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EDUCATION

A snapshot of anatomy teaching: Peer-led anatomy boot camps — Priming for success?☆

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ABSTRACT

Introduction: Pending changes regarding the medical curricula in Germany prompted us, members of the Department of Anatomy at the Medical Faculty of Saarland University, to critically evaluate anatomy teaching with special attention to macroscopic anatomy and the dissection class. Aiming at a thorough assessment we were particularly interested to which extend an optional peer-led tutorial ("anatomy boot camp"), which had preceded the dissection class, impacted the outcome in a series of oral exams of those who had participated.
Methods: We evaluated a student cohort of 307 students in the fall/winter semester 2015/16 at Saarland University, including those enrolled in medicine and dentistry, by implementing a series of questionnaires specifically designed for five mandatory oral exams during the course of the dissection class. The questionnaires contained different exam-relevant questions as well as several demographic items. The evaluation was complemented by interviews with students and examiners.
Results: Participants of the anatomy boot camp generally performed better in all exams and in three of them statistically significant. Items such as gender, age, and previous experiences in the health care professions contributed marginally – if at all – to the overall students' performance. Intriguingly, most students welcomed the idea of implementing questionnaire-based oral exams to balance out the different experience level of the respective examiner.
Conclusion: Our study showed that a comparable minimal timely investment on the part of the students to choose to participate in an optional anatomy boot camp was positively correlated with students' performance.

1. Introduction

The evaluation of educational programs has become an essential routine in anatomical teaching and is now a part of "evidence-based teaching". This is even more important because of an already planned renewed curriculum for all medical faculties in Germany starting from the year 2020 (Masterplan Medizinstudium 2020, BMBF; Jünger, 2018). Skill-based techniques are supposed to be implemented in a broad manner in all parts of medical education and examination. The pre-clinical knowledge will be linked to diseases and their treatments early from the start and a strict division between pre-clinical and clinical education will be completely omitted. In addition, a NKLM (national catalogue of learning in medicine) will be implemented. It will be of great importance to reflect critically and evaluate all steps of the new curriculum thoroughly to make the medical education sufficient, efficient and, finally, satisfactory for students and lecturers.

The syllabus of pre-clinical studies in human medicine dedicates a substantial amount of time to what are considered core subjects, i.e. anatomy, biochemistry and physiology. Although the admittance process to the studies of human medicine in Europe and the U.S. are different, the attributes required for newly-recruited medical students are overall similar (Moxham et al., 2018). Good study skills, the ability to memorize (factual retention), conscientiousness, emotional stability and a general understanding of biology are necessary to successfully navigate anatomical learning. Despite the implementation of modern technology and advanced teaching skills, the dissection of human bodies still remains to be an important educational tool and therefore a cornerstone in the anatomy curriculum (Ghosh 2017). This view is shared by medical students, who considered dissection as a foundation to develop clinical skills (Ghosh 2017), as well as professionals, especially surgeons, supporting prosection-based teaching as a beneficial method of

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teaching anatomy (Sheikh et al., 2016). Although the 'anatomy of the human body' remains unchanged, the incorporation of the ever-growing knowledge of modern cell and molecular biology as well as novel imaging techniques put timely constrains on the anatomy syllabus demanding the implementation of novel teaching methods. The relevance of human anatomy in the daily medical practice does not seize and remains a basis for general physical analysis and symptom interpretation (Arráez-Aybar et al., 2010). The current generation of medical students find themselves exposed to traditional and contemporary teaching methods (Chapman et al., 2013). Among students the learning by textbook and notes from the dissection class still prevails (Triepels et al., 2018), resources, however, such as movies from the internet, e.g. YouTube, are becoming increasingly popular (Jaffar, 2012; Barry et al., 2016). Anatomy teachers are asked to walk a small path to educate themselves and incorporate multi-modal approaches that have been shown to promote deeper learning, such as body-painting and clay-modeling (Nicholson et al., 2016; Jariyapong et al., 2016; Akle et al., 2018). On another hand, 'teaching the teachers' by instructing anatomy teachers to implement ultrasound as a teaching tool has been shown to require minimal training (Jurjus et al., 2014), and thus, less time to be invested to employ novel teaching means.

