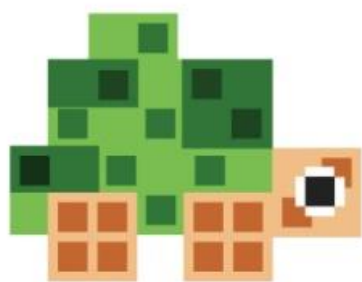


Teacher's guide for



RIDEX

Extended Robotics Solutions For the Inclusive
Development of Atypical and Typical Children

learning materials

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2020.

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2024.

RIDE – Robotics for the Inclusive Development of Atypical and
Typical Students (2019-1-HU01-KA201-061275)

RIDEX – Extended Robotics Solutions for the Inclusive
Development of Atypical and Typical Children
(2021-1-HU01-KA220-SCH-000029582)

has been realised with the support of the Erasmus+ program



Eötvös Loránd University
Faculty of Education and Psychology

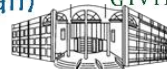


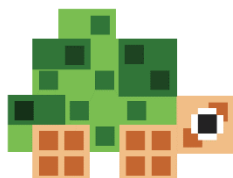
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RIDE LEARNING MATERIALS

The goal of RIDE learning materials is to **develop the love of reading, text comprehension and various competences** of children aged 8-14, using the **attractive, exciting world of robotics for aid**.

In accordance with the challenges of the modern age, our learning materials employ **ArTeC** robots to popularize classical children's and youth literature, while also aiding the development of the students' cognitive and socio-emotional functions. Our goal was to develop a pedagogical methodological toolkit which uses innovative tools to provide teachers an opportunity to develop their students' text comprehension, algorithmic thinking skills, spatial-visual processing skills, cooperation ability and creativity. All this is made possible within the philosophy of **inclusive pedagogy**, and **applicable to SEN, talented, and underperforming talented students with equal efficiency, based on the students' individual needs**.



It is no accident that the logo of the RIDE learning materials is this charming tortoise. In the interpretation of our partnership, the famous parable of the tortoise and the hare showcases that those starting off with serious disadvantages can be equal contestants and contributors, and can show their talent if provided with the right circumstances.

THE DEVELOPMENT TEAM

RIDEs learning materials are developed within the framework of a project supported by Erasmus+, running between 2019 and 2022 with the identification number 2019-1-HU01-KA201-061275.

The partnership includes 7 organisations from 4 countries. Experience in the application of ArTeC tools is provided by  Abacusan Stúdió and  Obo –We Teach Robotics, psychological and special educations knowledge-base by  ELTE Bárczi Gusztáv Gyógypedagógia Kar and  Università Libera di Bolzano. These four organisations developed the learning materials, while the three schools involved in the partnership,

 Scoala Gimnaziala Speciala SF Nicolae,  Istituto Comprensivo J.A. Comenius, and  Kardos István Általános Iskola, will contribute by carrying out impact assessment and refinement of the learning materials during the 2020/21 and 2021/22 school years.



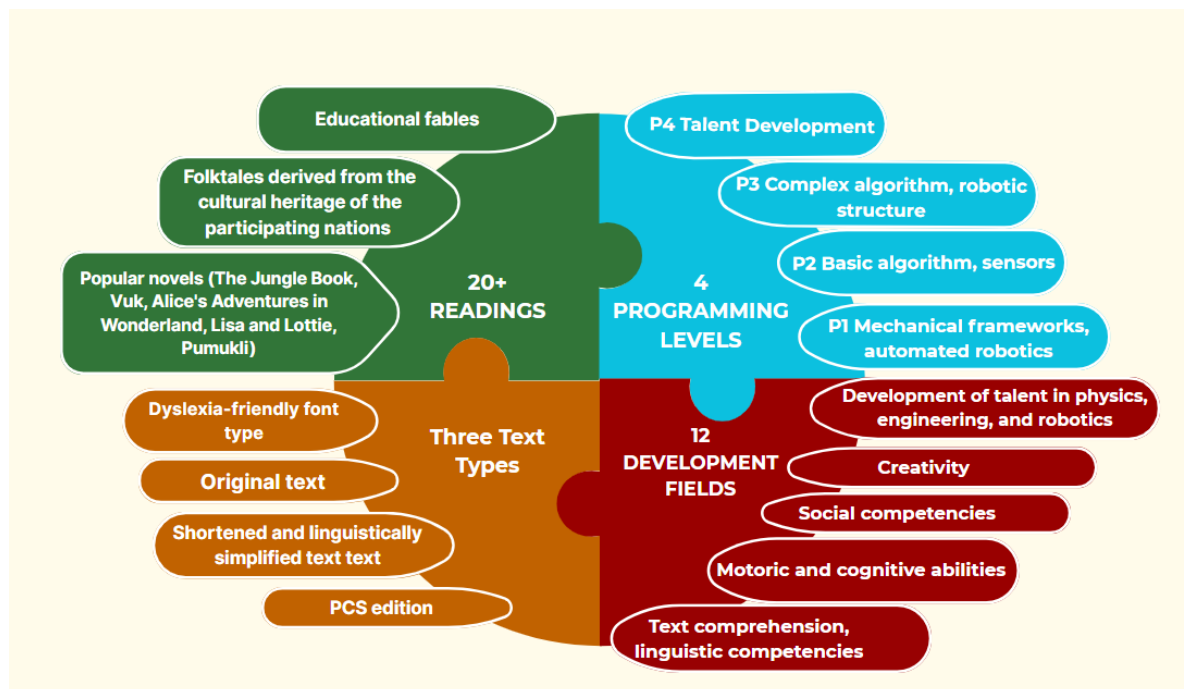
THE DEVELOPMENT OF THE RIDE UNIVERSE



THE MODULE MATRIX

We have organized RIDE learning materials into a **4-dimensional module matrix**, in order to enable aiding teachers in the personalized development within **inclusive groups** of **SEN, talented and underperforming talented (twice-exceptional)** students.

Dimensions of the module matrix: 10 texts, 9 developmental field, 3 text complexity levels, 4 robotics levels.



