



CLASS PACK IMPLEMENTATION GUIDE



Welcome to the Program

Welcome to *FIRST*® and the *FIRST*® LEGO® League program. *FIRST*LEGO League captures children’s curiosity and directs it toward discovering the wonders of science and technology. The program was created through a partnership between *FIRST* (For Inspiration and Recognition of Science and Technology) and LEGO® Education. *FIRST*LEGO League has three divisions: Discover, Explore, and Challenge. Your students will take part in the Explore Class Pack!

Thank you for participating in this innovative STEM program for students. Your students join a global community across more than 110 countries. Its impact is profound and leads to a further progression of STEM exploration, skills, and experiences even after students complete the program.

The Class Pack provides schools with the tools to implement *FIRST*LEGO League Explore in daily classroom lessons or as a structured after-school program. As the teacher, your role is to facilitate learning for your students and organize your implementation of the program. The guide is designed to help you do this.

This guide also contains information on how students can share their experiences and what they have learned throughout their journey – from highlighting your students’ hard work in a classroom showcase to putting on your own school or organization-based *FIRST*LEGO League Explore event.



Getting Started Checklist

Thank you to all the teachers and youth leaders who will be delivering the *FIRST*® LEGO® League Explore Class Pack with your students.

Please read the *Engineering Notebook* (these guidebooks are given to the students) and the

Team Meeting Guide. They are full of very useful information to guide you through the program. After completing the 12 sessions, your students will be prepared to participate in a festival that celebrates the magnificent achievements made by the teams.

We've created a checklist to guide you toward success. Use this to help you get started.

Ensure you have received all materials needed to run the program. See page [4](#) for list.

Identify the space where you will implement the program and store materials. Think about the WeDo 2.0 sets and assembled models that have to stay together for many days.

Think about the size of the event you want to have. You could have a showcase or festival in your classroom or have a bigger event for the whole school. Refer to the *Explore Class Pack Event Guide* for more information.

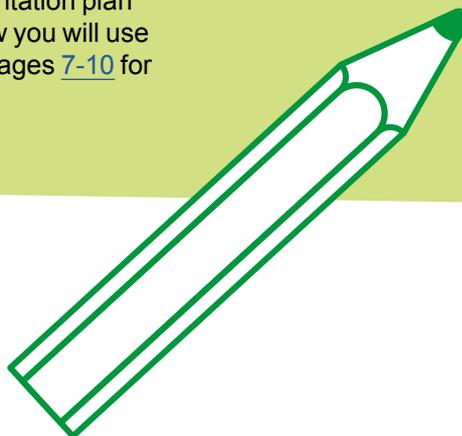
Create an implementation plan and timeline for how you will use the program. See pages [7-10](#) for

implementation tips and options.

Determine who will be participating in the program. Is it your entire class? Will the same materials need to be shared by different classes or other teachers?

Encourage family and home engagement. See *Developing Your FIRST Community* on page [13](#) for ideas!

Determine how you will place the class into teams. Each team should have no more than 4 students.



Material Needs

Look over the following list for what materials and space you will need in your classroom. It is recommended that students work in teams of four. Each team will need space to design, build, and code

with their WeDo 2.0 set as well as to participate in teamwork activities. Access to an electronic device is important for each team to have for a successful program implementation.

For each student:

- 1 *Engineering Notebook**

For each team (within class):

- LEGO Education WeDo 2.0 Set
- 1 Explore Set
- 1 electronic device (see *Team Meeting Guide* for specific details)
- Team poster board and art supplies*

Classroom space:

- Small workstations/tables for each team (enough space for LEGO building, electronic device, and assembled models)
- Portable or permanent storage
- Internet access (optional)
- Electrical support

*Items with an asterisk are consumable each time a team goes through this experience. If you need additional printed copies of the *Engineering Notebooks*, you can order them through the *FIRST*® Dashboard or access digital PDFs of the *Engineering Notebooks* through the Access Thinkscape button on the dashboard.