In regard to the changes that anatomy teaching has to face, a solid assessment of the teaching *status quo* needs to be performed. At the Institute for Anatomy and Cell Biology at Saarland University, Germany, a tutorial in form of an 'anatomy boot camp' has been offered by student peers on an optional basis preceding the beginning of the semester in which gross anatomy is taught. In previous years anatomy teachers/examiners were left with the impression that students who had participated in these tutorials were performing better compared to non-participants. Given a cohort of over 300 students of human medicine and dentistry in the fall/winter semester 2015/16, we aimed at evaluating the performance of participants and non-participants. We expanded our analysis and were including additional demographical items such as gender, previous work experiences in health care professions, native speakers (German), and age. The evaluation primarily based on several questionnaires implemented into a series of five consecutive oral exams, each of them concluding a thematic section of the gross anatomy class. Additionally, we wanted to include the 'performance' of the examiners themselves in handling these questionnaires as mandatory evaluation tools, which could potentially be in conflict with their examination routine.

Our study suggests that a peer-led anatomy boot camp prior to the gross anatomy course had a significant impact on student performance in regard to passing their oral exams.

2. Methods

2.1. Anatomy curriculum

In compliance with the curriculum of the School of Medicine, Saarland University, Germany, human anatomy is taught as part of the pre-clinical studies to third semester human medicine and dentistry students (http://www.uniklinikum-saarland.de/lehre/). The studies comprise the practical gross anatomy class, a lecture series introducing the students to different aspects of the human body and an accompanying seminar series addressing the clinical relevance of anatomical knowledge. For several years now, student peers who were advanced in their studies had offered to the designated third term students a peer-led voluntary tutorial (anatomy boot camp) immediately prior to the beginning of the third semester. The tutors received compensation by the university for their time and effort offering and organizing the tutorial. The anatomy tutorial consisted of five four-hour sessions within the course of two weeks. Since the students' performance is assessed in a summative way by five verbal and practical exams during the course of the gross anatomy class, the tutors dedicated each installment to one exam topic, i.e. basic anatomy, thorax and trunk, extremities, inner organs and cavities, and head/neck. Additionally, the tutors offered advice in how to tackle the large load of learning material as well as how to prepare for each exam.

2.2. Subjects

Human medicine (n = 283) and dentistry students (n = 24) of the third pre-clinical term of the fall/winter term 2015/2016 participated in this study. Students were informed that the evaluation was a part of the university's effort to improve teaching at the School of Medicine. The group of examiners who have been used to implement the questionnaires into a series of oral exams was heterogeneous including professors, academic staff and research associates with various levels of teaching experience (n = 11). This diversity has let us to distinguish between "senior" and "junior" examiners in our evaluation with seniors having more than five years of teaching experience in anatomy.

2.3. Instruments

In order to evaluate whether a participation in the tutorial had an impact on students' performance, we had designed a questionnaire, which was implemented into the verbal exams and filled out by the examiners. Due to timely constraints on the exam days, the questionnaire needed to combine two important aspects that allowed it to be implemented as an instrument for evaluation, (a) the questionnaire needed to measure the individual student's performance and survey demographic items/features, and (b) it needed to retrieve the before-mentioned data points without impairing the flow of the exam itself (cf. schematic of the questionnaire as an inset in Fig. 1). As a performance measurement we requested from the boot camp tutors ten questions that have been explicitly addressed in the peer-led tutorial. Additionally, we assembled a list of thirty questions depending on the focus of the exam. The examiners were prompted to ask two of the tutors' questions and, at least, two additional questions out of the remaining group of questions. The examiners needed to check (correct answer) or cross (wrong answer) the respective question and assess the student's exam performance. After implementation of the questionnaires the examiners were granted flexible arrangement of the remaining examination time to compromise for individual examination styles. To allow a straightforward implementation of the questionnaire that should not delay the subjective exam time on the side of the examiners, we surveyed the participation of the tutorial and a number of demographic items in a two-answer fashion helping the examiners to minimize the time spent with the questionnaire. These questions included: (1) participation in the student tutorial (yes, if three or more installments were attended), (2) age (older or younger than 25 years), (3) gender (male/female), (4) native speaker (i.e. German as a mother tongue), (5) type of studies (human medicine/dentistry), and (6) previous occupations related to health care professions. In the latter case we used the first round of exams to establish this group in which we included students that previously worked as nurses, OR of ICU nurses/assistants, paramedics, or physiotherapists. All of these professions require to some degree anatomical knowledge or have been exposed to anatomical terminology. The questionnaires were designed in landscape format with a header including the above-mentioned demographical questions, followed by two split text columns that presented a total of 40 questions that were specific for the respective exam topic. In the bottom section, the examiners were prompted to assure proper completion of the questionnaire

