

# Head in the Clouds: An Initiative for Digital Learning among Roma Communities in Europe

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**Keywords:** Computer-Supported Collaborative Learning, Digital Learning, Self-Organized Learning Environments (Sole), Alternative Educational Approach, Roma Minority Group.

**Abstract:** Digital literacy has become one of today's key-prerequisites in both professional and private life. Tasks such as navigating through an unknown city, writing an email, arranging a business meeting or learning a new language, call for a competent handling of devices (e.g. smartphones, computers, tablets etc.). In addition, a profound understanding of functions and applications is necessary to overcome the social and economic boundaries, which especially children and young people from socially disadvantaged groups, families with migration background, refugees or members of underprivileged minority groups (such as Roma) meet on a daily basis. This paper presents the digital educational method, contents and partial results of the ongoing project *Head in the Clouds: Digital Learning to Overcome School Failure* - an EU-Erasmus+ strategic partnership aiming at providing quality educational materials for students from Roma communities in order to help participants develop the digital and transversal skills required to overcome existing boundaries to access (higher) education, employment as well as economic stability.

## 1 INTRODUCTION

The exclusion of Roma children from public and quality education affects the marginalization of Roma citizens in Europe and has perpetuated a cycle of low education levels, economic vulnerabilities, inadequate housing conditions, poor health, and social exclusion across generations. In 2011, all European Union (EU) Member States agreed on the *EU Framework for National Roma Integration Strategies (NRISs) by 2020* (European Commission, 2011). The proposed measures call upon EU Members to develop national policies that promote the inclusion of Roma individuals as "EU citizen with equal access to all fundamental rights." The agreement also highlights the necessity of non-discriminatory access to education and non-segregated schools in order to increase employment and improve the quality of life among Roma communities in the EU. As a result, numerous public and private initiatives for social and economic integration of Roma community members have emerged since the introduction of the EU Framework. The key focus areas include education, employment, health, housing as well as horizontal and structural measures focusing on the promotion of intercultural

dialogue and the establishment of Roma Contact Points (European Commission, 2016). *Head in the Clouds: Digital Learning to Overcome School Failure* is an EU funded Erasmus+ strategic partnership in the field of school education that aims to provide quality educational materials for Roma children and promotes an inclusive public education system by utilizing technology as a learning tool.

The Vienna University of Technology (TU-Wien) launched *Head in the Clouds* in 2016, together with partners from five European countries, with the vision to boost the quality of learning for Roma students by enhancing their basic and transversal skills and digital literacy. The intended long-term outcomes of this Erasmus+ project should prevent early school leaving and enable the pursuit of long-term careers for marginalized minorities. The program introduces an alternative teaching and learning method that revolves around digital technologies and computer programming skills. The designed program provides six Self-Organized Learning Environment boxes (SOLE-boxes) to three groups of Roma students in Romania, Kosovo, and Slovak Republic.

## 2 THE ROMA POPULATION IN EUROPE

The ethnic group commonly referred to as “Gypsies”, identify themselves as Roma or Romani. Rom (plural Roma) derives from the word *dom*, which translates as “man” in some Indian languages. The Roma migration from the Indian subcontinent to Europe took place in the fourteenth century (Kendrick, 2007). The earliest written record of their presence in Europe is dated back to 1378 when the Roma were granted privileges by the Venetian governor of Nauplion in the Peloponnese (Davies, 2005). The Roma adopted a nomadic lifestyle, which generated their own forms of social organization and cultural practices that emerged as a transborder ethnic identity within Europe. By the nineteenth century, the nomadic lifestyle of the Roma in Europe started to decline as many Roma families were forced to settle. However, the shift to more permanent settlements did not ameliorate the social and economic living conditions of the Roma and until today Roma community members across Europe continue to experience systematic discrimination.

