FIRST® LEGO® League 21st Century Learning Skills Alignment & Instructional Exemplars

Rationale	Color Code
There is no evidence that the standard is addressed as part of a _FIRST_® program.	
This standard potentially could be addressed as part of a _FIRST_® program either by actions that the coach/mentor takes when working with the students or by conditions established by the program for that given year.	
The standard is clearly addressed by program activities.	

	Student Outcomes			_FIRST_® Alignment	Instructional Exemplar
Core Subjects	English, reading or language arts World languages Arts Mathematics Economics Science Geography History Government and Civics	Global Awareness	Using 21st century skills to understand and address global issues		As a part of the Challenge, students are asked to research a real-world scientific problem, propose an innovative solution, and share their findings with others through their Project presentation.
Core Subjects	English, reading or language arts World languages Arts Mathematics Economics Science Geography History Government and Civics	Global Awareness	Learning from and working collaboratively with individuals representing diverse cultures, religions and lifestyles in a spirit of mutual respect and open dialogue in personal, work and community contexts		Throughout the process of participating in the _FIRST_® LEGO® League program and at tournaments, students may have multiple opportunities to work collaboratively with team members, coaches and other individuals with varied cultures and backgrounds.

Core Subjects	English, reading or language arts World languages Arts Mathematics Economics Science Geography History Government and Civics	Global Awareness	Understanding other nations and cultures, including the use of non-English languages		Depending on the Challenge, students may investigate other cultures and nations as part of the research or innovative solution to their Project.
Core Subjects	English, reading or language arts World languages Arts Mathematics Economics Science Geography History Government and Civics	Financial, economic, business and entrepreneurial literacy	Knowing how to make appropriate personal economic choices		Depending on the Challenge, students may investigate specific economic impacts based on the success of their innovative solution.
Core Subjects	English, reading or language arts World languages Arts Mathematics Economics Science Geography History Government and Civics	Financial, economic, business and entrepreneurial literacy	Understanding the role of the economy in society		Depending on the Challenge, students may do an in-depth analysis of the problem, review existing solutions, evaluate the level of impactful innovation, and implementation considerations (including cost, ease of manufacturing, etc.) - all of these items address real-world economic impact.
Core Subjects	English, reading or language arts World languages Arts Mathematics Economics Science Geography History Government and Civics	Financial, economic, business and entrepreneurial literacy	Using entrepreneurial skills to enhance workplace productivity and career options		*FIRST*® LEGO® League teams often work with businesses and local, state and federal government agencies in the development of their solutions. Many teams apply for patents, make prototypes of their solutions, test their product, thus developing entrepreneurial skills.

Core Subjects	English, reading or language arts World languages Arts Mathematics Economics Science Geography History Government and Civics	Civic literacy	Participating effectively in civic life through knowing how to stay informed and understanding governmental processes	Students must prepare a Project presentation that details their proposed innovative solution to a real-world problem and illustrating how this solution will improve the lives of others. The proposed solution is then presented to interested groups in the community such as School Boards, teachers groups, parent groups, community members, schools, local governments, etc.
Core Subjects	English, reading or language arts World languages Arts Mathematics Economics Science Geography History Government and Civics	Civic literacy	Exercising the rights and obligations of citizenship at local, state, national and global levels	As a participant in the *FIRST*® LEGO® League program, students will develop an innovative solution to a real-world problem that will improve the lives of others in their local, national or global community.
Core Subjects	English, reading or language arts World languages Arts Mathematics Economics Science Geography History Government and Civics	Civic literacy	Understanding the local and global implications of civic decisions	Teams are required to share their Project solution with others. They work with local, civic leaders to educate others about their solution or to make their solutions a reality that benefits others.
Core Subjects	English, reading or language arts World languages Arts Mathematics Economics Science Geography History Government and Civics	Health literacy	Obtaining, interpreting and understanding basic health information and services and using such information and services in ways that are health enhancing	Not Applicable