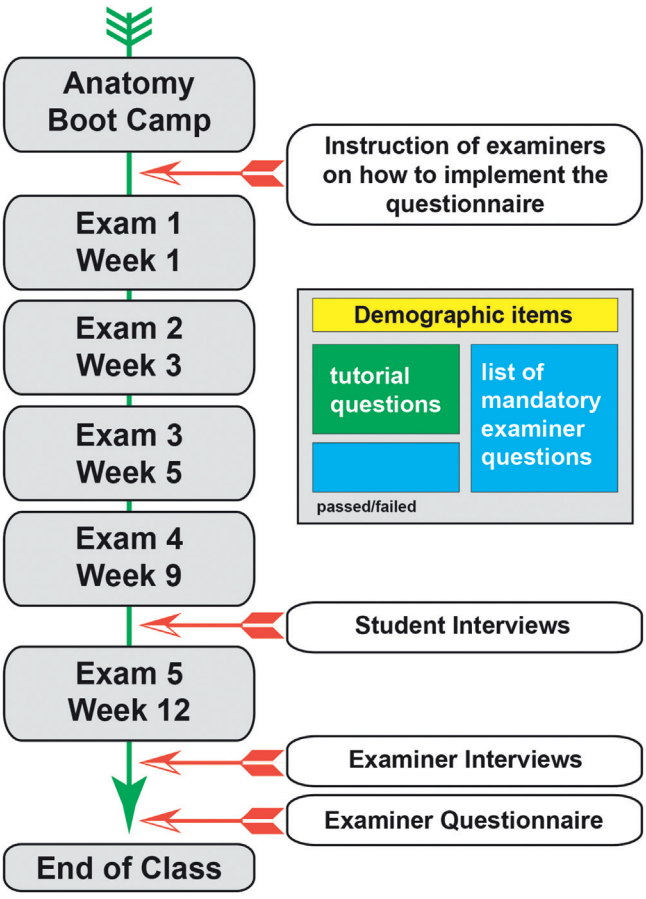

Fig. 1. Timeline of the evaluation process.
Schematic overview of the timeline in which the evaluation process has taken place. The questionnaire for the students has been implemented into five different exams (Exam 1–5) over the course of twelve weeks. Arrows are indicating events during the evaluation process. The colored inset represents an example of the general layout of the questionnaire.

and to indicate whether the student passed or failed the particular exam. An actual example of a questionnaire used for the forth exam (inner organs and abdominal cavities) can be found as Supplementary Fig. S1. All raw data can be found in Supplementary Data Set 1.

Starting from the second exam (topic: thorax/trunk), we surveyed the total duration each examiner needed for the examination of each student group ("table"). The amount of time dedicated to the implementation of the questionnaires was estimated by the examiners who could choose between three time bins: below 50%, 50–75%, or more than 75% of the total examination time.

In the final week of the gross anatomy class, we interviewed 25 voluntary student participants and made a transcript of their interviews upon their consent. Among the shared demographic questions that were part of the questionnaire, we wanted to (a) know their motivation to (not) participate in the tutorial and (b) what their perspective on the implementation of the questionnaire was.

Based on the students answers we extracted several key words that we included into a specific questionnaire for the examiners. The examiner questionnaire was designed using a five point Likert-scale.

On the first day back in the gross anatomy class after each exam, we additionally surveyed anonymously the attendance to the lectures leading up to the exams and their respective relevance for the individual learning to evaluate the role of the lecture series in the students' learning process and preparation for the exams.