Today, the Roma constitute approximately ten to twelve million of the European population—six million of which reside within the EU (Ec.europa.eu, 2018). In spite of EU efforts (European Commission, 2016) to promote Roma inclusion, the majority of the Roma population still struggles with social inclusion, access to formal education, and employment. Roma household members typically suffer from hunger (Worldbank.org, 2015) and more than 70% of Roma households live in deep poverty, comparable to the poorest regions of this world (European Commission, 2014). Despite the fact that according to the national laws of EU-member countries, all school-aged children must attend school, a high percentage of Roma children do not attend school (European Commission, 2012). Less than 30% of Roma students finish secondary school, this percentage is even much lower in some countries and especially among girls, resulting in the fact that employment among Roma men is below 50% and for women below 25% (Worldbank.org, 2015).

A study on the educational situation of Roma in 11 EU Member states concluded that 89% of Roma, aged 18-24 years, did not acquire any form of upper secondary qualification (European Union Agency for Fundamental Rights – FRA, 2014). The reasons for early school leaving are multifaceted including cultural and cognitive differences, socio-economic reasons as well as individual reasons. Unfamiliarity with linear text, resulting in many cases from the

illiteracy of parents and family members, e.g. leads to fear and insufficient understanding of educational materials. Other reasons for early school leaving include inadequate teaching styles, low motivation levels and exhaustion of teachers as well as a lack of available resources to use more appropriate and innovative teaching methods. Besides a shortage of equipment and poor infrastructure, other social-economic reasons include the geographical distance of many Roma-settlements to schools and missing public transportation means. Limited language skills and communication problems, mistrust in schools and the education system in general, early marriage and childbirth as well as the urgency to contribute to the household income are further reasons for early school leaving and the high dropout rates of Roma students (European Union Agency for Fundamental Rights – FRA, 2014). When taking a closer look at the OECD’s PISA test results of Romani speaking students it can be further concluded that more than 80% of Romani speaking students have not acquired basic cognitive skills and competencies. About 95% of Romani speaking students performed below the baseline of proficiency (below Level 2) in reading and science. This percentage slightly decreases to 87% for mathematics and 80% of Romani speaking students are below Level 2 with regards to problem solving skills (Bloem and Brüggemann, 2016). These results highlight the severe lack of basic education of Roma-children and young adults impeding employment possibilities, access to higher education, more economic stability, social integration and a better quality of life for Roma community members.

## 3 HEAD IN THE CLOUDS PROJECT

In view of the critical need for quality education among marginalized communities, the Vienna University of Technology initiated *Head in the Clouds* in 2016, with the purpose of designing a digital learning program that aims to increase educational attainment among Roma students in Europe. The project consortium exists of a total of seven partners from five European countries: Vienna University of Technology (Austria, project coordinator), Verein Offenes Lernen (Austria), Technical University of Kosice (Slovakia), GAIA (Kosovo), Fundatia Crestina Diakonia Filiala Sfantu Gheorghe (Romania), Sukromna zakladna skola (Slovakia) and SCIO (Czech Republic) (Brainsintheclouds.eu, 2018).

This initiative, focusing on the development of educational materials for application in Self-Organized Learning Environments (SOLE) in Roma communities in Kosovo, Romania and Slovakia, comprises of four stages, which are further described in the following: Needs Assessment, SOLE-Concept and Boxes, Implementation and Evaluation.

### 3.1 Needs Assessment

For the purpose of both (1) identifying the educational deficiencies of participating students and (2) assessing which digital technologies can address these shortcomings best, the implementing partners in Kosovo, Romania and Slovakia were asked to gather information about the students, families, living circumstances as well as level of skills and knowledge in different areas e.g. language skills, IT and computer skills etc.

The preliminary data collected by the three implementing partners indicated that the students and implementation partners in all three locations collectively expressed the need of developing knowledge and skills in five specific areas: i) Computer programming and digital literacy; ii) English; iii) environmental sustainability; iv) identity and health documentation; and v) creativity and innovation (Head in the Clouds Consortium, 2016). The assessment of the collected data and the expressed areas of interest played a vital role in the design and content development of six SOLE-boxes.

