INVENT THE FUTURE CHALLENGE HANDBOOK 2018-2019

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SECTION 1: HOW DO I START?

I. OVERVIEW

A. INTRODUCTION TO KID MUSEUM & MCPS PARTNERSHIP

KID Museum and MCPS are pleased to offer the second annual Invent the Future Challenge, inviting middle school students to develop, design, and prototype an innovative solution to a community problem. This districtwide STEM initiative broadens student access to hands-on, project-based learning experiences that promote creative problem-solving, adaptability, and technical skills critical to success in a fast-changing, 21st century economy. The partnership between KID Museum & MCPS focuses on providing outside-the-classroom, hands-on, experiential models of learning that engage all students in STEM, developing skills that align to the demands of college, careers, and the global workforce.

B. ABOUT KID MUSEUM

KID Museum aspires to create a world-class, "next generation" museum—a dynamic hub for informal learning that inspires and empowers all kids to invent the future with creativity and compassion.

1. Deliver high-quality youth programs designed to build skills and interest in STEM, arts and culture through maker-based learning
2. Serve as a catalyst for change in the education system
3. Provide a unique community gathering place to promote intergenerational learning

In October 2014, KID Museum opened its doors at the current 7,500 square foot space, establishing a living prototype for the museum. KID Museum transformed the space into a "makerspace" for kids and families, featuring a fab lab (3D printing), a woodshop, an electronics studio, and a textiles studio. Today, the museum serves more than 55,000 people annually through school and group visits, weekend workshops, open explore activities, after-school programs, off-site programs, camps, and special events.

C. INTRO TO THE INVENT THE FUTURE CHALLENGE

Beginning in 2017–2018, MCPS partnered with KID Museum to pilot the Invent the Future Challenge. Approximately 500 students from 30 middle schools participated in the first year. Building on the success of last year, the Invent the Future Challenge is launching for the 2018–2019 school year, with the goal of student participation from every MCPS middle school.

D. WHAT DO STUDENTS DO THROUGH THE CHALLENGE?

Students are invited to work through an iterative invention cycle: developing an idea, designing plans, making a physical prototype, and adapting when challenges arise. Students work collaboratively and use technical skills, creative problem-solving, and STEM concepts to develop solutions to a challenge question. In teams of 3-6, students build a physical prototype that illustrates their solution to the challenge question. Any type of prototype is encouraged, from the low-tech to the high-tech, with a $60 maximum materials budget. Teams present their prototypes and showcase their solutions at The Challenge Summit on Saturday, May 11, 2019, where multiple teams are recognized for excellence in a variety of categories.

E. CHALLENGE QUESTION

What will you make to protect life on this planet?

Think of an environmental problem, big or small, that needs to be addressed. Now, think of a solution to that problem; an invention that would address that problem. Use your imagination to push beyond today's limits to invent the future.

If you accept this challenge, your team must not only dream up an invention, but also design and prototype that invention. Use engineering, coding, and design techniques to turn your ideas into something tangible. High-tech or low-tech, mechanical or digital…*What will you make to protect life on this planet?*

The future is up to you.

F. CONNECTION TO NGSS

These criteria align with a variety of Next Generation Science Standards, including but not limited to:

Engineering Design:

MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria & constraints of the problem.

MS-ETS1-3. Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

MS-ETS1-4. Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

Earth and Human Activity:

MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

MS-ESS3-4. Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural.

Depending on the specific problem teams choose to solve, Challenge work may also cover additional standards in the following categories:

- MS-PS3. Energy
- MS-LS2. Ecosystems
- MS-ESS2. Earth's Systems
- MS-ESS3. Earth and Human Activity

II. COORDINATION

A. WHO SHOULD BE COORDINATING THIS AT MY SCHOOL?

Someone who is committed to working with students throughout the year on design thinking and innovation. It could be:

- STEM Coordinator
- Science, Technology, Math teacher
- Media Specialist
- Counselor
- Anyone else in the building with a passion for engaging kids in design thinking and innovation

It is helpful to have more than one person committed to supporting the group throughout the Challenge.