2.4. Statistical analysis

All exam questionnaires were compiled in respective Excel sheets and analyzed for completeness. Questionnaires that lacked essential data points were omitted and were not included in our analyses. Data analysis was performed using SPSS 23.0. The students' performance among the different categories within one particular exam was assessed using Fisher's exact test with a significance level set to 0.05. Differences regarding the exam duration depending on the examiner's experience or gender were assessed using a student's t-test. Error bars are indicating standard error of the mean (±SEM).

3. Results

Over the course of 12 weeks (Fig. 1) we have monitored the performance in anatomy studies of a student cohort (n = 307) in their second year of human medicine or dentistry studies. Prior to the beginning of the term, the students had been offered a voluntary anatomy tutorial ('boot camp'). We wanted to evaluate whether participation in the tutorial had an impact on overall performance in a series of oral exams during this term. In general, those students who had attended the tutorial generally performed better than their peers who had not attended (Fig. 2A). This tendency was in three of five oral exams statistically significant. The performance was monitored and evaluated using a questionnaire, which the examiners had to implement in their exams. This approach allowed us to further address categories with potential impact on students' performance, such as age, gender, ability to communicate as a native speaker, field of study and previous experience in a health care profession (Fig. 2B–F). This group included, for instance, paramedics, nurses, and physiotherapists, i.e. professions that have previously been exposed to anatomical terminology. Non-native speakers had a difficult start in the first two exams but caught up whereas dentistry students showed generally a weaker performance. Gender, anatomical knowledge from previous professions and age had no or just little impact on overall performance. Just prior to the last exam, we asked 25 voluntary students about their experience with the questionnaire during their individual exams. Although these interviews were intended to assess how the students thought about the questionnaire as an evaluation tool, we were surprised to hear that the students received the questionnaire positively in particular as having a moderating effect on the exams. Since all examiners needed to implement the questionnaire, the time spent on answering selected questions balanced out what many students perceived as a major discrepancy between a challenging/demanding senior examiner compared to less experienced juniors.

Due to the active role of the examiners to implement the questionnaire, we took the opportunity to address more closely the performances of examiners during the exams. We analyzed over one hundred exam groups (representing over one thousand individual exams) and, generally, found time-wise only small differences in the categories gender and experience level relative to "the average exam" which lasted approx. 10 min. However, the average exam duration of male as well as senior (experienced) examiners was minuscule but significantly shorter in both categories (Fig. 3A). Due to the equal distribution of gender and experience level in all groups we cannot further specify any significant correlation between combinations of both items in our results. We asked all examiners to roughly quantify the time spent using the questionnaire by self-assessment. Experienced examiners (seniors)

