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COMMUNICATION

The ARTiST-project still "alive" – Examples from Georgia and the Philippines

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ARTiST (Action Research to innovate Science Teaching) was a project co-funded by the ERASMUS+ program of the European Union under. Ten partners from seven countries worked together and implemented action research into their science teacher education programs. The main philosophy of the project was to innovate science education through classroom-based and teacher-driven action research. Training materials, teacher professional development courses for teachers and students were developed during the ARTiST-project. Some examples of the activities after three years of the projects' end will be presented in this communication.

Keywords: Science Education; Action Research; Implementation

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Introduction

ARTiST (Action Research to innovate Science Teaching) was a project co-funded by the ERASMUS+ program of the European Union under the CBHE scheme, focusing Capacity Building in Higher Education. Ten partners from seven countries worked together and implemented action research into their science teacher education programs in their countries. The project took place in 2016-2019. The main philosophy of the project was to innovate science education through classroom-based and teacher-driven action research (AR). ARTiST considered action research to be one of the most promising strategies for creating evidence-based classroom practices in educational studies. Networks of the universities, schools and enterprises were formed in the project lifetime to ensure sufficient impact of the project. ARTiST centers were officially launched as supporters for schools and teachers interested in doing AR in science education.

The primary goal of AR is for teachers to solve problems, or resolve dilemmas and dissonances to improve their practice field (Feldman, 1996). AR provides a whole set of medium to long-term strategies for both classroom-based research and teachers' professional development (Feldman, Altrichter, Posch & Somekh, 2018; Laudonia, Mamlok-Naaman, Abels & Eilks, 2018; Eilks, 2018).

Action research is described as a cyclical process of planning, implementation, observation and reflection (Gilbert & Newberry, 2004). These cycles allow teachers to evaluate their own classroom practices for improvement (Towns, Kreke & Fields, 2000). Through reflection, teachers and student teachers better understand students' learning difficulties and also critically look at their own teaching practices.

Training materials, teacher professional development courses and activities for the teachers and students were developed during the ARTiST-project implementation. Some examples about the activities after three years of the projects' end will be presented in this communication.

Examples from the Philippines

Two universities from the Philippines were involved in the project implementation: De la Salle University and Ateneo de Manila University, both located in Manila City. During the project live time interesting workshops and teacher conferences were held at the both universities.

De la Salle University (DLSU) academic staff regularly inform their students about the ARTiST website (http://www.erasmus-artist.eu/index.html), when they discuss the topic of AR. Participants are mostly graduate students. De la Salle University encourages students to "look around" for things that might be useful for them in their research. The ARTiST webpage is also mentioned with in-service teachers, as a resource to conduct AR in teachers' classrooms at basic level of education. This is compulsory as part of teachers' professional development. Course participants also receive the ARTiST guidebook, which were prepared by the ARTiST consortium during the course of the project. During the COVID-19 pandemic period, academic staff from De la Salle University was not able to distribute copies of printed versions. The electronic version of the ARTiST-Guidebook, which is available via ARTiST webpage (http://www.erasmus-artist.eu/resources.html) was considered very helpful.

Webinars about AR methodology were held during the COVID-19 Pandemic period, as the both campuses in the Philippines were closed from March 2020 until middle of 2022. These webinars were conducted in cooperation with the De la Salle University College research and development office, the Lasallian Institute for Development and Educational Research (LIDER) and a national association of biology teachers, the Biology Teachers' Association (BIOTA) – DLSU Chapter. Most of the webinars were delivered by DLSU PhD students in science education working in biology education.

ARTiST materials and equipment are still available for students in their selected pedagogy courses at the university. The Department of Science Education is cooperating with the Integrated School (IS) of DLSU that manages basic education. Earth and life science courses as well as physics courses in senior high school are in preparation. Academic staff from the DLSU department of science education are still using their experience from the ARTiST project to offers IS science teachers training in action research plus access to the project materials and equipment.

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The activities at Ateneo de Manila University (ADMU) with in-service teachers during the last two years were very limited because of the restrictions of onsite activities due to the COVID-19 pandemic. The activities during this period were centered on sharing methods and materials for teaching science and physics in the online setting.