	English, reading or language arts World languages Arts Mathematics Economics Science Geography History			Not Applicable
Core Subjects	Government and Civics	Health literacy	Understanding preventive physical and mental health measures, including proper diet, nutrition, exercise, risk avoidance and stress reduction	
	English, reading or language arts World languages Arts Mathematics Economics Science Geography History			Not Applicable
Core Subjects	Government and Civics	Health literacy	Using available information to make appropriate health-related decisions	
	English, reading or language arts World languages Arts Mathematics Economics Science Geography History			Not Applicable
Core Subjects	Government and Civics	Health literacy	Establishing and monitoring personal and family health goals	
	English, reading or language arts World languages Arts Mathematics Economics Science Geography History			Not Applicable
Core Subjects	Government and Civics	Health literacy	Understanding national and international public health and safety issues	

Core Subjects	English, reading or language arts World languages Arts Mathematics Economics Science Geography History Government and Civics	Environmental literacy	Demonstrate knowledge and understanding of the environment and the circumstances and conditions affecting it, particularly as relates to air, climate, land, food, energy, water and ecosystems		Depending on the Challenge, students may choose to investigate environmental issues as part of the research or innovative solution to their Project.
Core Subjects	English, reading or language arts World languages Arts Mathematics Economics Science Geography History Government and Civics	Environmental literacy	Demonstrate knowledge and understanding of society's impact on the natural world (e.g., population growth, population development, resource consumption rate, etc.)		Depending on the Challenge, students may choose to investigate societal impact on the natural world as part of the research or innovative solution to their Project.
Core Subjects	English, reading or language arts World languages Arts Mathematics Economics Science Geography History Government and Civics	Environmental literacy	Investigate and analyze environmental issues, and make accurate conclusions about effective solutions		Depending on the Challenge, students may choose to investigate environmental issues as part of the research or innovative solution to their Project.
Core Subjects	English, reading or language arts World languages Arts Mathematics Economics Science Geography History Government and Civics	Environmental literacy	Take individual and collective action towards addressing environmental challenges (e.g., participating in global actions, designing solutions that inspire action on environmental issues)		Depending on the Challenge, students may choose to investigate environmental issues as part of the research or innovative solution to their Project
Learning and Innovation Skills	Creativity and Innovation	Think Creatively	Use a wide range of idea creation techniques (such as brainstorming)		Students use brainstorming to generate ideas to address the real-world problem presented as part of the Challenge, in developing their approach to completing the missions, and coding the robot.

Learning and Innovation Skills	Creativity and Innovation	Think Creatively	Create new and worthwhile ideas (both incremental and radical concepts)		Students create new ideas to address the real-world problem presented as part of the Challenge, in developing their approach to completing the missions, and coding the robot.
Learning and Innovation Skills	Creativity and Innovation	Think Creatively	Elaborate, refine, analyze and evaluate their own ideas in order to improve and maximize creative efforts		Students must evaluate individual ideas to determine the best group solution to the Challenge, the approach to completing the missions, robot design, and coding the robot.
Learning and Innovation Skills	Creativity and Innovation	Work Creatively with Others	Develop, implement and communicate new ideas to others effectively		Students must communicate ideas effectively with team members to address the real-world problem presented as part of the Challenge as well as share the team's solution with others. The team must develop a shared approach to completing the missions, designing the robot, and coding the robot.
Learning and Innovation Skills	Creativity and Innovation	Work Creatively with Others	Be open and responsive to new and diverse perspectives; incorporate group input and feedback into the work		Students must be open to all individual ideas and work together to develop an agreed upon solution to the real-world problem, the approach to completing the missions, designing the robot, and coding the robot.
Learning and Innovation Skills	Creativity and Innovation	Work Creatively with Others	Demonstrate originality and inventiveness in work and understand the real world limits to adopting new ideas		Students develop an innovative solution to a real-world problem which could be implemented within the parameters of the Challenge, the approach to completing the missions, designing the robot, and coding the robot.
Learning and Innovation Skills	Creativity and Innovation	Work Creatively with Others	View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes		Students are encouraged to be innovative in robot design and Project solution which can result in initial failure. The nature of the missions and the Challenge require students to constantly refine their solutions and learn from mistakes.
Learning and Innovation Skills	Creativity and Innovation	Implement Innovations	Act on creative ideas to make a tangible and useful contribution to the field in which the innovation will occur		Students create an innovative solution to a real-world problem and present it to others who would be interested such as experts in the field, community or government leaders, etc.
Learning and Innovation Skills	Critical Thinking and Problem Solving	Reason Effectively	Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation		Students use all types of reasoning to develop and refine their innovative solution to the Challenge, the approach to completing the missions, designing the robot, and coding the robot.
Learning and Innovation Skills	Critical Thinking and Problem Solving	Use Systems Thinking	Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems		In order to accomplish the most missions in the time allotted students must analyze the best route on the board and the most effective method for completion of missions.