Storage and Material Management

Before you get started with the *FIRST*® LEGO® League Explore program content, you might want to play a game where the teams identify pieces in their WeDo 2.0 sets. It is recommended that students organize their LEGO sets to help in taking ownership of materials. This would allow you to start processes and procedures for keeping the sets organized.

After you have gathered or purchased all of the materials your students will need, you could use plastic storage tubs or other containers to create a kit for each team in your class. You could store the *Engineering Notebooks* and WeDo 2.0 sets inside the kit for each team ensuring that each team is responsible for their materials and they won't get mixed up with others in the classroom.

Alternatively, you could also assign and label each WeDo 2.0 set and Explore set with the team name and/or number so the students know what materials to grab each time. Be sure to check the battery levels of your hardware devices and charge them as needed between sessions. You will need batteries for the Smarthubs for each of the WeDo 2.0 sets also.

After you have all the kits assembled, you will need a place to store them. Beginning in Session 8, each team may need a sturdy board or container (such as a large plastic container, a cardboard box, a wooden board, etc.) to protect, store, and potentially transport their team models. Beginning with Session 10, each team will need a poster board to create a team poster. You will also need to identify a place to store the posters.

Possible Storage Solutions



Classroom Management

Teacher Role

The role of the teacher in a *FIRST*® Class Pack environment is more of a facilitator. Your teaching style should include a focus on developing holistic skills, building STEM confidence, embracing challenging activities and using play, discovery, and exploration.

Important things to consider when using the facilitator mindset is to:

- Reinforce *FIRST* Core Values.
- Ask the right kind of questions; guiding questions.
- Be comfortable with not having all the answers.
- Let students learn for themselves through problem-solving.
- Create opportunities for students to have ownership of the learning process and outcomes.
- Reflect on student and team goals and how they are working to achieve them.
- Guide students to the resources to help them achieve their goals.
- Celebrate mistakes and see learning opportunities.

Student Growth Mindset

As you guide students through their experience, having the right mindset is important. Creating student ownership of learning can assist with this. Ownership can be achieved by allowing students to focus on the skills they are developing and what they want to achieve and to use their problem-solving skills.

There are no right or wrong solutions, just different ways of solving problems. There is plenty of opportunity for students to enjoy their successes and learn from their mistakes.

As a teacher, if you can establish perseverance and resilience as traits to celebrate and be grateful for, students will be more likely to strive for them. Students need to be challenged just enough that it stretches their minds and creativity without overwhelming them.



Classroom Implementation

Flexible Implementation

First and foremost, use your professional judgment to augment this program to meet the needs of your students, class space, class timing and additional curricular requirements. Set student expectations for participation in the program based on the student growth mindset of holistic and STEM skills.

Teaming as Designed

The sessions in the guidebooks have guided tasks for two different groups within each student team. Here are the reasons behind this design:

- Ensures equitable experience for every student in all aspects of the program (WeDo set, Explore set, Core Values).
- Additional opportunity for collaboration and communication.
- Small groups promote deeper learning of content and build holistic skills to share out learning with other team members.
- Fewer materials are needed, and they can be used by more students.
- Having smaller groups allows for students to get hands-on time with building, coding, and exploration.

How to Run Differentiated Groups

- Physically split space to facilitate working in small groups.
- Establish norms for movement and talking in small groups.
- Be comfortable with talking and movement within groups.
- Orient students to daily goals for learning using the student outcomes for each session listed in the *Team Meeting Guide*.
- Have individual check-ins with each team at the start of class.
- Determine the length of time for daily tasks ahead of class and share with students.
- End each class with whole group sharing using the guiding questions outlined in the *Team Meeting Guide* as inspiration.



Classroom Implementation

You will need to adjust how each session is completed by your students if your designated class time to complete each session is different than the allotted 60 minutes per session outlined in the guides. The length this program will take to complete will depend on time within the day you have available to do *FIRST*® LEGO® League Explore and how often you will teach this program (daily, weekly, etc.).