Academic staff members of ADMU continued cooperation with the ARTiST network schools. Two graduate students, who were working at these schools, using AR methodology, developed their projects. One of the students developed portable physics kits for DC circuits and optics experiments, which can be performed within the classroom or at any available space in the school. This AR project was to address the absence of a dedicated physics laboratory as well as professional physics equipment in her school. All the professional physics equipment of the school was damaged by two huge floods. The new kits now have been adopted by the school and are still in use. Additional experiments (e.g. electromagnetic induction, wave optics and mechanics) are in preparation, which will be added to the current portable kits. Another graduate student was developing physics experiments on sound using mobile phones and the Physical Phone Experiment (Phyphox) free app. This action research is being done to address the need for lab experiments where students can collect, process and analyze the data outside the school laboratory. These activities are useful for online laboratory instruction where there is no access to the usual laboratory facilities, but readily available materials outside the schools' laboratories can be used.

The ARTiST guidebook is still used by students of the MSc in science education programme. The books is also distributed to public school teachers all over the country who are highly encouraged by the Department of Education of ADMU to be engaged in AR.

A number of the ARTiST equipment is still used for lecture demonstrations, video-taped and uploaded in a YouTube channel. These demos are used in online lectures and laboratory classes (https://www.youtube.com/watch?v=6esWfrxa-cA). The lecture room with the smart projector (part of the ARTIST project) has been modified to cater to flexible classes (with onsite and online students) and pure online classes.

Ivan Culaba, staff member from ADMU has reported: "*What I learned from the ARTIST project came very handy when classes shifted to the online mode during the pandemic. In my whole teaching career I had never taught a laboratory course online. I and my colleagues actually were clueless what would work for the students in an online laboratory.*

Following the action research cycle, reflection on potential laboratory activities was done with a focus on what the students could possibly perform at home. We came up with the following list:

- *Video analysis using the Logger Pro software of Vernier (if there is a license)*
- *Simple home experiments*
- *Simulation experiments using Physics Education Technology (PhET)*
- *Pure data analysis*
- *Viewing video-taped experiments, copying then, and analyzing the data*

We prepared activity sheets. They tried out the activities and got data. These activities were then used during the first online classes in 2020-2021 (quarterly). As a form of assessment, the students were required to write reflection papers about the online laboratory activities. Based on the students' performance and their reflection papers we rewrote the activity sheets and tested them again in the following semester. The activity sheets went through several iterations." This can be seen also as a form of AR in science education.

Analyzing these examples and stories it becomes visible that ARTiST project ideas, materials and equipment are widely used for in- and pre-service teacher preparation programs in the Philippines.

Examples from Georgia

Two universities successfully implemented the project in Georgia: Ilia State University, Tbilisi (co-coordinator of the ARTiST project) and Batumi Shota Rustaveli State University.

The ARTIST guidebook and the materials of the project workshops, which reflect the AR experiences of teachers from different countries, are actively used by the academic staff of Batumi Shota Rustaveli State University (BSU) for in-service and pre-service teacher training in the Adjara Region in western Georgia. The curricula of the teacher training program have been significantly modified by implementing AR methodology courses and projects.

Due to the rules adopted during the COVID-19 pandemic, for the next three years after the completion of the project, with the exception of a short period, the educational process in Georgia was conducted online. Due to the new challenges of online learning, the experience of ARTiST project proved to be an important component for in-service teachers involved in the project. Teachers from three schools from the ARTiST-network in Batumi (N1, N2 and the Georgian-French School) developed a case for effective biology teaching on the topic "Difficulties in understanding the mechanisms and results of modification variability in students", using AR.

The ARTIST equipment in the science laboratory is still used by BSU students to conduct different experiments. From time to time, school students also use the mentioned devices and, under the guidance of their science teacher, gain experience in conducting tests in the direction of embryology, genetics, etc.