THE MODULE MATRIX

The developmental fields

- D1: text comprehension
- D2: graphomotoric skill
- D3: spatial orientation
- D4: attention
- D5: social competences
- D6: algorithmic thinking – life skills
- D7: technical knowledge – physics, engineering, robotics
- D8: subject concentration – robotics in the teaching of other subjects
- D9: creativity, talent development
- D10: creativity
- D11: language consciousness
- D12: language communication

Within the module matrix, teacher's guides and student worksheets can be found for processing each of the 10 texts. Each text is comprised of 4-6 parts, and is therefore suitable for the simultaneous development of 4-6 groups of children.

We provide recommended realisation methods for each text part, which each cover 5-9 of the 9 developmental fields (taking the opportunities provided by the specific text part into account). Text parts are provided in 2 different lengths (original and abridged/simplified), as well as in a PCS version for learning-impaired students.

We recommend 4 different levels of robotics solutions for each text part, enabling to choose tasks by combining developmental fields, and the robotics and programming skills and knowledge of the students.

The 4 robotics levels:

- Level 1 (**PROG1**): building, primarily manual and mechanical solutions, simple motorised machines, basic automatic algorithms
- Level 2 (**PROG2**): programming, simple robots, programs a few lines in length
- Level 3 (**PROG3**): complex problem-solving, interactive algorithms, use of sensors
- Level 4 (**PROG4**): talent development, complex robots, structured programming, optimisation

THE MODULE MATRIX

Story number	Country of origin	Title	Recommended age group	Approximate length of each text part Original version / abridged version	Number of text parts (group)	Subject concentration
S1		The Five Loaves	8+	0,5 page / 5 lines	4	Mathematics, citizenship
S2		Camino de Santiago	10+	0,5 page / 0,5 page	5	History, geography Citizenship
S3		The Paul Street Boys	10+	2,5 pages / 1 page	5-6	Ethics, biology, physics
S4		The Jungle Book	8+	0,5 page / 5 lines	4	Biology, Ethics, Drama
S5		The walk of the distracted child	8+	0,5 page / 5 lines	4	Biology
S6		Don Quixote	10+	1 page / 0,5 page	4	Physics, History
S7		Vuk	8+	2 pages / 0,5 page	5	Biology, Nature, History
S8		The Story of the Pig	8+	1 page / 0,5 page	4	Literature Nature, Folk art
S9		Alice in Wonderland	8+	1 page / 0,5 page	6	Citizenship Maths
S10		The Comic Book Mouse	7+	0,5 page / 5 lines	3	Language, Ethics, Biology

THE MODULE MATRIX

Story number	Country of origin	Title	Recommended age group	Approximate length of each text part Original version / abridged version	Number of text parts (group)	Subject concentration
S11		Lisa and Lotti	8+	2 oldal / 0,5–1 oldal	5	Etika
S12		The Robber Hotzenplotz	8+	4 page / 1 page	4	Literature , music
S13		Mures and Olt	8+	2 page / 1 page	3	Geography, ethnography
S14		The Old Woman's Daughter and the Old Man's Daughter	7+	1 page / 0,5 page	3	Folk art
S15		Holiday with Cinnamon	7+	5 page / 2 page	5	Citizenship skills
S16		Bobula	7+	2 page / 1 page	5	Civics, ethnography
S17		Keloglan and the Magic Bowl	7+	1 page / 0,5 page	4	Ethics
S18		The Sultan of Elephants	10+	2 page / 1 page	4	Ethics, history
S19		The Cat who Came in off the Roof	8+	2 page / 1 page	5	Media literacy
S20		Pumukli and Master Eder	7+	3 page / 1 page	3	Technology, ethnography

RECOMMENDED WORK METHODOLOGY

The learning materials can be integrated into classroom lessons, or employed in the form of club activities.

Processing requires 5 sessions for each story, each taking 50 to 90 minutes.

Our learning materials are each based on the project-based processing of a literary, historical or educational text.

For processing each topic, we recommend **group work**. Form as many small groups from the children as there are text parts in the material (4-6 groups).

While **forming groups**, the teacher using the toolkit can follow multiple different strategies. They can create **homogenous or heterogenous** groups.

Using the toolkit enables, for example, students who achieve weakly in text comprehension but excel in technical knowledge and IT to take on an a proactive role in class.

With a homogenous group composition, an opportunity arises for different groups to become grounds for talent development or catching up certain students to others. With a heterogenous group composition, the same opportunity is provided by a distribution of work roles, the determination of tasks for processing, and intra-group help.

Using the toolkit also aids **the reinforcement of several other IT competences**: we also introduce students to software solutions useful for cooperation, content sharing, recording the realisations of the text parts, and the presentation of the project.

We have developed our materials with the aim of providing the **greatest flexibility possible to the teachers employing the materials as well as the students taking part in the project**.

We envision **the teacher as having an orientational and mentoring role** during the processing of the stories, while students are provided with a wide room of movement to process the topics which excite them, and to realise their own ideas. The teacher can pick the elements of the module matrix expedient for reaching their developmental goals, while taking the students' choices into consideration.

With our learning materials, we have made it our goal to develop and integrate the technique of **self-regulated learning** into the students' learning structure. Therefore, our module matrix is fundamentally based upon close interaction between teacher and student, as well as an „invisible director“ role for the teacher, which focuses on encouraging discovery, creativity and creating in groups or individually, rather than giving out concrete tasks and instructions.

The development of self-reflection, as well as the supplemental materials accompanying the module matrix (fillable task cards, robotics knowledge-base, example robots and programs, text procession aid templates etc.) all support self-regulated learning. The teacher's role is to introduce students to the effective use of these tools.

THE ARTEC TOOLKIT



Why ArTeC robots?

The robotics kit used with the learning materials is manufactured by Japan's largest learning tools company, which has been successfully operating for 60 years.

The robots are build around an **Arduino motherboard** and provide great variability with their total of 20 ports, which can support up to 8 motors and 8 sensors at a time. **The programming interface, based on Scratch**, will be familiar to many, as this block-based programming language is being taught in an increasing number of schools.

The building block kit, which comes in 20 colors and is quick and easy to build with is eminently suitable for „worldbuilding“ – modelling and visually depicting the locations, props, characters or even sceneries of the literary, historical or educational texts.