B. WHAT IS MY ROLE AS THE TEAM COORDINATOR?

At a minimum, Team Coordinator(s) is/are committing to:

- Recruiting and retaining a cohort of 30 students
- Organizing an orientation session for parents at the beginning of the year and keeping them abreast of developments throughout the year
- Hosting a regular club/class
- Organizing transportation to KID Museum for 5 visits and to Challenge Summit on May 11, 2019
- Accompanying entire cohort to KID Museum for 5 visits and actively participating in workshops alongside students
- Organizing turnout for Challenge Summit
- Accompanying entire cohort to Challenge Summit

III. CHALLENGE PROCESS: HOW DO I GET STARTED?

A. WHEN DO I START?

You can start working as soon as you would like! The intention is that the Challenge can be a year-long experience where students can engage in a robust iterative design process. Below are some important dates:

Month	Date	Event
September	Thursday, 9/13 4pm-6pm	Invent the Future Challenge 101: Teacher Info Session @ KID Museum
	Friday, 9/14	Team registration opens
	ongoing	Teachers recruiting students
	ongoing	Parent info sessions at schools
	Sunday, 9/23	KIDfest, Community outreach event hosted by KID Museum in downtown Silver Spring
October	Monday, 10/1 4pm–6pm	Invent the Future Challenge 101: Teacher Info Session Make-up Date @ KID Museum
	Wednesday, 10/31	Deadline to schedule Invention Studio visits
November	Thursday, 11/8 4:30pm–6pm	Learning Collaborative 1 @ KID Museum
January	Wednesday, 1/9 4:30pm–6pm	Learning Collaborative 2 @ KID Museum
	Thursday, 1/31	Team registration deadline
March	Monday, 3/18 4:30pm–6pm	Learning Collaborative 3 @ KID Museum
April	Thursday, 4/11	Summit RSVP Deadline
	mid-April	Invention Studio visits end
May	Saturday, 5/11	Challenge Summit @ Gaithersburg High School

B. IDENTIFY STUDENTS TO PARTICIPATE

Each school is encouraged to recruit students in a way that makes sense for its particular context. One of the main goals of the partnership between MCPS and KID Museum is to engage students in STEM who have traditionally been underrepresented in those fields - Girls and Black and Latino students. Students may be identified in a variety of ways:

- Student data
- Teacher recommendations
- Application process
- Specific class or club

EXAMPLE 1: Student Data

Teachers can use student data to identify traditionally underrepresented groups in STEM. Once a list has been generated, consult with other teachers, counselors, and administrators for recommendations or concerns based on the list. Meet with the students as a group to explain the program, and send home an invitation to a parent info session. When committing to the program, parents and students should sign a participation contract.

EXAMPLE 2: Application Process

Some schools ask students to apply to participate in the Invent the Future Challenge. On the application, students explain their interest in the program and then teachers make selections.

EXAMPLE 3: Specific Class or Club

Some teachers have had great success working with an existing class or club. The Invent the Future Challenge can align to science classes and STEM electives which allows teachers to incorporate this program into their regular class time. Additionally, Invent the Future Challenge afterschool clubs can be formed or the work can be incorporated into an existing club.

C. STUDENT RECRUITMENT

Once you have identified a core group of students, you must then gauge their interest in participating in the Challenge. We recommend inviting students to an information session during lunch or after school, during which you would explain the program and give them an invitation to an evening information session for both parents and students. Follow up phone calls should be made to parents inviting them to the event and confirming their participation. For the schools with large Latino populations, ideally back to back sessions will be offered in Spanish and English.

D. COMMUNICATIONS TO OTHER SCHOOL PERSONNEL

Once students and families have committed to participating in the Challenge, teachers and counselors of all students involved must be informed of the Challenge and what it entails. Teachers must be informed ahead of time regarding when visits to KID will occur, especially if it involves missing class time.

