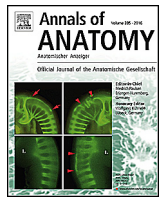




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## Effect of didactically qualified student tutors on their tutees' academic performance and tutor evaluation in the gross anatomy course

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### ABSTRACT

**Introduction:** Peer teaching is widely applied in medical education, anatomists having a notably long tradition in cooperating with student tutors in the dissection course. At Ulm University we established an intensified concomitant didactic training program for student tutors and investigated possible effects on their tutees' academic performance and tutor evaluation.

**Methods:** In winter semester 2012/13 all student tutors of the dissection course were invited to participate in the "Train-the-Tutor" educational program.<sup>1</sup> Test results and failure rates of 149 tutees who had been supervised by program participants ( $n = 14$ ) and 136 tutees of not participating tutors ( $n = 13$ ) were analyzed, as well as data on tutor evaluation and learning behavior of 235 (82%) of these tutees.

**Results:** Overall, both groups of tutees showed equal learning behavior and evaluated their tutors' performances similarly. However, tutees of program participants consistently obtained better examination results (median: 1.9 versus 2.2 in overall scores) and lower ultimate failure rates (13.4 versus 17.6% of students failed, respectively).

**Discussion:** An intensified didactic training program for student tutors may help their tutees to pass the gross anatomy course. Additional studies are necessary to objectify and further investigate this effect in order to optimize the concept regarding time expenditure and costs.

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### 1. Introduction

Teaching gross anatomy to hundreds of students in the dissection course requires a multitude of skilled instructors. For decades, anatomical institutes have therefore been resorting to student

tutors to support their teaching staff, thus gaining extensive experience concerning peer teacher (PT) employment. In recent years, peer-assisted learning (PAL) has been shown not only to successfully complement traditional instruction by anatomists or physicians, but to hold a number of specific advantages (Whitman and Fife, 1988; Topping, 1996; Ten Cate and Durning, 2007a). These mainly result from student tutors sharing their tutees' social and cognitive background, thus qualifying the tutor to create favourable – notably fear-free – learning conditions, better comprehend the beginners' particular difficulties and at the same time represent a desirable role model.

Little is known so far, however, about how best to prepare students to become competent peer teachers. In 2007, Dandavino et al. proposed the introduction of "Teaching Skills Improvement (TSI) Programs" into all medical school curricula in order to enhance future physicians' teaching abilities on principle. However, according to Soriano et al. (2010) no more than 44% of consulted US Medical Schools offer such programs, their extent and structure

**Abbreviations:** TtT, Train the tutor; DC, dissection course; NPT, near-peer teaching, near-peer teacher.

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<sup>1</sup> Horneffer, A., Fassnacht, U., Oechsner, W., Boeckers, A. 2013. Vom Lernenden zum Lehrenden: Das Ulmer Programm "Train the Tutor". Vortrag auf der Jahrestagung der GMA in Graz 26.-28.09.2013, German Medical Science GMS Publishing House. DocV07.03. DOI: 10.3205/13gma189, URN: urn:nbn:de:0183-13gma1897.

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differing greatly between institutions. Research concerning the consequences of TSI Programs mainly deals with student teachers' self-evaluations and/or their pupils' assessments (Shiozawa et al., 2010a,b; Erie et al., 2013). Information about the effect of didactical training on the pupil academic performance is lacking for most of the aforementioned programs.

When implementing a long-term didactical training program ("Train-the-Tutor (TtT)-Program") for student tutors, we therefore conducted a controlled observational study to explore possible influences not only on their tutees' evaluations but also on learning behavior and academic results. When launching the program in autumn 2012, participation was offered to tutors of the dissection course only, therefore, the present investigation is restricted to dissection course participants. Assuming an altogether beneficial effect of the TtT-Program with the null hypotheses including an adversary or no effect, the alternative hypotheses were formulated as follows:

- I.  $H_1$ : Student tutors who participated in the didactical training program ("TtT-tutors") receive better tutee evaluations than their counterparts as to the following tutor activities addressed in the preparatory didactics workshop: inducing a good working atmosphere, structuring course days, varying students tasks, encouraging active participation, giving feedback and providing overall learning support (cf. Section 2.3.2.1, tutor evaluation items 2 through 7).
- II.  $H_1$ : As participating tutors impart their expertise concerning effective learning strategies to their tutees, "TtT"-tutees make use of a greater variety of learning tools and social settings than "Non-TtT"-tutees.
- III.  $H_1$ : TtT-tutees achieve better examination results than Non-TtT-tutees.
- IV.  $H_1$ : TtT-tutees achieve a lower overall failure rate.