Following is a daily lesson planning example for how to adjust the session content to meet a different class time frame. This example is from Session 1 and uses a 30-minute class time.

Day 1 (Session 1)

Time	Activity	Teacher Notes
10 minutes	Introduction Activity	Review activity listed in Session 1 of the <i>Team Meeting Guide</i> .
15 minutes	Complete the first page of Tasks in Session 1.	Each student should fill out the writing and drawing space on the first page of Session 1 in their <i>Engineering Notebook</i> .
5 minutes	Clean Up	Show teams where to keep their <i>Engineering Notebooks</i> .

Day 2 (Session 1)

Time	Activity	Teacher Notes
5 minutes	Check-in with teams.	Review Session outcomes in the <i>Team Meeting Guide</i> .
15 minutes	Complete the second page of Tasks in Session 1.	Give each team the prototyping pieces from the bags labeled "4". Each student should fill out the drawing space on the second page of Session 1 in their <i>Engineering Notebook</i> .
5 minutes	Share Task	Look at Guiding Questions in the <i>Team Meeting Guide</i> .
5 minutes	Clean Up	Look at the Cleanup Pointers in the <i>Team Meeting Guide</i> .

*If your school or district is running as a cohort using reusable materials, collaborate with other teachers who will run the program on daily lesson planning and timing.

Scope and Sequence Options

FIRST® has created various scope and sequences to provide options for implementation in the classroom. Below are high-level summaries of the scope and

sequence options. Detailed documents for each of the different scope and sequence options can be found on the FIRST Education website [here](#).

15 Hours	13 Hours: Sessions 1-12 outlined in guides		2 Hours: Event
30 Hours	2 Hours: Getting Started Activities	12 Hours: Sessions 1-12 outlined in guides	2 Hours: Event
	14 Hours: WeDo 2.0 Guided Projects (Choose 5 different projects.)		
40 Hours	2 Hours: Getting Started Activities	12 Hours: Sessions 1-12 outlined in guides	2 Hours: Event
	12 Hours: WeDo 2.0 Guided Projects (Choose 4 different projects.)		
	12 Hours: STEM Learning and Skill Growth (FIRST @ Home Unit Plan on next page)		
60 Hours	2 Hours: Getting Started Activities	12 Hours: Sessions 1-12 outlined in guides	2 Hours: Event
	30 Hours: WeDo 2.0 Guided and Open Projects (Choose 10 different projects.)		
	14 Hours: STEM Learning and Skill Growth (FIRST @ Home Unit Plan on next page)		
80 Hours	2 Hours: Getting Started Activities	12 Hours: Sessions 1-12 outlined in guides	2 Hours: Event
	48 Hours: WeDo 2.0 Guided and Open Projects (complete all projects)		
	16 Hours: STEM Learning and Skill Growth (FIRST @ Home Unit Plan on next page)		

Scope and Sequence Resources

Additional Resources

FIRST® and LEGO® Education have additional educator content. These resources and other relevant content can be used prior to starting the FIRST LEGO League Explore, during the program, or an extension once the program is complete.

FIRST resources can be found on the [FIRST Educator page](#) or the [FIRST @ Home page](#).

FIRST @ Home Unit Plan

2 Hours: Core Values Activities	2 Hours: Coding Activities	2 Hours: 3-D and CAD Activities
2 Hours: Simple Machines Activities	2 Hours: Engineering Design Activities	2 Hours: Capstone Activities

LEGO Education Resources

This program utilizes the complete solution packages that LEGO Education has available. The robotics sets purchased for use with the FIRST LEGO League Explore also include additional lesson plans and resources available through the LEGO Learning System and the [LEGO Education website](#).

