

Head in the Clouds – Digital Learning in Indonesia

Background:

From 2015-2018 the Vienna University of Technology, together with six partners from five European countries, implemented a strategic partnership targeting ICTs in education entitled “Head in the Clouds – Digital Learning to overcome School Failure” (see also <https://brainsintheclouds.eu/>). This project dealt with the prevention of early school leaving, the development of basic and transversal skills and the enhancement of digital literacy and education, primarily targeting children from families with minority backgrounds. In the frame of the Head in the Clouds project, the researchers developed a total of six educational modules, following the MINIMAX Approach (Minimal teacher invasion, Maximum learner autonomy), originally inspired by Sugata Mitra’s SOLE approach (Self-Organized Learning Environments) and constructionist learning theory, both supporting an individual learning process according to a student’s abilities, needs and interests.

Project Initiation and planning:

During a visit from Prof. Inggriani Liem (ITB) to the Vienna University of Technology's Institute of Information Systems Engineering in 2017, Dipl.-Ing. Niina Novak, MSc (TU Wien) who was leading the three-year Head in the Clouds project introduced Prof. Liem to the project, the alternative educational MINIMAX approach and the developed educational modules. As a result, of this initial meeting, Prof. Liem, Dipl.-Ing. Novak and Dr. Ekaputra (TU Wien) developed a plan to implement a selection of the educational modules (e.g. English, EKOPOLIS, IT 101 and Programming Module) with students of different school levels in different locations in Indonesia and to furthermore introduce and train local teachers and researchers in this alternative educational approach and the use of the developed educational modules.

The planned training and implementation in Indonesia is crucial as Prof. Liem is currently working in a team with colleagues from leading universities in Indonesia, including ASEA-UNINET members: UI, IPB and ITS, for "Puskurbuk" with the purpose of developing a new IT and Informatics curriculum for all levels of school (preschool, elementary school, middle school, high school). “Puskurbuk” is short for “Pusat Kurikulum dan Perbukuan”, which is the "Center of Curriculum development and books" of the Indonesian Ministry of Education. Noting that the current focus of this team lies on designing implementation methods, the developed educational modules of the Head in the Clouds project are perfectly in line with the team’s work on Informatics curriculum improvement in Indonesia and will thus contribute to the improved implementation model for villages outside Java, and other areas of Indonesia in the following years.

Project implementation:

The project implementation in Indonesia took place from March 21st to 31st, 2019, with workshops and seminars in three different cities: Bandung, Jakarta and Balige and over 300 teachers, researchers, children and youth in attendance.

On Monday March 25th, 2019 the first seminar for teachers and researchers took place at ITB Bandung. The morning seminar was split into two parts “Introduction to new Informatics Curricula in Indonesia” by Prof. Liem and “Introduction to Head in the Clouds Project” by Dipl.-Ing. Novak. During the presentation Dipl.-Ing. Novak focused especially on the characteristics and implementation setting of the developed educational MINIMAX approach, the content and background of the individual learning modules and shared a lot of first hand experiences and lessons learned from the implementation of the modules in different locations across Europe. In the afternoon, the participants at ITB had the possibility to experience and work with three of the educational modules: EKOPOLIS, IT 101 and Programming in the frame of a workshop. During the workshop, the participants also got to know, some of the devices and materials used within the boxes including the educational board game EKOPOLIS, focusing on environmental education and awareness raising for issues related to sustainability, the “Ozobot” robots and MaKey MaKey boards.



Head in the Clouds Seminar participants at ITB in Bandung



Head in the Clouds Workshop at ITB: EKOPOLIS Module



Head in the Clouds Workshop at ITB: Programming Module (MaKey MaKey)



Head in the Clouds Workshop at ITB: IT 101 Module & Programming Module (Ozobots)

On Tuesday March 26th, Prof. Liem, Dipl.-Ing. Novak and Dr. Ekaputra travelled to Jakarta by train to hold a four hours seminar at the "Center of Curriculum development and books" of the Indonesian Ministry of Education (“Puskurbuk”). The seminar was again split into three parts, (1) the introduction to the new informatics curricula in Indonesia. (2) Presentation of the Head in the Clouds project and educational approach as an example of how computer science can be also taught in a non-traditional school setting and in a student-centred approach and (3) experiencing the Head in the Clouds educational modules.



Seminar on new Indonesian Informatics Curriculum and Head in the Clouds Project in Jakarta, Indonesia
(Left picture: Speakers, Right picture: Seminar participants)



Participants of the Seminar at the Center of Curriculum development and books,
Indonesian Ministry of Education in Jakarta, Indonesia

On Wednesday March 27th, Prof. Liem, Dipl.-Ing. Novak and Dr. Ekaputra travelled to Balige, Sumatra, Indonesia. In the afternoon Dipl.-Ing. Novak and Dr. Ekaputra gave a guest lecture on the topic of "Studying in Austria" and "Introduction to Semantic" web for senior students of IT Del, in Balige. On thursday March 28th, Prof. Liem, Dipl.-Ing. Novak and Dr. Ekaputra introduced the teachers of IT Del and surrounding schools to the new informatics curricula in Indonesia and the Head in the Clouds project. The presentation of the Head in the Clouds project was bilingual in Bahasa Indonesia and English language.