## 2. Material and methods

### 2.1. The Ulm University gross anatomy course

#### 2.1.1. General framework

At Ulm University, the dissection course (DC) is carried out every winter term for approximately 400 students of medicine and dentistry, who usually enroll during their 3rd and 4th or 5th term, respectively. In preparation of the DC, the preceding winter term, medical students have to attend an 8 day (28 teaching units) seminar, dealing with basics of gross anatomy. Additionally, according to Ulm university study regulations, both Medical and Dentistry students need to pass a 30-Item-Multiple choice test concerning basics of anatomy at the end of said term.

The DC encompasses 25 days of practical studies, equivalent to 114 teaching units (TU). Using a random generator, participants are divided into teams of 10 students on average, which will progressively dissect their body donor under guidance of a student tutor. Students who have to repeat the course are distributed separately, thus arranging for no more than one or two repeating students per team. Two or three adjacent dissection teams are supervised by a lecturer belonging to the institute's teaching staff; i.e. a qualified anatomist or physician.

#### 2.1.2. Tutor selection and preparation procedure

Any interested student who passed the gross anatomy course may apply for tutorship in the subsequent course. A comprehensive list of applicants is compiled and circulated among the future teaching staff, enabling each lecturer to individually select his or her tutors. At the start of term, all chosen tutors are required to participate in a one-week (35 TU) preparatory course which mainly

deals with dissection techniques, but also covers 4 TU of lectures concerning organizational issues, educational resources, group dynamics and feedback. According to definitions by Whitman and Fife (1988) and more specifically Ten Cate and Durning (2007b), the Ulm DC tutors are near peer teachers (NPT) as they need to have passed the course beforehand and thus precede their tutees by at least one year of medical education. They receive a student assistant salary according to Ulm University regulations of about 230€ per month.

#### 2.1.3. Dissection and examination procedure

According to the anatomical regions to be dissected, the course is organized into five sections: 1st: Posterior trunk/Lower extremity, 2nd: Anterior trunk/Upper extremity, 3rd: Situs/Retrostus, 4th: Head and neck, 5th: Central nervous system. Students of dentistry follow a modified course without dissection of upper and lower extremities, focusing instead on head and neck dissection.

To complete the study of an anatomical region, the students' learning results are verified by means of an oral or written test. Dentistry students' exams are held orally throughout, medical students' after the 1st, 3rd and 4th section. In order to equalize opportunities in these tests, examiners are randomly assigned to all but their own dissection group. Written examinations after the 2nd and 5th course section for medical students consist of 30-Item-Multiple choice questionnaires with 5 answering options (type A) each. In accordance with Ulm university study regulations, marks are given as follows: 1 = very good (90% or more); 2 = good (80% or more); 3 = acceptable (70% or more); 4 = sufficient (60% or more). If less than 60% of answers are correct (grade 5 = insufficient), the participant fails the respective section; however, a single failure may be compensated by an additional oral exam ("colloquium") at the close. The arithmetic mean of the above mentioned single results is given as final score. To pass the DC, participants thus have to show at least sufficient performances in every single anatomical region; otherwise, they may take a written exam concerning the entire content after the end of course. If attendance (at least 85%; i.e. 22 days of the course) is insufficient, the course has to be repeated in the following year.

### 2.2. The Didactical Training Program "Train-the-Tutor (TtT)"

The central objective of the TtT-program is to qualify student tutors of different obligatory Basic Medical Sciences courses for subsequent peer assisted learning formats (e.g. skills training, problem-orientated learning etc.) in the Clinical Studies Section. The training program was introduced in winter term 2012/13 and initially offered to student tutors of the Gross Anatomy Course. Tutors of Physiology, Medical Terminology, Histology and Biochemistry courses were included in the following years. As the long-term purpose was to qualify tutors for a variety of peer teaching formats, our concept does not target educational demands specific to the dissection course but on general teaching and learning principles. Considering the actual implementation of conveyed didactic knowledge to be one of the major challenges with any TSI Program, we established a three-step structure of didactical workshops and teaching practice in the respective course as shown in Fig. 1.

In the two-day preparatory workshop, students dealt with learning objectives and lesson structuring as well as different teaching methods and feedback instruments. Further topics were tutor roles, essentials of group dynamics and handling proposals for difficult teaching situations. Most of these issues were addressed by individual or group exercises. Considering the transfer of didactic knowledge to teaching practice as far more important than theoretical excellence, we abstained from performing a formal examination after the workshop. Self-estimations that were

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