WeDo 2.0 Available Content

5 Getting Started Activities (2 Hours Total) <i>excluding projects completed in program content</i>	
4 Computational Thinking Guided Projects (2 Hours Each)	8 Science Guided Projects (2 Hours Each)
4 Computational Thinking Open Projects (2 Hours Each)	8 Science Open Projects (2 Hours Each)

Teacher Resources

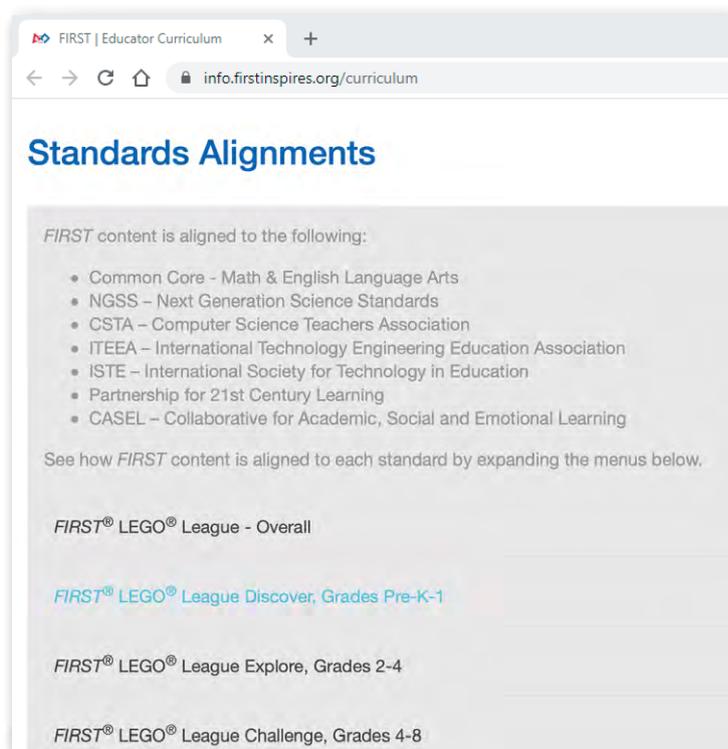
Standards Alignments

FIRST® has completed an external analysis and mapping of all its programs to national educational standards. To increase the usefulness of the standards alignments, they are provided for each program division and standard set. Below is a list of the available standards alignments located [here](#).

- 21st Century Skills
- CASEL SEL
- CC ELA
- CC Math
- CSTA
- ISTE
- ITEEA
- NGSS

Learning Progression

FIRST has created a learning progression of skills used in FIRST LEGO® League Explore and their correlation to various subject areas. The document allows teachers to see how FIRST LEGO League Explore can be used across different grades to develop skills. The Learning Progression document can be accessed [here](#).



Additional Resources

Some of the resources below are from third-party sites not developed or managed by FIRST or LEGO Education, but they're too great not to share!

- [LEGO Education Lesson Plans](#)
- [Coding with Scratch](#)
- [NASA STEM](#)
- [Virtual Fieldtrip](#)
- [Hour of Code](#)
- [PBS Design Squad](#)
- [Core Value Activities](#)
- [Autodesk Tinkercad](#)
- [MIT Full STEAM Ahead](#)



Assessment Resources

Formative Assessments

You can keep track of how your students are progressing against the outcomes for each of the 12 sessions. Place the session outcomes into the formative assessment templates on pages [17-18](#).

Engineering Notebooks

The *Engineering Notebook* serves as a proof of learning and is a great resource for students to document their journey and the process they went through to create their team model and team poster. Encourage them to document core values concepts demonstrated throughout their experience.



Summative Assessments

There are multiple summative assessments within the program. The culminating event or showcase serves as a capstone of the students' achievements and participation in the program. Evidence of learning includes the final event, final presentations and final products: team model and team poster.

Public Celebration

During the festival, student teams will get the chance to showcase all the work they have prepared. You will be able to observe and record a summative assessment of how they have done using the reviewing sheet found on firstlegoleague.org/season#resources.



Making Connections

Developing Your *FIRST*® Community

Consider hosting an open-house event for participating children and their families before the start of the program to share a preview of what they will experience. Also, let families know if there will be a culminating event that will take place at the end of the program and invite them to attend.