Learning and Innovation Skills	Critical Thinking and Problem Solving	Make Judgments and Decisions	Effectively analyze and evaluate evidence, arguments, claims and beliefs	As part of the research process, students will analyze and evaluate many different types of information and arguments to propose an innovative solution to the real-world problem. Students will also constantly evaluate approached to completing the missions, designing the robot, and programming the robot.
Learning and Innovation Skills	Critical Thinking and Problem Solving	Make Judgments and Decisions	Analyze and evaluate major alternative points of view	As part o the research process, students will review many points of view regarding the problem and how to solve it. Students will also have to evaluate other team members points of view when developing their approach to completing the missions, designing the robot, and programming the robot.
Learning and Innovation Skills	Critical Thinking and Problem Solving	Make Judgments and Decisions	Synthesize and make connections between information and arguments	Students will research and synthesize information to create an innovative solution to a real-world problem. Students must also make connections between writing programs and robot movements when completing missions.
Learning and Innovation Skills	Critical Thinking and Problem Solving	Make Judgments and Decisions	Interpret information and draw conclusions based on the best analysis	As a part of the research process, students will interpret information and determine how best to use it to create an innovative solution to a real-world problem.
Learning and Innovation Skills	Critical Thinking and Problem Solving	Make Judgments and Decisions	Reflect critically on learning experiences and processes	Students will be asked to reflect on their ideas and approach to completing missions to refine their processes.
Learning and Innovation Skills	Critical Thinking and Problem Solving	Solve Problems	Solve different kinds of non-familiar problems in both conventional and innovative ways	Students solve many unfamiliar problems by completing missions in the Robot Game and by creating their innovative solution in the Project.
Learning and Innovation Skills	Critical Thinking and Problem Solving	Solve Problems	Identify and ask significant questions that clarify various points of view and lead to better solutions	Students will need to ask questions of each other, their coach and experts to find solutions to the missions, to develop their research question and innovation solution in the Project.
Learning and Innovation Skills	Communication and Collaboration	Communicate Clearly	Articulate thoughts and ideas effectively using oral, written and nonverbal communication skills in a variety of forms and contexts	Students will have to communicate effectively with each other as well as others to develop an innovative solution to the real-world problem and the missions. Students must present their Project solution to a real-world audience and a panel of judges at a competition which will require different approaches.

Learning and Innovation Skills	Communication and Collaboration	Communicate Clearly	Listen effectively to decipher meaning, including knowledge, values, attitudes and intentions		Students will have to listen effectively to each other as well as others to develop an innovative solution to the real-world problem for the Project and to complete the missions for the Robot Game.
Learning and Innovation Skills	Communication and Collaboration	Communicate Clearly	Use communication for a range of purposes (e.g. to inform, instruct, motivate and persuade)		Students will communicate with each other to complete the Challenge and with other teams to complete missions. Students will have to communicate their solution to others through presentation and other means.
Learning and Innovation Skills	Communication and Collaboration	Communicate Clearly	Utilize multiple media and technologies, and know how to judge their effectiveness a priori as well as assess their impact		Students will have to communicate their solution to others through presentation and other means and will need to utilize varying types of media to effectively convey information.
Learning and Innovation Skills	Communication and Collaboration	Communicate Clearly	Communicate effectively in diverse environments (including multi-lingual)		Depending the make up of the team, the other teams at competitions, or community members with which they work, students may work with students in diverse environments.
Learning and Innovation Skills	Communication and Collaboration	Collaborate with Others	Demonstrate ability to work effectively and respectfully with diverse teams		As a part of *FIRST*® LEGO® League Core Values, students are judged on their ability to work effectively and respectfully with individuals on their team as well as with other teams to complete the Challenge and develop an innovative solution to a real-world problem.
Learning and Innovation Skills	Communication and Collaboration	Collaborate with Others	Exercise flexibility and willingness to be helpful in making necessary compromises to accomplish a common goal		As a part of *FIRST*® LEGO® Core Values, students are judged on their ability to work cohesively as a team and compromise when necessary to develop the best approach to completing missions, programming the robot, and to complete the Challenge by developing an innovative solution to a real-world problem.
Learning and Innovation Skills	Communication and Collaboration	Collaborate with Others	Assume shared responsibility for collaborative work, and value the individual contributions made by each team member		As a part of *FIRST*® LEGO® Core Values, students are judged on their ability to collaborate and share work responsibilities to complete tasks and develop an innovative solution to the real-world problem.
Information, Media and Technology Skills	Information Literacy	Access and Evaluate Information	Access information efficiently (time) and effectively (sources)		As a part of *FIRST*® LEGO® Core Values, students must manage time and tasks effectively to determine the types of resources needed to complete the Challenge and develop an innovative solution to ta real-world problem.

