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KEYNOTE

Using the Master-Apprentice Relationship when Teaching Medical Students Academic Skills: The Young Excellence Class

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Abstract
Medical education has historically been characterized by a master-apprentice relationship. In current medical curricula, this didactic method is only found in the master phase when students enter the hospital for apprenticeships. We plea for a re-appreciation of this method in the bachelor-phase to ensure a proper academic training of young medical students. We describe our experience with the Young Excellence Class (YEC) of the Leyden Academy on Vitality and Ageing, a two weekly discussion group in which medical students train their academic skills while discussing scientific articles under guidance of an experienced scientist. In our experience the results of this method are fourfold. First, the students acquire skills that cannot be learned from books or lectures alone: reading, listening, reasoning and arguing. Second, the matured students learn to guide younger students in how to perform a research project and how to write a scientific report. Third, this method can convince talented students to pursue an academic career, also in disciplines such as ageing that are at first sight less attractive for young medical students. Out of the 15 alumni of the YEC, 12 have continued in a PhD trajectory out of which 9 in the field of ageing. Fourth, students can under guidance contribute to scientific output at the highest level, as was shown by two students who published their research as first authors in a high impact journal. Finally, we have shown that the didactic model can also be successfully employed at a different university. Given the successes and the ability to disseminate the method, we encourage others to also adopt the master-apprentice approach in their scientific field and start their own Young Excellence Class.

Introduction
Medical education has historically been characterized by a master-apprentice relationship in which an experienced physician teaches his apprentices side-by-side.[1] In medieval times, this form was common in many professions that required years-long training to perfect certain skills.[2] In these professions, the master-apprentice relationship was an appropriate didactic model and physicians would not only transfer medical knowledge and skills but also communication skills, ethics, logical reasoning and other essential qualities of a good physician.

After the biomedical revolution, medicine became an academic discipline and students would not only be trained in clinical skills but also in academic skills. The didactic models evolved with it and most medical curricula of the world now have a bachelor phase that provides students with a basic academic training mainly characterized by textbook learning and large scale lectures.[3] In the master phase of their studies, however, students undergo an apprenticeship in the hospital that still resembles the old master-apprentice relationship.

In this article we plea for a re-appreciation of the master-apprentice method in the bachelor phase of medical education, an essential period in the development of the medical student to become an academic scholar also. The personal guidance of the master-apprentice relationship, that is now absent from the medical curricula, can be a powerful didactic method to inspire students. In this article we describe our experience of the past eight years with a small group of students known as the Young Excellence Class of the Leyden Academy on Vitality & Ageing, a knowledge centre in the field of vitality

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and ageing connected to the Leiden University in the Netherlands

The Method

The Young Excellence Class (YEC) is a discussion group for medical students that meets on a two-weekly basis to discuss scientific papers on topics related to aging and evolutionary medicine. Currently the YEC has 16 members ranging from 2nd year medical students to those who are almost finished after six years of medical education. Every year two or three members who complete their medical studies leave the group and make room for two or three new members, who are recruited from a group of twenty students that follow an elective course called The Ageing Process. This three-week course deals with the fundamentals of ageing, evolution as a scientific basis for the life sciences and involves the critical reading of papers and plenary discussions. Students learn to perform a small research project in couples, give a scientific presentation and write a small scientific report. Each year, students that excel in these activities and are enthusiastic, active participants in the small scale discussions are invited to join the YEC.

YEC meetings start with a simple meal, last three hours and end with a glass of wine. During a meeting of the YEC its sixteen members critically appraise a scientific paper that they have read beforehand and engage in a discussion. The meetings are presided over by one of us (RW, DvB). Members take turns in selecting a paper for discussion. The student that has selected the paper leads the discussion and guides the others through the manuscript during the meeting. Examples of topics discussed in the YEC include; the heritability of behavior, epigenetics, ageing in different animal species, the effect of caloric restriction on ageing, using animal models to study ageing and the evolution of longevity.

During the meeting, the selected paper is reviewed thoroughly and the ideas that are presented in it are discussed. Systematically, the paper is scrutinized on its hypothesis, assumptions, methodology and the logic and interpretation of the results. The chairman maintains order throughout and attempts to guide the discussions and elicits a consensus from the group. The members of the group are stimulated to bring forward their views using valid arguments and through discussion convince others. The chairman aids in this process by correcting false argumentation, by questioning the viewpoints of members and challenging members to defend their views.