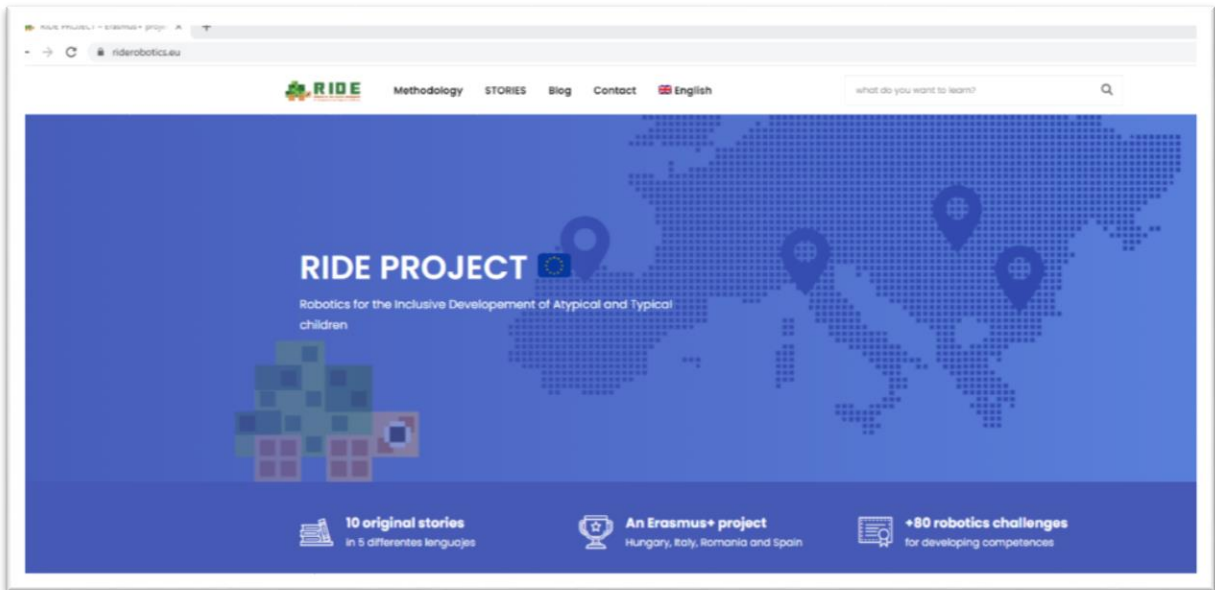
A specialty of the building block kit is **3-dimensional construction capability** and an asymmetric distribution of connection points. These greatly enhance the kit's developmental traits, especially in the fields of fine motor skills and spatial orientation.

With the robotic components, characters and scenes can be brought to life, bringing interpretation of the plot and cause/effect relations into the foreground.

The kit is excellently suitable for **carrying out projects**: the processing of the text in parts, researching related background information, the integration of physics and IT knowledge necessary for a robotics-based solution, and finally the combination of the details „brought to life“ define the project's content-arc.

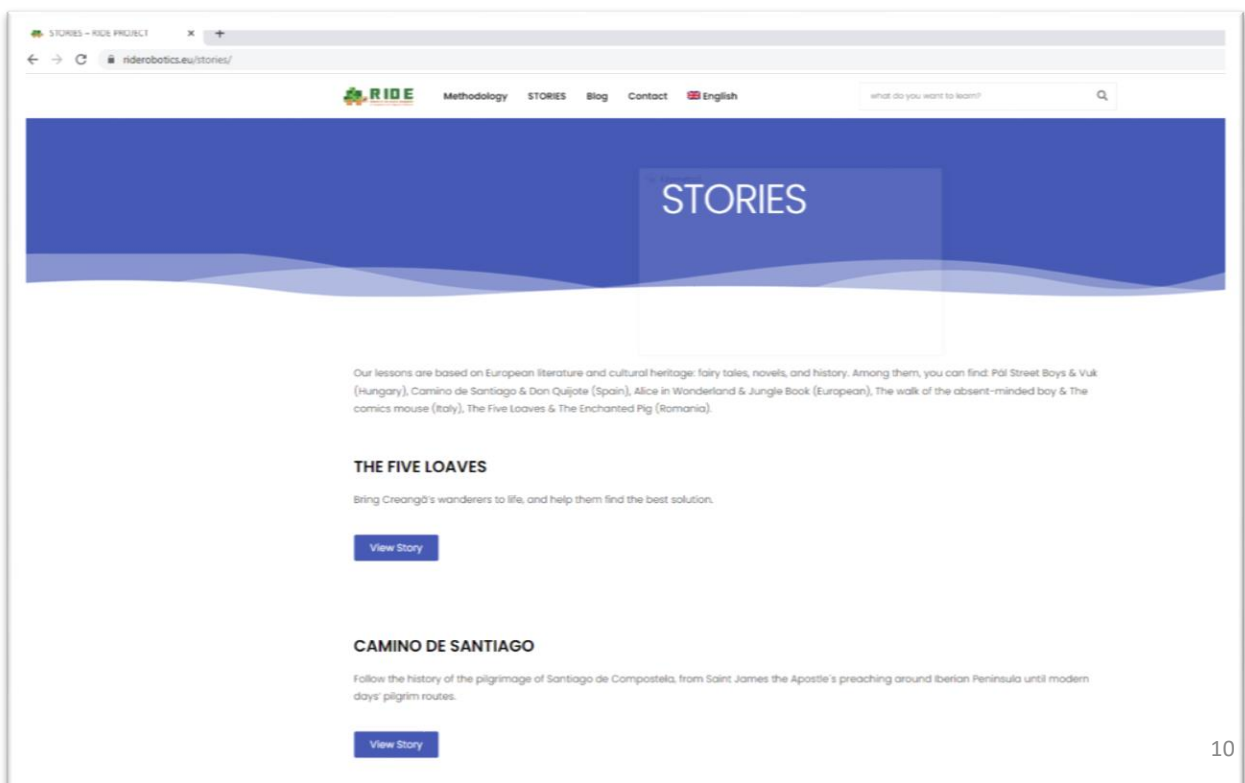
THE RIDE WEBSITE

Website of the RIDE project: <https://www.riderobotics.eu>



The website, and all its content, are available in 5 languages (English, Hungarian, Spanish, Romanian, Italian). After selecting the language, you can access the learning materials under the Stories submenu.

