

USE OF MOBILE TECHNOLOGIES IN SCIENCE TEACHING



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Topic:	WHAT MATERIAL ABSORBS SOUND BETTER?
Inquiry skills, reasoning skills, and scientific literacy:	Planning an investigation, collecting data by using an mobile application (decibel meter), identifying variables, teamwork
Student group:	12 Students, 6 th Grade, Science Lesson
Summary	This poster presentation focuses on how teachers develop activities by themselves based on basic inquiry-based science education (IBSE) principles. The teacher was instructed about IBSE and how to use formative assessment during this process. Afterwards, the teacher was given some SAILS activities, but she preferred to develop her own activity (called "What material absorbs sound best?") based on these activities.

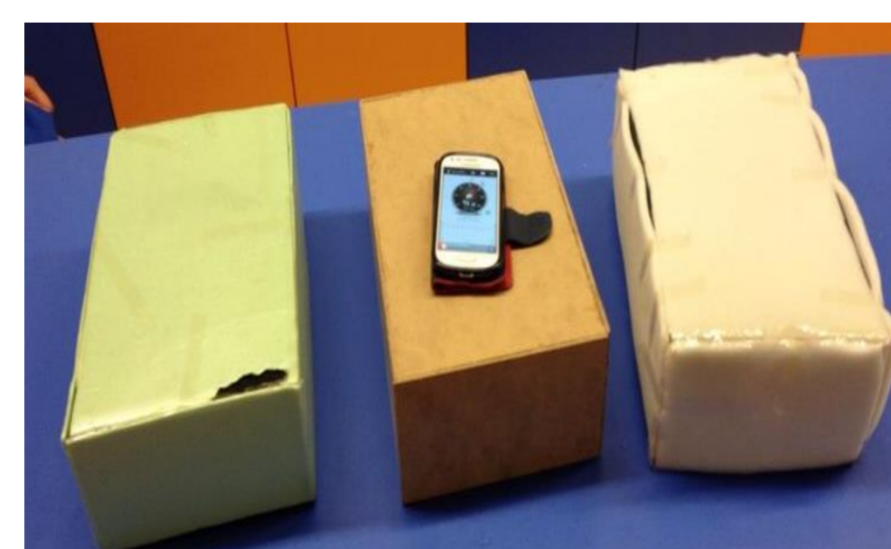
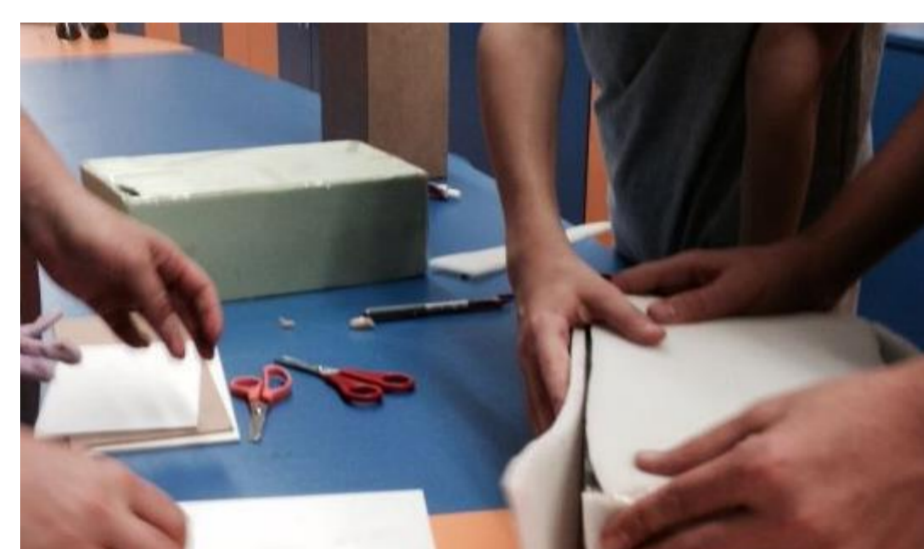
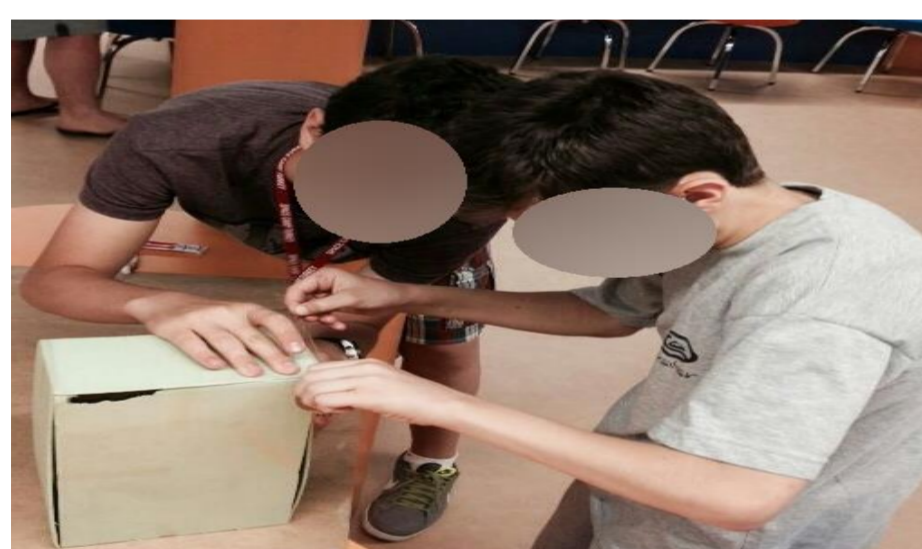
Learning sequence