E. FUNDING

All MCPS middle schools have access to funding through the Achievement Focused Extracurricular Programs budget, which can be used to cover:

- Transportation to KID Museum for Invention Studio workshops
- Stipends for teachers

Invention Studio (described below) is open to all middle schools at a program fee. Selected schools (based on FARMS rate) received additional support to participate in the Invention Studio program. Please contact Laurel Harrington **laurel@kid-museum.org** for more information.

Please contact your principal and financial specialist as soon as possible to discuss your school's plan for funding the Invent the Future Challenge. Please note: Invention Studio visits must be scheduled by October 31, 2018. If your principal or financial specialist has specific questions regarding MCPS funding sources, please contact Scott Murphy at **Scott_W_Murphy@mcpsmd.org**.

SECTION 2: WHAT WILL WE BE DOING?

To supplement Challenge work, schools and students have the option to participate in Invention Studio.

I. INVENTION STUDIO OVERVIEW

Prepare for the Challenge with a series of skill-building workshops at KID Museum. Build on what you know and learn new skills to invent your own solution to the Challenge Question. The first four Invention Studio visits focus on developing skills in design, engineering, electronics, and coding. In the final visit, KID Museum educators will guide students through focused brainstorming and designing, culminating in students building quick prototypes with tools and materials at KID Museum.

Visit 1: Intro to Design & Engineering
Visit 2: Electricity & Circuits
Visit 3: Sensors & Coding
Visit 4: Fabrication
Visit 5: Rapid Prototyping

II. TEACHER SUPPORT FOR ALL SCHOOLS

Throughout the year, KID Museum staff is available to support teachers with any questions or concerns they have regarding the Invent the Future Challenge. Additionally, Bruna Genovese will keep in touch with team coordinators and visit schools periodically throughout the year.

A. LEARNING COLLABORATIVES

KID Museum will host a series of three Learning Collaboratives throughout the year, with the goal of providing teachers who are participating in the Challenge an opportunity to gather, share their experiences, ask questions, and learn from one another. Learning Collaboratives will be informal, discussion-based opportunities to connect with other individuals who are participating in the Challenge.

DATES:
- Thursday, 11/8/18
- Wednesday, 1/9/19
- Monday, 3/18/19

TIME:
4:30pm–6:00pm

LOCATION:
KID Museum

B. MATERIALS COST REIMBURSEMENT

KID Museum and MCPS are developing a list of materials that teachers may order directly through their school's financial specialist using a specific program code. Teachers can purchase up to $30 of materials per participating team.

III. MARKERS OF SUCCESS

Throughout the year, teams should focus their work based on the Markers of Success: **IDEA, PROCESS, SHARE**

IDEA: An Idea Award celebrates a thoughtful problem choice and originality in developing an impactful solution to that problem. The project explores new ideas and approaches to protecting life on this planet, applies these ideas in innovative ways, and demonstrates the impact of the solution.

PROCESS: A Process Award celebrates engaging in a robust, iterative, and collaborative design process. The project shows evidence of the team going through multiple stages of a design cycle, complete with incorporating feedback, learning new skills, and working together with teammates.

SHARE: A Share Award celebrates compelling and thoughtful communication of ideas, both in sharing with audiences and the built prototype. The team's presentation of ideas is clear and compelling, and the prototype illustrates their solution to the Challenge Question.

IV. CHALLENGE SUMMIT

Invent the Future Challenge Summit
Saturday, May 11th, 2019
Gaithersburg High School

The Challenge Summit is a celebration of the inspiring work students have done throughout the year. Each team will have table space to set up their prototypes and any accompanying materials such as design notebooks. During the event, teams will present their work to peers, family, friends, and the broader community. Panels of experts will circulate to each team to informally interview them and assess their work based on the Markers of Success (please see attachment).

Teams will need to RSVP to the Summit through their team coordinator by April 11th, 2019. Only teams who have officially RSVP'ed to the event will be guaranteed space to set up projects, an opportunity to present to the panels of experts, and be eligible for awards.

All are invited to attend the Summit! Fellow students, teachers, administrators, families, and friends are all encouraged to attend. As a team coordinator, it is best to arrange permission slips, transportation, and all other necessary logistics for the Summit event as soon as possible. Keep in mind that teams will also need to transport their projects and other materials to the Summit location!

