West Windsor-Plainsboro Regional School District
Technology Grade 7 Practical

Unit 0: Technology Education

Content Area: Technology Education

Course & Grade Level: Technology Education – Grade 7

Summary and Rationale

The West Windsor-Plainsboro Regional School District recognizes the importance of the study 21st Century Life and Careers standards. Additionally, it is also believed this learning should not be taught in isolation and cross curricular and career ready practices are embedded in every unit of study. Unit 0 is incorporated into each unit of study of this curricular document.

Recommended Pacing:

ELA Companion Standards and Career Ready Practices will be integrated throughout all units of study.

Interdisciplinary Connections

Grades 6-8

Progress Indicators Reading Science and Technical Subjects

Key Ideas and Details

RST.6-8.1. Cite specific textual evidence to support analysis of science and technical texts.

RST.6-8.2. Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.

RST.6-8.3. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

Craft and Structure

RST.6-8.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 6-8 texts and topics*.

RST.6-8.5. Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.

RST.6-8.6. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.

Integration of Knowledge and Ideas

RST.6-8.7. Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

RST.6-8.8. Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.

RST.6-8.9. Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

Range of Reading and Level of Text Complexity

RST.6-8.10. By the end of grade 8, read and comprehend science/technical texts in the grades 6-8 text complexity band independently and proficiently.

Career Ready Practices

CRP1. Act as a responsible and contributing citizen and employee.

CRP2. Apply appropriate academic and technical skills.

CRP4. Communicate clearly and effectively and with reason.

CRP5. Consider the environmental, social and economic impacts of decisions.

CRP6. Demonstrate creativity and innovation.

CRP7. Employ valid and reliable research strategies.

CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.

CRP9. Model integrity, ethical leadership and effective management.

CRP10. Plan education and career paths aligned to personal goals.

CRP11. Use technology to enhance productivity.

CRP12. Work productively in teams while using cultural global competence.

Competencies for 21st Century Learners			
X	Collaborative Team Member	X	Effective Communicator
X	Globally Aware, Active, & Responsible Student/Citizen	X	Information Literate Researcher
X	Innovative & Practical Problem Solver	X	Self-Directed Learner

Unit 1: Technology and You

Content Area: Industrial Technology

Course & Grade Level: Technology Cycle, Grade 7

Summary and Rationale

The Technology program at the Middle School believes that its primary purpose is to prepare students, who are users and creators of technology, for a productive and meaningful life, both now and beyond their schooling years. With change as we are experiencing it today, students must be prepared to live in an ever-changing technological society, They must 'learn how to learn'. This involves the application of mathematical, scientific, social science and communication principles and skills to understand, select, process and evaluate the technology around them. Students must be taught to understand and evaluate the impacts, tradeoffs and consequences of their technological choices.

Technology is for all students. The program applies problem solving strategies and proposes rational solutions to human problems and human adaptation to the environment. The process brings human and material resources together to solve problems and extend human potential. The approach appeals to the diverse learning styles of middle school students who can develop and create their own ideas, make choices and apply previously learned knowledge, while studying and building things that evoke their natural curiosity, To accomplish this, students must understand what resources are available, how these resources are processed and what can be expected as results. The processes of technology require that the students solve problems, think critically and make decisions regarding purpose, design, construction, tools, materials and energy. Students can begin the process as used in industry to produce, develop and maintain systems, create new products and techniques and perform complex tasks.

Cooperative learning and teamwork are emphasized to encourage social development and sensitivity to others. Students communicate their individual knowledge and creativity through graphics, the written and spoken work and by the construction of models. Products designed and constructed are the result of the students' effort and creativity, which enhances their self-esteem and encourages lifelong learning. Success is demonstrated through design solutions, effectiveness, accuracy, and excellence in production.

The students are present and future consumers who are able to solve problems, innovate, process, apply and evaluate present and future technologies.

