Case Study 8: Panagiota placement in the industry as way of professional development

There are two sections in this case study:

A. The Case Study
B. Deconstructing this case study

Section A. The Case Study

Panagiota Argyri is a Mathematician Teacher in Evangeliki Model High of Smyrna for the last 10 years. She is also PhD Candidate to the Department of Secondary Educational Studies of National Kapodistrian University of Athens.

Background

Panagiota, except of the teaching of content of the subject of mathematics according to the guidelines of the curriculum, gives priority to the good practices and innovative actions for personal, social and emotional development of students. Thus, she motivated to choose as a topic of PhD research the connection of secondary education with workplaces in order to develop students' skills, that it is involved in the field of pedagogy. She is working in Evangeliki (one of Model Schools in Greece), that focus on the dissemination of the idea and practices of excellence in the education system, as well as in the promotion and encouragement of students with talents and special learning abilities. Under this framework, she is interesting in organization and implementation career exploration activities that help students learn about the skills needed for their future careers and career preparation activities that integrate career and academic skills acquired in the classroom with skills and knowledge acquired in the workplace.

Panagiota make the hypothesis that her placement in the industry, could have a central role not only in better understanding the needs and expectations of the workplaces, but also in integrating skills, knowledge and attitudes related to the workplace within the classroom with students.

Pedagogical Focus

The social, economic and environmental challenges of the modern social reality are creating increasing demands for the workforce that must be properly prepared to meet the required workplace skills. The fourth industrial revolution with the digitization and development of technology, the globalization, the environmental problems with a focus on climate change cause changes in all areas of our lives, and especially in the workplace.

Panagiota is concerned:

- *How are students prepared for the transition from secondary education to the labour market?*
- *How are students supported in making professional career decisions?*
- *By what criteria do they choose the role of the professional they would like?*
- *Do they know the requirements of the workplaces they would like to involved?*

As a teacher, she believes that the rapidly evolving of the modern society makes the role of the school crucial for preparing young people for the transition to the labour market and, above all, to educate them with knowledge, attitudes and skills to be able to undertake an active role as future citizens in making decisions for future careers, which will have a positive impact on their professional life.
The next step is to think about how she could take an active role in support students for the preparation of their future professional career. Her research as a PhD candidate shows that stakeholders and educational policies promote the partnerships between school and industry[1, 2, 3] . But there are many structural barriers in Greek educational system which do not allow provision time among weekly school program for activities based on school-industry partnerships

She encouraged and motivated to make a research plan for placement in industry as she recalled in her memory, that the teacher's placement initiatives had been presented as good practices to support the central role of the STEM teachers to motivate young people to pursue STEM studies and careers through workshops organised by STEM Alliance (that is an international initiative, coordinated by European Schoolnet).

Research Question

In order to consider that its placement in industry is an effective way of her professional development, she thinks that the research plan needed to focus on 3 key issues/topics: i) to understand what skills needed to incorporate in her teaching practices (Objectives of teaching practices) ii) what teaching methodologies does she need to implement to develop these skills to her students (how she could achieve the objectives) iii) how will she evaluate the development of students' skills. Before making the final decision for her placement in the industry, he was very worried that it might not be possible to answer these 3 questions, as industry workers and teachers perform different roles and tasks in different work environments and in incomparable situations. But she thought that researchers are examining hypotheses that are sometimes rejected and so they review and redesign their research, so it would not be a waste of time to follow a research field to an industry for collect data and then analyse them for the topic:

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[1] OECD (2012), *Better Skills, Better Jobs, Better Lives: A Strategic Approach to Skills Policies,* OECD Publishing. http://dx.doi.org/10.1787/9789264177338

[2] Bakhshi, H., Downing, J., Osborne, M. and Schneider, P. (2017). *The Future of Skills: Employment in 2030*. London: Pearson and Nesta.

[3] European Commission (2016). Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions Improving and Modernizing Education. Brussels, Belgium. COM/2016/0941.

Are industry and the STEM classroom different learning environments?

Data Collection

The field research of industry took place during the summer months of her holidays, so that it can devote enough time. A food industry owner (who was a close family friend) was informed by Panagiota about the aims of her research and willingly accepted her proposal to participate in his workplace to carry out her research. This food industry is a state-of-the-art product manufacturing plant located in the Peloponnese with a total area of 5,200 sq.m., with 40 employees on a daily basis. The main product categories of the company are manufactured according to international standards, where they are exported locally and internationally.