Here, you can find a short blurb text for all stories, then proceed to the learning materials by clicking „View Story” under the title.



THE RIDE WEBSITE



Methodology

STORIES

Blog

Contact

English

what do you want to learn?

Q

THE FIVE LOAVES

The Five Loaves



Ion Creangă (1837-1889): widely considered one of the foremost figures of Romanian children's literature, his tales and anecdotes generally depict rural life in the 19th century.

The story in short

This tale is about two wanderers, who go on a journey to try their luck. On the road, they meet an old wanderer, whom they invite for a meal. The old man thanks their hospitality with money, who accept it after some insistence. However, the two wanderer cannot agree on how to split the reward between themselves. To solve the problem, they seek out a judge.







Downloadable Content

Students

Teachers

Lesson 1 Warm Up

Lesson 2 The Story

Lesson 3-4 Build Your Robot!

Lesson 5 Show and Tell

Task sheet

	IDEA 1	IDEA 2	IDEA 3	IDEA 4	IDEA 5
IDEA BAZAR					

On the main page of each story, a short introduction can be read about the story’s author, as well as the story itself.

Below this, a few pixel art images can be seen depicting the major characters of the story. These suggest certain visual solution ideas, but they do not depict specific robots – therefore, they leave room for the students’ imagination and creativity to be expressed.

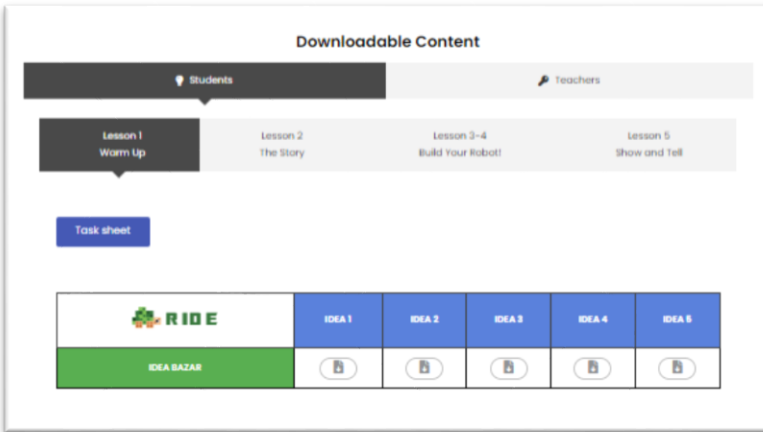
The student and teacher documents are downloadable from a bifurcated menu system.

The Student section makes documents available by session, while the Teacher section does so by category.

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STUDENT MATERIALS

LESSON 1 – WARMING UP

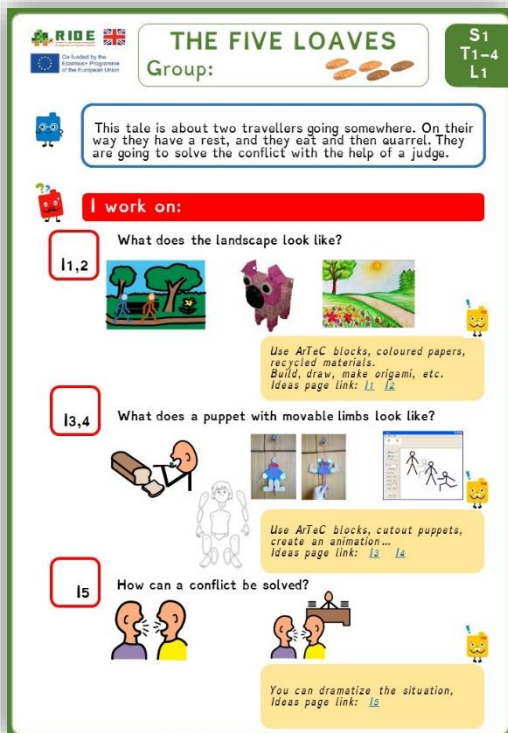


The goal of Lesson 1 is warming up.

For this lesson, we planned exercises which students can immerse themselves in the story's situation, identify its most important details, and prepare for robot construction by studying certain phenomena and solutions.

You can find specific learning material parts by clicking „Task Sheet“, or the icons within the „Idea Bazaar“ table.

The warmup exercises of Lesson 1 are associated with specific parts of the text. They are part of the differentiated developmental process, meaning that choices made here already influence later task distribution between groups, as well as the direction development will proceed in. For this reason, a very large degree of flexibility and purposefulness is required of the teacher even at this point, so that they can direct the children in the right direction while still leaving them the freedom of choice. (e.g. groups are free to pick exercises, but consult with one another, while the teacher orients groups or individual students in their choices in the direction appropriate for the developmental goal.)

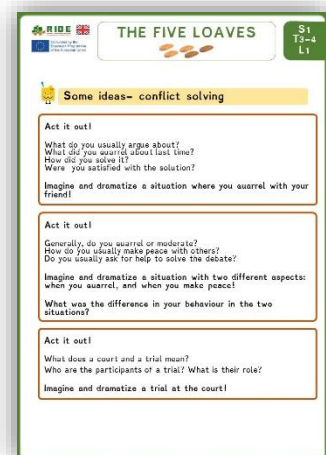


The task sheet

The group selects an exercise from the task sheet, which they can note by drawing an X in the red rectangle.

The relevant idea cards can be found in the yellow box next to the exercise (notated by number and link).

In terms of work organisation, the group can complete an exercise together, or different students within the group can work individually by following different idea cards, in accordance with their different developmental goals.



The idea cards

STUDENT MATERIALS

LESSON 2 – TEXT COMPREHENSION

Downloadable Content

Students Teachers

Lesson 1 Warm Up Lesson 2 The Story Lesson 3-4 Build Your Robot! Lesson 5 Show and Tell

Task sheet

RIDEX	TEXT 1	TEXT 2	TEXT 3	TEXT 4
LONG TEXT				
BRIEF TEXT				
PCS				

RIDEX	MINDMAP	TABLE	STORYLINE	CHARACTER TASK CARDS
TEMPLATES				

The goal of Lesson 2 is becoming familiar with the text part, the development of text comprehension, and the organisation of group work.

