

Emphasis on student activating methods in teaching international students in “Basic Epidemiology”

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Abstract

Twenty-one students from six different African countries (Ghana, Kenya, Malawi, Senegal, Tanzania and Uganda) participated in a PhD course on “Research Methodology”, which included a three day module on “Basic epidemiology”. For all three days approximately six hours were set aside for teaching, so a number of student activating methods were needed to supplement the lecturing. The selected methods were 1) use of buzz groups, 2) use of exercise in class, 3) use of group work and 4) use of voting. During the three days of teaching, buzz groups were used once, exercise in class eight times, group work four times and voting five times. The students participated vividly in all the exercises, and the voting showed that they had understood the different concepts, which was taught. As the students are most acquainted with lecturing from their home universities, it was important to investigate how these students received and evaluated these student activating teaching methods. Apart from the oral evaluation decided by the course organizers, a written evaluation was performed only on this module, asking specifically how the students perceived the different teaching methods. The written evaluation showed that the students received the methods very positively.

Introduction

The module “Basic epidemiology” was a three day module (full time), which was part of a six week course on “Research Methodology”. The course was offered to all students, who got their Ph.D. projects financially supported by the Wellcome Trust (all projects were related to malaria research). Twenty-one students from six different African countries (Ghana, Kenya, Malawi, Senegal, Tanzania and Uganda) participated in the course. For all three days approximately six hours were set aside for teaching, so a number of student activating methods were needed to supplement the lecturing. The reasons for including student activating methods were to ensure that the students kept attention high and thereby improve learning, and furthermore to give the responsibility for learning to the students themselves. In addition, as I was the only teacher, the student activating methods would relieve me of some of the pressure and the change in methods would decrease the possibility that students got fed up with the same teacher. In the students’ home countries the most frequently used teaching method is lecturing and the objective of this project was therefore to investigate how these students received and evaluated a variety of student activating teaching methods.

Different student activating methods included

Use of buzz groups 🗨️

The buzz groups were used to break the ice and to make it acceptable to talk and discuss freely. It should pave the way for a more free discussion during exercises in class and during presentation of group work. The buzz group consists of two persons sitting next to each other.

Use of exercise in class 🗨️🗨️🗨️

Exercises in class are small exercises to be answered and discussed in plenum. It is meant to make brakes in the lectures and to put the theoretical parts into practice. Students may for instance think that the concept of “target population” is easy, but with small real life exercises, they realize that it is a bit more difficult.

Use of group work 🍄 🍄 🍄

Group work seeks to ensure deep learning and give the students time to follow up on themes which they found difficult. Good group work should result in vivid discussions both in the group during work and in plenum afterwards during the presentation of the work by the group. The groups are put together in such a way that all the different scientific backgrounds are represented in all groups. This means, for example, that the entomologists (mosquito specialists), who do not have prior knowledge on basic epidemiology, was divided among the groups.

Use of voting ¹

After each major theme (5 in total), the students should give the right answers to a multiple choice on the spot. Each multiple choice had four answers to choose among. The students were provided with four notes numbered 1 to 4 for use in the voting. The voting was useful for judging whether the students had understood the main concepts of what was taught.

Student evaluation 🧠

After the module an oral evaluation was done for the module as decided by the course coordinator. Furthermore, a written evaluation was performed asking specifically on how the students perceived the student activating methods.

Description of the module and its implementation

Learning objectives

- To become familiar with the main principles of epidemiology, such as various types of study designs, sampling, random and systematic error.
- To become able to choose a design and a set of data collection methods which are appropriate for a given (set of) research questions.

Fig. 15.1. The learning objectives of the module











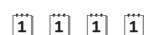




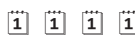
Time	Day 1	Day 2	Day 3
8:00 - 10:00	Introduction of module objectives	Sampling 	Interpreting data: Alternative explanations: bias & random error
	 Introduction to epidemiology		
10:00 - 10:30	Coffee/tea	Coffee/tea	Coffee/tea
10:30 - 12:30	Introduction to epidemiology cont. 	Types of epidemiological study design 	Confounding 
			
12:30 - 13:30	Lunch	Lunch	Lunch
13:30 - 14:30	Health facility-based data collection methods	Exercise 	Exercise 
			
14:30 - 14:45	Coffee/tea	Coffee/tea	Coffee/tea
14:45 - 16:00	Exercise 	Exercise cont. 	Oral and written evaluation 
			

Fig. 15.2. The timetable for the module also indicating the different teaching method used

Examples of student activating activities

The content for the discussion in the buzz groups

After the introduction to the module where the objectives for the module (Figure 15.1) and the timetable for the module (Figure 15.2) were presented, the students were given Figure 15.3 and asked the following questions:

1. Discuss the possible reasons for the start of the cholera epidemic in the first place?
2. Discuss the possible explanations for the difference in number of cases (and deaths) in Hamburg and Altona?