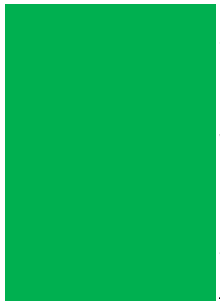
Information, Media and Technology Skills	Information Literacy	Access and Evaluate Information	Evaluate information critically and competently		Students conduct research to address the solution to the Challenge. Through the course of the research, students must make judgments about the type of resources that will be used.
Information, Media and Technology Skills	Information Literacy	Use and Manage Information	Use information accurately and creatively for the issue or problem at hand		Students will use information gained through research to develop and innovative solution to a real-world problem.
Information, Media and Technology Skills	Information Literacy	Use and Manage Information	Manage the flow of information from a wide variety of sources		Students will have to evaluate information from multiple sources to create their solution to a real-world problem.
Information, Media and Technology Skills	Information Literacy	Use and Manage Information	Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information		Teams learn how to gain knowledge through acceptable means, and determining which sources are reliable, etc. as they conduct research for their Project, and they learn how to site that information.
Information, Media and Technology Skills	Media Literacy	Analyze Media	Understand both how and why media messages are constructed, and for what purposes		Not Applicable
Information, Media and Technology Skills	Media Literacy	Analyze Media	Examine how individuals interpret messages differently, how values and points of view are included or excluded, and how media can influence beliefs and behaviors		Not Applicable
Information, Media and Technology Skills	Media Literacy	Analyze Media	Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of media		As part of the Project development, students must understand the ethical and legal issues surrounding the use of music, film clips, and other media if they choose to use it as part of their presentation.
Information, Media and Technology Skills	Media Literacy	Create Media Products	Understand and utilize the most appropriate media creation tools, characteristics and conventions		During the Project presentation, students will use a variety of media creation tools and conventions to effectively communicate with the audience.
Information, Media and Technology Skills	Media Literacy	Create Media Products	Understand and effectively utilize the most appropriate expressions and interpretations in diverse, multi-cultural environments		Teams may work collaboratively with culturally diverse individuals within their team or with other teams. Students might be presenting to a diverse set of judges, and they might work with a diverse set of referees during their tournament experience.