Recommended Pacing

9 Days

State Standards

8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming:

All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

CPI #	Cumulative Progress Indicator (CPI)
8.2.8.A.1	Research a product that was designed for a specific demand and identify how the product has changed to meet new demands (i.e. telephone for communication - smart phone for mobility needs).

8.2.8.A.2	Examine a system, consider how each part relates to other parts, and discuss a part to redesign to improve the system.
8.2.8.A.3	Investigate a malfunction in any part of a system and identify its impacts.
8.2.8.A.4	Redesign an existing product that impacts the environment to lessen its impact(s) on the environment.
8.2.8.A.5	Describe how resources such as material, energy, information, time, tools, people, and capital contribute to a technological product or system.
8.2.8.B.1	Evaluate the history and impact of sustainability on the development of a designed product or system over time and present results to peers.
8.2.8.B.2	Identify the desired and undesired consequences from the use of a product or system.
8.2.8.B.3	Research and analyze the ethical issues of a product or system on the environment and report findings for review by peers and /or experts.
8.2.8.B.4	Research examples of how humans can devise technologies to reduce the negative consequences of other technologies and present your findings.
8.2.8.B.5	Identify new technologies resulting from the demands, values, and interests of individuals, businesses, industries and societies.
8.2.8.B.6	Compare and contrast the different types of intellectual property including copyrights, patents and trademarks.
8.2.8.B.7	Analyze the historical impact of waste and demonstrate how a product is upcycled, reused or remanufactured into a new product.
8.2.8.C.1	Explain how different teams/groups can contribute to the overall design of a product.
8.2.8.C.2	Explain the need for optimization in a design process.
8.2.8.C.3	Evaluate the function, value, and aesthetics of a technological product or system, from the perspective of the user and the producer.
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8.2.8.C.5	Explain the interdependence of a subsystem that operates as part of a system.
8.2.8.C.5.a	Create a technical sketch of a product with materials and measurements labeled.
8.2.8.C.6	Collaborate to examine a malfunctioning system and identify the step-by-step process used to troubleshoot, evaluate and test options to repair the product, presenting the better solution.
8.2.8.C.7	Collaborate with peers and experts in the field to research and develop a product using the design process, data analysis and trends, and maintain a design log with annotated sketches to record the developmental cycle.
8.2.8.C.8	Develop a proposal for a chosen solution that include models (physical, graphical or mathematical) to communicate the solution to peers.
8.2.8.D.1	Design and create a product that addresses a real world problem using a design process under specific constraints.
8.2.8.D.2	Identify the design constraints and trade-offs involved in designing a prototype (e.g., how the prototype might fail and how it might be improved) by completing a design problem and reporting results in a multimedia presentation, design portfolio or engineering notebook.

8.2.8.D.3	Build a prototype that meets a STEM-based design challenge using science, engineering, and math principles that validate a solution.
8.2.8.D.4	Research and publish the steps for using and maintaining a product or system and incorporate diagrams or images throughout to enhance user comprehension.
8.2.8.D.5	Explain the impact of resource selection and the production process in the development of a common or technological product or system.
8.2.8.D.6	Identify and explain how the resources and processes used in the production of a current technological product can be modified to have a more positive impact on the environment.

Instructional Focus

Unit Enduring Understandings

- Technology has played a key role in human development since the beginnings of time (e.g. spear, farming, wheel, writing, etc.).
- The ability to recognize a problem and apply critical thinking and problem-solving skills to solve the problem is a lifelong skill that develops over time.
- Gathering and evaluating knowledge and information from a variety of sources, including global perspectives, fosters creativity and innovative thinking.
- Collaboration and teamwork enable individuals or groups to achieve common goals with greater efficiency.
- Leadership abilities develop over time through participation in groups and/or teams that are engaged in challenging or competitive activities.
- The nature of the 21st-century workplace has shifted, demanding greater individual accountability, productivity, and collaboration.