Next to the meetings, the members of the YEC also assist in education themselves. During the elective course 'The ageing process', from which the YEC members have originally been selected in previous years, the members act as tutors to the students that follow the elective course and assist them with their small research project. This resembles the way older apprentices would teach younger apprentices in the classical master-apprentice relationships.

Outcomes

The YEC, an example of the master apprentice method of education, has provided us four main results. First of all, members of the YEC acquire essential academic skills from the meetings that cannot be learned from books or lectures alone. They learn how to critically read a scientific paper, how to present the line of reasoning and the conclusions of a paper to the group and how to defend their views using scientific arguments. They also learn to critically review the methodology and the underlying assumptions of scientific articles. In short, they acquire insight in the principles of scientific research and learn the skills of presenting, discussing and argumentation.

Second, the vertical structure of the YEC results in a group of students from different years of medicine. Younger students learn from older students who have been in the YEC for several years. Vice versa, the older students learn to guide younger students in the basics of science which is a very useful skill for them. The vertical structure is even further elaborated when YEC members during the elective course the ageing process guide younger students in performing their own small research project and write their report.

Third, YEC members have been able to get a good appreciation of what science is about and after their four year membership, they are also well prepared for a scientific career. When they finish their medical education and leave the YEC, most of them continue in a PhD position. In eight years' time, 15 alumni have left the YEC out of which 12 continued in a PhD trajectory. Moreover, 9 out of these continued their PhD in the field of ageing, a field that has difficulty in attracting talented students for their PhD positions. Many also continue their scientific career after their PhD trajectory, either full time as assistant professor or part time, next to their clinical specializations. PhD students also present their papers at YEC meetings. Not only do the papers from the PhD students improve from the discussions of these meetings, the PhD students are also role models for the YEC members. One of the

alumni continued with a full time academic career after finishing his PhD and is now an assistant professor at the department of gerontology and geriatrics. He now organizes elective courses and presides over YEC meetings that he once participated in as a student.

Fourth, the YEC not only provides benefits for students, but having a YEC also improves the scientific output of a department. YEC members often have creative and valuable contributions when papers of PhD students of the department are discussed. However, students can also contribute to scientific output at the highest level themselves. Two students, under the guidance of another YEC alumnus, expanded their small research project in their spare time during two years and their study was published in the famous Christmas edition of the British Medical Journal, a high impact journal.[4]

As an experiment, the elective course 'The ageing process' was organized at a different university. Here too, several students were inspired during the course to continue with their research project in their spare time after the course ended. This indicates that the format itself is a powerful didactic method, independent of the lecturer or the university.

Discussion

It is known that the master-apprentice relationship is a very powerful didactic method. So powerful in effect, that it often frustrates those involved in the bachelor phase of the regular curriculum. Everything they teach the students is easily forgotten or abandoned when students enter the 'hidden curriculum' of the hospital wards where they are reshaped quickly in the master-apprentice relationship.[5-7] We plea that those involved in the bachelor phase of the curriculum should adopt the same didactic method to teach students the academic skills of critical reading, listening, questioning and arguing.

Given the ability to employ the method successfully at a different university, we think we have identified a didactic model that can be applied in any discipline, by any scientist. The method has great power to attract and inspire talented students not only for the specific field but also for science in general. Now that medicine has become an academic discipline, we should use the master apprentice method as its most powerful didactic method not only to teach students the essentials of clinical medicine in the master phase but also to make them into academic scholars in the bachelor phase. They should acquire basic academic skills and the master-apprentice relationship in small scale groups where scientific articles are scrutinized and discussed under guidance of an experienced scientist have been found to be a successful method to do this. Students need these skills before they are subjected to master apprentice relationships in the master phase when the dogma of clinical practice is transposed upon them.

We believe that the master apprentice method makes students not only better scientists, but can make them better doctors too. In a medical community in which the practice of evidence based medicine is held in ever higher regard, YEC-alumni are well-equipped to lead teams of doctors in appraisals of scientific evidence and approach patient-care with a broad minded perspective on what constitutes good health.

As a final call, we would like to encourage others to start a Young Excellence Class in their field. It requires dedicated scientists who are willing to spend two evenings a month with a small group of students, but the benefits to the students, the department, the field and clinical science as a whole make it an outstanding experience. On top of that, there are worse ways to spend an evening than with a group of young and enthusiastic students who set their first steps in the field of science.

Key Words

Medical education, master-apprentice relationship, didactic models, bachelorphase, academic development

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