Lesson in Maths: Sample and Sampling

The teaching unit was primarily designed and is currently developing to fulfil the needs of the ERASMUS + KA2 project the school is being involved as a partner, since 2016-17, titled "The Living Book". Promoting in various ways the reading habits amongst young readers/pupils across Europe is the main purpose of the project. Similar survey will be conducted in all partner schools. Additionally, the Teachers Professional Learning (TPL) scheme offered by the Cyprus Pedagogical Institute and promoted by the Ministry of Education and Culture is supporting this ambitious plan by guiding and reflecting on the research procedures followed. Inquiry and argumentative skills are expected to be developed and conquered by the pupils involved, as well as research method procedures.

Phase 1: Creative activities were planned within the framework of "The Living Book" project, where the central theme was the "dragon" figure in various forms i.e. in books-folk stories, in films - "How to train your dragon" and games. Children eventually became concerned about how books could become more attractive and then their own question arose: "*To what extent do school children love reading and what are their reading habits?*" A framework by Meletiou-Mavrotheris & Paparistodemou (2015) [1] was followed in order to find an answer to children's inquiry.

Phase 2-3: The children were asked to think individually and suggest ways to answer the question. Conducting an investigation was identified as the most ideal choice, so the debate began about core issues: what research is, what types of research exist and why. They studied and analyzed data from everyday life and reported, for example, in polls, elections, telephone interviews, etc. They also reported in various data collection tools derived from their personal experiences (e.g. personal interview, phone call and questionnaire). Subsequently, the children, initially individually and then in groups, recorded and suggested the possible questions that would be answered by the other school children, who were identified as the population of the survey.

Phase 4: (Lesson plan-see below) Sample-Sampling. Children, after studying some sampling scenarios[2], have to decide which and how many children will ask for answering their survey.

Phase 5 (to follow): Once the sample will be determined, the research tool will be configured accordingly. Decisions will be made on the format and how they will eventually collect their data. The results will then be analyzed, presented graphically and interpreted by the children-researchers. It is expected that the other partner schools of the "The Living Book" will have similar results in order to make comparisons.

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[1] Meletiou-Mavrotheris, M., and Paparistodemou, E. (2015). Developing Young Learners' Reasoning about Samples and Sampling in the Context of Informal Inferences. *Educational Studies in Mathematics*, *88(3)*, 385-404.

[2] Jacobs, V. R. (1999). How do students think about statistical sampling before instruction? *Mathematics Teacher Middle School, 5,* 240–263.

Aims
Children to be able to:
- identify the concept of sample in everyday activities
- recognize the need of sampling in their survey
- recognize the positive and negative issues of sampling

Mathematical Practices:
- Make sense of problems and persevere in solving them
- Construct viable arguments and critique the reasoning of others
- Use appropriate tools strategically

 Pre-existing knowledge (Phase 1-3)

Activity 1: (tablets/QR codes/Kahoot)
Every couple watches a short video showing customers in supermarkets trying products. Then a brief game-playing questionnaire is held at Kahoot for their views on what they saw. Immediately the graphical depiction of their answers is causing debate.

Activity 2: (whole-class activity/independent activity)
Debate is held in plenary whole class on the concept of the sample and its relation to the population (eg cheese = sample / whole cheese=population). On a post-it paper they write other experiences about sample (sample of perfume, sample of clothes, cosmetics sample, blood sample, etc.) and post it on the table, indicating the respective population.

Activity 3: (in couples)
Question: Why should researchers use a sampling procedure?
In a working sheet they write 3 reasons that sampling is useful for. They present their thoughts in the whole class.

Activity 4: (in couples)
Inquiry:
'How can we indicate our sample? Study what other kids did and choose the method you think is the best. You need to have at least two arguments that support your opinion (worksheet 2).'

They present their suggestions (debating-argumentation) /Evaluation