Participants of the Seminar for Teachers at IT Del in Balige, Indonesia

On Friday March 29th, in total three consecutive workshops took place all introducing selected modules of the Head in the Clouds project (EKOPOLIS, IT 101, Programming and English) including devices such as Raspberry Pis, Ozobots, the EKOPOLIS board game and MaKey MaKey boards. The first one was exclusively designed for teachers of IT DEL and surrounding schools. The second workshop, was designed for elementary school students and in the third workshop junior and high school students participated. Notably teachers were given the opportunity to observe how the kids interact and work with the modules during the second and third workshop-round.



Head in the Clouds Workshop for teachers at IT DEL: EKOPOLIS Module



Workshop for elementary school students with teachers observing - Programming Module (Ozobots)



Workshop for elementary school students at IT DEL: IT 101 & Programming Module (MaKey, MaKey)



Workshop for elementary school students at IT DEL: EKOPOLIS Module





Participants of the Workshop for Junior and Senior High School students at IT Del in Balige, Indonesia



Workshop for junior and senior high school students at IT DEL: Work with the IT 101 & Programming Module (Raspberry Pis, MaKey Makey, Ozobots and presentation of the tasks of the English Module



Head in the Clouds workshop participants and student volunteers from IT Del, Balige, Indonesia

Outlook and further plans:

Based on the very positive feedback of participating teachers and students. The Indonesian partners are currently working on the translation of selected tasks of several of the educational modules, which are available as Open Educational Resources (OER) and plan to make them available across Indonesia. In addition, the Indonesian partners are planning to develop a local version of the EKOPOLIS board game for environmental education. The project partners from TU Wien will support with consultation services in the development and translation of the educational modules. Moreover, the implementation of the developed educational materials in a different location in Sanga-Sanga (Borneo, Indonesia), as well as additional seminars and workshops for training teachers and youth workers is envisioned.

Project partners:

Dr. Ir. Inggriani Liem joined ITB as a lecturer in 1978. She has been participating in the development of the Informatics department in 1981, the first informatics study program in Indonesia. She received her bachelor degree from ITB in the field of Engineering Physics. Then she pursued her study in France, for DESS Informatique Double Compétence from Université Grenoble I France and DEA from Institute National Polytechnique de Grenoble. She obtained her Docteur en Informatique from Université Joseph Fourier, Grenoble, France with specialization in Programming Pedagogy. After returning from her study from France, she joined the ITB Data and Software Engineering Research Group, School of Electrical Engineering and Informatics. She was assigned by ITB as the advisor to Del Institute of Technology, Balige, Sumatera during its initiation phase, and she was Director of the school from 2007 until 2011. Her research interest is in the field of pedagogy programming and the development of the platform and tools for automated grading for programming assignment and competition. She is one of the members of coaches and judges for the Indonesian Olympiad in Informatics (IO) since 2004 until now, preparing high school students for national selection and IOI. She was also coaching and advising the Bandung Institute of Technology's team for ACM-ICPC International Collegiate Programming Contest between 2012-2013. She is now the leader of Bebras Indonesia NBO, and part of the team who develops the K-12 Indonesian informatics curriculum.



Dipl. Ing. Niina Maarit Novak, MSc BSc joined the Vienna University of Technology (TU Wien) as Research Assistant in 2015 and the Linked Data Lab of TU Wien in 2017. She received her Dipl. Ing. from the University of Vienna in Business Informatics with a specialization in business intelligence. Previously she received a Master degree in International Business Administration from the University of Vienna with a specialization in innovation management and spend one semester at the Concordia Universities, John Molson School of Business in Montréal, Canada. Her current research topics are located at the intersection of economy, society and computer science, focusing on sustainability, digitalization and business intelligence. She edited three books and co-authored more than 15 papers in refereed venues. Besides working as a researcher at the Vienna University of Technology, Ms. Novak is also working as Assistant to the executive board and senior project manager for the ASEAN-European Academic University Network (ASEA-UNINET) since 2015. In this function, she coordinates more than 100 research project and scholarship applications on an annual basis, with a special focus on internationalization in research as well as knowledge and technology transfer between the 85 ASEA-UNINET member universities from Europe and Southeast Asia.



Dr.techn. Fajar J. Ekaputra, S.T., M.T., is a Postdoctoral researcher at TU Wien. His research focuses on Semantic Web Technologies for data integration and knowledge change management in several application domains, including Industrie 4.0, Personal Data Management, and Smart City. During his time in TU Wien, he took part in implementing both practical and research use cases for industry partners in several domains. Concretely, he was involved in developing analytic and management tools for AutomationML models and building a common concept ontology for a Hydro Power Plant production system as part of the CDL-Flex project in the Automation System Engineering domain. He was recently leading the development of the STAR project prototype, where he designed and integrated semantic search capabilities for software architectural knowledge in a large organization. He co-authored 5 book chapters and more than 25 papers in refereed venues out of which 2 won best paper awards. One of his recent publication in the area of knowledge change management was selected as one of the best paper nominations. He is actively involved in research communities as a scientific reviewer for several international conferences and workshops, e.g., ISWC, SEMANTiCS, IFAC, ICoDSE, and BigScholar.