PROJECT WEEK REPORT

3rd project week | 29 – 31 October 2019 (ATEC, Portugal)

ABSTRACT

Because of the growing digitalisation of the society and industry there is a growing demand for people with programming skills. The micro:bit system is an accessible and easy to use educational tool to make interested people familiar with the basics of programming, while students develop additional soft skills.

QUALITY CATEGORY

- ☐ Guidance
- ✓ Learning
- ☐ Examination

QMS4VET Consortium

The partners within the QMS4VET project are:

- Aventus (www.aventus.nl)
- ATEC (www.atec.pt)
- BBS Syke EUROPASCHULE (www.bbs-syke.de)
- bit Schulungscenter (www.bitschulungscenter.at)
- West Lothian College (www.west-lothian.ac.uk)
- Kainuun ammattiopisto (www.kao.fi)

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INTRODUCTION

ATEC is a private Training Academy certified by ISO 9001:2015 with its headquarters located in Palmela, south of Lisbon, and with a delegation in the North region of Portugal in Matosinhos, Porto. ATEC is focused in providing EQF level 4 and 5 technical vocational training to young people and adults, and also to employees from companies that select ATEC as their training provider.
During QMS4VET third project week, ATEC put together a team of colleagues and students from the Robotics and Mechatronics areas to introduce the Project Week Participants to the micro:bit teaching approach (see www.microbit.org).

For more information about the QMS4VET project and other project week reports see www.aventus.nl/qms4vet

OBJECTIVES

The following objectives were set for best practice with respect to ATEC's micro:bit education program:

Ensure that:

1. Awareness, interest and basic skills are created in programming;
2. Attractiveness of their educational programmes is improved;
3. Soft skills through team learning is improved.

METHODOLOGY

The overall aim of ATEC's micro:bit education program is to include computer programming in their curriculum. This element of the total curriculum is organised in a special Creative Lab, a classroom with computers and relevant hardware. A mentor/coach delivers tasks/assignments to the students which they have to undertake individually or in (small) teams.

In order to ensure the overall aim, the following objectives have to be met:

1. **Create awareness, interest and basic skills in programming**

   By using the micro:bit system in the education program, students are confronted with programming assignments with increasing complexity. The micro:bit system ensures a user-friendly methodology to achieve these objectives and enhance logical thinking skills.

2. **Improve attractiveness of their educational programs**

   The micro:bit system ensures an attractive, practical, learning by doing methodology with visual tools (drag and drop) to build a program. Practical work is motivating because the students can see the immediate results of their efforts.

3. **Soft skills through team learning is improved**

   This is achieved through an informal and interactive learning environment, which means that certain tasks/assignments have to be undertaken in small groups which stimulates the reinforcement of soft skills like cooperation, communication, creative thinking, problem solving and team building.

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SWOT ANALYSIS

The following analyses the Strengths, Weaknesses, Opportunities and Threats (SWOT) of ATEC's case study.

Strengths	**Weaknesses**
• Fun and engaging • Clear immediate results – instant feedback on assignment • Inexpensive resources • Intuitive learning • Simple and easy to understand (for non-technical people) • Applicable across all curriculum areas • Contemporary and relational to young people • Practical, hands-on learning • Easy route into STEM engagement • No language barriers • Increase knowledge of English • Basic learning skills required (no previous experience) • Diverse range of learners and providers • Diverse range of additional affordable hardware available • Lots of example programmes available • 'Plug and play' and open source	• Needs practical demonstration to engage users • Knowledge depth is limited • Teaching staff need to be knowledgeable, flexible and engaged • Extra attention necessary for connection with social/soft skills • Preparation time required for teaching staff • Restrictive tech – large gap between learning environment and industry • Over-simplification limits programming connection with technology
Opportunities	**Threats**
• Introduce coding to young people over 5 years old and increase number of future students in STEM field • Start-ups, for example sell services • Promoting VET-school marketing – co-operation with other schools • Good marketing tool – attracts a wide variety of learners • Promote distance learning and independent learning • Opener to learn another language or even coding languages like JavaScript • Filling future market demand for coders • Address gender balance in STEM subjects • Upskill teaching staff in non-technical areas • Introduce use of technology into broader curriculum	• Product becomes obsolete if Microsoft withdraws from project • Difficult to hire staff to teach classes (unpaid prep time) • Unwillingness of teaching staff to create new curriculum and resources, to engage and to teach • Dependent on creative thinking to embed into curriculum