Participatory observation was the main method of data collection and lasted 40 working hours (5 days of 8 hours daily). The place of her observations was the field of industry, but she is thinking about *what* she could observe and *how* she could record her observations in order to be able to proceed with the analysis of the data. She decided that the observations would be focused on the departments of operation of the production, but mainly on the way that they are operating in order to achieve the objectives. However, she understood that this itself would not provide a completive view of the field of her research, but it is requirement the active interaction and communication with those involved in the workplace.

Therefore, it was important to conduct dialogues and informal interviews with the employees of the operating departments with questions such as:

- *What tasks do you perform in the workplace?*
- *What are the goals of daily work?*
- *How do you perform the duties?*
- *What knowledge and what skills do they need to have?*
- *What problems arise and how do you solve them?*
- *How do you evaluate the results of your work?*

Having as a basic criterion that the conclusions she drew should be as objectively as possible, she met the director of the production industry, but also the directors of the research and development department and to discuss with them through informal interview for (i) explanations for required skills employees needed in industry (ii) overview of the methods of the organization and the operation of the departments of the industry.

Detailed notes were written every day for recording the data provided of the interviews, as well as the observations.

For teaching lessons in the schools during school year there are official documents from the Ministry of Education and Religions that describe i) the objectives and the content of the curriculum ii) the teaching methodologies iii) the way of evaluation of

the students. So, part of its data collection was the collection of items / documents for (i) the objectives were set each year by industry (ii) crisis management policies (iii) the annual employee evaluation form. She collected these documents with the written declaration that it will not disclose the name of the industry/ name of employees/ and any information referred to its economic performance.

Data Analysis

The most important, but the most time-consuming part of her placement in industry was the qualitative analysis of the data. She analyzed the context of the collected data throughout the observations, interviews at the end of each day. She searched for coding subjects- this means that she tried to creating categories and subcategories under the thematic areas: i) skills of employees in industry ii) attitudes of employees in industry iii) methodologies of production in industry. At the end, she searched for patterns/links and make comparison in order to identify relationships between the data sets and the three topics of her research.

Making Claims

According to the teacher's view point, the context analysis of the qualitative research for the field of industry provided important conclusions for the skills and attitudes of employees, the operation of departments and in general the objectives and expected results of R&D in food industry. However, for the reliability of these information, it would be necessary to request the validation of the directors of the departments of the industry, in order to avoid errors and misinterpretations. On the other hand, for the reliability of conclusions for skills and attitudes of students STEM classroom, the objectives and expected results of teaching in school curriculum, it would be necessary to request the validation of her colleagues. The critical point of the comparing the results of the two fields (industry/ STEM classroom) needs a critical consideration. The implementation of STEM project in the classroom based on results of the research field could be a method of validation them.

Conclusions

In this case study a teacher is a researcher, who designs a research plan based on the methodology of research field of industry. The teacher is the protagonist in the design/planning of professional development activities in order to match her existing needs and it seeks to build teachers' capacity to adapt to the changes that arise from our rapidly changing, interconnected world, for preparation students for future careers. The participatory observation of the research field of industry provides a complete view of activities and tasks performed skills requirements, procedures of food production and career opportunities in industry. Based on educator' critical reflection, she made comparisons of how she could integrate them in teaching of STEM.

B. Deconstructing this case study

Background

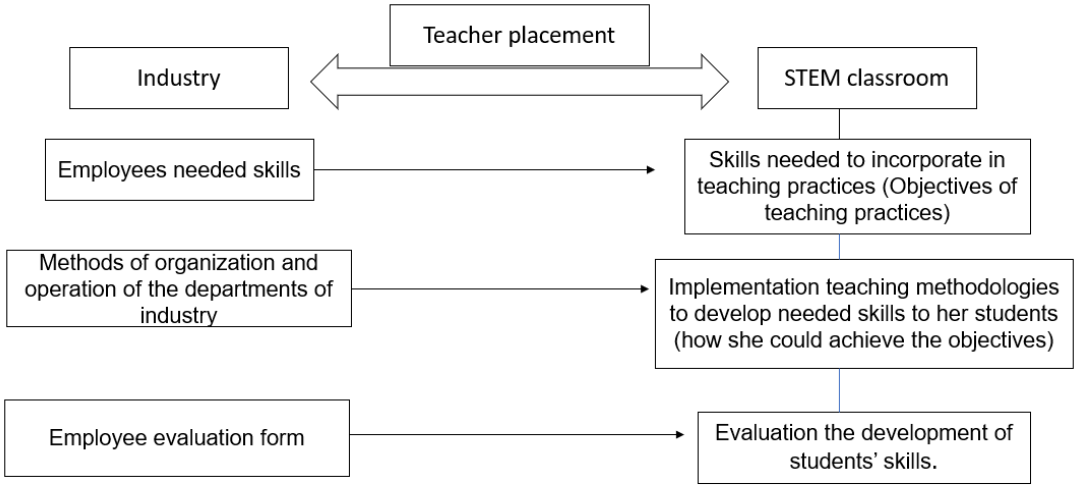
Teachers' professional development that focuses on the future careers of students encourages innovation and adaptability and equips teachers with the potential to generate new answers to existing challenges. She through direct on-site observation to workplace (industry) the teacher gains experience about career choices, labor market needs, activities and tasks performed order to enrich and enhance her teaching methodologies. Teacher placement in industry is a unique opportunity to link the content of the curriculum to students' future interests and support them develop both the academic and technical skills required in the workplaces.