In Tbilisi, regular meetings of the ARTiST-network of science teachers are organized by the SALiS center at Ilia State University (ISU). Teachers exchange their innovative ideas and share experience about the improvement of their everyday school practice.

ARTiST guidebooks are used for the pre- and in-service teachers for their professional development. As the meetings were online during the COVID-19 pandemic, teachers used online versions from ARTiST webpage. Anyhow, printed versions are still available at the university.

Academic staff members conduct practical laboratory courses for pre- and in-service science teachers using the installed ARTiST equipment, which is installed in the SALiS laboratory at ISU.

AR became the main strategy for the pre-service teachers preparing their master thesis at ISU. Last year three pre-service teachers worked with science teachers of Kutaisi State School N30 and conducted several circles of AR. Diagnostic investigation showed that students had no interest in science disciplines. To raise their motivation, pre-service teachers suggested inquiry-based learning and different teaching sequences based on inquiry with an integrated approach to in-service science teachers at school. Measurements showed some progress in students' achievement and motivation.

Conducting AR helped pre-service teachers to analyze the situation and improve the learning process in the classroom. It helped the school students to develop more interest in studyingin school science subjects. At the stage of intervention, a positive tendency in terms of students' involvement in the learning process was noted. They asked questions and tried to connect the lesson content to everyday life. On the basis of AR, it was assumed that a learning process oriented on students' interests and needs led to students' fascination and involvement in the lesson, both of which were indicators of enhancing student's motivation. In-service science teachers have seen the importance of AR for their future everyday practices.

Also, the examples from Georgia show successful continuation of the ARTiST-project ideas and importance of AR methodology for teacher professional development.

Conclusions

All above discussed examples show the importance of AR and its role for teacher everyday practices. AR is part of professional development and university courses in many countries (Mamlok-Naaman & Eilks, 2012). From the presented examples from Geogia and the Philippines we assume that the ARTiST-project was an important support for the project participant countries, as they became aware about the importance and effectiveness of AR for helping teachers to reflect on and develop their own teaching practices.

To conclude with Feldman et al. from 2022: "AR provides a distinctive approach to both research in science education and the development of science teachers and their teaching. Since it is done by and with teachers, it offers numerous opportunities for teachers to learn by reflecting on their practice, based on collected evidence. Thus, it is a promising approach to science teacher education as a means of continuous professional development" (Feldman et. al 2022).

References

Eilks, I. (2018). Action research in science education: A twenty-year personal perspective. *Action Research and Innovation in Science Education, 1*(1), 3-14.

Feldman, A. (1996). Enhancing the practice of physics teachers: mechanisms for the generation and sharing of knowledge and understanding in collaborative action research. *Journal of Research in Science Teaching, 33*, 513–540.

Feldman, A., Altrichter, H., Posch, P., & Somekh, B. (2018). *Teachers investigate their work: An introduction to action research across the professions*. London: Routledge.

Feldman, A., Belova, N., Eilks, I., Kapanadze, M., Mamlok-Naaman, R., Rauch, F., & Taşar, M. F. (2022). Action Research: A promising strategy for science teacher education. In J. A. Luft & M. Gail Jones (Eds), *Handbook of research on science teacher education* (pp. 352-362). London: Routledge.

Gilbert, J. K., & Newberry, M. (2004). The Cams Hill Science Consortium: An inter-institutional collaborative action research project in science education. In B. Ralle & I. Eilks (eds.), *Quality in practice-oriented research in science education* (pp. 53-62). Aachen. Shaker.

Laudonia, I., Mamlok-Naaman, R., Abels, S., & Eilks, I. (2018). Action research in science education–an analytical review of the literature. *Educational Action Research, 26*, 480-495.

Mamlok-Naaman, R., & Eilks, I. (2012). Different types of Action Research to promote chemistry teachers' professional development – a joined theoretical reflection on two cases from Israel and Germany. *International Journal of Science and Mathematics Education, 10*, 581-610.

Towns, M. H., Kreke, K., & Fields, A. (2000). An action research project: Student perspectives on small-group learning in chemistry. *Journal of Chemical Education, 77*, 111-115.