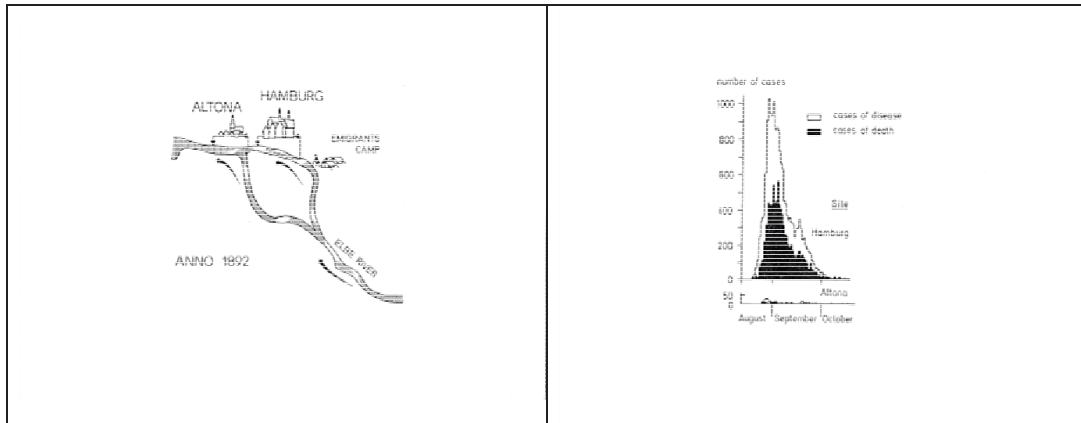


Fig. 15.3. The left figure shows the location of two German cities and an emigrant camp along the Elbe River in the year 1892. The right figure shows the development of cholera cases and cholera deaths in a three months period of 1892 in the two cities.

The content of exercises in class 🍌🍌🍌

This type of exercise was given several times each day as seen in the time-table. An example: after an introduction to different sampling strategies, the class was given the following exercises to be discussed in plenum:

Exercise in sampling

Which sampling strategies have been used in the following situations?

1. In order to obtain an estimate of the prevalence of *Schistosoma mansoni* infection in the human population the investigator chooses the inhabitants in the 10 houses closest to the laboratory.
2. A PhD student is examining the number of snails with *S. mansoni* cercariae in a certain pond. She randomly selects 50 snails from the pond.
3. The necessary sample size for a study on infection with *S. haematobium* was estimated to be 2000 snails. The researcher decided to select 20 ponds and within each pond 100 snails were selected.
4. A veterinary student planned to study occurrence of *Ascaris* infection in pigs. He randomly identified 5 villages and examined one faecal sample from each pig in all 5 villages.
5. In order to study the effect of *S. mansoni* infection on the development of liver disease in humans, 100 infected persons were selected.
6. In order to compare the prevalence of hookworm between girls and boys, 50 boys and 50 girls were randomly selected from the school register in a school.

Fig. 15.4. Exercise in sampling

Content of group work 🍀 🍀 🍀

Group work was used every day. The following is an example of the group work given at the last day. The aim of the exercise was to sum up all the themes which were taught during the module:

Exercise on recognising the limitations in a study

1. The following extract is taken from a study which sets out to determine the effect of infant feeding practices on the risk of infant death, in urban centres in Southern Brazil.

An attempt was made to ascertain all infant deaths from diarrhoea occurring over a one-year period in two cities in Southern Brazil, by means of weekly visits to all hospitals, coroner's services and death registries in the cities.

Whenever the underlying cause of death was considered to be diarrhoea, a physician visited the parents or guardians to collect further information about the terminal illness, and data on possible risk factors. The same data were collected for two "control" infants. Those chosen were the nearest neighbour aged less than 1 year, and the next child in the neighbourhood aged less than 6 months. This procedure was designed to provide a control group with a similar age and socioeconomic distribution to that of the cases.

Children with important peri-natal risk factors were excluded from the study as follows: those with a birth weight under 1500g; twins; those with major malformations and those whose initial stay in hospital exceeded 15 days. Also excluded were those aged less than 7 days, as there were very few diarrhoea deaths in this age group.

During the one-year study period, data were collected on 170 cases together with their 340 controls. In examining the risk associated with different infant feeding practices, care was taken to collect a history of the feeding mode at the time of death and prior to the onset of terminal illness, to allow for the possibility that the illness may have resulted in a change in feeding practice. For controls, the feeding information was collected for the same dates as their matched cases.

- a) What is the study design?
- b) What is the primary relationship under study?
- c) Can you identify any possible sources of random error, especially measurement error?
- d) Can you identify ways in which the selection of subjects could be biased?
- e) Can you identify other ways in which the study might be biased, e.g. measurement bias?
- f) Identify some of the factors that could be confounders in the study.
- g) What have the investigators done to avoid confounding?