Students who have participated on a team throughout the year and present their project at the Challenge Summit may earn SSL hours.

Team coordinators are responsible for completing and distributing SSL forms to their team members. Each student who worked on an Invent the Future Challenge project can earn a maximum of 15 hours as follows:

- For showcasing their project at the Challenge Summit on May 11, each student can earn a maximum of 5 hours. Students who attend the Summit as an observer or a guest are not eligible for SSL hours.
- For their research, skill building and design time, each student can earn a maximum of 10 hours. This can include visits to KID Museum as well as time spent at school under team coordinator supervision.

Please feel free to make additional copies of the SSL form to complete for your team members.

SECTION 3: LOGISTICS & FORMS

I. SCHEDULING YOUR VISITS

Invention Studio visits are two hours and can occur Monday–Thursday from 10 am–12 pm or between 1 pm and 4 pm. All visits must be scheduled through Laurel Harrington, Director of School and Group Visits at KID Museum: **laurel@kid-museum.org**, 301-897-5437.

Visits must be scheduled by October 31, 2018 and completed by mid-April in order to allow teams sufficient time to prepare for the Summit after their final visit to KID Museum.

Note: Transportation, permission slips, and substitute teachers need to be arranged through your school.

II. FORMS

In order to be approved for a field trip at your school, you must first fill out the related MCPS field trip forms: Request to Plan a Field Trip, Field Trip Calculator, Permission Slip, MCPS Transportation 555-6 or Charter Transportation 560-31, Request to Purchase 280-54, OSP Activity Setup Form.

The following are other forms to help you get started.

A. Invitation to Info Session for Parents and Students (English)
B. Student/Parent Participation Contract (English)
C. Parental Approval for Field Trip (English)
D. Invitation to Info Session for Parents and Students (Spanish)
E. Student/Parent Participation Contract (Spanish)
F. Parental Approval for Field Trip (Spanish)

A. INVITATION TO INFORMATION SESSION FOR PARENTS AND STUDENTS (ENGLISH)

Dear Student,

Congratulations! You have been selected to participate in the second annual Invent the Future Challenge, which is a partnership between KID Museum and MCPS. Approximately 500 students from 30 middle schools participated last year. Building on the success of last year, Invent the Future Challenge is launching for the 2018-2019 school year, with the goal of student participation from all 40 MCPS middle schools.

What will I get to do through the Challenge?

- Participate in 5 skill building sessions at KID Museum, an interactive makerspace in Bethesda. Students will explore design, engineering, coding, and electronics.
- Through regularly scheduled meetings back at school, work through an iterative invention cycle: developing an idea, designing plans, making a physical prototype, and adapting when challenges arise.
- Work collaboratively and use technical skills, creative problem-solving, and STEM concepts to develop solutions to this year's challenge question (see below).
- In teams of 3-6, build a physical prototype that illustrates your solution to the challenge question. Any type of prototype is encouraged, low-tech, high-tech, or anywhere in between.
- Present your team's prototypes and showcase your solutions at The Challenge Summit on Saturday, May 11, 2019, where multiple teams will be recognized for excellence in a variety of categories.

Challenge Question

What will you make to protect life on this planet?

Think of an environmental problem, big or small, that needs to be addressed. Now, think of a solution to that problem; an invention that would address that problem. Use your imagination to push beyond today's limits to invent the future.

If you accept this challenge, your team must not only dream up an invention, but also design and prototype that invention Use engineering, coding, and design techniquest to turn your ideas into something tangible. High-tech or low-tech, mechanical or digital....*What will you make to protect life on this planet?*

The future is up to you.

In order to participate, you and your parent(s)/guardian(s) must attend an information session on _____ at _____.

✂ ----------

Dear Parent/Guardian,

We are excited to share more information with you regarding the aforementioned program. In order for your child to participate, you must attend the information session on _____. If you are unable to make it on that evening, or have questions, please contact _____.