There were 12 students (12-13 years old) in one classroom and they worked in groups. The teacher told a story to the students. The story was "yesterday I couldn't sleep well, because the baby from her next door neighbor had cried all night long". Inquiry process started at this point. Groups thought about their daily life and shared their experiences about this kind of issues. They were asked if they were building a house how they could structure the walls. They decided to cover walls of a model house and suggested to use sponge, wood, styrofoam to cover the box. The teacher asked them to make predictions about which one is the best material that can isolate sound well. Each group formed a hypothesis and designed and carried out an experiment to test their hypothesis.



How were the skills assessed?

- The teacher assessed some inquiry skills when students group working their inquiry processes.
- First group started with designing their boxes/houses. They used different materials to start. All the groups interpreted their results and the teacher facilitated them to elaborate their results.
- The teacher also focused on the dependent and independent variables.
- Dependent variable: the intensity of sound that comes out
- Independent variable: kind of material
- Controlled variables: thickness of material, box, mobile phone's melody in the box, application.



The teacher tried out the activity with a class of students aged 12-13. At the end of activity she asked them to explain how they gathered the data. These explanations include some answer of following questions:

- How will you measure? (use decibel meter app.)
- Why do we hear sound with different intensities when we alter the material?

Evidence collected

Teacher Opinion:

The activity includes low inquiry processes. Every students read their group's hypotheses and planed that show how to cover the boxes. I observed group works when students studied with their classmates. I asked them to explain their results at the end of the lesson. I mainly focused on the teamwork, planning, communication, making comparison and scientific process skills. I adapted the rubric and tried not to intervene much the group works.