### 3.2 SOLE Concept and Boxes

The SOLE-box curriculum seeks to develop an innovative method for both teaching and learning by employing computational thinking, computer programming, group activities, educational games, and new technologies in the process. The *Head in the Clouds* Consortium believes in a playful and exploratory approach to education while developing the skills and knowledge of the students in a variety of subjects.

The *Head in the Clouds*' curriculum is based on the pedagogical method of Self-Organized Learning Environments (SOLE). This non-traditional educational method was originally developed by Sugata Mitra in villages and urban slums in India, starting in 1999. The original "hole in the wall" experiments included the provision of computer screens incorporated in walls and installed at a suitable height allowing children to freely use them. Over a time period of five years Mitra observed how children, who previously did not know how to use a

computer or the Internet, learned by themselves how to use the device, downloaded media, played games and researched information online. The significant educational achievements of students working in groups and in unsupervised environments following the SOLE concept (Mitra and Crawley, 2014), have since inspired educators around the world and led to the development of the first "School in the Cloud" in 2013. In addition, Sugata Mitra received the 2013 TED award for the concept of SOLE and the underlying social innovation of this alternative educational concept (Dolan et al., 2013).

SOLE focuses on a student self-driven learning process, accommodating every single student's capabilities, needs, and interests. A learning process driven by students is based on curiosity, it is collaborative and engaging, self-organized and only facilitated by adult encouragement (Mitra, 2015). A key concept of SOLE is that students creatively concern themselves with their own environment in order to consciously deal, both physically and mentally, with a topic or subject and to encourage discussion and further learning. In this context, the learning objectives of a SOLE activity are not predefined and include both the acquisition of skills, knowledge and competences in various subjects and areas (e.g. language, mathematics, and environmental education) as well as interdisciplinary and transversal skills, e.g. presentation, intercultural and interpersonal skills (Mitra, 2015). Another key concept of SOLE is the use of "big questions". Big questions are by definition questions which cannot be easily answered and which guide and encourage children to learn about basic theories, historic events and science, leading them to embark on a genuine process of knowledge and skill discovery (Theschoolinthecloud.org, 2018). The central idea of incorporating hands-on activities in project-based and self-driven learning processes, is also a fundamental building block of leading and successful learning theories e.g. constructionism (Harel and Papert, 1991).

Based on the results of the needs assessment, the *Head in the clouds* project team developed the following six SOLE-boxes, which can be implemented in a very easy manner in both group and individual settings. Each box contains a teacher-manual providing guidance for educators assuming the role of mentors, as well as a set of simple and modular structured task sheets containing as little text as possible (see also figure 1). Every task is linked to an online hand-in application via a QR-code shown on the task-sheet. The hand-in tool represents one

vital part of the evaluation of the developed educational materials.

**SOLE-Box 1 Video:** The material of this box encourages students to learn how to handle a mobile device, how to work with QR-codes and how to search for information on the Internet. Furthermore, it focuses on learning how to make a video or short film (storybook writing, taking and editing of pictures) including personal interviews (preparing interview questions, social interaction and presentation skills) and motivates students to provide constructive feedback while learning how to give and receive feedback. The video box particularly aims at making participating students familiar with the tools and applications (tablets, smartphones, QR-Codes, Online apps etc.) used throughout the different SOLE-boxes. Furthermore, through personal videos the box allows getting better to know the participating Roma-students across locations.

**SOLE-Box 2 IT 101:** This box uses *Raspberry Pi* computers (Raspberrypi.org, 2018) to allow students to discover basics about how to use different (Open) Office Programs (text processing, drawing and picture editing), online services (Google, Google Maps, Wikipedia, YouTube etc.) and further encourages students to learn some elementary level computer programming skills using the visual programming language *Scratch* (Resnick et al., 2009). To do so the box includes materials to learn how to assemble a *Raspberry Pi* computer, connect it to a computer screen, keyboard, mouse and WIFI as shown in the exemplary task sheet in figure 1.