Unit Essential Questions

- How did technology change the way people lived? How does it affect our world today?
- Is there a "best way" to solve a problem?
- How do we know we have the proper information and knowledge to solve a problem?
- What makes a group more efficient?
- What makes a leader effective?
- How has the workplace changed in the 21st century? How has it remained the same?

Objectives

Students will know:

- How to define technology and the elements that comprise it
- How to trace historical and evolutionary developments in technology with its impacts, consequences and the cultural influences it has experienced
- How to use the proper tools and communication techniques for research, documentation, problem identification and presentation
- How to explore technological systems: information, structural and control

Students will be able to:

- Define technology and explain the nature of technology
- Understand that technology cannot always provide successful solutions for problems or fulfill every human need.
- Describe the benefits of technology and list the products which it has developed
- List historical events and devices in the evolution of technology

- Describe some social and environmental harm caused by significant technological advances, e.g., the automobile, the light bulb, and the computer
- Speculate about what life would be like without common technological devices, systems and processes
- Describe the social benefits and the social and environmental harm caused by significant technological advances, e.g., the automobile, the light bulb, and the computer
- Explain the relationship between science and technology
- List the resources necessary for technology and describe how they are used
- Explain how needs and wants affect the development of a technological solution
- Develop their ability to select and use technological products and services available

Evidence of Learning

Assessment

Common Assessment 1.1

Competencies for 21st Century Learners

x	Collaborative Team Member	x	Effective Communicator
x	Globally Aware, Active, & Responsible Student/Citizen	x	Information Literate Researcher
x	Innovative & Practical Problem Solver	x	Self-Directed Learner

Resources

Suggested Resources:

https://www.stemfinity.com

Unit 2: Designing and Problem Solving

Content Area: Industrial Technology

Course & Grade Level: Technology Cycle, Grade 7

Summary and Rationale

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Technology is for all students. The program applies problem solving strategies and proposes rational solutions to human problems and human adaptation to the environment. The process brings human and material resources together to solve problems and extend human potential. The approach appeals to the diverse learning styles of middle school students who can develop and create their own ideas, make choices and apply previously learned knowledge, while studying and building things that evoke their natural curiosity, To accomplish this, students must understand what resources are available, how these resources are processed and what can be expected as results. The processes of technology require that the students solve problems, think critically and make decisions regarding purpose, design, construction, tools, materials and energy. Students can begin the process as used in industry to produce, develop and maintain systems, create new products and techniques and perform complex tasks.

Cooperative learning and teamwork are emphasized to encourage social development and sensitivity to others. Students communicate their individual knowledge and creativity through graphics, the written and spoken work and by the construction of models. Products designed and constructed are the result of the students' effort and creativity, which enhances their self-esteem and encourages lifelong learning. Success is demonstrated through design solutions, effectiveness, accuracy, and excellence in production.

The students are present and future consumers who are able to solve problems, innovate, process, apply and evaluate present and future technologies.

Recommended Pacing

9 Days

State Standards

8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming:

All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

CPI #	Cumulative Progress Indicator (CPI)
8.2.8.A.1	Research a product that was designed for a specific demand and identify how the product has changed to meet new demands (i.e. telephone for communication - smart phone for mobility needs).