Texts can be downloaded by clicking the appropriate cells of the table. Each text part is available in **3 variations**: unabridged („Long Text”), abridged and grammatically simplified („Short Text”), and in PCS form, for learning-impaired students.

The **Task Sheet** aids in organising group work and preparing the project-closing presentation.

We aid text processing with various templates:

The groups should all fill out the **Character task card**. Based on the group’s structure, there can be either a common task card, or different ones for each child, depending on whether they’re building a single common robot on a group level, or if the group’s final product emerges out of combining the individual works of the children together. Later on, further types of task cards or parts of them may be filled out, if the children highlight new important, depictable traits from the text.

Use of the further types of task cards is **optional**.

The traits and interactions of the scene’s characters, the key movements of actions, and emotions to be depicted can be collected in the **Chart**.

The **Mindmap** and **Storyline** templates help to elucidate the sequentiality of the scenes within the text, as well as their cause-and-effect relationships.

THE FIVE LOAVES S1 T1-4 L2

Group:

Character task cards

I am building: Your name _____

Make sure your robot is able to: _____

There also should be: _____

Think over: _____

THE FIVE LOAVES S1 T1-4 L2

Group:

Plan the scenes for interpreting the story! Work together with your group mates!

☐ Define the tasks and divide them among yourselves!

☐ Don't forget to choose a person responsible for the workflow, to distribute the tasks! You should listen to that person!

☐ How will you present your work at the end of the project?

☐ One of you should make pictures/videos of the making of the work.

Build the story! Work as a group!

Talk with the other groups, so that the characters are similar in size but look somewhat different.

☐ Determine the most important features of the characters!

☐ Take into account the connections among people!

☐ Build the story!

Draw your project: you can foresee the outcome and guide the process!

☐ What does the environment look like? What does it contain? What would you re-create? How?

☐ What materials would you use?

THE FIVE LOAVES S1 T1-4 L2

Group:

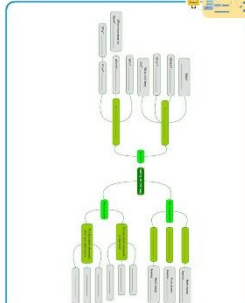
Create and fill in a table!

Character	Feature	Actions	Feelings

THE FIVE LOAVES S1 T1-4 L2

Group:

Fill in the mindmap!



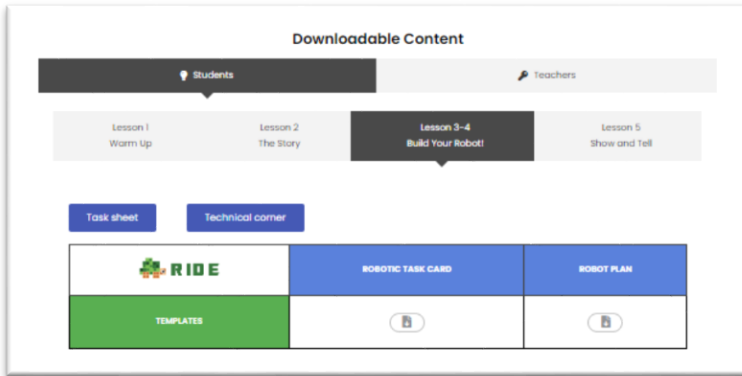
THE FIVE LOAVES S1 T1-4 L2

Group:

Storyline

STUDENT MATERIALS

LESSON 3-4 – ROBOTICS

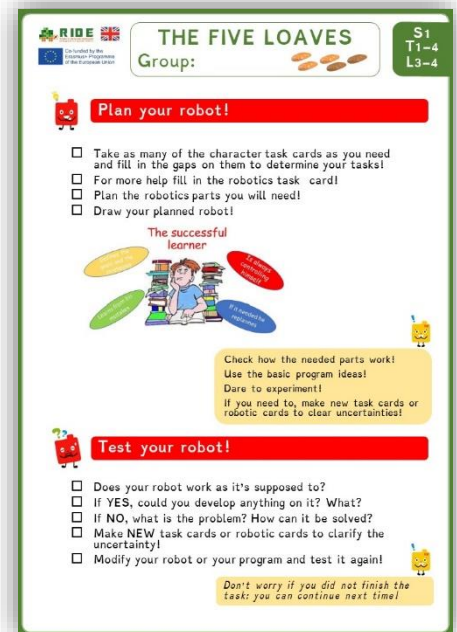
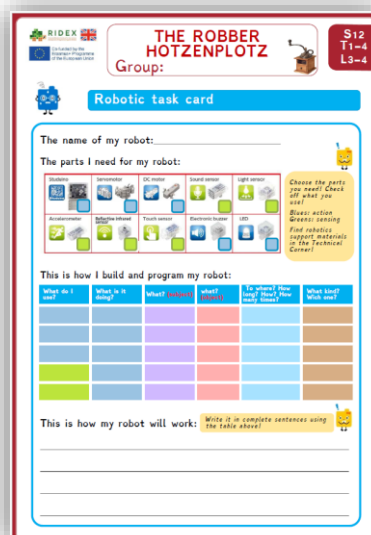
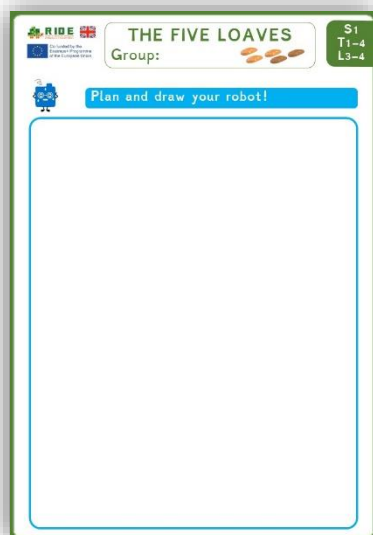


There are two further downloadable documents, the **Robotic Task Card** and the **Robot Plan** template.