B. STUDENT/PARENT PARTICIPATION CONTRACT (ENGLISH)

Invent the Future Challenge 2018-2019

I, _____ (student name) understand that participating in Invent the Future Challenge is both a privilege and a commitment.

I pledge to do the following (Please write your initials in each blank):

_____ Attend regularly scheduled meetings/classes at school to work through an iterative invention cycle.
_____ Participate in 5 skill building sessions at KID Museum.
_____ Turn in permission slips in a timely manner.
_____ Work collaboratively with a team to develop solutions to this year's challenge question.
_____ Present a prototype with my team at the Challenge Summit on Saturday, May 11, 2019.

I, _____(parent/guardian name) will do everything I can to ensure that my child follows through on the aforementioned commitments.

_____ _____
Student signature Date

_____ _____
Parent signature Date

C. PARENTAL APPROVAL FOR FIELD TRIP (ENGLISH)

_____MIDDLE SCHOOL

Parental Approval for Field Trip

Permission Slip Due Date: _____

Destination: KID Museum, 6400 Democracy Blvd., Bethesda, MD 20817	**Date:**
Sponsor:	**Grade:**
Field Trip Purpose/Educational Objectives: Students who are participating in this year's Invent the Future Challenge will develop skills in design, engineering, electronics, and coding.	
Transportation from school provided by: MCPS buses	**Cost:**
Time of Departure:	**Approx. Time of Return:**
Administrative Approval:	**Title:** Principal

PARENTAL PERMISSION

Student Name: _____ Grade: _____ Student ID #: _____
Please print student's first and last name

_____ I give my child permission to attend the aforementioned field trip.

Parent Signature: _____ Date: _____
*** Written permission is required for all field trips. No verbal permission will be accepted.*

EMERGENCY CONTACT INFORMATION | *please provide information below.*

_____ My child receives medication during the day (check if applicable). *The school nurse will be contacted to acquire the necessary details.*

Emergency Contact #1 _____ Phone # _____
Emergency Contact #2 _____ Phone # _____

Please Note: Students who have academic obligations or who receive an office referral once they have signed up for a field trip may be revoked the right to attend the field trip. ***Refunds are not available.***

D. INVITATION TO INFORMATION SESSION FOR PARENTS AND STUDENTS (SPANISH)

Querido estudiante,

¡Felicidades! Has sido seleccionado/a para participar en el segundo concurso anual del Desafío para Inventar el Futuro, que es una colaboración entre KID Museum y las escuelas de MCPS. Aproximadamente 500 estudiantes de 30 escuelas intermedias participaron el año pasado. Tras el éxito del año pasado, el Desafío para Inventar el Futuro se lanzará para el año escolar 2018-2019, con el objetivo de contar con la participación estudiantil de las 40 escuelas intermedias de MCPS.

¿Qué voy a hacer durante el Desafío?

- Participarás en 5 sesiones de desarrollo de habilidades en KID Museum, un espacio de creación interactivo en Bethesda. Los estudiantes explorarán las áreas de diseño, ingeniería, codificación y electrónica.
- A través de reuniones regulares programadas en la escuela, trabajarás en un ciclo de invención reiterativo que consistirá en: desarrollar una idea, diseñar planes, hacer un prototipo físico y adaptarse cuando surjan desafíos.
- Trabajarás en colaboración y usarás las habilidades técnicas, la resolución creativa de problemas y los conceptos de Ciencia Tecnología Ingeniería y Matemática (o STEM por sus siglas en inglés) para desarrollar soluciones a la pregunta del Desafío de este año (consulte a continuación).
- En equipos de 3 a 6, construirás un prototipo físico que ilustre tu solución a la pregunta del Desafío. Se recomienda cualquier tipo de prototipo, de baja tecnología, alta tecnología o cualquier punto intermedio.
- Presentarás los prototipos de tu equipo y mostrarás tus soluciones en La Cumbre del Desafío el sábado 11 de mayo de 2019, donde se reconocerán a varios equipos por su excelencia en una variedad de categorías.

El Desafío

¿Qué vas a hacer para proteger la vida en este planeta?

Piensa en un problema ambiental, grande o pequeño, que debe abordarse. Ahora, piensa en una solución a ese problema; una invención que abordaría ese problema. Usa tu imaginación para ir más allá de los límites de hoy e inventar el futuro.

Si aceptas este desafío, tu equipo no solo debe idear una invención, sino también diseñar y crear un prototipo de esa invención. Usa la ingeniería, la codificación y la técnica de diseño para convertir tus ideas en algo tangible. Alta tecnología o baja tecnología, mecánica o digital ... *¿Qué harás para proteger la vida en este planeta?*

El futuro depende de ti.

Para poder participar, tú y tu(s) padre(s) / tutor(es) deben asistir a una sesión informativa el _____ a las_____.

✂ ----------

Estimado Padre/Tutor,

Nos complace compartir más información con usted con respecto al programa mencionado anteriormente. Para que su hijo participe, debe asistir a la sesión de información el _____. Si no puede asistir esa noche o tiene preguntas, contáctese con _____.

E. STUDENT/PARENT PARTICIPATION CONTRACT (SPANISH)

Desafío para Inventar el Futuro 2018-2019

Yo, _____(nombre del estudiante) entiendo que participar en el Desafío para Inventar el Futuro es un privilegio y un compromiso.

Me comprometo a hacer lo siguiente (Por favor, escriba sus iniciales en cada espacio en blanco):

_____ Asistir a reuniones/clases programadas regularmente en la escuela para trabajar a través de un ciclo reiterativo de invenciones.
_____ Participar en 5 sesiones de desarrollo de habilidades en el Kid Museum.
_____ Entregar las hojas de permiso de manera oportuna.
_____ Trabajar en colaboración con un equipo para desarrollar soluciones a la pregunta del Desafío de este año.
_____ Presentar un prototipo con mi equipo en la Cumbre del Desafío el sábado 11 de mayo de 2019.

Yo, _____ (nombre del padre/tutor) haré todo lo que pueda para asegurar que mi hijo/a cumpla con los compromisos antes mencionados.

_____ _____
Firma del estudiante Fecha

_____ _____
Firma del padre/tutor Fecha

F. PARENTAL APPROVAL FOR FIELD TRIP (SPANISH)

_____MIDDLE SCHOOL
Aprobación de los padres para una excursión

Permission Slip Due Date / Fecha de vencimiento para entregar el Formulario de Permiso:

_____

Destino: KID Museum, 6400 Democracy Blvd., Bethesda, MD 20817	**Fecha:**
Patrocinador(a):	**Grado:**
Propósito de la excursión/Objetivos educativos: Estudiantes que están participando en el Desafío para Inventar el Futuro desarrollarán habilidades en las áreas de diseño, ingeniería, electrónica y codificación.	
Transporte provisto por: Autobuses de las escuelas MCPS	**Costo:**
Hora de salida:	**Hora de regreso:**
Aprobación administrativa:	**Título:** Principal/Director(a)

PERMISO DE LOS PADRES

Nombre del estudiante: _____ Grado: _____ Número de Identificación estudiantil: _____
Favor de escribir claramente nombre y apellido

_____ Le doy permiso a mi hijo/a de asistir a la excursión arriba mencionada.

Firma del padre: _____ Fecha: _____
*** Permiso por escrito se requiere para todas las excursiones. No se aceptarán permisos verbales.*

INFORMACIÓN DE CONTACTO DE EMERGENCIA | *favor de proveer abajo.*

_____ Mi hijo recibe medicamentos durante el día (marque si corresponde). *Se contactará con la enfermera de la escuela para obtener los detalles necesarios.*

Contacto de emergencia #1 _____ Teléfono _____
Contacto de emergencia #2 _____ Teléfono _____

Tenga en cuenta: A los estudiantes que tienen obligaciones académicas o que reciben una solicitud de envío a la oficina administrativa una vez que se hayan inscrito para una excursión se les puede revocar el derecho de asistir a la excursión. ***No se admiten reembolsos.***