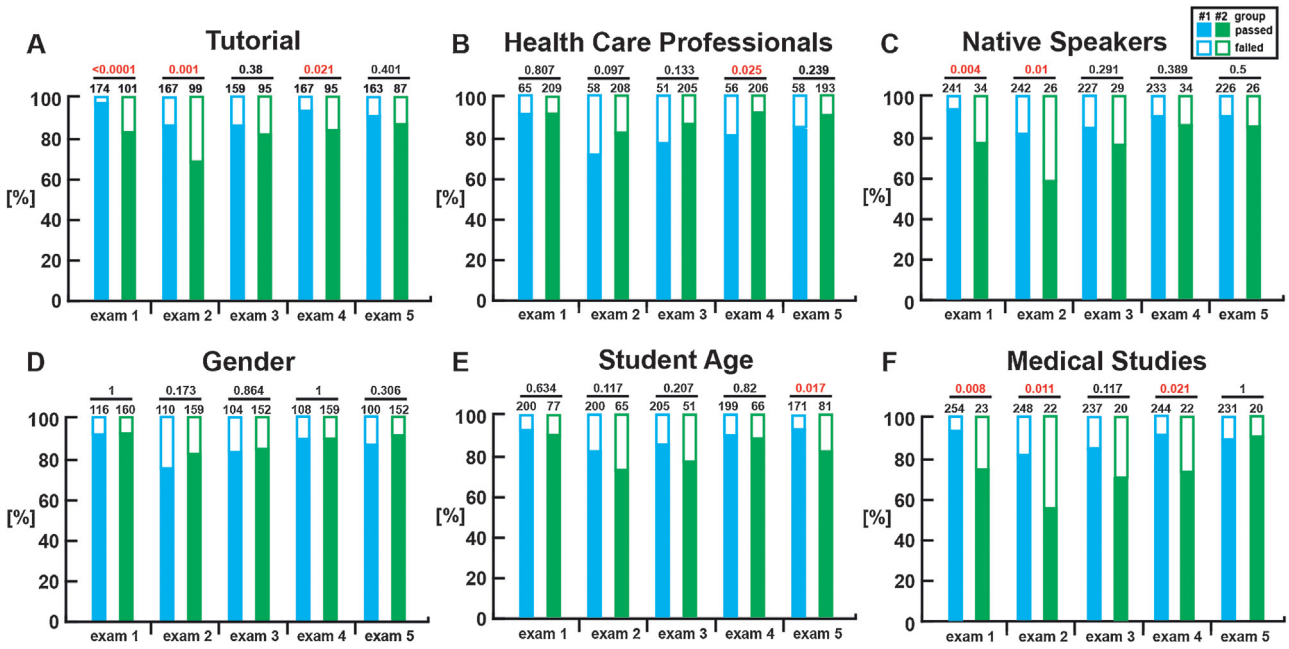

Fig. 2. Analysis of the results of the students' performance. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

Statistical analysis of a total of six different items (A–F) in regard to overall students' performance during the course of the gross anatomy class. Statistical differences were assessed using the exact Fisher test. P-values were added and statistical significant values are depicted in red. Student groups that had been compared are presented in blue or green, respectively. Stacked bars represent the total of 100% (Y-axis) from both, students in one group that had passed (filled bars) and those that failed the particular exam (hatched bars). Absolute numbers of students in each group are shown on top of stacked bars. (A) Tutorial: [blue] participation/[green] no participation; (B) Health Care Professionals: [blue] previous experience/[green] no experience; (C) native speakers (German): [blue] yes/[green] no; (D) gender: [blue] male/[green] female; (E) student age: [blue] younger than 25/[green] 25 and older; (F) medical studies: [blue] Human Medicine/[green] Dentistry.

needed less than 50% or between 50–75% of the total exam time to implement the questionnaire, less experienced juniors, however, used in over half of the cases more than 75% of their time to implement the questionnaire (Fig. 3B).

In parallel to the dissecting class and self-motivated learning at home or in the library, anatomy faculty members hosted a series of lectures to complement anatomy learning according to the curriculum of medical studies. After the second exam we asked the students whether they used this opportunity by attending the lectures. Due to variations in the number of lectures offered between two exams we categorized the attendance in two groups (attendance to less than 50% of the offered lectures, or over 50%). Overall attendance declined during the term with just as little as a quarter of the students attending more than half of the lectures (Fig. 4A). Most of the students found that lectures were merely complementary to their own learning since book-studies at home or in the library were favored over sitting in the classroom. Although lecture attendance was per se mandatory, individual registration to each lecture was not required, which resulted in fluid attendance. Over the course of the term, an increasing number stated that attendance and learning were not correlated. Only a fraction of the students (approx. 10%) regarded their attendance to the lectures as important for exam preparation.

The clear difference in the time management of handling the questionnaire depending on the experience level prompted us to further investigate potential underlying reasons. Based on interviews with all examiners we asked thirteen questions that allowed us to quantify the examiners' behavior and motivation using the questionnaires during the exams. The questions were answered using a Likert-scale und categorized in regard to gender and experience level (Table 1). The gender of the examiner showed no influence on the answers to our questions; however, the answers based on the experience level showed differences. Juniors found the implementation easier over the course of the time and found that the positive feedback of the students should prompt further usage of such a concept. Almost all examiners found that a questionnaire-based exam might be a useful tool to help inexperienced examiners to structure their exams.