Information, Media and Technology Skills	ICT Literacy	Apply Technology Effectively	Use technology as a tool to research, organize, evaluate and communicate information		As part of the research process and completion of the Project, students will use technology to research the topic and create a presentation.
Information, Media and Technology Skills	ICT Literacy	Apply Technology Effectively	Use digital technologies (computers, PDAs, media players, GPS, etc.), communication/networking tools and social networks appropriately to access, manage, integrate, evaluate and create information to successfully function in a knowledge economy		In order to complete the Challenge, students will communicate using technology with each other, experts, other teams, and their coach. They will also use technology for research and presentation.
Information, Media and Technology Skills	ICT Literacy	Apply Technology Effectively	Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information technologies		In the development of their Project presentation, students may choose to use many types of media and information. They will need to evaluate the ethical/legal issues associated with using their chosen media and information.
Life and Career Skills	Flexibility and Adaptability	Adapt to Change	Adapt to varied roles, jobs responsibilities, schedules and context		As a part of *FIRST*® LEGO® Core Values, students are judged on their ability to adapt to and take on varied roles and responsibilities as they complete the missions in the Robot Game and the Challenge.
Life and Career Skills	Flexibility and Adaptability	Adapt to Change	Work effectively in a climate of ambiguity and changing priorities		In completing the engineering and design requirements of the Robot Game and the research requirements of the Project, students must adapt to changing program priorities, as determined by trial and error in their design solutions, by ideas that do not work as planned in the Project solution, or as they work within a challenging team dynamic.
Life and Career Skills	Flexibility and Adaptability	Be Flexible	Incorporate feedback effectively		Students will incorporate feedback from team members, coach, experts and judges to refine their Project and Project presentation.
Life and Career Skills	Flexibility and Adaptability	Be Flexible	Deal positively with praise, setbacks and criticism		Students will work with a team, coach and experts and will incorporate feedback into the final Project and completion of the Challenge.
Life and Career Skills	Flexibility and Adaptability	Be Flexible	Understand, negotiate and balance diverse views and beliefs to reach workable solutions, particularly in multi-cultural environments		As a part of *FIRST*® LEGO® Core Values, students are judged on their ability to work in a collaborative team to reach agreed upon solutions to complete the Challenge and missions in the Robot Game.

Life and Career Skills	Initiative and Self-Direction	Manage Goals and Time	Set goals with tangible and intangible success criteria		As part of the team, students will set individual and team goals that will lead to their approach to completing missions in the Robot Game and addressing the Challenge.
Life and Career Skills	Initiative and Self-Direction	Manage Goals and Time	Balance tactical (short-term) and strategic (long-term) goals		As a part of *FIRST*® LEGO® Core Values, students are judged on their ability to set goals and manage their deliverables. Both short-term and long-term goals are assessed.
Life and Career Skills	Initiative and Self-Direction	Manage Goals and Time	Utilize time and manage workload efficiently		As a part of *FIRST*® LEGO® League Core Values, students are judged on their ability to demonstrate time management skills in completion of the Project and strategy for completing missions in the Robot Game.
Life and Career Skills	Initiative and Self-Direction	Work Independently	Monitor, define, prioritize and complete tasks without direct oversight		As a part of *FIRST*® LEGO® Core Values, students are judged on their ability to complete a task as a collaborative team, independent of adult (coach) direction.
Life and Career Skills	Initiative and Self-Direction	Be Self-directed Learners	Go beyond basic mastery of skills and/or curriculum to explore and expand one's own learning and opportunities to gain expertise		Teams and students will want to get better at every aspect of the program as they progress. Self-learning and gaining experience are crucial to become more successful.
Life and Career Skills	Initiative and Self-Direction	Be Self-directed Learners	Demonstrate initiative to advance skill levels towards a professional level		*FIRST*® has an ethos of Gracious Professionalism® - this concept encourages high-quality work and high-quality engagement of others to improve everyone's competence and professional skill sets. *FIRST*® LEGO® League challenges students to engage in meaningful research to solve societal problems that requires a civic connection, to engineer a robotic solution to a Robot Game, and to do all of the work in a highly proficient, functioning teaming environment. Teams also engage, support, train, mentor other teams in design and programming, thus increasing the engineering competencies of other teams, as well as their own.
Life and Career Skills	Initiative and Self-Direction	Be Self-directed Learners	Demonstrate commitment to learning as a lifelong process		Many teams continue with Project development and implementation months and even years after the conclusion of their Challenge season.
Life and Career Skills	Initiative and Self-Direction	Be Self-directed Learners	Reflect critically on past experiences in order to inform future progress		In completing the engineering and design requirements of the Robot Game and the research requirements of the Project, students must adapt their design and solution based on the success of the previous iterations.