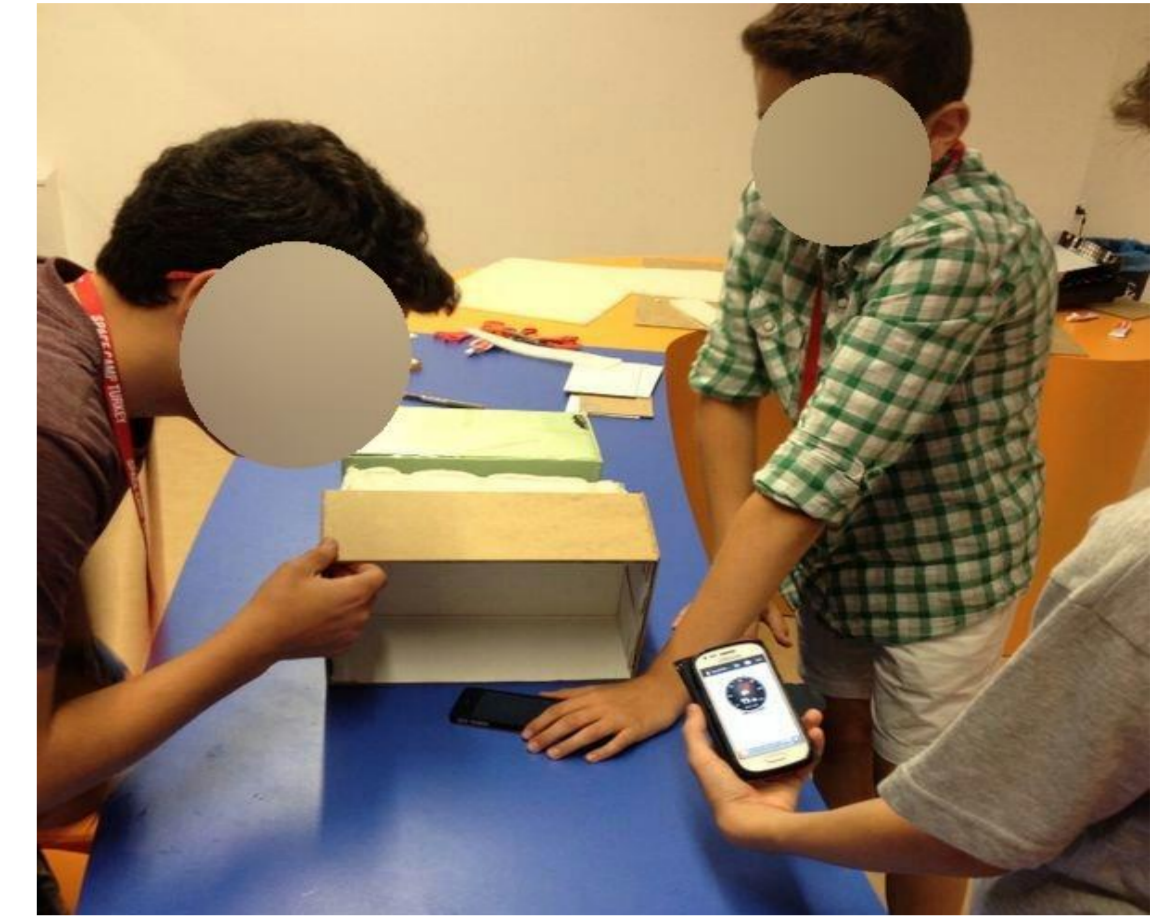
We can draw attention the differences between experiments groups, than we can point subjectivity aspect of science.

Measuring decibel of sound was a problem for them, because there was no exact measurement for sound. Numbers always went up and down during measurement. I told them not to concentrate on the increasing or decreasing numbers; just to decide the range of numbers that decrease or increase.



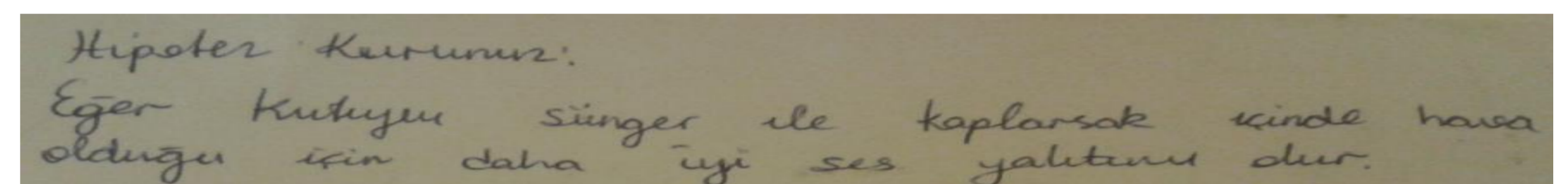
Observer Notes:

- Students were willing to use mobile technologies in science teaching. These kind of lessons seems to increase students motivation.
- Students had enough time to carry out the experiment but they were not quite enough to measure the decibel of sound.