8.2.8.A.2	Examine a system, consider how each part relates to other parts, and discuss a part to redesign to improve the system.
8.2.8.A.3	Investigate a malfunction in any part of a system and identify its impacts.
8.2.8.A.4	Redesign an existing product that impacts the environment to lessen its impact(s) on the environment.
8.2.8.A.5	Describe how resources such as material, energy, information, time, tools, people, and capital contribute to a technological product or system.
8.2.8.B.1	Evaluate the history and impact of sustainability on the development of a designed product or system over time and present results to peers.
8.2.8.B.2	Identify the desired and undesired consequences from the use of a product or system.
8.2.8.B.3	Research and analyze the ethical issues of a product or system on the environment and report findings for review by peers and /or experts.
8.2.8.B.4	Research examples of how humans can devise technologies to reduce the negative consequences of other technologies and present your findings.
8.2.8.B.5	Identify new technologies resulting from the demands, values, and interests of individuals, businesses, industries and societies.
8.2.8.B.6	Compare and contrast the different types of intellectual property including copyrights, patents and trademarks.
8.2.8.B.7	Analyze the historical impact of waste and demonstrate how a product is upcycled, reused or remanufactured into a new product.
8.2.8.C.1	Explain how different teams/groups can contribute to the overall design of a product.
8.2.8.C.2	Explain the need for optimization in a design process.
8.2.8.C.3	Evaluate the function, value, and aesthetics of a technological product or system, from the perspective of the user and the producer.
8.2.8.C.4	Identify the steps in the design process that would be used to solve a designated problem.
8.2.8.C.5	Explain the interdependence of a subsystem that operates as part of a system.
8.2.8.C.5.a	Create a technical sketch of a product with materials and measurements labeled.
8.2.8.C.6	Collaborate to examine a malfunctioning system and identify the step-by-step process used to troubleshoot, evaluate and test options to repair the product, presenting the better solution.
8.2.8.C.7	Collaborate with peers and experts in the field to research and develop a product using the design process, data analysis and trends, and maintain a design log with annotated sketches to record the developmental cycle.
8.2.8.C.8	Develop a proposal for a chosen solution that include models (physical, graphical or mathematical) to communicate the solution to peers.
8.2.8.D.1	Design and create a product that addresses a real world problem using a design process under specific constraints.
8.2.8.D.2	Identify the design constraints and trade-offs involved in designing a prototype (e.g., how the prototype might fail and how it might be improved) by completing a design problem and reporting results in a multimedia presentation, design portfolio or engineering notebook.

8.2.8.D.3	Build a prototype that meets a STEM-based design challenge using science, engineering, and math principles that validate a solution.
8.2.8.D.4	Research and publish the steps for using and maintaining a product or system and incorporate diagrams or images throughout to enhance user comprehension.
8.2.8.D.5	Explain the impact of resource selection and the production process in the development of a common or technological product or system.
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Instructional Focus

Unit Enduring Understandings

- Technology has played a key role in human development since the beginnings of time (e.g. spear, farming, wheel, writing, etc.).
- The ability to recognize a problem and apply critical thinking and problem-solving skills to solve the problem is a lifelong skill that develops over time.
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- The nature of the 21st-century workplace has shifted, demanding greater individual accountability, productivity, and collaboration.

Unit Essential Questions

- How did technology change the way people lived? How does it affect our world today?
- Is there a "best way" to solve a problem?
- How do we know we have the proper information and knowledge to solve a problem?
- What makes a group more efficient?
- What makes a leader effective?
- How has the workplace changed in the 21st century? How has it remained the same?

Objectives

Students will know:

- Problem solving strategies to help them design and build a model
- How to use the proper tools and communication techniques for research, documentation, problem identification and presentation
- How to explore technological systems: information, structural and control

Students will be able to:

- Identify problem situations and design opportunities
- Identify and apply the steps of the design process to develop a solution to a problem
- Design and make devices or systems that solve real problems
- Research and apply existing technologies to solve problems
- Research and combine relevant information from a variety of sources to solve problems
- Develop criteria and requirements for solutions to design problems based on specific needs
- Generate alternative design proposals
- Develop action plans for the creation of products, systems, and environments

- Develop and test alternative design models
- Objectively evaluate alternative solutions to determine the optimum one
- Access the appropriateness and effectiveness of a designed solution based on predetermined design criteria
- Document and assess their work through the use of portfolios

Evidence of Learning

Assessment

Common Assessment 2.1

Competencies for 21st Century Learners

x	Collaborative Team Member	x	Effective Communicator
x	Globally Aware, Active, & Responsible Student/Citizen	x	Information Literate Researcher
x	Innovative & Practical Problem Solver	x	Self-Directed Learner