Reflection and awareness on possible weaknesses and threats

In the preceding SWOT analysis an overview was given of the Strengths, Weaknesses, Opportunities and Threats of ATEC's programming/coding education programme. In the following section, the strengths and opportunities are integrated in a Step-By-Step Implementation plan which can be used in implementing all or parts of the system. However, in doing so, it is important to be aware of the weaknesses and threats of ATEC's

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programming/coding education program. Therefore, in the following paragraph a reflection can be found on the main and most important potential weaknesses and threats based on the results of the SWOT-analysis. This reflection serves to inform potential users of some vital basic steps to put in place when considering implementation of all or part of ATEC's micro:bit programming/coding education program:

1. Allocate the necessary resources to guarantee successful practical demonstration of the program.
2. Integrate micro:bit in an initial stage of the training program to engage students into the programming/coding learning activities and make sure to complement it with real life industry technology.
3. Use micro:bit as a basis to integrate different learning subjects, including soft skills like English language, communication and/or team work.
4. Develop your trainers to use micro:bit to its full potential (use micro:bit website) and to use it integrated in the training program, including the validation of the learning outcomes.
5. Make sure you are not over dependent on one single technology to develop your training program.

RECOMMENDATION FOR STEP BY STEP IMPLEMENTATION

The following recommendations can be used when implementation of all or parts of the ATEC's programming/coding education program is considered.

1.1. Step 1 – Gathering information

- Study the micro:bit website https://microbit.org
- Carry out a workshop at school that is using micro:bit in education

1.2. Step 2 – Planning and Piloting

- Assign the project leader
- Prepare a business plan outlining your intentions/ goals, budget, resources and facilities
- Promote the micro:bit learning system in your organization and find the early adaptors
- Let early adaptors start a pilot with early adaptor students
- Evaluate the pilot

1.3. Step 3 – Incorporate into curriculum

- Prepare an implementation plan including intentions/ goals, budget, resources and facilities
- Incorporate the early adaptors in the development of the curriculum
- Develop curriculum according to intentions/ goals

EVALUATION

After analysis of ATEC's programming/coding education program the following conclusions can be drawn:

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Advantages:
By integrating the micro:bit programming/coding education program in their curriculum, ATEC has found a low cost and effective solution for raising awareness, interest and basic skills in programming/coding, improving the attractiveness of their educational program and stimulating the learning of soft skills.

Disadvantages:
Although the implementation of the micro:bit method does not require huge amounts of money, it is good to realize that it needs investments in staff to get familiar with the system and create curriculum. In addition to this the micro:bit methodology is suitable for basic programming/coding education, but not for more sophisticated/ industry standard requirements.

Tips for implementation:
Study the www.microbit.org website and visit an education centre which already works with the system to get hands on experience. Create a business plan, organise a pilot phase, evaluate, an implementation plan, implement and evaluate.

APPENDICES

1. Agenda and Minutes 3rd QMS4VET project week
2. ATEC presentations

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2018-1-NL01-KA202-038886

MINUTES 3rd PROJECT WEEK MEETING

28 Oct. – 1 Nov. 2019, Porto (PT)

LOCATION
ATEC
Edifício Siemens
Avenida Mário Brito (EN 107),
nº 3570 - Freixieiro
4455-491 Perafita

AGENDA MONDAY 28 OCTOBER 2019

Time	Item	Location
	Arrival	Sea Porto Hotel, Matosinhos
20:00	Welcome dinner	O Valentim, Matosinhos

AGENDA TUESDAY 29 OCTOBER 2019

Time	Item	Preparation/Presentation
08:45	Departure from hotel	
09:15	Welcome to ATEC	Durk van Wieren & Paulo Peixoto
09:30	Project Week(s) overview	Durk van Wieren & Duarte Silva
09:45	Presentation of ATEC	Paulo Peixoto
10:15	Presentation of the quality management system	Joao Alves
11:00	Visit to ATEC	Duarte Silva
12:00	Lunch	All
13:15	German Examination AHK in practice (EQF level 5 Course in Management of Computer Networks and Systems)	Pedro Vasconcelos
15:15	SWOT Analysis	All
17:00	End of Meeting	

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AGENDA WEDNESDAY 30 OCTOBER 2019

Time	Item	Preparation/Presentation
08:15	Departure from hotel lobby	
08:45	Evaluation of previous day	All
09:00	Innovation methodologies - STEM School	Manuel Teixeira
09:30	STEM School in practice - Microbit	Manuel Teixeira
11:00	SWOT Analysis	All
12:30	Lunch	All
13:45	Step by step implementation and Start of Digitalisation	All
17:00	End of meeting	