Fig. 15.5. Exercise on recognising the limitations in a study

Content of voting ¹

Following is an example of the questions to be answered by vote after the theme on study design:

The following is true about cross-sectional studies:

1. They can examine the development of disease in a defined population
2. They can examine the relationship between disease and other variables of interest in a defined population
3. They can distinguish between cause and effect in a given population
4. They include a time dimension

Fig. 15.6. Example of the questions

Oral and written evaluation

The oral and written evaluations are found in Appendices A and B. Twenty of the 21 students were present on the day of the evaluation as one was ill. Nineteen students completed the written evaluation, while one did not. The overall response to the student activating teaching methods was positive. The lowest number of students with a positive response was 14 (for the question on time allocated to discussions in class) and the highest was 18 (for the question on summing with my neighbor course participant about the German case on the cholera epidemic). The number of positive responses for the rest of the questions was in-between.

Discussion

The written evaluation showed that the students received the methods very positively. The students participated vividly in all the exercises provided to them and the voting showed that they had understood the different concepts taught. Though the students are most acquainted with lecturing from their home universities they liked the use of especially group work as seen in the oral evaluation.

The positive attitude was also evident from one of the student's comments during the oral evaluation. He said: *"First I thought that your teaching was going too slowly and I wondered whether we would be able to go through the whole curriculum. Then I realised that your intention was to include all of us and make sure that we all could follow you. This is very nice because back home things are different. Teachers will approach us directly during lectures, ask difficult questions and if we are not able to answer the question, we will be told off. This means that at the end of the day we find ourselves more embarrassed than enlightened"*.

The participants showed a high level of responsibility for the learning of all group members. This became evident as the groups encouraged those students with the least background knowledge on the topic to come up first with their solutions to the group work. This ensured that these students were not run over by the more epidemiology experienced group members. This was a good solution to the fact that the level of knowledge of epidemiology was very diverse in the whole group.

I think that problem-based learning (PBL) can successfully be used on some of the topics instead of starting with a lecture. For example, I will next time try to use PBL at least for the design theme. The students will be given a research question and should identify the most appropriate epidemiological design to solve that question. That will also better ensure that the course content is in alignment with the second part of the course objectives (to become able to choose a design and a set of data collection methods which are appropriate for a given (set of) research questions). Another way to better ensure alignment is to give room for discussion of design, sampling, possible errors, biases and confounders in the students' individual projects as suggested by some of the students in the oral evaluation (Appendix A).

A Appendix

ORAL EVALUATION AFTER EACH MODULE

Quantitative study methods by Annette Olsen

- **List the 3 most positive things about the module**
Group work
The “Basic Epidemiology” book
The thorough handouts
- **List 3 things which can be improved about the module**
The module should be as close as possible to the “Data handling and statistics” module, maybe even integrated with it.
- **Discuss the relevance of the module**
The students found the module very relevant.
- **Discuss the teaching form and the manner in which it was presented**
The teaching form and the attitude from the teacher were good. The balance between the different methods was good.
- **Discuss the length of the module**
The students found the length of the module adequate.
- **Discuss whether the module can be integrated with other modules**
It could be worthwhile to try to integrate with the module “Data handling and statistics”.
- **Any other comments**
It was suggested that there should be room for discussion of design, sampling, possible errors, biases and confounders in the students’ individual projects just like the individual objectives are discussed in the module on “Objective Development” (another module in the same course).

B Appendix

Evaluation of the module on quantitative study methods

This written evaluation will focus on the teaching methods used in this module.

Evaluation of other aspects will be dealt with in the oral evaluation.

I would like to have your opinion about the different teaching methods used in this module. For every question, please make one X in the box you find most appropriate.

1. Summing with my neighbour course participant about the German case on the cholera epidemic in Hamburg and Altona was:

Very bad	Bad	Neutral	Good	Very good
		1	9	9

2. The amount of lecturing was:

Too little	A bit too little	Adequate	A bit too much	Too much
	3	16		

3. The time allocated to discussions in class was:

Too little	A bit too little	Adequate	A bit too much	Too much
	1	14	4	

4. The amount of group work was:

Too little	A bit too little	Adequate	A bit too much	Too much
	2	15	1	1

5. The balance between the different teaching methods was:

Very bad	Bad	Neutral	Good	Very good
		4	11	4

6. I find the voting after each sub-module:

Very bad	Bad	Neutral	Good	Very good
		3	8	8

All contributions to this volume can be found at:

http://www.ind.ku.dk/publikationer/up_projekter/2009-2-1/

The bibliography can be found at:

http://www.ind.ku.dk/publikationer/up_projekter/kapitler/2009_vol2_nr1_bibliography.pdf/