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Title: Great expectations: Principal investigator and trainee perspectives on hiring, supervision, and mentoring

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Abbreviations

PI - principal investigator

EASL - European Association for the Study of Liver Disease

AASLD - American Association for the Study of the Liver Diseases

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Abstract:

Background: A functioning mentor-trainee relationship is of high importance in academia. Discrepancies in expectations between principal investigators (PIs) and trainees are a source of misunderstandings and conflicts, endangering scientific progress and career advancement. In this pilot study we sought to explore the expectations of principal investigators and trainees, providing consensus data from physician-scientists and junior researchers who attended an educational workshop, entitled the “The EASL/AASLD Masterclass”, in December 2017.

Methods: Twenty-three Masterclass attendees, composed of nine trainees (four PhD candidates, five postdocs) and fourteen PIs, responded to an online survey. Both parties were asked to score twenty-nine predefined statements of important expectations, enabling a comparative analysis for each statement between the groups.

Results: For the trainees, the success of the PI, either mirrored by successful mentoring or scientific work, as well as a clear road for academic development are of utmost importance. PIs did not prioritize these aspects, highlighting discrepancies of expectations. PIs prioritized trainee competence, reliability, strong daily initiative/work ethic, qualities which were also recognized to be important by the trainees’ group but not to same degree as PIs.

Conclusion: Discrepancies in expectations pose a preventable threat to the mentor-trainee relationship, if considered and discussed beforehand. The discrepancy in the most common expectations between the two groups could have resulted from the fact that trainees prioritize outcomes of success while PIs focus on the necessary qualities leading to those outcomes.

Introduction

The mentor-mentee relationship in academia

Preparation for an academic research career involves a long road with multiple challenges. After graduation from university, many academic researchers find themselves faced with a formidable challenge: finding the right environment for pursuing an advanced degree, postdoctoral training and the transition to independence. The German term “*Doktorvater*” or PhD supervisor, literally translates to “the father of the PhD student” and poetically epitomizes the importance of the mentee-mentor relationship in academia. Principal investigators (PIs) expect trainees to possess a set of qualities when they apply for scientific training including honesty, ethics, competence and a strong work ethic. These virtues form the basis for a research career of academic integrity, leading hopefully to a successful thesis and strong publication record (1). The PhD student’s work should be organized, transparent and well documented and is expected to command considerable problem-solving skills and a high frustration tolerance.

Likewise, PhD students have a major goal in common – the completion of their PhD thesis, with candidates choosing an attractive project directed by an inspiring and encouraging mentor. For the PhD student, a clear road to the thesis, positive working atmosphere and availability of infrastructure and resources to guide growing academic independence might be decisive factors in selecting a supervisor. Just as teenagers blossom into adults, over time, PhD students need to renegotiate the terms of their relationship with their PI (2). As PIs foster scientific independence and maturity in their team members, they need to gradually give them free reign as the trainee approaches the end of training.

Once PhD students graduate and move on to becoming postdoctoral candidates, the relationship with their PIs changes dramatically. Postdocs demand more independence, less guidance and a working alliance on a more equal footing (3). A healthy relationship should be symbiotic where both parties benefit from each other. In “*The Evolution of Postdocs*”, Stinger *et al.* state that a hallmark for a good mentor is their honesty with each postdoc about their talents, accomplishments, and potential, since postdocs tend to prefer direct feedback on their performance (4).

PIs as the leaders of the team have multiple duties and are not uncommonly overburdened with work. This is especially true for clinical scientists when the PI runs a laboratory in parallel with clinical obligations (5), with expectations in both “worlds” rising substantially compared to just ten years ago. PIs need to provide the infrastructure required for the group to conduct their research, including securing grant funding and providing proper training. However, PIs currently spend significantly more time in grant writing activities than years ago since competition for funding is far greater than in previous years. Furthermore, research grant dollar amount has remained overall stagnant, oftentimes not offsetting the increase in salaries, reagents and other resource costs which drives demands for more clinical productivity. Thus, one can speculate that there is less time for direct supervision and mentoring as compared to decades ago, despite a fundamental need to continue to foster the mentor-mentee relationship. Successful PIs foster their postdocs' experiences outside the laboratory to broaden their aspirations. In return, the postdoc is expected to be the work-horse of the team, delivering high-quality research that is published jointly with the mentor. In addition, as researchers undergoing advanced training, postdocs are expected to supervise junior members (e.g. PhD candidates, undergraduate students) in the laboratory (4)(6).

When expectations on both sides have not thoroughly been discussed beforehand, misunderstandings arise, endangering the trust of the PI-trainee relationship. To address these gaps in understanding, in December 2017, junior investigators from both sides of the Atlantic participated in a unique two-day intensive educational collaboration entitled “The Masterclass”. They received training in basic, translational and clinical liver-related research led by eminent clinical scientists from the European Association for the Study of Liver Disease (EASL) and the American Association for the Study of the Liver Diseases (AASLD). The event included interactive small group workshop sessions to discuss relevant topics in more depth. In one of these interactive sessions entitled “Hiring and supervising research team members,” expectations of PIs towards trainees [e.g. PhD candidates or postdocs] and vice-versa were debated. It became quickly evident that many of the discrepancies in expectations between them, highlighted above, might be a source of conflict and misunderstanding(7), with the potential to negatively impact scientific progress and career advancement. Since these issues affect nearly everyone in academia, we sought broader consensus about the workshop findings from all Masterclass attendees through a follow-up online survey.