4. Discussion

In this study we wanted to evaluate whether students who had participated in a peer-led anatomy boot camp preceding the semester in which anatomy was taught performed better than those who had not participated. Our data of a cohort of over 300 students of medicine and dentistry in the fall/winter semester 2015/16 confirmed this observation. Our data revealed, however, that the benefit reflected in their performance in a series of oral exams was statistically significant only in three out of five exams. The two exams that lacked statistical significance showed a trend to better performance for the anatomy boot camp participants. This result is for two reasons of utmost importance. On the one hand the participation is time-wise a minimal investment (five installments in two weeks) for the individual student compared to an intense semester with lectures, seminars and actual presence in the dissection room. On the other hand it shows that minimal monetary compensation by the university for the organizing student tutors of the anatomy boot camp was positively correlated with the students' performance. This is remarkable since the tutorial was free of charge and optional compared to a plethora of online tutorials that were charging for subscription and therefore representing access limitation for financially challenged students.

About one in five students (58 of 307) has identified him-/herself as formerly been affiliated to health care professions, i.e. they were either nurses, paramedics or physiotherapists. To our knowledge not many studies are dedicating a special focus on this considerably large sub-group of medical students. They are often advanced in age and have been employed by or worked for health care institutions

Table 1
Distribution of Likert-scale results from the examiner questionnaire.
Thirteen questions are listed with the absolute numbers of answers given by eleven examiners. Next to the total distribution the answers are split into the results of two categories representing experience level or gender of the respective examiners. Numbers in brackets are total numbers of examiners per category item. In the columns listing the results of the categories decisions tending towards agreement (A*, i.e. "SA + A") or disagreement (D*, i.e. "D + SD") are combined. SA, strong agreement; A, agreement; U, undecided; D, disagreement; SD, strong disagreement.

	Distribution (total)					Distribution (experience)						Distribution (gender)					
	Junior (7)				Senior (4)				Male (5)			Female (6)					
	SA	A	U	D	SD	A*	U	D*	A*	U	D*	A*	U	D*	A*	U	D*
1. My examination style is "associative".	3	4	1	3	–	3	1	3	4	–	–	3	–	2	4	1	1
2. Previously, I prepared my own questionnaire.	3	1	4	–	3	4	3	–	–	1	3	2	1	2	2	3	1
3. I had no problem to implement the questionnaire on the day of my first exams.	2	3	2	4	–	3	1	3	2	1	1	2	–	3	3	2	1
4. It was easier to handle the questionnaire on the day of the final exam (exam 5) compared to the first exam.	5	3	2	1	–	7	–	–-	1	2	1	4	1	–	4	1	1
5. I have been properly instructed on how to use the questionnaire.	6	1	3	1	–	3	3	1	4	–	–	3	1	1	4	2	–
6. I would have appreciated a better instruction on how to use the questionnaire.	–	3	3	1	4	3	2	2	–	1	3	2	1	2	1	2	3
7. I have given thought on how to combine the questionnaire with my own examination style prior to every exam.	3	1	3	1	3	3	2	2	-	1	3	2	1	2	2	1	3
8. My time management on the exam days is very important due to organizational issues or research.	4	3	–	3	1	4	–	3	3	–	1	2	–	3	5	–	1
9. A questionnaire concept based exam might be useful for junior examiners to structure their exams.	6	4	–	–	1	6	–	1	4	–	–	4	–	1	6	–	–
10. The positive feedback on the questionnaire-based exams by the students should be considered whether to continue this form of exams.	3	4	2	1	1	6	–	1	1	2	1	3	1	1	4	1	1
11. I had enough time to return to my own examination style after filling out the questionnaire.	1	4	3	2	1	3	2	2	2	1	1	3	1	1	2	2	2
12. I could imagine continuing using a questionnaire-based concept in the future if it reduced my current exam duration by more than 20%.	2	2	3	2	2	3	3	1	1	–	3	3	–	2	1	3	2
13. In every exam should be sufficient time to adjust to the individual situation of the examinee (anxiety, repeater, etc).	6	3	1	1	–	6	–	1	3	1	–	4	–	1	5	1	–