Filling these out aids students in identifying problems to be solved and robotic components necessary for their solution, according to a plan. It is important for the robot's plan and the tasks it must solve to be in accordance with the Character task card filled out during Lesson 2. If necessary, multiple Robotic Task Cards can be filled out.

During Lessons 3 and 4, students create the robotic depiction of their text part.

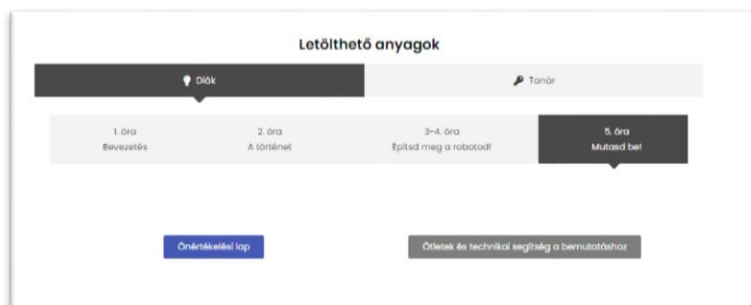
The **task sheet** for these lessons, which provides help for self-regulated learning to the students, is available on the website.



Clicking „**Technical corner**“, you can find small robot construction and programming ideas which aid independent work unconnected to concrete stories and robot building approaches. These solutions are **indexed**, so students can easily find solutions they find interesting. As the helping examples found in the Technical corner are not tied to specific robots, they do not influence the childrens' realisation ideas.

STUDENT MATERIALS

LESSON 5 – PROJECT CLOSING, SELF-ASSESSMENT



The goal of Lesson 5 is to close down the project, to chain the story's scene after one another, and individual as well as group-based **self-assessment**.

For self-assessment, a **Self-Assessment Form** can be downloaded from the website. Filling this out individually, then discussing the gathered experiences together is an important part of the lesson.

There are numerous ways the **project** can be **closed**.

- **Presenting the text**
 - Live/online presentation (held for classmates, schoolmates, parents, teachers, students of other schools etc.)
 - **Video** film, where **functioning robots** play the roles
 - **Video** film, where the **robots function as puppets**, with the children providing narration
 - **Stop motion animation** created from photos of the robots' phases of motion
 - **Collage, tableau, photo montage, comic book** made from photos of the robots
 - **Presentation** using photos, videos of the robots, and screenshots of the programs
- Presenting the work process
 - Making-of film made out of videos recorded during the project work
 - **Collage, tableau, photo montage** made from photos of the project work, filled-out task sheets, cards and templates
 - **Presentation** using photos, videos, screenshots of the programs, task sheets, cards, templates



**THE ROBBER
HOTZENPLOTZ**
 Group:

S12
T1-4
L5

Closing the project
 Fill in the self-assessment form

1. How did you like this project? (emoji) /How did you feel about this project? (emoji)







2. In what areas did you learn the most from the project? Arrange the areas by numbering them from 1 to 8. (1 shows the most and 8 shows the least.)

- ☐ Finding new ideas in building robots
- ☐ Finding new ideas in programming
- ☐ Cooperating with teammates
- ☐ Learning how to understand texts of the story better
- ☐ Finding creative ways to develop characters or background
- ☐ Communicating efficiently
- ☐ Problem solving
- ☐ Debating and agreeing efficiently during the teamwork

3. What was your biggest success? (open question)

4. What was your favourite part of the project?(choose 1)

- ☐ The warm up lesson
- ☐ Dealing with the text
- ☐ Building robots
- ☐ Programming robots
- ☐ Representing the story



**THE ROBBER
HOTZENPLOTZ**
 Group:

S12
T1-4
L5

Closing the project
 Fill in the self-assessment form

5. Groupwork – please scale the following statements

- ☐ In our group each member had his/her own responsibility
- ☐ Every member had equal contribution to the task
- ☐ I got help from my teammates whenever I needed
- ☐ I got help from members of other teams whenever I needed
- ☐ I gave help to my teammates whenever they needed
- ☐ I gave help to members of other teams whenever they needed
- ☐ I listened to the other's ideas
- ☐ The others listened to my ideas
- ☐ I'm satisfied with my group's products and presentation
- ☐ I liked the other groups' presentation

If you could change anything in the project, what would it be?

TEACHER MATERIALS

STUDENT DOCUMENTS

Teacher materials can be found on the website organized by category.

Some groups are connected directly to the developmental goals, others are independent of them and can be used on any field.

Under the submenus **Text variations**, **Templates** and **Idea Bazaar** all materials available to the students - texts, character and robotic task cards, all templates, and the idea sheets of Lesson 1 – can be found.

We have collected these documents together here so that teachers using RIDE can look over all materials used by the students in the easiest way possible.

Under the **Whole material** submenu, a complete compilation of all student and teacher materials, complete with a clickable table of contents, can be downloaded.

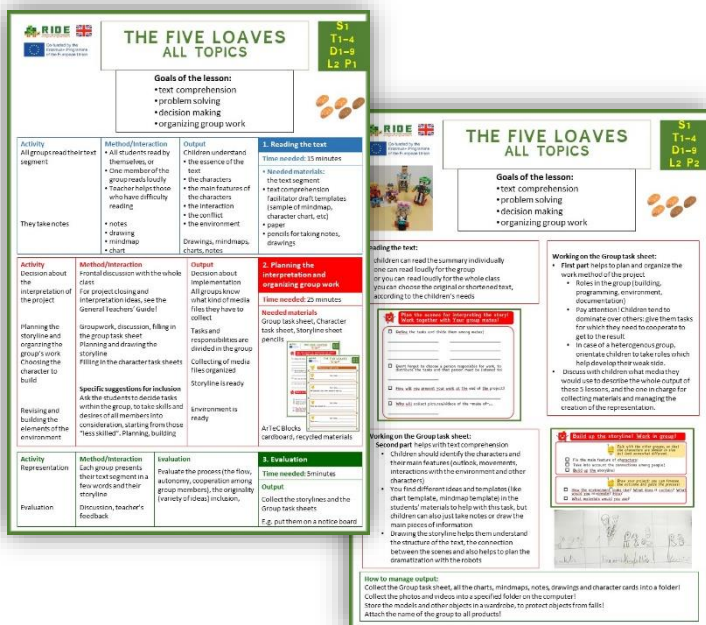
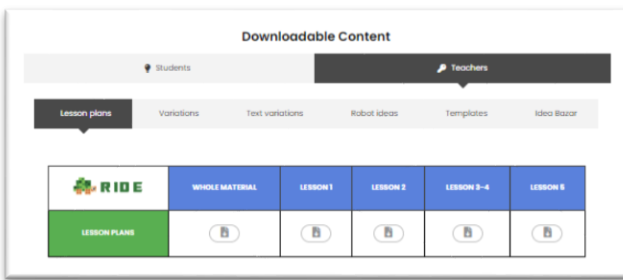
LESSON PLANS