AGENDA THURSDAY 31 OCTOBER 2019

Time	Item	Preparation/Presentation
08:45	Departure from hotel lobby	
09:15	Evaluation of previous day	All
09:20	Digitalisation of results	All
11:00	Meeting with ATEC management to discuss meeting outcomes	Joao C. Costa
11:30	Presentation of 'Fake-off' education program	Laura Reutler
12:00	End of the meeting & departure for lunch and Porto Cultural Program	

AGENDA FRIDAY 1 NOVEMBER 2019

Time	Item	Preparation/Presentation
	Departure	

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PARTICIPANT'S LIST:

Organisation	Name	28 Oct. 2019	29 Oct. 2019	30 Oct. 2019	31 Oct. 2019	1 Nov. 2019
Stichting Regionaal Opleidingen Centrum Aventus	Durk van Wieren	√	√	√	√	√
Stichting Regionaal Opleidingen Centrum Aventus	Teun Gerritsen	√	√	√	√	√
ATEC - Associação de Formação para a Industria (Parque Industrial da Autoeuropa - Quinta da Marqueza 2950-557 QUINTA DO ANJO, PT)	Joao Alves	√	√	√	√	√
ATEC - Associação de Formação para a Industria (Parque Industrial da Autoeuropa - Quinta da Marqueza 2950-557 QUINTA DO ANJO, PT)	Paulo Peixoto	√	√	√	√	√
ATEC - Associação de Formação para a Industria (Parque Industrial da Autoeuropa - Quinta da Marqueza 2950-557 QUINTA DO ANJO, PT)	Duarte Silva	√	√	√	√	√
BBS Syke EUROPASCHULE (An der Weide 8, 28857 Syke, GE)	Silke Hillermann	√	√	√	√	√
BBS Syke EUROPASCHULE (An der Weide 8, 28857 Syke, GE)	Bernhard Zahn	√	√	√	√	√
bit Schulungscenter GmbH (Kärntner Str. 311, 8054 Graz, AT)	Laura Reutler	√	√	√	√	√
bit Schulungscenter GmbH (Kärntner Str. 311, 8054 Graz, AT)	Julius Riegler	√	√	√	√	√
bit Schulungscenter GmbH (Kärntner Str. 311, 8054 Graz, AT)	Michael Kvas	√	√	√	√	√

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Organisation	Name	28 Oct. 2019	29 Oct. 2019	30 Oct. 2019	31 Oct. 2019	1 Nov. 2019
Kainuun ammattiopisto (Opintie 3, 87100, Kajaani, FI)	Tarja Huovinen	√	√	√	√	√
Kainuun ammattiopisto (Opintie 3, 87100, Kajaani, FI)	Jukka Savilampi	√	√	√	√	√
Kainuun ammattiopisto (Opintie 3, 87100, Kajaani, FI)	Jyrki Kilponen	√	√	√	√	√
West Lothian College (Almondvale Cres, Livingston EH54 7EP, UK)	Shelagh Fraser	√	√	√	√	√
West Lothian College (Almondvale Cres, Livingston EH54 7EP, UK)	Eileen Greenshields	√	√	√	√	√
West Lothian College (Almondvale Cres, Livingston EH54 7EP, UK)	Allan McGregor	√	√	√	√	√
West Lothian College (Almondvale Cres, Livingston EH54 7EP, UK)	Scott Fleming	√	√	√	√	√

MINUTES OF THE MEETING:

Photo's of the meeting and handouts of the used presentations can be found in the QMS4VET Dropbox folder.

TUESDAY 29 OCTOBER 2019

1. **Welcome to ATEC:**
   Durk van Wieren opened the meeting, welcomes all participants and thanked ATEC for hosting this 3rd QMS4VET project week. After this, Paulo Peixoto took over and welcomed the participants on behalf of ATEC.

2. **Project Week(s) overview:**
   Durk gave the new participants an overview of the 1st and 2nd project week incl. the methodology and outcomes. After this he informed all participants about the activities since the last project meeting (Steering board meeting in Syke, Learning Outcomes Certificate, the interim report, Joao Alves presentation at the EOQ conference, the Innotecs and EfVET roundtables and the meeting evaluation survey).
   Duarte Silva went through the agenda (no changes necessary).

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3. **Presentation of ATEC:**
   Paulo gave a presentation about ATEC, its history, mission and methodology. Lot's of relevant questions were asked and answered in order to create a clear understanding amongst all participants.

4. **Presentation of the quality management system:**
   Joao Alves presented ATEC's overall quality management system and questions were answered to clarify all unclarities.