prior to their medical studies. Additionally, due to their age many have to balance special financial and family related circumstances that potentially limit their individual exam preparation. Except for one exam we did not find any significant difference between this group and other students, which can be considered a silver lining for many of them who are confronted with a lingering doubt whether pursuing medical studies was the right choice. In our observation gender did not impact exam performance. The exam performance of male and female students has been subject to debate in previous reports. Some reports demonstrated that male students had performed better in anatomy and physiology than female students (Kelly and Dennick, 2009). An analysis of factors that were related to academic success in medical studies in two Austrian reports identified male students as more likely to succeed (Frischenschlager et al., 2005; Haidinger et al., 2005). In contrast a UK study (Haq et al., 2005) indicated that performance scores for females were slightly higher than for males when it came to the outcome of written exams and objective-structured clinical exams. Our results that non-native speakers performed initially significantly worse than their peers might be owed to the situation of giving oral exams itself. A situation to which they needed to adapt to before they finally caught up. Tutorials designed for international first year students have been proven to be effective and help the students to battle the upcoming exam situation (Huhn et al., 2015).

A previous study demonstrated the benefit of a three-day tutorial in preparation of junior students for the national anatomy exam, which was organized by older peers (Rengier et al., 2010). In fact it is not surprising that the benefit of the anatomy boot camp did not persist throughout the semester (at least to its level of significance). Older peers in the dissecting class additionally tutored all students throughout the semester. They were helping participants and non-participants likewise by reviewing individual exam performances and by general exam debriefings, which had been shown to positively impact future exam performances (Favero, 2011; Favero and Hendricks, 2016). The benefit of peer tutoring has been demonstrated previously (Burgess et al., 2016). In that regard the anatomy boot camp might just "prime" those participating and act "sensitizing" ahead of the semester for the upcoming workload. Comparably to an athletic boot camp our peer-led anatomy boot camp also allowed by means of repetition and exercise the strengthening of the ability to "jump over the bar" (and, thus, to pass the exam) rather than lowering the bar by presenting two familiar

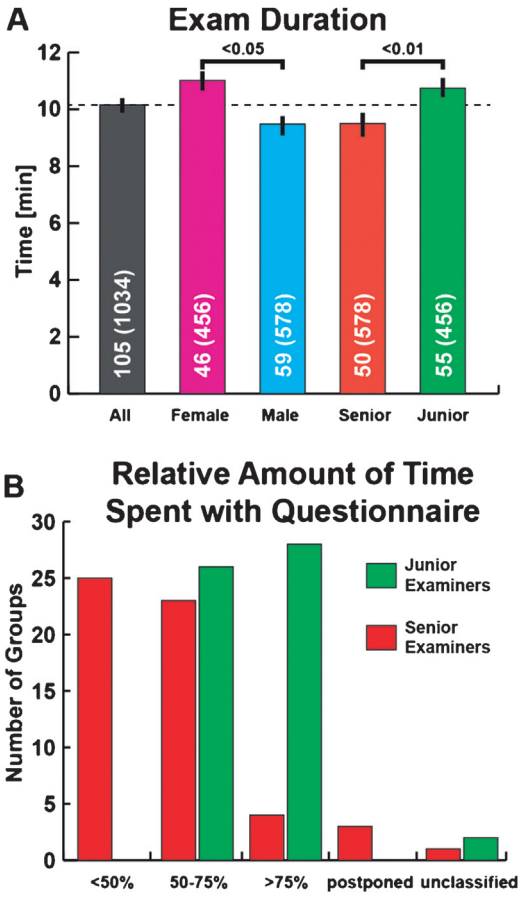

Fig. 3. Analysis of examiner performance.
(A) The duration of the exams was compared in the categories gender (female/male) and experience level (senior/junior) using a student's t-test with error bars (±SEM). Numbers on columns represent the total number of average exam durations per group that have been assessed. Numbers in parentheses resemble the total number of exams. (B) The time spent implementing the questionnaire in the category experience level was assessed by plotting the distribution of the absolute number of examined groups in three bins (<50%, 50–75%, 75%) excluding those group exams that had been postponed or were unclassifiable reports from the examiners. The results refer to the relative time spent during the entire duration of the exam.