We have subdivided the lesson plans into two different parts, in accordance with **group-level organisational tasks** and the simple and flexible usability of **differentiated tasks according to developmental goals**.

Under the **Lesson plan** submenu, you can find those parts of the lesson plans which can be employed regardless of developmental area and programming level. Each lesson has a 2-3 page associated document.

On the first page of these, our general recommendations regarding organising the lesson can be read, in a classical structure: activities, methods, results, necessary tools, evaluation, and recommended time span (projected for a 90-minute lesson).

Subsequent pages contain methodological recommendations for filling out student task sheets (especially for them organising group work) and methodological reviews.



VARIATIONS

Under the **Variations** submenu, documents can be downloaded which aid differentiated, personalized skill development on the 9 fields targeted by the project. With the diversity of available variations, we also ensure that the targeted developmental field can be combined with the text part being processed by the student or group in question. This way, the method's flexibility and the students' motivation can be increased.

Downloadable Content

Students
Teachers

Lesson plans
Variations
Text variations
Robot ideas
Templates
Idea Bazar

Developmental skills

D 1 = Text comprehension

D 4 = Attention

D 7 = Physics, robotics, engineering

D 2 = Graphomotor skills

D 5 = Social competences

D 8 = Teaching other subjects with robotics

D 3 = Spatial orientation

D 6 = Computational thinking – life skills

D 9 = Creativity, talent development

	D1	D2	D3	D4	D5	D6	D7	D8	D9
RIDE									
Topic 1									
Topic 2									
Topic 3									
Topic 4									

Download links of the variations can be found within a table on the website, with rows tagged by the text part's number (T1 ... T4), and columns by developmental fields (D1 ... D9). The developmental fields' names can be read above the table.

Naturally, not all text parts can be processed in a way that supports all developmental fields, therefore the table contains a few empty spaces.

Variations belonging to the same text part but supporting different developmental fields enable inclusive development of students within heterogeneous groups, e.g. by handing out variation tasks within a group processing text part T2 so that a student with graphomotoric problems gets the tasks of D2, a student in need of spatial orientation development gets D3, while a student with social skill deficiencies gets D5. This way, children can work together on the same task, and yet each receives the development they personally need.

TEACHER MATERIALS

VARIATIONS

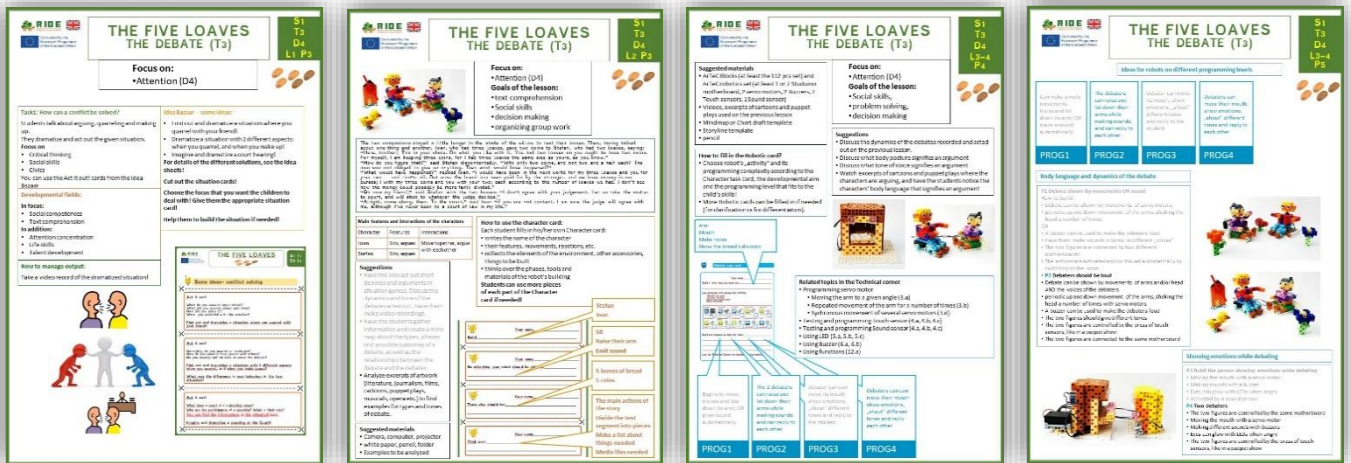
While under the **Lesson plan** submenu, portions of the lesson plans for each lesson which are not affected by developmental field and programming level, the Variations submenu contains the remaining pages of each lesson plan, specialized for each developmental field.

Each **variation** document follows the **materials of Lessons 1-4**, highlighting activities which aid in **development of the specific developmental field** while processing the text part in question. These divergences can be **different subtasks**, different suggestional and warmup activities, and certain robot variations also fit some developmental fields, while others do not.