Resources

Suggested Resources:

https://www.stemfinity.com

Unit 3: Designing and Building Models

Content Area: Industrial Technology

Course & Grade Level: Technology Cycle, Grade 7

Summary and Rationale

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Recommended Pacing

9 Days

State Standards

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8.2.8.B.2	Identify the desired and undesired consequences from the use of a product or system.
8.2.8.B.3	Research and analyze the ethical issues of a product or system on the environment and report findings for review by peers and /or experts.
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8.2.8.C.4	Identify the steps in the design process that would be used to solve a designated problem.
8.2.8.C.5	Explain the interdependence of a subsystem that operates as part of a system.
8.2.8.C.5.a	Create a technical sketch of a product with materials and measurements labeled.
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Instructional Focus

Unit Enduring Understandings

- Technology has played a key role in human development since the beginnings of time (e.g. spear, farming, wheel, writing, etc.).
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Unit Essential Questions

- How did technology change the way people lived? How does it affect our world today?
- Is there a “best way” to solve a problem?
- How do we know we have the proper information and knowledge to solve a problem?

- What makes a group more efficient?
- What makes a leader effective?
- How has the workplace changed in the 21st century? How has it remained the same?

Objectives

Students will know:

- Problem solving strategies to help them design and build a model
- How to use the proper tools and communication techniques for research, documentation, problem identification and presentation
- How to explore technological systems: information, structural and control

Students will be able to:

- Build physical models, which demonstrate good workmanship and creativity
- Use a variety of "hard" (wood, metal, plastic) and "soft" (paper, card, fabric, etc.) materials while fabrication conceptual models and prototypes
- Select materials for specific purposes based on their physical properties
- Select and properly use material processing tools and equipment
- Select appropriate adhesives to join similar (e.g., wood to wood) and dissimilar materials (e.g., sheet metal to wood)
- Select appropriate mechanical fasteners
- Construct devices using both metric units and United States units, by measuring with an accuracy of (metric) one millimeter and (US) one-sixteenth of an inch (linear)
- Select and use existing products, devices, and systems as resources for solving new problems

Evidence of Learning

Assessment

Common Assessment 3.1

Competencies for 21st Century Learners

x	Collaborative Team Member	x	Effective Communicator
x	Globally Aware, Active, & Responsible Student/Citizen	x	Information Literate Researcher
x	Innovative & Practical Problem Solver	x	Self-Directed Learner

Resources

Suggested Resources:

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Unit 4: Understanding and Building Structures

Content Area: Industrial Technology

Course & Grade Level: Technology Cycle, Grade 7

Summary and Rationale

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society, They must 'learn how to learn'. This involves the application of mathematical, scientific, social science and communication principles and skills to understand, select, process and evaluate the technology around them. Students must be taught to understand and evaluate the impacts, tradeoffs and consequences of their technological choices.

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Recommended Pacing

9 Days

State Standards

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8.2.8.A.5	Describe how resources such as material, energy, information, time, tools, people, and capital contribute to a technological product or system.
8.2.8.B.1	Evaluate the history and impact of sustainability on the development of a designed product or system over time and present results to peers.