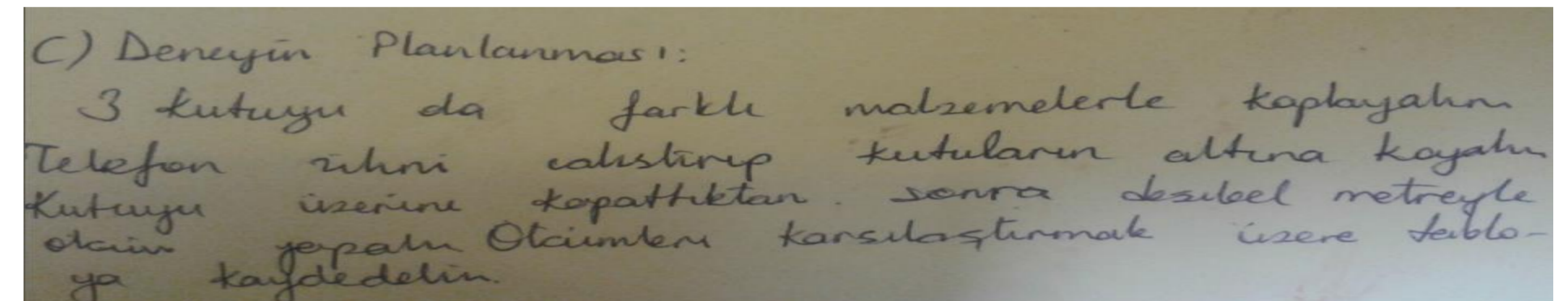


Sample student artefacts:

Student groups generally used similar experimental methods. They covered their boxes with different materials which have nearly same thickness 0.3 mm. They put a mobile phone which rings long alarm clock sound under each box. They used another mobile phone to measure the decibel of sound that comes out. Student's group compared their results and hypotheses. In the below example lastly stated by all groups: *If you measure the decibel of sound when the box covered with sponge, the measurement will take lowest value, so sponge is the best isolator.*

