Case Teaching Notes
for
CHILDBED FEVER
A Nineteenth-Century Mystery

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INTRODUCTION

This case provides a brief, factual account of the pioneering work of Ignaz Semmelweis and his efforts to remedy the problem of childbed fever in mid-nineteenth century Europe. The case was designed to be used in a freshman seminar class entitled "Scientific Serendipity" as a concrete example of the "Scientific Method" in practice. It is important for students to understand that although there is no single sequence of events that must always transpire in order for scientific discoveries to be made, there is a set of commonly employed strategies to facilitate such discoveries. If we simply present a didactic list of steps in order to teach the scientific method, then we fail to allow students the freedom to explore alternative methods and pathways. Instead, this case elicits from students the key aspects of the scientific method in a discovery-based format, without resorting to memorization or rote learning. It is likely that the students may not even be aware that the study questions associated with this case are designed to guide them to conduct the scientific method through Semmelweis' eyes. As such, this case is best used as an introduction to the scientific method, even before an explicit discussion of the method has taken place. Such a discussion could be subsequently held, and would be facilitated by referrals back to this case. This case could successfully be used in any introductory science course in which the scientific method is discussed and/or practiced.

Objectives

The overall purpose of this case is to allow students to learn about the scientific method by "dissecting" the various steps involved in an important, historical medical breakthrough. More specifically, the objectives of this case are:

- To learn about the importance of observation when conducting scientific experiments, and to encourage observations beyond those expected or anticipated.
- To be able to define a problem or a question given a set of observations.
- To be able to formulate an "explanatory story," or hypothesis, in order to solve the problem at hand.
- To be able to design a suitable experiment in order to evaluate the validity of the proposed hypothesis.
- To be able to draw logical conclusions based on experimental results.
- To understand the importance of the dissemination of scientific information and of establishing credibility within the scientific community.

CLASSROOM MANAGEMENT

This is a short and effective case that requires only about 30 to 40 minutes to conduct in a freshman seminar class of 15 students. However, the use of this case should not be limited to small, discussion-based classes. It would be equally successful even in a large (60 or so student) introductory science class (for example, in a section of Freshman Chemistry), albeit an entire 50-minute class would likely be required to facilitate discussion among a greater number of students.

Progressive Disclosure Method

In order for students to figure out for themselves the important steps that constitute the so-called scientific method, this case should be presented by the method of progressive disclosure. That is, only one piece of information at a time should be distributed to the students, followed by discussion, before moving on to the next, more telling piece of information. If students are already familiar with the history of childbed fever, they will be tempted to jump ahead and suggest experiments that are not warranted by the observations presented in the earlier parts of the case.

Part I of the case, accompanied by its study questions, is distributed to the students. The students are then instructed to read the brief text provided and to consider the study questions before reconvening for a whole-class discussion. It has proven effective at this point to ask students to work in pairs with their nearest neighbor when considering the study questions. Not only will the pairs come up with more possible solutions to the questions than any given individual might, the pairs will also be more willing to relate their solutions back to the class as a whole. Be sure to emphasize that there are a range of possible answers to these questions - often science students are hesitant to write down an answer that is not absolute, and this hesitancy will severely stifle discussion. After a brief time, ask the class to come together again to share their answers to the study questions (see "Directing the Discussion: Expected Outcomes," below). Maintain a class list of the suggested explanatory stories and possible tests on one of the blackboards in the room (or on an overhead transparency), since the class will refer back to these lists after completing Part II of the case.

Next, distribute Part II of the case, with the same directions to students as for Part I: read the text and, in pairs, consider solutions for the accompanying study questions. After a brief time, the class will come together again to create a new list of possible explanatory stories and tests. These lists should be compared to the original lists, and explanations for any differences should be sought.

The case proceeds in this fashion of progressive disclosure, moving next to Part III and its study questions, and finally, Part IV and its study questions. The final question in Part IV, referring to the role of serendipity in this case, need not necessarily be addressed by an introductory science class that is focusing only on scientific method. However, even a class that isn't intentionally going to discuss serendipity in science might well enjoy a brief exposure to it in this context, so that the instructor may be able to highlight serendipitous aspects of "regular" course material throughout the remainder of the semester.

Finally, the class should retrace their steps through this case in order to gain an appreciation for the "big picture." That is, an open-class discussion should follow after completion of parts I through IV of this case in order to encourage the students to recognize that they have just witnessed an example of the scientific method in action.

Directing the Discussion: Expected Outcomes

This case was specifically designed to elucidate the steps of the scientific method, defined as follows: (i) Observation, (ii) Statement of the Problem, (iii) Hypothesis, (iv) Experiment, [reiteration of (i) - (iv), as necessary], and (v) Conclusion. By establishing this set of events as a frame of reference, students are later able to compare future cases to these benchmarks and will come to appreciate the variability within this thing known as the "Scientific Method." It seems more instructive for students to deduce the "standard scientific method" from this case, rather than simply having them recite a list of five steps as defined by a text book or other source, since the latter tacitly implies invariability. Other instructors may, of course, choose to define the standard scientific method differently from the way in which it is defined here; for example, by citing experimentation as the first step, or by neglecting to include the statement of the problem as a distinct step. This case should be adaptable enough to teach other definitions of the scientific method, too.

In order to ensure that the class is able to ultimately conclude that their analysis of this case highlighted the pertinent steps of the scientific method, it is important to direct the discussion each time the student pairs return to the class as a whole. Below are some suggested responses that should be solicited from the students if they are not immediately offered by the students themselves.

ANSWER KEY

Answers to the questions posed in the case study are provided in a separate answer key to the case. Those answers are password-protected. To access the answers for this case, go to the key. You will be prompted for a username and password. If you have not yet registered with us, you can see whether you are eligible for an account by reviewing our password policy and then apply online.

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