

How Do We Arouse Students' Interest in Statistics? -By Development of Teaching Materials-

Hiroaki Hirabaysshi
Department of Juvenile Education
Osaka Women's Junior College
Fujiidera-Shi 583-0026, Japan
skyfine@ka2.so-net.ne.jp

1. Abstract

In Japan, many students in women's junior college dislike statistics. In order to arouse students' interest in statistics, we had tried to develop teaching materials for many years and succeeded in arousing their interest in statistics.

2. Situations and Purpose

At many junior women's colleges in Japan the following was found:

- 1) Many students already lost interest in mathematics during the elementary or secondary education;
- 2) Many students had little fundamental knowledge of mathematics;
- 3) Many students felt difficulty in studying statistics. If we expressed this more exactly, they dislike statistics.

Considering these situations, we had been trying to develop good teaching materials to arouse students' interest in statistics. Here, we developed periodical phenomena scenario as teaching materials.

Our junior college has the course of health education. Therefore, students of this course studied periodical epidemics but they did understand these diseases only vaguely because professors showed them many data about these diseases but did not explain periodical phenomena accurately. Therefore, we felt the necessity to make the mathematical materials of a periodical epidemic and to make those students understand it thoroughly, and in result, to make them more interested in statistics.

3. Method

There are many phenomena that have periods in the world, for instance, business fluctuations, numbers of sunspots, trends in deaths by motor vehicle accidents and

trends in deaths by epidemic diseases and so forth. Hence, in the first place, students understood what periods meant. The next, as one of periodical infections, they studied chicken pox by referring to the data (of the number of sufferers) of this disease, officially published by the Ministry of Welfare in Japan. These data had been reported to the Ministry by the clinics for the observation, since 1982 in Japan. Then they graphed the data and observed them and confirmed that almost the same graphs were found every year and this disease had one-year period. They knew that it could be verified by using the correlogram. In order to understand simple basic Fourier series and to apply them to this disease, they had to recollect trigonometric functions and they had to review them, because they had forgotten a part of them. They calculated simple approximate expressions and gradually a little more complicated ones in order to approximate the numbers of sufferers of this infectious disease and they graphed approximate value. Then they understood the variation of the number of sufferers and the possibility to be able to estimate the number of sufferers of this disease in the future.

The processes that they had were as follows:

- 1) They graphed the data of the number of sufferers of chicken pox in 1997 (for 52 weeks).
- 2) Comparing the graphs that they drew with ones that the personal computer did, the students corrected their graph if they found mistakes.
- 3) Applying Fourier series, students got the simple approximate expressions and drew graphs by them and compared them with ones that the personal computer did, and if there were mistakes they had to correct them.
- 4) With regard to more complicated approximate expressions, by using personal computers students got them and their graphs and they had good understanding of the fluctuations of the number of patients of this disease.
- 5) Finally, by analyzing these graphs, the students knew that they were able to have the possibility to estimate the number of sufferers of this disease in the future.

4. Result

By practising the method as mentioned above, the students understood the period of this disease, approximate expressions and approximate value. Then when they noticed that the more the graphs were complicated, the more the graphs were similar to real ones, the students were very surprised at the fact and they were deeply impressed by knowing the usefulness of statistics. Similarly when they found the possibility to estimate the number of sufferers of chicken pox in the future in Japan, they were more interested in statistics than before.

5. Conclusion

It is very difficult for students who have little knowledge of mathematics to understand the theories of Fourier series and spectral analysis. But it is possible to make them understand these theories in some degrees and they are able to be interested in them as well, if the next conditions are satisfied.

- 1) Using the knowledge of mathematics, which students have.
- 2) Avoiding difficult theories and explaining to them easily.
- 3) Using personal computers, especially using their graphic faculties, students who understand these theories in some degree can deal with periodical phenomena and they do know that statistics has to do with many kinds of phenomena in the world. Hereafter, we will make the best use of their knowledge of mathematics and make use of personal computers if they are needed. By doing that, students will notice that statistics is interesting and it is useful to solve real problems in the world. This is the reason why we try to make good materials for statistics.