5. **Visit to ATEC**
   Duarte took the participants on a tour through the ATEC education centre. There were opportunities to talk with students and teachers during the tour.

6. **German Examination AHK in practice:**
   Following lunch Pedro Vasconcelos explained how ATEC has integrated the German AHK curriculum including examination in the EQF level 5 Course 'level 5 Network and Systems Administration Specialist'. A detailed discussion with the participants was part of the explanation.

7. **SWOT Analysis:**
   The participants were divided into 3 groups, forming a carousel to discuss the SWOT of the presented AHK certification. Outcomes were evaluated with the whole group and can be found in the 3rd Project week report (Integration of German AHK Examination process in EQF 'level 5 Network and Systems Administration Specialist' curriculum).

8. **End of meeting:**
   At around 17:00 hour the 1st meeting day was closed.

WEDNESDAY 30 OCTOBER 2019

9. **Evaluation of previous day:**
   A short evaluation of the previous day was held. All participants were happy with the process and outcomes so far. No changes necessary.

10. **Innovation methodologies - STEM School:**
    Participants moved to ATEC's 'Creative lab'. A classroom with extra ICT facilities. Manuel Teixeira explained the necessity and basics of STEM (Science, Technology, Engineering and Mathematics) education (see presentation in Project Week Report) and that ATEC promotes STEM education via Minecraft (Education edition, see: https://education.minecraft.net/) and via the use of Micro:bit (see: https://microbit.org/code/).

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11. **STEM School in practice – Micro:bit:**
    In order to really understand the benefits and use of the Micro:bit education methodology, the participants had to program the Micro:bit 'minicomputer' – after a short background instruction, with a few practical assignments. See the Dropbox shared folder for photos and short videos.

12. **SWOT Analysis:**
    The participants were divided into 3 groups, forming a carousel to discuss the SWOT of the presented Micro:bit methodology. Outcomes were evaluated with the whole group and can be found in the 3rd Project week report (Micro:bit education program as part of STEM education).

13. **Step by step implementation and Start of Digitalisation:**
    Participants were divided into two groups to discuss the 'Step by step implementation recommendations' for both studied subjects. Outcomes were evaluated with the whole group and can be found in both Project week reports.
    Both groups started the digitalisation process.

14. **End of meeting:**
    At around 17:00 hour the 2nd meeting day was closed.

THURSDAY 31 OCTOBER 2019

15. **Evaluation of previous day:**
    A short evaluation of the previous day was held. All participants were happy with the process and outcomes so far. No changes necessary.

16. **Digitalisation of results:**
    The digitalisation process of the previous day was continued and finalized.

17. **Meeting with ATEC management to discuss meeting outcomes:**
    Mr. Joao Costa (ATEC's General Director) visited the participants in the meeting room and had a discussion with the participants about the outcomes of the project week.

18. **Presentation by Laura Reutler about their developed 'Fake-off' education program:**
    Partner 'bit Schulungscenter' has developed an educational program about how to recognise fake news. She held a presentation about the outcomes, which can be found at:
    PROJECTWEBSITE: http://fake-off.eu/
    FACEBOOK: https://www.facebook.com/FAKE-OFF-421377148289668/
    Participants agreed to take this information home and distribute it in their education centres.

19. **End of the meeting & departure for lunch and Porto Cultural Program:**
    After thanking all participants for their collaboration and ATEC for their wonderful organisation and hospitality, the 3rd QMS4VET project week meeting was closed at around 12:00 hour and the cultural experience was started. Photo's can be found in our QMS4VET Dropbox folder.

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Innovation methodologies - STEM School

30th october 2019

Manuel Teixeira

1

Outline

STEM
Why?

Minecraft
How?

Microbit
Hands-On

2

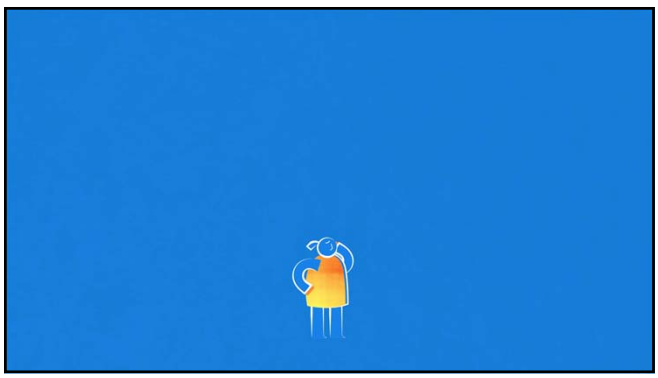
3

Why STEM?