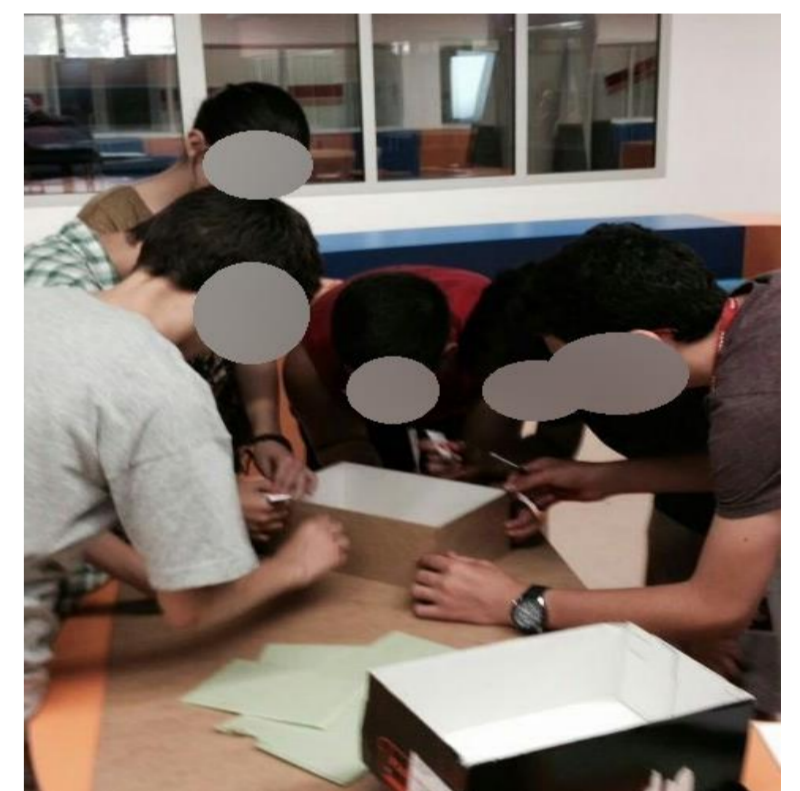
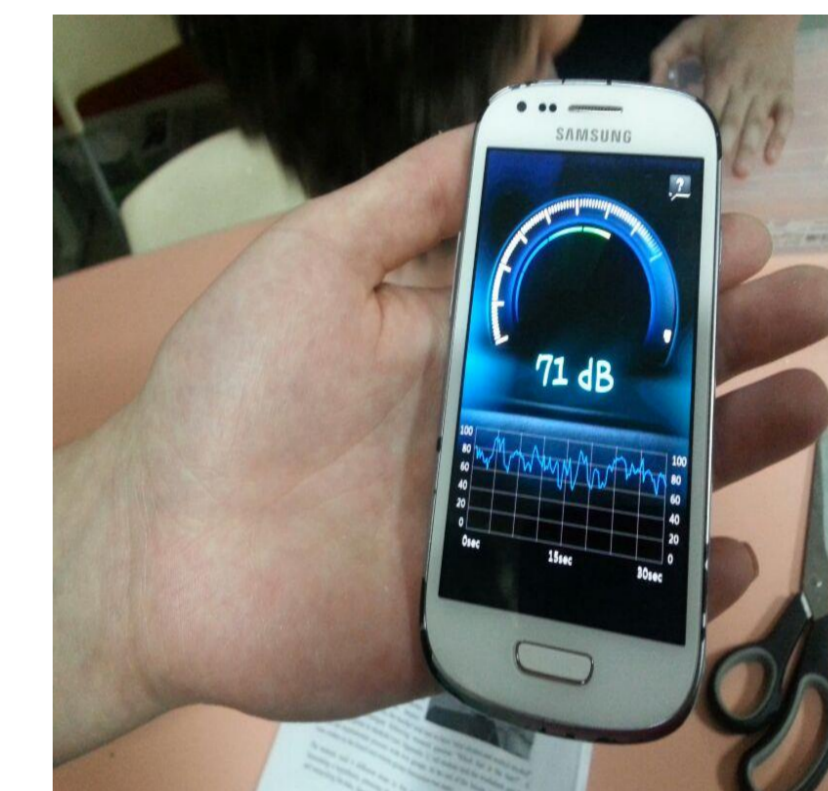


Students found that, sponge isolates sound better than wood and styrofoam because of having air in it.



At the end, the teacher asked students following questions:

- "Do your data support the hypothesis you formulated? Did the data support your hypothesis?"
- "We measure the intensity of sound of mobile phone with the application of decibel meter. We define each range for materials. Then we find out sponge isolates better"



Criteria for judging assessment data

The teacher used following rubric when she assessed students' working and she decided to group levels/stages. Then she gave appropriate feedback according to group levels. Besides the teacher asked some questions to students in every inquiry processes.

	Emerging	Developing	Consolidating	Extending
Collecting data	Only listens the final presentation of groups	Observes own and others measurements and thinks about it	Successfully writes down the measurements of his/her own group.	Successfully writes down the measurements of other groups and make a conclusion
Teamwork	Takes part in the group activity	Takes a role in the task and helps others doing their part in the task	Discusses with others in the group who should do what and willingly takes on their role.	Negotiates with others in the group who should do what, willingly takes on their role and supports others in doing theirs.
Scientific Process skills	Makes a prediction to solve the problem	Makes prediction and forms a hypothesis	Successfully tests the hypothesis and collect data	Uses all data to suggest the best material according to results
Identifying Variables	Variables Mentioned	Relevant variables mentioned (speed, time, distance)	Relationship between variables and measurements	Relates to control variables