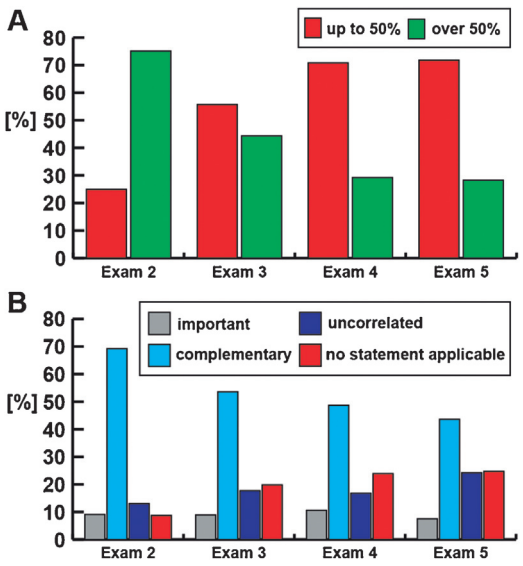

Fig. 4. Implications of lecture attendance in student learning.
(A) Student attendance at lectures held prior to the respective exam. Results per exam represent the relative attendance at the lectures between the previous and upcoming exam. Absolute numbers of lectures offered varied between different exams. (B) 'Snapshot' of students' perception assessing the influence of the lecture series on personal exam preparation and learning.

questions. That is why we speculate that many non-participants were eventually catching up during the course of the semester due to the benefit of lecture/seminar attendance.

A great surprise and outcome of this study was the smoothening benefit that many students experienced. Whereas we considered the questionnaire-based exam as an evaluation tool, the students, in contrast, valued its implementation as a mean to standardize and structure the exam with the consequence of adding fairness. Although examiners implemented the questionnaires to a different degree in their exams, students perceived that this was evening out examiners that appeared more challenging than others (junior vs. senior examiners). This is in line with previous observations by Löffler et al. (2013), in which students generally valued transparency and fairness in oral exams. Structuring of oral exams and asking the same questions has been identified as one of the suggested best practice aspects besides the change of examiners and adequate training of the examiners (Davis and Karunathilake, 2005).

Oral exams that were partially relying on questionnaires might be of value to examiners with less teaching experience. This was one of the general observations among all examiners when they were asked on how they had dealt with the questionnaires. Developing an appropriate examination style is time consuming and based on personal trial and error. The taxonomy classes by Bloom et al. (1956) might be a good starting point, i.e. applying different qualities of questions in one exam. Often, however, the personal examination style is merely a compromise between the number of exams on the given day and the timely investment. As in clinical subjects where objective-structured clinical exams, OSCEs, are more frequently used (Harden et al., 1975), anatomy teaching might benefit from a structured approach, too. A rotation between different human bodies would be feasible to identify anatomical structures. The development of this exam type and its application, however, would likely be considered too time-consuming and logistically challenging.

Our study is limited by the fact that it had only been performed in one year (fall/winter 2015/16). In particular, the group of dentistry students was comparably small and needs further investigation over the course of several years. Due to the varying number of students but also fluctuations regarding the teaching staff, no anatomy class in a given year is a repetition of the preceding year. Although we aimed at facilitating the implementation of the questionnaire for examiners and students, in its first implementation the students were shy to clearly state whether they had participated or not since they were afraid of being subject to judgment whether non-participation would be considered being less dedicated to studying anatomy. We were wondering whether our experimental set up was selecting for the already more ambitious and, likely, academically more successful group of students. If that was indeed the case, the group of participants would have continued to outperform throughout all exams. This, however, was not the case. Our study represents a snapshot regarding anatomy studies at a German university and might therefore not be representative for others. We believe, however, that our assessment left us with a good basis for further development and growth. Among that further education of the peer tutors should be considered which has been shown to have additional benefits to positively impact students' performance (see Shiozawa et al., 2010, 2016; Walser et al., 2017).

5. Conclusion

Using a questionnaire based approach we had evaluated in our study whether participants in an anatomy boot camp offered by older peer tutors had a significant effect on students' performance. Our results demonstrate that especially initially the participants benefited in passing oral exams. These results should not only prompt students to participate in such a tutorial, but also demonstrate to financial authorities at universities that minimal financial investment is reflected in increased students' performances. Our analysis demonstrates that it is important to not only assess certain aspects of teaching but to listen to students as well as examiners at the same time to have a view of the full picture. Depending on technical and educational advancement, medical and, especially in our case, anatomical teaching remains subject to improvement and can therefore only be considered "work in progress".

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Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at https://doi.org/10.1016/j.aanat.2018.10.005.

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