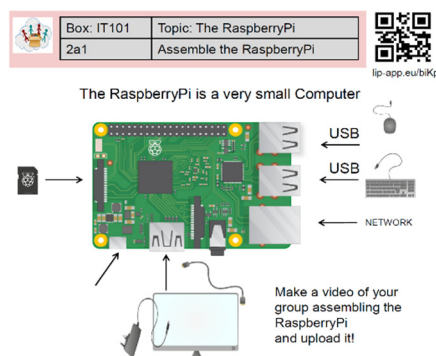


Figure 1: Task sheet from SOLE-Box 2 IT 101.

In addition the IT 101 box encourages students to create a basic document and folder management structure to organize digital content, motivates students to write and send emails to peers and aims at discovering background information on the authors of

websites to evaluate the authenticity of online content while discovering some of the do's and don'ts on the web.

**SOLE-Box 3 English:** Given that English is one of the predominant languages of online communication, this box presents students with various activities and materials to develop and enhance their English language skills. The main aims of the English box are to encourage students to learn the basics of English (vocabulary, sentences, pronunciation etc.), to communicate with other participating students in different locations and to raise interest for English. Furthermore, this box introduces some vocabulary needed for other, following boxes. The box includes e.g. tasks to retrieve information online (e.g. in which countries English is used and how many people speak English), tongue twisters, materials encouraging students to work on their spelling skills, build sentences and learn how to structure sentences. It further encourages students to construct family trees, describe a friend (hobbies, age, favorite food, etc.) and record audio messages. In addition, the English box uses a series of big questions of general education as suggested by Sugata Mitra, e.g. "Why do people living in different continents look differently?" or "Why do we have four different seasons?" to further guide the learning process of students.

**SOLE-Box 4 Ekopolis:** The main objective of the Ekopolis box is to address environmental issues in a playful manner. In the case of this box, the learning process is based on the educational board game *Ekopolis* (Ekopolis.cz, 2018) coupled with a variety of follow-up activities, exercises and hand-on tasks intended to encourage students to think about the principles and consequences of spatial relations in an urban context. To do so the box introduces students to topics and concepts such as pollution, sustainability, recycling and the ecological footprint. The box is intended to raise awareness for the impact of human actions and stimulates discussions on the before mentioned topics. It furthermore motivates participating students to get to know their cities (e.g. drawing a map of their hometown, analyzing local infrastructure etc.) and environment through a new "sustainable lens" with the purpose of brainstorming and finding ways of how to improve their living conditions and make their neighborhoods more sustainable.

**SOLE-Box 5 Programming:** The programming box is entirely made up of hands-on programming



and engineering activities. To do so this box uses *Makey Makey* boards (Makeymakey.com, 2018) to allow students to discover the basics of electric circuits and engage participants in handicraft work using e.g. *Scratch* (Scratch.mit.edu, 2018). Furthermore, it intends to convey very basic programming skills, particularly suitable for very young children, by using *Ozobot* robots (Ozobot.com, 2018) to find logical and creative solutions to problems presented in the box. *Lego WeDo* (Education.lego.com, 2018) is used to spark participants' creativity and building skills while acquiring new programming skills in the *Lego WeDo* native programming environment or in *Scratch*. Furthermore, the very popular online game *Minecraft* (Minecraft.net, 2018) is used to encourage students to learn and use the programming language *Python* (Python.org, 2018), e.g. for automating game-activities. Learning a very powerful programming language such as *Python* might have a huge motivational impact on participants and can lead the way to professional opportunities in the future.

**SOLE-Box 6 Real Life:** In this box, students find activities and materials that guide them towards collecting information on how to repair things, going on a trip and personal hygiene (bacteria and viruses, doctors, physical activity, vitamins, water drinking, drugs, and first aid basics). Furthermore, the box is intended to encourage students to learn about sex education (my body, inappropriate touching, contraception), relationships (different levels of relationship, having a date, friendly and unfriendly behavior, bullying, how to take care of pets) and Roma culture (history, legends, role models, Roma language, traditions, recipes etc. ...).