A great way to enhance the *FIRST*® LEGO® League Explore program in your classroom is to use your community for support. They could provide background information related to the challenge topic or provide feedback to the teams on team models and posters. They could also serve as volunteer reviewers. You could ask if any parents or guardians would be willing to help during the program or at the final event.

Connect with Others

Get connected with other educators that are implementing this program.

- [LEGO Education Teacher Community](#)
- [FIRST LEGO League](#)

FIRST LEGO League also has a Professional Learning Community where you can connect with other teachers who are implementing Class Packs. In your Thinkscape platform, you have access to an online professional learning community that has a forum for you to ask questions, as well as post updates and best practices as you work through the curriculum.

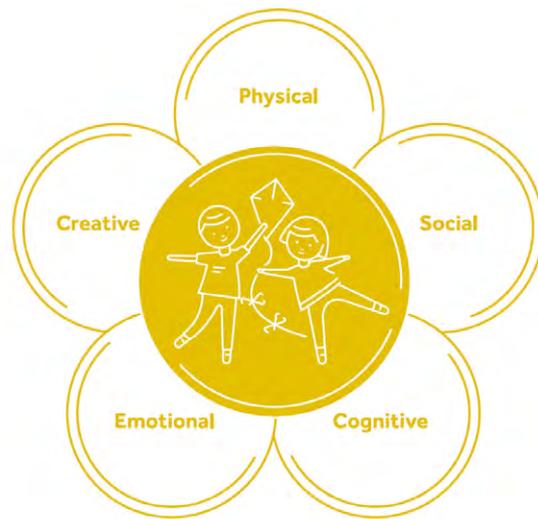


FIRST® LEGO® League Education Philosophy

FIRST® LEGO® League is a program created through a partnership between FIRST and LEGO Education and is infused with the educational philosophies of both organizations. All three divisions of FIRST LEGO League: Discover, Explore, and Challenge, follow these philosophies.

Learning Through Play

This program encourages schools to incorporate play throughout all grades into the learning process. Play has positive impacts on holistic skill development. Through the design of guided materials, this program allows for the increase in STEM confidence of both the students and teachers. Content is designed with the idea that the teacher does not know all the answers. The materials provided don't give the exact answers but provide guidance and tips to the teacher on how to support their students. It is for the students to determine the way forward in solving the problem through play, discovery, and exploration.



Five Skills for Holistic Development



Intellectual Challenge



Authenticity



Public Product



Collaboration



Project Management



Reflection

Project-Based Learning

FIRSTLEGO League is a project-based learning program that creates meaningful, authentic learning opportunities for the students. Students gain knowledge and skills by working towards goals through the investigation of solutions and complex problem solving.

Key project-based learning elements include:

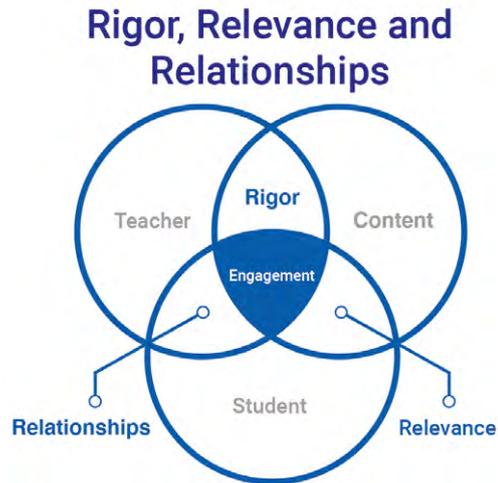
- **Intellectual Challenge:** To start the engineering design process, this program begins with a challenge to solve.
- **Authenticity:** This program features age-appropriate real-world contexts and includes career awareness.
- **Public Product:** Teams present public products as a showcase of work to a public audience.
- **Collaboration:** Teams work together to brainstorm and develop design ideas then make decisions to create public products.
- **Project Management:** Scaffolded through the engineering design process and teams hone these skills throughout their experience.
- **Reflection:** Reflecting on an experience is a key tool that is incorporated after achieving a learning outcome.