Pedagogical Focus

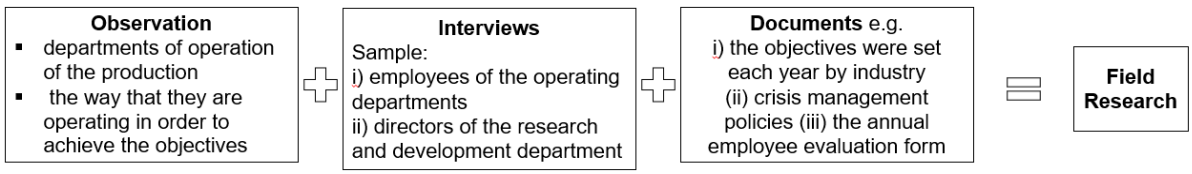
Nowadays, the rapidly changing modern world is creating new demands in the workplace and this connected with challenges in educating young people. The starting point for designing this field study research is the teacher's need for how she can prepare students for the transition from secondary education to the work life. In other words, the study of the required workplace skills, which are essential to be integrated into learning and teaching within the STEM classroom. In those ways, teachers need to constantly update their own knowledge and skills about current practices, tools, gaining an "on-site" understanding of the world of industry that will affect their students, so that all students are prepared for higher education and professional careers. This mean that teacher take the role of a research to identify and collect data in an area of industry, to analyze and to interpret the data, and make conclusions in her findings of how she could integrate them in her teaching practices in STEM.

Cycles of Action and Research Question

The research question if industry and the STEM classroom are different learning environments originated by the hypothesis that teacher placement in the industry could increase the teacher's ability of the understanding of workplace practices and it analyses as:

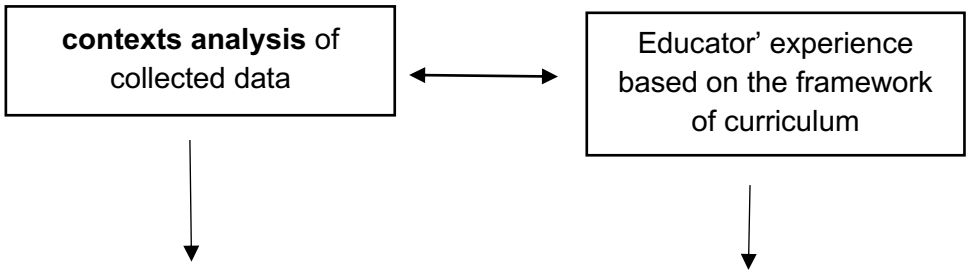


Data Collection



Data Analysis

Comparison i) skills and attitudes of employees in food industry ii) expected results of Research & Development (R&D) with i) skills and attitudes of student in STEM classroom ii) teaching in STEM school curriculum