Life and Career Skills	Social and Cross-Cultural Skills	Interact Effectively with Others	Know when it is appropriate to listen and when to speak		Students will work with coaches and other students to design, create and learn in a team environment. Effective communication is key.
Life and Career Skills	Social and Cross-Cultural Skills	Interact Effectively with Others	Conduct themselves in a respectable, professional manner		As a part of *FIRST*® LEGO® League Core Values and Gracious Professionalism®, students are judged on the team's ability to demonstrate respectful and professional behavior.
Life and Career Skills	Social and Cross-Cultural Skills	Work Effectively in Diverse Teams	Respect cultural differences and work effectively with people from a range of social and cultural backgrounds		As a part of *FIRST*® LEGO® League, students work with a variety of individuals, both on their team and outside their team when presenting their Project to judges or experts and when working with other teams. This can include people from different cultures and social backgrounds.
Life and Career Skills	Social and Cross-Cultural Skills	Work Effectively in Diverse Teams	Respond open-mindedly to different ideas and values		*FIRST*® LEGO® League provides the environment for critical thinking and problem-solving, and the team format requires students to keep an open mind in order to maintain a successful and productive work environment.
Life and Career Skills	Social and Cross-Cultural Skills	Work Effectively in Diverse Teams	Leverage social and cultural differences to create new ideas and increase both innovation and quality of work		*FIRST*® LEGO® League is designed to create a team environment where many ideas can come together to create innovation and high-quality work.
Life and Career Skills	Productivity and Accountability	Manage Projects	Set and meet goals, even in the face of obstacles and competing pressure		Teams will set goals at the beginning of the season, which must be completed under specific time constraints. Through the engineering design process, working on a team and creating an innovative solution to a real-world problem, teams will encounter many obstacles that they will have to overcome to be successful.
Life and Career Skills	Productivity and Accountability	Manage Projects	Prioritize, plan and manage work to achieve the intended result		As a part of *FIRST*® LEGO® League Core Values, students are judged on their time management and division of labor.

Life and Career Skills	Productivity and Accountability	Produce Results	Demonstrate additional attributes associated with producing high quality products including the abilities to: - Work positively and ethically - Manage time and projects effectively - Multi-task - Participate actively, as well as be reliable and punctual - Present oneself professionally and with proper etiquette - Collaborate and cooperate effectively with teams - Respect and appreciate team diversity - Be accountable for results	As a part of *FIRST*® LEGO® League Core Values, students are judged on a wide variety of skills that produce a high quality Project, engineered solution to designing a robot and solution to the Robot Game. Students are expected to demonstrate respect, professionalism, and civic responsibility within their team work and impactful outreach to others. Students work in teams, using communication and interpersonal skills to solve problems, research solutions, etc.
Life and Career Skills	Leadership and Responsibility	Guide and Lead Others	Use interpersonal and problem-solving skills to influence and guide others toward a goal	
Life and Career Skills	Leadership and Responsibility	Guide and Lead Others	Leverage strengths of others to accomplish a common goal	Throughout the process of participating in the *FIRST*® LEGO® League program and at tournaments, students will have multiple opportunities to work collaboratively with other individuals to accomplish a common goal. Students must leverage the strengths of team members in order to most effectively meet the goals of the team.
Life and Career Skills	Leadership and Responsibility	Guide and Lead Others	Inspire others to reach their very best via example and selflessness	Throughout the process of participating in the *FIRST*® LEGO® League program and the Core Value of Coopertition®, students will have multiple opportunities to inspire each other and other teams to put forth their best efforts in much the same way as a sports team does. *FIRST*® students often mentor new or young team, help competing teams and are recognized in this area through the Inspiration award.
Life and Career Skills	Leadership and Responsibility	Guide and Lead Others	Demonstrate integrity and ethical behavior in using influence and power	Throughout the process of participating in *FIRST*® LEGO® League and Core Values, students will have the opportunity to influence the direction of other team members and will learn to be honest and ethical when using their influence for the betterment of the team.

Life and Career Skills	Leadership and Responsibility	Be Responsible to Others	Act responsibly with the interests of the larger community in mind		Throughout the process of participating in the *FIRST*® LEGO® League program, students are asked to create innovative solutions to real world problems that will impact their local community and the larger global community. Students are expected to demonstrate Gracious Professionalism® in their interactions with individuals on their team, as they mentor, advise, teach and assist other teams, and as they interact with judges and the community.