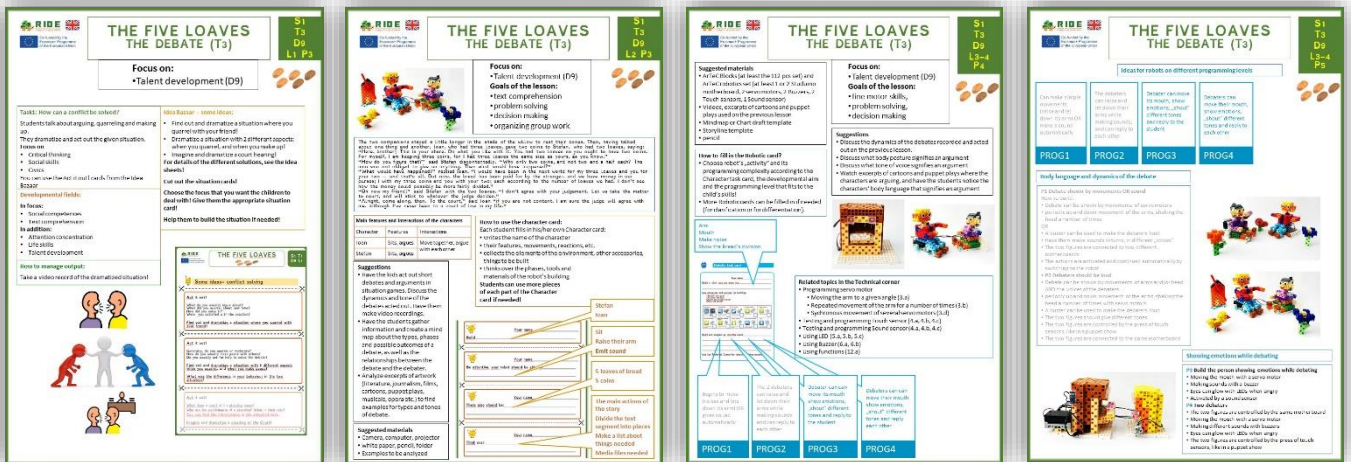
For the sake of better transparency and comparability, **we have colored tasks unrelated to the targeted developmental field in grey**.

Also within the variations, our **robot solution** recommendations for the text part in question can be found, for **all 4 programming levels**.

T3 D4



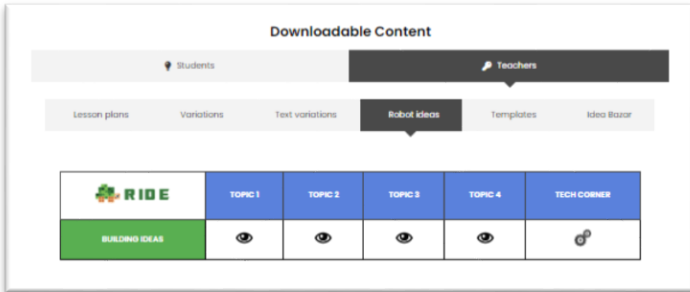
T3 D9



On page 1 of the variation sheets, ideas and developmental focuses for Lesson 1 can be found. Page 2 provides help for Lesson 2 with topics aiding text comprehension and text processing, and a collection of filling-out possibilities for the Character task sheet, among other things. Pages 3-4 deal with the material of Lessons 3-4 and robotics solutions: it lists robotics ideas for levels P1 ... P4, complete with detailed descriptions, necessary components and necessary programming knowledge (with references to appropriate chapters of the **Technical Corner**).

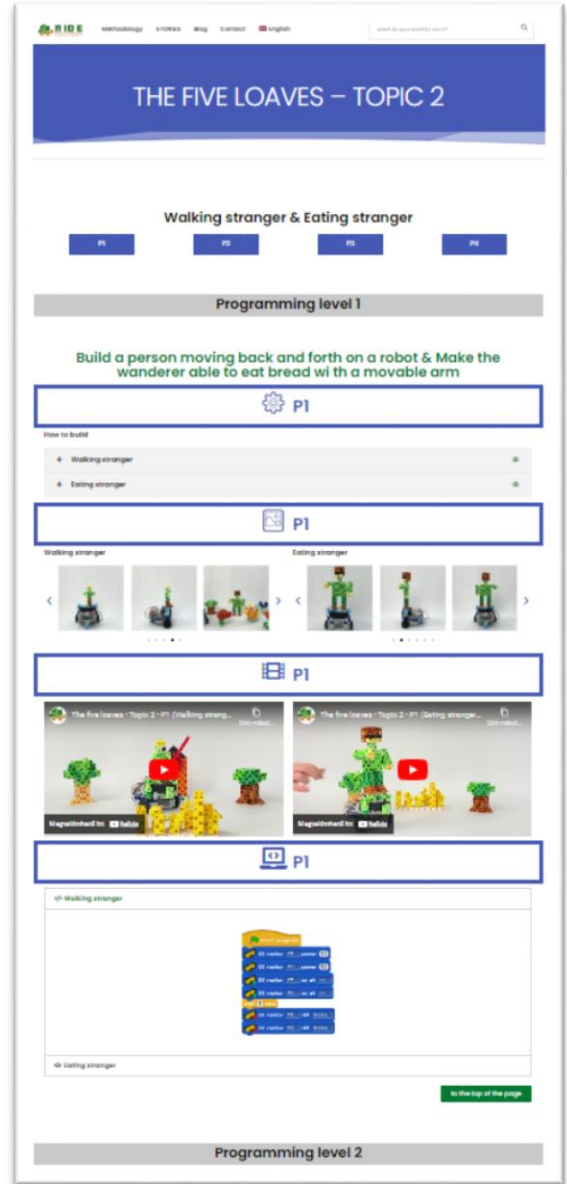
TEACHER MATERIALS

ROBOT IDEAS



Under the **Robot ideas** submenu, sample robots developed for the text part in question can be found. Creative work is aided by detailed photographic documentation, videos of the robots in action, and sample programs, all organized by programming level. The goal is not to have the students copy the robot solutions produced by the project's developers, but to carry out independent creative work based on their own imagination, mental imagery, creativity and prior knowledge – after all, this is what serves their development.

We have placed this collection among the teacher materials, because we would like to aid the work of teachers using RIDE with ideas. Furthermore, there is also an opportunity to aid children directly: if the teacher would like to have the children produce a concrete robotics solution (e.g. a walking robot), or the children are out of ideas or need help (e.g. at the start of the learning material's implementation, when they have no experience yet), the teacher can show them these ideas as well.



LEGEND

In order to handle student and teacher documents properly, it is important to become familiar with the meaning of the **indexes** located in the **top right corner** of the sheets:

