Boats4Schools

COMPETITION REGULATIONS

Erasmus+

Funded by the Erasmus+ Programme of the European Union

Contents

WELCOME

The “Boats4Schools: An Educational Challenge” is an European project funded by the Erasmus + Programme. It intends to develop a ludic and educational methodology that can get young students attention to the importance of STEM-A (Science Technology Engineering and Math through Art) and persuade them to take up a STEM based career.

The methodology developed in the project is oriented and designed as a youth challenge for students in the age range 12-17 years old. The students, organized in teams, have to build a small boat (miniature) following a defined set of rules. During the Boats4schools’s challenge students will get in contact with several technologies like 3D design, Additive Manufacturing, Cloud Manufacturing, Computer Aided Engineering (CAE) tools, Computer Aided Design (CAD) tools, High performance computing (HPC), Math, Physics, Innovative thinking, creativity and so many other skills.

The goal is to combine the construction and preparation of the boat the challenge with the learning of contents related to STEM-A. During the process, students will have the help of a tutor/teacher who will guide the students in the process of development of the best boat to compete in the Boats4school challenges (Regional School Challenges, National and International Challenges). Besides the STEM-A related contents, each team of students will have the opportunity to develop other competences and soft skills. For instance, they will do the marketing of their own boats and get sponsors, they will develop leadership and communication competences because they need to present their boats to a jury, and so on.

The challenged is thought to be an extracurricular activity based on a modern educational approach - learn by doing - with the power to stimulate students’ attention and giving them the opportunity to promote self-learning competences, active participation and independent (self) development in academic fields which are not often easy to engage the students.

The purpose of this document is to define the rules for the competition to be used during the Boats4schools finals.

Competition classes

Level A – Ages until 15 (mainly for wind boats: but not exclusive)

Level B – Ages between 16 and 19 (mainly for solar boats: but not exclusive)

TEAMS

Minimum 4, maximum 6 and one teacher as a facilitator in all project process.
(Adapt the relationship between teams and schools according to local organizations.)

STEAM OBJECTIVES

The Boats4schools is an Science, Technology, Engineering, Arts & Math's (STEAM) projects which challenges teams to build a remote control boat according to a technical specifications and rules. During the project, teams must achieve several tasks to show some deliverables like a real company, get ready a product (boat) within a specific requested features and others things to maximize the impact of the product in the market (business skills).

PROJECT ENVIRONMENT

The goal of this challenge is to create curriculum design and provide engineering, applied sciences (physics, mathematics, etc), CAD / CAM /CAE, electronics, financial management, arts and ICT. The project aims to develop participants' skills in the practical application of scientific principles through the design and manufacture of a small boat powered by wind (sail) and solar Power (electric motor). Throughout the challenge, team members gain knowledge and a hands-on experience in the following areas:

Learning aims

Students will be able to:

1. Ask questions and define problems
2. Developing and implementing prototypes
3. Plan and carry out investigations
4. Analyze and interpret data
5. Use mathematics to make calculations
6. Construct explanations and design solutions
7. Argument Theory from evidence
8. Be able to obtain and communicating information

Research

- ICT and Engineering
- New materials and new uses in different applications
- Different technologies and approaches
- Manufacturing techniques
- Quality of manufacturing
- Product Life cycle
- Digitalization

TIME MANAGEMENT

The ability to manage your time effectively is important. Good time management leads to better efficiency and a more successful competition. Before planning begins, every team member should know exactly which is his/her role in the strategy development. Check the competition rules and deadlines to meet the requirements with the correct timing. Set goals that are achievable and measurable and define intermediate checkpoints to evaluate your path towards the goal at any time. Keep the planning simple, but state clearly deadlines, prioritize key activities and set meeting schedule. Team members must meet frequently to discuss progress toward the goal and remove unnecessary processes, sharing the agenda of the day in advance to avoid time waste and poorly run meetings. And don't forget to have fun, in between, by celebrating each task you reached!

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WHAT TO DO?

Build a team – Every team member should be match to a job role during the project. They will then begin sole responsibility for that element of the challenge. Each team member should choose a role that best suits their skills and will gain the most enjoyment from doing all tasks. Ideally, one job role should be allocated to each team member, however you may have to double up on your roles and responsibilities depending on the number of team members you have in your team. One team member must also the role of team leader and will be responsible for and ensure each team member works in time, and controls the tasks and resources. Any person is more important than another, complementary is the key of success!

SUPPORTS

Schools – Your school will be the main supporting entity for your participation in this challenge. Try include the more players to your team (colleagues, teachers and school direction). You will need their help with knowledge from several subjects (Math, Physics, English, etc) and some help in your travel to the finals.

Registration – (adapt according the specific final; How the team must register the team in the challenge like email, web form or other way).

Boat parts – To build your boat, depending what kind (wind or solar), you will need several parts. Please read carefully the technical rules document, and ask for some help to your teacher.

External support – Sometimes teams don´t have all knowledge to achieve all goals in this kind of project (physics, engineering, marketing, ICT, etc), so you will need to find theses expertise's outside of your schools. Professional companies and Universities are good sources of help and knowledge, try establish some partnership. Remember you will be theirs 'future client or collaborator.

Finding sponsors – Before you start for seeking sponsors around your school or town, you need to establish a list about what exactly you want from them. By writing this list (most detailed possible), you can answer a potential sponsor's questions. Offer a business deal for publicity by sponsoring your team during the event. Some companies are not very open offer money, so ask for non-monetary donations like donating parts to your project or services like printing or access to consumables.

CURRICULA MATERIALS

Teachers and students, could get several sources to get ideas, to develop and to improve their projects. In the Boats4schools consortium website, you can find some documents that could be useful to help your team during the project development.

BOATS4SCHOOLS FINALS

During the final, only the registered teams members can represent the team at registration, pit display assembly, verbal presentation, business judging, engineering judging, technical review, track races, and any direct communication with the Judges or Event Directors.

Each team receive a time table, during the check-in process, for the judging moment, please manage your time during the competition day, try be present in the judge place some minutes before the time schedule.

TECHNICAL ASPECTS

The final product will be a boat. All technical aspects will be evaluated, such the use of ICT tools, CAD/CAM use, manufacturing choices and technologies, linking the ideas and developments to Science, the implementation of electronics and programming (coding). If you got some external help, you must explain to the judges how things work. Please read carefully the technical rules.

VERBAL PRESENTATION

Each team must prepare a verbal presentation in English, to present in front a judge panel, explaining in an attractive way all project, with a maximum of 5 minutes (10 minutes if final organizer decide to increase the time). The judge panel can use 2 minutes for some questions after presentation.

The team should bring their own laptop or mobile device for supporting the presentation. Before the finals, the organization could offer several additional devices, such projectors, big screens or others.

PROJECT REPORT

All teams must produce a project report that describe in a concise, and clear way, their experience, the design and all decisions during the boat construction and team building

- The report must be in A4 size, in English (You can an additional second version in your natural language).
- The report document must have a minimum of 10 pages and could not exceed 20 pages.
- Must include a plan of tasks (Gantt chart) and listed budget.
- Must include technical drawings from the boat

PIT DISPLAY

One wall panel to fix and expose a poster based one a provided template by organization. Please, make some research how produce an academic poster.

Here we can show some sources:

Movie: https://www.youtube.com/watch?v=AwMFhyH7_5g

Templates: https://www.postersession.com/poster-templates.php

Example:

https://www.lightsource.ca/ckfinder/userfiles/files/LiSSE%20Poster%2020180607.pdf

The teams will have access to one table (dimensions provided by event organizer) to put the boat, and other items that teams want expose and show to the judges and public. Teams are free to bring other kind of stuff to improve the pit display, but finishing the setup the all set do not be extend the available area.

SPECIFICATIONS

The teams are facing by a panel of judges on the process of the boat design and manufacturing. The criteria for choosing their option for the design will be take in account. At the same time, the judges scrutinize each boat, analyzing elements such as dimensions (length, width and height), electronics components, other additional parts, etc. Boats with faults in any dimensions / characteristics are penalized, but are not excluded from the challenge. Please read carefully the rules documentation document.

WATER TRACK ACCESS

The boats must achieve with success the navigation of the water track build for this specific event.

Time limit (wind power)

Each team will navigate twice in each water lane, for each direction. For each race the team have 2 minutes maximum to get the finish line.

Time limit (electric/solar power)

Each team will navigate (remote control) in several courses defined for each final. For each race the team will have a maximum time to get the finish line according the difficulty for each course.

Phases

The races could be completed in two tracks and the total points will be the sum of points from all races. All penalties must be considered. At least 3 members must participate in the water races for operating the boat navigation.

Malfunctions

If the boat was stocked in the water track, or sink, it could be repaired and repositioned during the time available for the race.
Establish penalties for each malfunction and maximum of malfunction per race.

TEAM ACCOUNTING

All team must reflect their incomes and expenses inside the project report. They should to show in a simple way all sponsorships, acquired parts and team budget.

Budget: Some parts could by provided by organizers. Teams should not apply more than 200€ for their own budget. Teams could apply extra budget if related items (parts, marketing, etc) are sponsored by schools external entities. All budget items must be showed in the project report.

Sponsors: The teams could try get sponsorship from companies or other institutions to get materials, get technical support or other kind of knowledge to improve of the project quality.

Bill of materials

Each team must complete, and show in the project report, the list if material used and their cost.

SUSTAINABILITY AND ENVIRONMENT

The judges will evaluate the environment impact and sustainability of the boats and team projects. The teams will be judged in the following points to determine if the team build the most sustainable boat.

- Recycled material used in the boat and during the all project

- Carbon footprint

- Reused material (second hand components)

- Elements from all project that could be reused in the future

USING OF DIGITAL SOCIAL MEDIA

The teams could create their own social media profiles. That can be a powerful way for announce and promote the project team and keep informed the fans and sponsors.

JUDGING CRITERIA

A. Technical rules points/specifications
   Each team starts with 60 points. The boats will be analyzed according to the technical rules document. Each team starts with For each rules missed it will penalized some points (see technical rules). **If any team breaks any mandatory rule, they cannot claim the first place, the technical evaluation prize or race.**
B. Verbal presentation
   In this point it will be evaluated the presentation covering some aspects of the project process and how the team organised themselves. It will be an evaluation about how team members communicate with enthusiasm, the use of visual aids, time management, etc. Maximum score 90 points.
C. Technical evaluation
   This part will be evaluated the use of several software such as CAD, CAE and CAM. The understanding of manufacturing process, materials and finishing product. Maximum score 320 points.
D. Water track assessment
   Each team starts with 60 points, and each penalty should be deducted. It will be announced the maximum time limit for the race. All time spent in race will be recorded for eventual tiebreaker.
E. Art evaluation
   The evaluation will be made among participants, the teams will be informed about how each team could evaluate others teams, except the verbal presentation that will be done by the verbal judges. The main focus will be about boat finishing, team identity, the logo and poster. Maximum score 10 points
F. Business evaluation
   These judges will make the assessment based on the developed work on team´s ideas management through to design development, Evaluation process, project report, pit display, poster, digital marketing, etc. Maximum score 140 points.