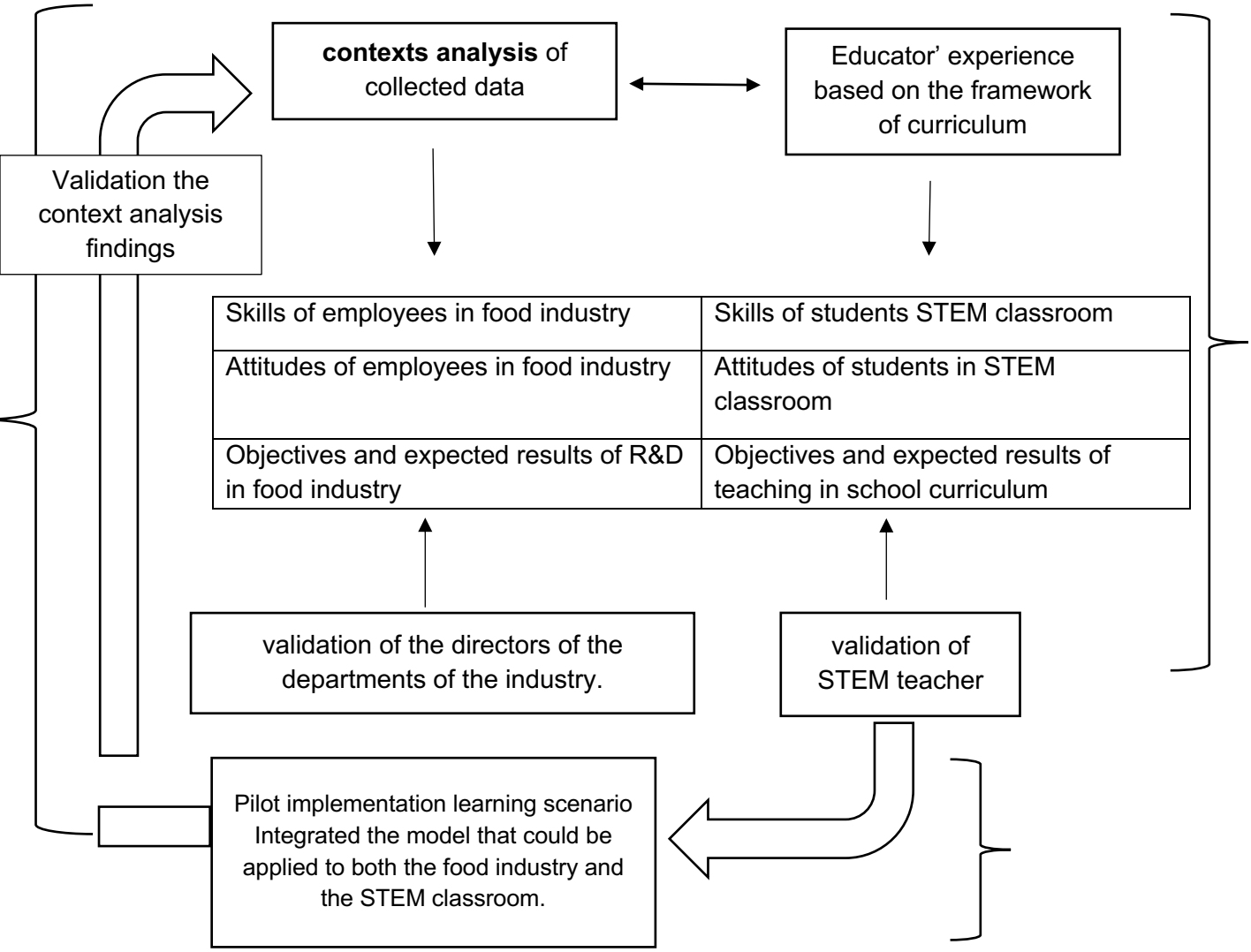


Skills of employees in food industry	Skills of students STEM classroom
Attitudes of employees in food industry	Attitudes of students in STEM classroom
Objectives and expected results of R&D in food industry	Objectives and expected results of teaching in school curriculum

The evaluation form of employees in food industry could be as an evaluation tool to STEM classroom.

Making Claims

This research could be labelled and modified as action research if she will follow a cyclic procedure for the validation of findings of the analysis.



Conclusion

If teacher doing research (as demonstrated in this case study) has a potential impact in professional development: as she '*investigating their own questions, rather than waiting for someone to tell them what to do, empowers teachers to generate their own knowledge about "what works" in teaching and learning. Teachers who conduct research are engaging in ongoing, professional learning embedded in the workplace.*

It encourages them to be reflective and adopt a questioning stance toward teaching and learning. Teachers who improve classroom teaching/learning through their inquiries become more accomplished practitioners. And, accomplished practitioners have a positive impact on student learning [4]' (Henderson, et.al, 2012 (p.5)).

[4] Henderson, B., Meier, D. R., Perry, G., & Stremmel, A. J. (2012). The nature of teacher research. Voices of practitioners, 2012, 1-7. https://www.naeyc.org/sites/default/files/globally-shared/downloads/PDFs/resources/pubs/Nature%20of%20Teacher%20Research.pdf