"That's where the jobs of tomorrow will be."

James Brown

4



5

What are we doing?

MINECRAFT EDUCATION EDITION

micro:bit

6

What are we doing with?

MINECRAFT EDUCATION EDITION

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7

EDUCATOR RESOURCES

Learn to teach with Minecraft, find activities to engage your students across subjects and join our global community. Whether you are new to Minecraft or looking to improve your skills, these training materials will help.

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SUBJECT KITS

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SCIENCE

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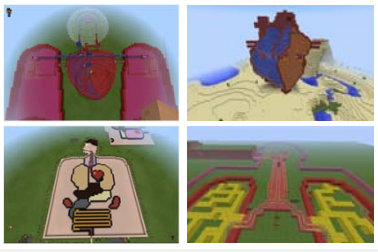
SCIENCE



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11

MATH

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12

MINECRAFT

Code Connection

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13

What are we doing with?

micro:bit

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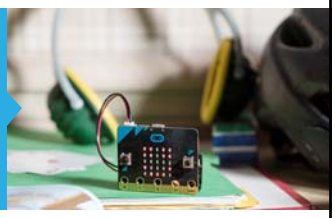
14

micro:bit

- 90% of students said it showed them anyone can code
- 70% of girls said they would choose computing as a school subject after using it



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micro:bit

Multifunctional

- School
- Robotics
- Music

microbit.org/guide/features

Coding

- Scratch
- JavaScript
- Python

microbit.org/code

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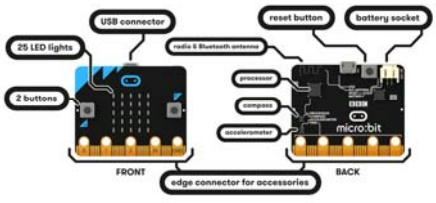
micro:bit



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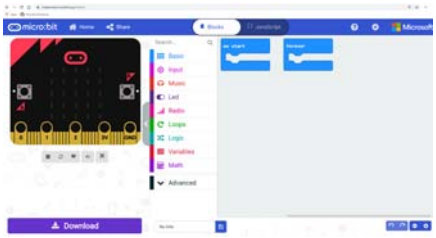
micro:bit



makecode.microbit.org

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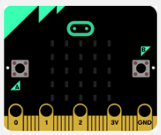
micro:bit

Pressing A button:

- Will show the word QMS4VET



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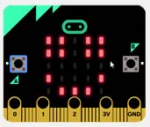
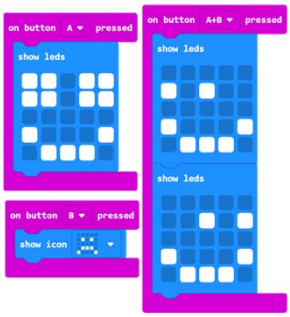
19

micro:bit

Pressing A, B ou A+B:

- Will show a smile, a sad face or changing eyes





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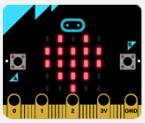
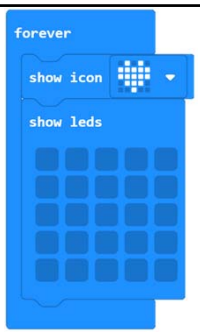
micro:bit

Forever:

- Will show a blinking heart





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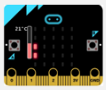
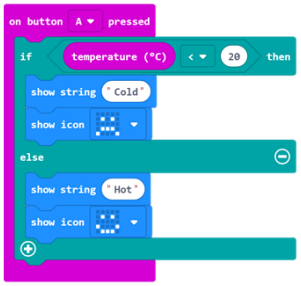
micro:bit

Pressing A button:

- Will measure temperature
- If lower than 20°C (cold) will show a sad face, otherwise it will be hot and it will appear a smile





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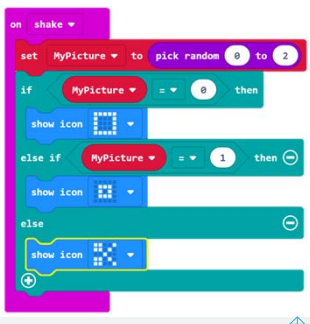
micro:bit

Rules

- Rock wins Scissor (crashes)
- Scissor wins Paper (cuts)
- Paper wins Rock (wraps up)
- If same symbol, then play again untill score

Shake to:

- Show randomly Paper (1st picture), Rock (2nd picture) or Scissor (last picture)



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Thank You QMS4VET!

Congratulations to the new Programmers!

Creative Lab

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