS) located at UTEP needs to be contacted. If you have a condition, which may affect your ability to perform successfully

in this course, you are encouraged to discuss this in confidence with the instructor and/or the director of the Center for Accommodations and Support Services (CASS). You may call 915-747-5148 for general information about the American with Disabilities Act (ADA) and the rights that you have as a UTEP student with a disability. Individuals with disabilities have the right to equal access and opportunity. It is the student's responsibility to contact the instructor and the Center for Accommodations and Support Services (CASS) at The University of Texas at El Paso.

Equipment for Course

This classroom includes materials and equipment for facilitating hands-on activities, some of which are flammable (i.e., Bunsen burners, 3D-printers, 2D-fabricators); therefore, *per* The University of Texas Regulations, any type of gunpowder-based weapons or ammunition is strictly forbidden in the Educational Technology Research Laboratory (room #201 of the Education Building at UTEP), and violation of this policy will result in the violator being dropped from the class and escorted off the premises by UTEP Security.

Academic dishonesty statement

Academic dishonesty is prohibited and is considered a violation of the UTEP Handbook of Operating Procedures. It includes, but is not limited to, cheating, plagiarism, and collusion. Cheating may involve copying from or providing information to another student, possessing unauthorized materials during a test, or falsifying data on lab reports.

Plagiarism occurs when someone intentionally or knowingly represents the words or ideas of another person's as one's own. And, collusion involves collaborating with another person to commit any academically dishonest act. More information about scholastic dishonesty can be found on this site.

<http://admin.utep.edu/Default.aspx?PageContentID=2084&tabid=30292>

Any act of academic dishonesty attempted by a UTEP student is unacceptable and will not be tolerated. Violations will be taken seriously and will be referred to the Dean of Students Office for possible disciplinary action.

Rubric for Assignments

<i>Level</i>	<i>Standard to be achieved for performance at a specified level.</i>
A	Fully achieves the goals and objectives of the assignment, has made accurate observations, drawn insightful conclusions or extensions, and shows clear understanding of concepts. Communicates effectively.
B	Addresses all aspects of assignment, but goals and objectives may not be fully met. Student displays understanding of main concepts, although some less important ideas may not be in place. Results may be incomplete or not clearly presented.
C	Important goals or objectives of the assignment are not met. Work may need redirection. Gaps in conceptual understanding are present. Student's approach to assignment may lead away from assignment completion. Attempts communication.
D	Goals and objectives of the assignment are not met. Shows little or no evidence of appropriate reasoning. Presents fragmented understanding of concepts. Presents erroneous or extraneous conclusions.
F	Does not attempt assignment.

Student learning outcomes and assessment

The course's learning outcomes will require the student to acquire throughout the semester new knowledge and skills pertaining to educational technology, and then build upon them. The following table provides a list of outcomes for the course.

Student learning outcomes	Assessment
<i>By the end of course, the student will be able to:</i>	<i>To evaluate these outcomes, the following assessment procedures:</i>
Employ concepts from the TPACK framework, constructivist learning, diffusion of innovations, and situated cognition to develop skills in using assistive technology tools and techniques for the classroom teacher.	Class exercises, class discussions, assignments, final project, and final exam.
Employ concepts from research-based curricula and cognitive load theory to develop knowledge and skills pertaining to legal issues regarding technology access and equity.	Class discussions, assignments, final project, and final exam.
Employ the entertainment-education strategy to develop further understanding of the principles of educational technology for prospective and inservice teachers.	Class exercises, class discussions, assignments, and final project.
Employ authentic learning theory, embodied cognition theory, and Papert's constructionism to become better prepared to meet national and state standards for using	Class exercises, class discussions, assignments, final project, and final exam.

technology to improve productivity and integrating technology into teaching as an instructional tool.

Understand the history of educational technology, important models and frameworks in technology integration, and national and state standards of educational technology.

Class discussions, assignments, final project, and final exam.

Improve skills in using word processing program to enhance productivity, and presentation program to enhance productivity.

Class exercises, class discussions, assignments, final project.