### 3.3 Implementation

The developed SOLE-boxes and educational materials are currently being implemented by the *Head in the Clouds* Consortium in three locations in Kosovo, Romania and Slovakia. It is worth mentioning that the three implementing partners were already very experienced in working with the local Roma communities and therefore familiar with their educational challenges and needs.

The implementation time per box and location is 6-8 weeks and all materials and boxes are provided by the *Head in the Clouds* Consortium. In preparation of the implementation, representatives from the implementing partners were trained to learn and personally experience the *Head in the Clouds* teaching methods in addition to the content of the

SOLE-boxes. Although the nature of the boxes highly encourages a self-learning process for students, mentors are also supplied with instructions regarding the methods of presentation and guidance throughout the implementation period. Furthermore, at the beginning of each box a guidance session in the form of a teleconference is organized to give both mentors and box developers the possibility to discuss the box-contents and possible implementation scenarios. In addition, regular Skype-meetings take place throughout the implementation cycles.

Although all locations use the same SOLE-box materials, the implementation settings between locations differ greatly. Currently Fundatia Crestina Diakonia Filiala Sfantu Gheorghe (Romania) implements the SOLE-box in the framework of an afternoon care program with about 30 participating kids aged 6-11 years. GAIA (Kosovo) runs a community center for kids and teenagers aged 10-17 years with 5-30 children and young adults in attendance and Sukromna zakladna skola (Slovakia) implements the boxes in a class-setting with about 20 children, aged 12-14 years.

### 3.4 Evaluation

The evaluation of the SOLE-boxes is focused on two principle goals of the SOLE method: (1) Children's ability to learn on their own and (2) Children experience the joy of learning. The designed evaluation is intended to mainly assess to what extent these general goals are being fulfilled and to identify underlying factors (i.e. to determine what factors may influence the effectiveness of the SOLE approach). To this extend the evaluation consists of three main parts.

The first part is mainly based on several simple "screening" questions designed to get basic demographic data about the teachers and children participating in the project, coupled with a short personality questionnaire which serves to identify possible personality traits which may be connected to the suitability of the SOLE method. The second part is directly related to the boxes and their content and serves to evaluate the suitability of the boxes, the interest of children in the boxes' content, the extent to which children developed their skills using the boxes etc. This part consists of questionnaires, live observation sheets, collected information from the online hand-in application and structured interviews with the teachers in order to get detailed feedback. The third part of the evaluation is executed in the form of an evaluation matrix, focusing on the assessment of learners' autonomy and the extent to which it is

being developed while working with the boxes, including the development of the ability to work with feedback, to set and achieve goals and to handle freedom.

After the completion of all SOLE-boxes, a final analysis will be conducted in order to make the necessary adjustments and modifications to the SOLE-box contents.

#### 4 LESSONS LEARNED & CONCLUSION

Despite the fact that the two-year trial period is still ongoing and the analysis of the evaluation is still to be conducted, the implementation of the first SOLE-boxes developed by the *Head in the Clouds* Consortium in the three locations in Romania, Kosovo and Slovakia, allow us to draw the following conclusions which are based on the ongoing assessment of materials, perceived progress of children by mentors and live observations.

The concept and idea of Self-Organized Learning Environments is not directly applicable when aiming at conveying specific educational contents as a minimal degree of intervention and guidance by mentors appears to be indispensable. Although the box content is always identical, the success and implementation of the educational materials differs greatly. All locations have in common that task sheets with hand-on activities and involving all senses, work best. Common difficulties include a lack of motivation of students to read long texts as well as unfamiliarity with basic concepts such as a world map and identifying role models due to cultural differences. Common visible improvements of participating students, across all three locations, include improved social interaction, reading and writing skills as well as learning how to handle devices such as computers and tablets.

Organizational challenges included in one case the fact that more children wanted to participate in the program than could be accommodated, while in a different location the irregular attendance of participants (e.g. during harvest season) represented a challenge at times. Infrastructural challenges included the provision of Internet connections, electricity and in some locations computer monitors.

