



Story Telling by An Exemplary Scientist to Engage High School Students in Scientific Practice

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Purpose and Problem

One of the principal challenges of the partnership of scientists and high school students are the existent barriers of language between them (Kim & Fortner, 2007). In other words, since scientists are usefully deemed as characters with higher power, status, and knowledge, students may feel nervous or intimidated, especially when scientists speak jargons and complex language. The best educators have a magical way of engaging their audiences with compelling stories. Even the talented few know that effective storytelling requires careful planning and practice and knowing the audience (Komoroske et al., 2015). Therefore, the purpose of this ethnographic study is to demonstrate how an exemplary scientist could communicate effectively with students through story telling.

Research Context

Work With a Scientist Program (WWASP):

- ❖ One Scientist, two Science RA and two Educational RA
- ❖ Nine high school students
 - Four groups of two students each
- ❖ Seven months
 - Spring semester (January-May)
 - Summer (June-July)
- ❖ Scientific connections of students projects
 - Proposal Presentation
 - Final Presentation
- ❖ Cogenerative Dialogues (Cogen)
 - Spring semester-every other Saturday
 - Summer-Tuesdays and Thursdays
 - Safe space for participants to share positives, negatives or any other topic.

Data Sources and Analysis

- ❖ **Data Sources:**
 - Real time video recording
 - Field notes
 - Pictures
 - Artifacts used by participants
- ❖ **Data Analysis:**
 - Thematic Analysis (Braun & Clarke, 2008)
 - Find patterns
 - Analyze relevance of patterns
 - Categorize patterns
 - Ethnography (Lichterman & Reed, 2015)
 - The term ethnography comes with the definition of the qualitative research (non-academic context, social and natural sciences) of the everyday life. In other words ethnography emphasized in the social research that has a cultural interpretation. This study generates a cultural insight point of view. In order to generate this point of view the person conducting the research has to gather a reasonable and efficient amount of data as a base foundation to proceed to interpretation and then conclusions. We have to remark that the ethnographer has to rely in the cultural frame analysis in order to get his data interpretations.

Results

1. Acknowledge students' ideas and engage students to ask more questions

- A story about Dr. Lupes' colleague, who is close to receiving a Nobel Prize, and cannot understand her speech about the basic vector knowledge and was not afraid to ask her what she was talking about.
- A story about how Dr. Lupes learned Spanish by asking a lot of questions to the cleaning lady.

2. Encourage students to give feedback on Dr. Lupes' instruction

- Dr. Lupes told a story when she explained a topic to another scientist, but she went too fast and the other scientist did not understand what she was trying to say.

3. Teach students how to take scientific notes systematically

- A story about how some of Dr. Lupes' students did not take notes and they forgot how to do certain processes.
- Dr. Lupes shared that a doctoral student from her lab did not have the habit of taking notes. Now she is struggling with remembering what was done, and she needs to redo her experiment.

4. Improve student's communication with peers and scientists

- A story about how year two Cogen was not productive since there were some people who took over the conversation and when they felt they talked too much, they stopped and the room just stayed in silence.
- Dr. Lupes told the students a short story of how in year two a group of students jeopardized their project because of their lack of communication and excessive procrastination.

9. Encourage students to pursue careers based on one's passion

- Dr. Lupes shared the story of how she ended up going to a college because her parents could not afford her to attend the college she preferred.
- A story about a person who didn't like his job, and for him, the time at work passed by extremely slow.

8. Advise students of not being afraid of making mistakes

- Dr. Lupes shared the story of how her PhD mentor encouraged her to keep trying to clone even though she was constantly failing that process.
- A story about how Dr. Lupes' lab members played a depressing song when they did not achieve their expected results in their experiments. This routine helped them to not get discouraged when they made mistakes.

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5. Encourage students to brainstorm ideas without hesitation

- A story about a time when Dr. Lupes didn't feel confident to report her data and at the end, her data turned out to be important.
- A story about a scientist's hypothesis about the mosquito egg being the cause of a disease, when nobody believed it was true. But at the end he discover that he was correct and had a publication in a top journal.

6. Help students understand the advantages of being a scientist

- Dr. Lupes shared her experience of how she became multitask by managed her time to be a scientist, a mother and a wife and how she did it because she love to be a scientist.

7. Help students to present scientific findings effectively

- Dr. Lupes shared the story when she just started to teach and she was really nervous, but with practice she started to feel more relaxed and confident.
- A story about a time when Dr. Lupes presented a poster in a conference and man told her to give more detail because he had no idea of what she was trying to present. She told this story to highlight the importance of having a strong introduction and background in their presentations.

Student Comments

"[Dr. Lupes] is very supportive, even when I'm feeling unsure of myself." (Student 1)

"[Dr. Lupes] is very up lifting and encouraging." (Student 2)

"She really, like-- she has this, like, passion for whatever. And it just makes me think like, "Oh my god. Like, this is like real stuff that she believes in." And she believes in me and like, everyone in the program, and that's pretty special." (Student 3)

"It was extremely positive environment, Dr. Lupes found ways to relate to us while teaching." (Student 4)

"She kept us involved and encouraged us to participate." (Student 5)

Conclusion and Discussion

Our study concluded that these stories helped the scientist to convey the value, importance, knowledge, and skills of scientific practice seamlessly in a non-intimidating, friendly, and comprehensive manner. As a result, students were able to work with the scientist closely without barriers. These stories may also serve as pedagogical tools to help educators to teach science more efficiently in educational settings.

References

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