Improve skills in using spreadsheet to manage and analyze data related to teaching, understand important Web 2.0 concepts and tools, and know how to use content aggregation tools to stay updated with topics.

Class exercises, class discussions, assignments, final project.

Know how to use online collaborative tools to create and share documents with peers, create digital story telling using photo-sharing tools, and create a comprehensive class website to enhance instructional productivity.

Class exercises, class discussions, assignments, final project.

APPENDIX A: TExES Competencies Addressed during Course

Here is the list of TExES Competencies that this class will address --

DOMAIN I—TECHNOLOGY APPLICATIONS CORE

Competency 001. The teacher knows technology terminology and concepts; the appropriate use of hardware, software, and digital files; and how to acquire, analyze, and evaluate digital information.

Competency 002. The teacher knows how to use technology tools to solve problems, evaluate results, and communicate information in a variety of formats for diverse audiences.

Competency 003. The teacher knows how to plan, organize, deliver, and evaluate instruction that effectively utilizes current technology for teaching the Technology Applications Texas Essential Knowledge and Skills (TEKS) for all students.

DOMAIN II—DIGITAL GRAPHICS/ANIMATION AND DESKTOP PUBLISHING

Competency 004. The teacher demonstrates knowledge of the principles of design and their application to digital graphics/animation products.

Competency 005. The teacher demonstrates knowledge of principles of typography and page design and knows how to use technology tools to create desktop publishing products.

Competency 006. The teacher knows how to use graphics, animation, and desktop publishing software to produce products that convey a specified message to an intended audience.

DOMAIN III—VIDEO TECHNOLOGY AND MULTIMEDIA

Competency 007. The teacher knows how to produce and distribute digital video and multimedia products.

Competency 008. The teacher demonstrates knowledge of strategies and techniques used in the preproduction, production, and postproduction of video products.

Competency 009. The teacher knows how to design, produce, and distribute multimedia products.

DOMAIN IV—WEBMASTERING

Competency 010. The teacher demonstrates knowledge of strategies and techniques for Web site administration.

Competency 011. The teacher knows principles of Web page design and uses a variety of tools and techniques to design and troubleshoot Web pages for a diverse audience.

Competency 012. The teacher knows how to use Web pages to communicate and interact effectively with others.

APPENDIX B: TEA Test Frameworks Addressed during Course

Here is the list of TEA Test Framework for Generalist EC-6 that this class will address --

10 Competency 009 (Reading, Inquiry, and Research)

The teacher understands the importance of research and inquiry skills to students' academic success and provides students with instruction that promotes their acquisition and effective use of those study skills in the content areas.

The beginning teacher:

A. Teaches students to develop open-ended research questions and a plan (e.g. timeline) to locate, retrieve, and record information from a range of content-area, narrative, and expository texts

B. Selects and uses instructional strategies to help students comprehend abstract content and ideas in written materials (e.g., manipulatives, examples, graphic organizers)

C. Selects and uses instructional strategies to teach students to interpret information presented in various formats (e.g., maps, tables, graphs) and how to locate, retrieve, and record information from technologies, print resources, and experts

D. Selects and uses instructional strategies to help students understand study and inquiry skills across the curriculum (e.g., brainstorming; generating questions and topics; using text organizers; taking notes; outlining; drawing conclusions; applying critical-thinking skills; previewing; setting purposes for reading; locating, organizing, evaluating, and communicating information; summarizing information; selecting relevant sources of information; using multiple sources of information; recognizing identifying features of sources, including primary and secondary sources; interpreting and using graphic sources of information) and knows the significance of organizing information from multiple sources for student learning and achievement

E. Knows grade-level expectations for study and inquiry skills in the Texas Essential Knowledge and Skills (TEKS) (e.g. in kindergarten, use pictures in conjunction with writing to document research; in fifth-sixth grade, refine research through use of secondary questions)

F. Provides instruction to develop a topic sentence, summarize findings, and use evidence to support conclusions

G. Understands how to foster collaboration with peers, families, and with other professionals to promote all students' ability to develop effective research and comprehension skills in the content areas

13 Competency 012 (Viewing and Representing)

The teacher understands skills for interpreting, analyzing, evaluating, and producing visual images and messages in various media, including electronic, and provides students with opportunities to develop skills in this area.