The trial-implementation further showed that the potential and the implementation possibilities of the developed SOLE-boxes are multifaceted. It should be further emphasized however that it is not the intention of the *Head in the Cloud* Consortium to propagate

SOLE as an alternative to conventional teaching methods. On the contrary, SOLE can be beneficial as a possible extension and supplement to conventional teaching curricula, enabling students to acquire new learning contents in a playful and self-explanatory manner, driven by curiosity and the desire for knowledge. At the same time, the SOLE approach offers a way back to education for children and young adults who have already dropped-out of school as it is the case with many Romani-speaking children and young adults. SOLE-boxes can be used in various settings including schools, afternoon care programs, summer programs or day care centers and are aimed at children and young adults, regardless of origin and level of education, aged between 7-16 years.

After evaluating the students' performance at the end of the two-year trial period in 2018, the Vienna University of Technology and partners are planning to expand the *Head in the Clouds* program to a larger number of students, from both minority as well as non-minority groups in Europe and beyond.

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#### REFERENCES

- Bloem, S. and Brüggemann, C., 2016. *Student Performance and Inequality in Central and South Eastern Europe: Cross-country Comparison and a Case Study on Romani-speaking Students in Slovakia*. Working Paper No. 1. [pdf] Budapest: Roma Education Fund. Available at: [https://www.romaeducationfund.hu/sites/default/files/publications/bloem\\_bruggemann\\_ref\\_working\\_paper\\_2016\\_en\\_web.pdf](https://www.romaeducationfund.hu/sites/default/files/publications/bloem_bruggemann_ref_working_paper_2016_en_web.pdf) [Accessed 3 Jan. 2018].
- Brainsintheclouds.eu, 2018. *HEAD IN THE CLOUDS: Digital Learning to overcome School Failure*. [online] Available at <https://brainsintheclouds.eu> [Accessed 30 Jan. 2018].