8.2.8.B.2	Identify the desired and undesired consequences from the use of a product or system.
8.2.8.B.3	Research and analyze the ethical issues of a product or system on the environment and report findings for review by peers and /or experts.
8.2.8.B.4	Research examples of how humans can devise technologies to reduce the negative consequences of other technologies and present your findings.
8.2.8.B.5	Identify new technologies resulting from the demands, values, and interests of individuals, businesses, industries and societies.
8.2.8.B.6	Compare and contrast the different types of intellectual property including copyrights, patents and trademarks.
8.2.8.B.7	Analyze the historical impact of waste and demonstrate how a product is upcycled, reused or remanufactured into a new product.
8.2.8.C.1	Explain how different teams/groups can contribute to the overall design of a product.
8.2.8.C.2	Explain the need for optimization in a design process.
8.2.8.C.3	Evaluate the function, value, and aesthetics of a technological product or system, from the perspective of the user and the producer.
8.2.8.C.4	Identify the steps in the design process that would be used to solve a designated problem.
8.2.8.C.5	Explain the interdependence of a subsystem that operates as part of a system.
8.2.8.C.5.a	Create a technical sketch of a product with materials and measurements labeled.
8.2.8.C.6	Collaborate to examine a malfunctioning system and identify the step-by-step process used to troubleshoot, evaluate and test options to repair the product, presenting the better solution.
8.2.8.C.7	Collaborate with peers and experts in the field to research and develop a product using the design process, data analysis and trends, and maintain a design log with annotated sketches to record the developmental cycle.
8.2.8.C.8	Develop a proposal for a chosen solution that include models (physical, graphical or mathematical) to communicate the solution to peers.
8.2.8.D.1	Design and create a product that addresses a real world problem using a design process under specific constraints.
8.2.8.D.2	Identify the design constraints and trade-offs involved in designing a prototype (e.g., how the prototype might fail and how it might be improved) by completing a design problem and reporting results in a multimedia presentation, design portfolio or engineering notebook.
8.2.8.D.3	Build a prototype that meets a STEM-based design challenge using science, engineering, and math principles that validate a solution.
8.2.8.D.4	Research and publish the steps for using and maintaining a product or system and incorporate diagrams or images throughout to enhance user comprehension.
8.2.8.D.5	Explain the impact of resource selection and the production process in the development of a common or technological product or system.

8.2.8.D.6	Identify and explain how the resources and processes used in the production of a current technological product can be modified to have a more positive impact on the environment.

Instructional Focus

Unit Enduring Understandings

- Technology has played a key role in human development since the beginnings of time (e.g. spear, farming, wheel, writing, etc.).
- The ability to recognize a problem and apply critical thinking and problem-solving skills to solve the problem is a lifelong skill that develops over time.
- Gathering and evaluating knowledge and information from a variety of sources, including global perspectives, fosters creativity and innovative thinking.
- Collaboration and teamwork enable individuals or groups to achieve common goals with greater efficiency.
- Leadership abilities develop over time through participation in groups and/or teams that are engaged in challenging or competitive activities.
- The nature of the 21st-century workplace has shifted, demanding greater individual accountability, productivity, and collaboration.

Unit Essential Questions

- How did technology change the way people lived? How does it affect our world today?
- Is there a "best way" to solve a problem?
- How do we know we have the proper information and knowledge to solve a problem?
- What makes a group more efficient?
- What makes a leader effective?
- How has the workplace changed in the 21st century? How has it remained the same?

Objectives

Students will know:

- Problem solving strategies to help them design and build a model
- How to use the proper tools and communication techniques for research, documentation, problem identification and presentation
- How to explore technological systems: information, structural and control

Students will be able to:

- Apply concepts about structure systems
- Realize that there are many types of structural systems, each designed for a specific purpose
- Realize that all structural systems depend on many resources, including information I knowledge, people, tools, materials, energy, capital and time
- Evaluate existing structural systems and suggest improvements
- Realize that technological systems are essential to and influence a vast number of occupations and industries
- Understand and explain the similarities of all technological systems
- Understand and explain the basic operation principles of energy, materials, and information processing systems

Evidence of Learning

Assessment

Common Assessment 4.1

Competencies for 21st Century Learners

x	Collaborative Team Member	x	Effective Communicator
x	Globally Aware, Active, & Responsible Student/Citizen	x	Information Literate Researcher

x	Innovative & Practical Problem Solver	x	Self-Directed Learner
Resources			
Suggested Resources: ITEA			