The beginning teacher:

A. Knows grade-level expectations for viewing and representing visual images and messages as described in the Texas Essential Knowledge and Skills (TEKS)

B. Understands and teaches the characteristics and functions of different types of media (e.g., film, print) and knows how different types of media influence and inform

C. Teaches students to compare and contrast print, visual, and electronic media, including levels of formality and informality (e.g. email, Web-based news article, blogs)

D. Teaches students to evaluate how visual image makers (e.g., illustrators, documentary filmmakers, political cartoonists, news photographers) represent messages and meanings, and provides students with opportunities to interpret and evaluate visual images in various media

E. Knows how to teach students to analyze visual image makers' choices (e.g., style, elements, media) and evaluate how those choices help represent or extend meaning

F. Provides students with opportunities to interpret events and ideas based on information from maps, charts, graphics, video segments, and technology presentations and to use media to compare ideas and points of view

G. Knows steps and procedures for teaching students to produce visual images and messages with various meanings to communicate with others

H. Teaches students how to select, organize, and produce visuals to complement and extend meanings

I. Provides students with opportunities to use technology for producing various types of communications (e.g., class newspapers, multimedia reports, video reports) and helps students analyze how language, medium, and presentation contribute to the message

J. Understands how to foster collaboration with families and with other professionals to promote students' development of media literacy

Competency 014 (Mathematics Instruction)

The teacher understands how students learn mathematical skills and uses that knowledge to plan, organize, and implement instruction and assess learning.

The beginning teacher:

A. Plans appropriate instructional activities for all students by applying research-based theories and principles of learning mathematics

B. Employs instructional strategies that build on the linguistic, cultural, and socioeconomic diversity of students and that relate to students' lives and communities

C. Plans and provides developmentally appropriate instruction that establishes transitions between concrete, symbolic, and abstract representations of mathematical knowledge and that builds on students' strengths and addresses their needs

D. Understands how manipulatives and technological tools can be used appropriately to assist students in developing, comprehending, and applying mathematical concepts

E. Creates a learning environment that motivates all students and actively engages them in the learning process by using a variety of interesting, challenging, and worthwhile mathematical tasks in individual, small-group, and large-group settings

F. Uses a variety of tools (e.g., counters, standard and nonstandard units of measure, rulers, protractors, scales, stopwatches, measuring containers, money, calculators, software) to strengthen students' mathematical understanding

G. Implements a variety of instructional methods and tasks that promote students' ability to do the mathematics described in the Texas Essential Knowledge and Skills (TEKS)

H. Develops clear learning goals to plan, deliver, assess, and reevaluate instruction based on the mathematics in the Texas Essential Knowledge and Skills (TEKS)

I. Helps students make connections between mathematics and the real world, as well as between mathematics and other disciplines such as art, music, science, social science, and business

J. Uses a variety of questioning strategies to encourage mathematical discourse and to help students analyze and evaluate their mathematical thinking

K. Uses a variety of formal and informal assessments and scoring procedures to evaluate mathematical understanding, common misconceptions, and error patterns

L. Understands the relationship between assessment and instruction and knows how to evaluate assessment results to design, monitor, and modify instruction to improve mathematical learning for all students, including English-language learners

M. Understands the purpose, characteristics, and uses of various assessments in mathematics, including formative and summative assessments

N. Understands how mathematics is used in a variety of careers and professions and plans instruction that demonstrates how mathematics is used in the workplace

Competency 016 (Patterns and Algebra)

The teacher understands concepts related to patterns, relations, functions, and algebraic reasoning.