FIRST® LEGO® League Education Philosophy

Rigor, Relevance, and Relationships

Through the data of our longitudinal study, it has been proven that experiencing just one year of FIRST® LEGO® League Explore has an impact on STEM outcomes for students. These outcomes are manifested by this program’s rigorous and relevant content that incorporates relationships within a team and the larger community.

- **Rigor:** The teacher is the facilitator of a student-led, engaging experience involving activities related to robotics, coding, engineering, research, and innovative design.
- **Relevance:** Students acquire technology literacy by experiencing authentic activities with ties to careers that build technical and holistic skills through real-world problem solving.
- **Relationships:** This program engages students to foster pathways to careers with the mission of building a better society and activating students to action in their communities.



Core Values

The FIRST Core Values and ethos are the foundation of the program. For the FIRST Core Values to have effect, they must be known and practiced. The Core Values should be woven into all activities, projects, assessments and reflection tools to infuse them into the student learning. The Core Values are used within every step of the engineering design process as teams develop their solutions.

Gracious Professionalism® and *Coopertition*® are part of the ethos of FIRST. *Gracious Professionalism* is a way of doing things that encourages high-quality work, emphasizes the value of others, and respects individuals and the community. *Coopertition* is displaying unqualified kindness and respect in the face of fierce competition.

To read more about the LEGO Education Philosophy, click [here](#).

FUN

We enjoy and celebrate what we do!

IMPACT

We apply what we learn to improve our world.

INCLUSION

We respect each other and embrace our differences.

INNOVATION

We use creativity and persistence to solve problems.

TEAMWORK

We are stronger when we work together.

DISCOVER

We explore new skills and ideas.

Formative Assessment

SESSION 1

The team explored/showed these Core Values: *Discovery* *Innovation* *Impact* *Inclusion* *Teamwork* *Fun*

Feedback

SESSION 2

The team explored/showed these Core Values: *Discovery* *Innovation* *Impact* *Inclusion* *Teamwork* *Fun*

Feedback

SESSION 3

The team explored/showed these Core Values: *Discovery* *Innovation* *Impact* *Inclusion* *Teamwork* *Fun*

Feedback

SESSION 4

The team explored/showed these Core Values: *Discovery* *Innovation* *Impact* *Inclusion* *Teamwork* *Fun*

Feedback

SESSION 5

The team explored/showed these Core Values: *Discovery* *Innovation* *Impact* *Inclusion* *Teamwork* *Fun*

Feedback

SESSION 6

The team explored/showed these Core Values: *Discovery* *Innovation* *Impact* *Inclusion* *Teamwork* *Fun*

Feedback

Formative Assessment

SESSION 7

The team explored/showed these Core Values: *Discovery* *Innovation* *Impact* *Inclusion* *Teamwork* *Fun*

Feedback

SESSION 8

The team explored/showed these Core Values: *Discovery* *Innovation* *Impact* *Inclusion* *Teamwork* *Fun*

Feedback

SESSION 9

The team explored/showed these Core Values: *Discovery* *Innovation* *Impact* *Inclusion* *Teamwork* *Fun*

Feedback

SESSION 10

The team explored/showed these Core Values: *Discovery* *Innovation* *Impact* *Inclusion* *Teamwork* *Fun*

Feedback

SESSION 11

The team explored/showed these Core Values: *Discovery* *Innovation* *Impact* *Inclusion* *Teamwork* *Fun*

Feedback

SESSION 12

The team explored/showed these Core Values: *Discovery* *Innovation* *Impact* *Inclusion* *Teamwork* *Fun*

Feedback

Professional Development Resources

Training Opportunities

As part of our commitment to creating a diverse, inclusive, and equitable community for all our participants, *FIRST*® has trainings on how you can inspire the youth voice, create a sense of belonging, and more. You can access these trainings [here](#).



LEGO® Education offers product-specific training available that you can access [here](#). Your local *FIRST* Program Delivery Partner may offer *FIRST* training in your area. Find your local *FIRST* Partner [here](#).

Within this box, you can add information relevant to your country.



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