- Davies, N., 2005. *Europe: A history*. Pimlico Publishers. London.
- Dolan, P., Leat, D., Mazzoli Smith, L., Mitra, S., Todd, L., Wall, K., 2013. Self-Organised Learning Environments (SOLEs) in an English School: an example of transformative pedagogy?. *Online Education Research Journal*, [online] Volume 3(11). Available at: [http://nrl.northumbria.ac.uk/15077/1/SOLEs\\_-\\_Transformative\\_Pedagogy.pdf](http://nrl.northumbria.ac.uk/15077/1/SOLEs_-_Transformative_Pedagogy.pdf) [Accessed 2 Jan. 2018].
- Ec.europa.eu, 2018. *Roma Integration in EU Countries. European Commission* [online] Available at: [https://ec.europa.eu/info/strategy/justice-and-fundamental-rights/discrimination/roma-and-eu/roma-integration-eu-countries\\_en](https://ec.europa.eu/info/strategy/justice-and-fundamental-rights/discrimination/roma-and-eu/roma-integration-eu-countries_en) [Accessed 29 Jan. 2018].
- Education.lego.com, 2018. *Education Lego-Website*. [online] Available at <https://education.lego.com> [Accessed 30 Jan. 2018].
- Ekopolis.cz, 2018. *Ekopolis-Website*. [online] Available at <http://www.ekopolis.cz/> [Accessed 30 Jan. 2018].
- European Commission, 2011. *An EU Framework for National Roma Integration Strategies up to 2020: Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions COM (2011) 173*. [pdf] Brussels: European Commission. Available at: <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52011DC0173&from=DE> [Accessed 2 Jan. 2018].
- European Commission, 2012. *National Roma Integration Strategies a first step in the implementation of the EU Framework: Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions COM (2012) 226*. [pdf] Brussels: European Commission. Available at: [http://ec.europa.eu/justice/discrimination/files/roma\\_nat\\_integration\\_strat\\_en.pdf](http://ec.europa.eu/justice/discrimination/files/roma_nat_integration_strat_en.pdf) [Accessed 3 Jan. 2018].
- European Commission, 2014. *Report on discrimination of Roma children in education*. [pdf] Brussels: European Commission Directorate-General for Justice. Available at: [http://ec.europa.eu/justice/discrimination/files/roma\\_childdiscrimination\\_en.pdf](http://ec.europa.eu/justice/discrimination/files/roma_childdiscrimination_en.pdf) [Accessed 3 Jan. 2018].
- European Commission, 2016. *Assessing the implementation of the EU Framework for National Roma Integration Strategies and the Council Recommendation on Effective Roma integration measures in the Member States 2016: Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions COM (2016), 424*. [pdf] Brussels: European Commission. Available at: [http://ec.europa.eu/justice/discrimination/files/roma-report-2016\\_en.pdf](http://ec.europa.eu/justice/discrimination/files/roma-report-2016_en.pdf) [Accessed 3 Jan. 2018].
- European Union Agency for Fundamental Rights – FRA, 2014. *Roma survey – Data in focus Education: the situation of Roma in 11 EU Member States*. [pdf] Luxembourg: Publications Office of the European Union. Available at: [http://fra.europa.eu/sites/default/files/fra-2014\\_roma-survey\\_education\\_tk0113748enc.pdf](http://fra.europa.eu/sites/default/files/fra-2014_roma-survey_education_tk0113748enc.pdf) [Accessed 3 Jan. 2018].
- Harel, I., Papert, S.; 1991. *Constructionism*. Ablex Publishing Corporation. Westport, CT.
- Head in the Clouds Consortium, 2016. *Needs Assessment Report*. June 2016, unpublished.
- Kenrick, D., 2007. *Historical dictionary of the Gypsies (Romanies)*. Scarecrow Press. Lanham, Md., 2<sup>nd</sup> edition.
- Mitra, S. and Crawley E., 2014. Effectiveness of Self-Organised Learning by Children: Gateshead Experiments. *Journal of Education and Human Development*, 3 (3), pp. 79-88.
- Makeymakey.com, 2018. *Makeymakey-Website*. [online] Available at <https://makeymakey.com/> [Accessed 30 Jan. 2018].
- Minecraft.net, 2018. *Minecraft-Website*. [online] Available at <https://minecraft.net/> [Accessed 30 Jan. 2018].
- Mitra, S., 2015. *SOLE TOOLKIT - How to bring self-organized learning environments to your community*. Newcastle University. [online] School in the Cloud. Available at: [https://s3-eu-west-1.amazonaws.com/school-in-the-cloud-production-assets/toolkit/SOLE\\_Toolkit\\_Web\\_2.6.pdf](https://s3-eu-west-1.amazonaws.com/school-in-the-cloud-production-assets/toolkit/SOLE_Toolkit_Web_2.6.pdf) [Accessed 3 Jan. 2018].
- Ozobot.com, 2018. *Ozobot-Website*. [online] Available at <https://ozobot.com/> [Accessed 30 Jan. 2018].
- Python.org, 2018. *Python-Website*. [online] Available at <https://www.python.org/> [Accessed 30 Jan. 2018].
- Raspberrypi.org, 2018. *Raspberrypi-Website*. [online] Available at <https://www.raspberrypi.org/> [Accessed 30 Jan. 2018].
- Resnick M., Maloney J., Monroy-Hernández, A., Rusk, N., Eastmond, E., Brennan, K., Millner, A., Rosenbaum, E., Silver, J., Silverman, B., Kafai, Y., 2009. Scratch: programming for all. *Communications of the ACM*, 52(11), pp. 60-67.
- Scratch.mit.edu, 2018. *Scratch-Website*. [online] Available at <https://scratch.mit.edu/> [Accessed 30 Jan. 2018].
- Theshoolinthecloud.org, 2018. *About School in the Cloud*. [online] Available at: <https://www.theschoolinthecloud.org/about/> [Accessed 3 Jan. 2018].
- Worldbank.org, 2015. *Roma*. [online] Available at <http://www.worldbank.org/en/region/eca/brief/roma> [Accessed 3 Jan. 2018].