The beginning teacher:

A. Illustrates relations and functions using concrete models, tables, graphs, and symbolic and verbal representations, including real-world applications

B. Demonstrates an understanding of the concept of linear function using concrete models, tables, graphs, and symbolic and verbal representations

C. Understands how to use algebraic concepts and reasoning to investigate patterns, make generalizations, formulate mathematical models, make predictions, and validate results

D. Formulates implicit and explicit rules to describe and construct sequences verbally, numerically, graphically, and symbolically

E. Knows how to identify, extend, and create patterns using concrete models, figures, numbers, and algebraic expressions

F. Uses properties, graphs, linear and nonlinear functions, and applications of relations and functions to analyze, model, and solve problems in mathematical and real-world situations

G. Translates problem-solving situations into expressions and equations involving variables and unknowns

H. Models and solves problems, including those involving proportional reasoning, using concrete, numeric, tabular, graphic, and algebraic methods (e.g., using ratios and percent with fractions and decimals)

I. Determines the linear function that best models a set of data

J. Understands and describes the concepts of and relationships among variables, expressions, equations, inequalities, and systems in order to analyze, model, and solve problems

K. Applies algebraic methods to demonstrate an understanding of whole numbers using any of the four basic operations

Competency 019 (Mathematical Processes)

The teacher understands mathematical processes and knows how to reason mathematically, solve mathematical problems, and make mathematical connections within and outside of mathematics.

The beginning teacher:

A. Understands the role of logical reasoning in mathematics and uses formal and informal reasoning to explore, investigate, and justify mathematical ideas

B. Applies correct mathematical reasoning to derive valid conclusions from a set of premises

C. Applies principles of inductive reasoning to make conjectures and uses deductive methods to evaluate the validity of conjectures

D. Evaluates the reasonableness of a solution to a given problem

E. Understands connections among concepts, procedures, and equivalent representations in areas of mathematics (e.g., algebra, geometry)

F. Recognizes that a mathematical problem can be solved in a variety of ways and selects an appropriate strategy for a given problem

G. Expresses mathematical statements using developmentally appropriate language, Standard English, mathematical language, and symbolic mathematics

H. Communicates mathematical ideas using a variety of representations (e.g., numeric, verbal, graphic,

pictorial, symbolic, concrete)

I. Demonstrates an understanding of the use of visual media such as graphs, tables, diagrams, and animations to communicate mathematical information

J. Demonstrates an understanding of estimation, including the use of compatible numbers, and evaluates its appropriate uses

K. Knows how to use mathematical manipulatives and a wide range of appropriate technological tools to develop and explore mathematical concepts and ideas

L. Demonstrates knowledge of the history and evolution of mathematical concepts, procedures, and ideas

M. Recognizes the contributions that different cultures have made to the field of mathematics and the impact of mathematics on society and cultures

N. Demonstrates an understanding of financial literacy concepts and their application as it relates to teaching students (e.g., describes the basic purpose of financial institutions, distinguishes the difference between gross and net income, identifies various savings options, defines different types of taxes, identifies the advantages and disadvantages of different methods of payments savings and credit uses and responsibilities)

O. Applies mathematics to model and solve problems to manage financial resources effectively for lifetime financial security as it relates to teaching students (e.g., distinguishes between fixed and variable expenses, calculates profit in a given situation, develops a system for keeping and using financial records, describes actions that might be taken to develop and balance a budget when expenses exceed income)

Competency 025 (Lab Processes, Equipment, and Safety)

The teacher understands how to manage learning activities, tools, materials, equipment, and technologies to ensure the safety of all students.

The beginning teacher:

A. Understands safety regulations and guidelines for science facilities and science instruction

B. Knows procedures for and sources of information regarding the appropriate handling, use, disposal, care, and maintenance of chemicals, materials, specimens, and equipment

C. Knows procedures for the safe handling and ethical care and treatment of organisms and specimens

D. Selects and safely uses appropriate tools, technologies, materials, and equipment needed for instructional activities

E. Understands concepts of precision, accuracy, and error with regard to reading and recording numerical data from a scientific instrument

F. Understands how to gather, organize, display, and communicate data in a variety of ways (e.g., charts, tables, graphs, diagrams, written reports, oral presentations)

G. Understands the international system of measurement (i.e., metric system) and performs unit conversions within measurement systems including the use of non-standard units