Methods

Using initial findings from the workshop debate, we sought to ascertain the most important expectations of PIs and trainees by creating an online survey of all Masterclass attendees. Qualitative findings from the workshop discussions were transcribed during the sessions and then used to inform the creation of an online survey (supplementary table 1). Participants were asked to score 29 predefined statements comprised by 14 points focused on the trainee’s expectations and the remaining 15 statements representing PI’s expectations.

Respondents were asked to answer all 29 questions, enabling a comparative analysis for each statement. In this exploratory analysis, the calculated p-values serve as an indicator for level of agreement (p-value \in 0 or 1) between the PIs and trainees expectations. Specifically, P-values of 1 or 0 reflect absolute agreement or non-agreement, respectively. P-values were not adjusted for multiple testing since they would exhibit tendencies rather significances. Mann-Whitney U statistical tests for significance were utilized.

Results

From thirty-six Masterclass participants, twenty-three (64%) completed the follow-up online survey, including nine trainees (four PhD candidates, five postdocs) and fourteen PIs (Figure 1).

Participants of the survey

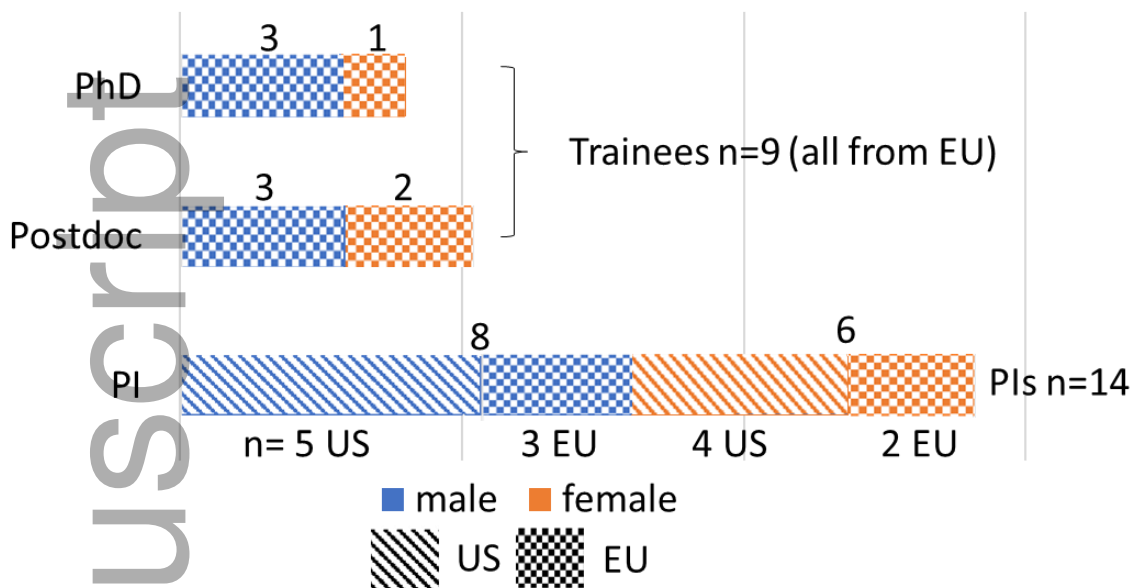


Figure 1: Number and gender of Masterclass participants in the online survey, composed by 14 PIs, 9 from the US plus 5 from the EU, and 9 European trainees, including 4 PhD candidates and 5 postdocs.

The most important expectations between PIs and their trainees appear to be distinct. Trainees' expectations focused on the PI's track record for successful mentoring (rank **1**, Figure 2A), road to independence to establish their own group (rank **2**), and overall career success of the PI (rank **4**), whereas PIs appear to not prioritize these aspects (p-values for group accordance 0.083 (rank **1**) and 0.179 (rank **2**)). Interestingly, the online survey results show that the trainees attribute the same level of importance to PI's track record for successful mentoring and to PI's success, while the PIs appear to give more importance to PIs success than to his/her track record for successful mentoring (Figure A).

When it comes to finances, trainees are in agreement with PIs (p-value 0.734) that monetary incentives such as salary (**14**) or the certainty of a continuous working contract (**12**) are less important; these statements received the lowest score by both trainees and PIs (Figure A). There are no gender related differences for trainees concerning their expectations as suggested by the high p-values (Supplementary Figure 1). However, responses of male trainees regarding the most important expectation of PIs "Initiative/work ethics day-to-day of the employee" are heterogenous compared to their female counterparts, who are in good agreement with their PIs (rank **1**, p-value 0.095; Supplementary Figure 1).

PI's expectations consist of daily initiative/work ethic and competence of their trainees (ranks **1, 2**, Figure 2B). Additionally, PI's appreciate mentee's honesty and transparency as well as self-awareness (ranks **3, 4**). These four statements were also recognized to be important by trainees. Statements of PIs from the US are in agreement with their European colleagues except for rank **4** and **5** concerning the expectations of PIs. Here, PIs from the US were firmer about the importance of these statements as their European counterparts, who tended to be more flexible on these two points (rank **4** and **5** for expectation of PIs, p-value 0.042 and 0.083; Supplementary Figure 2).

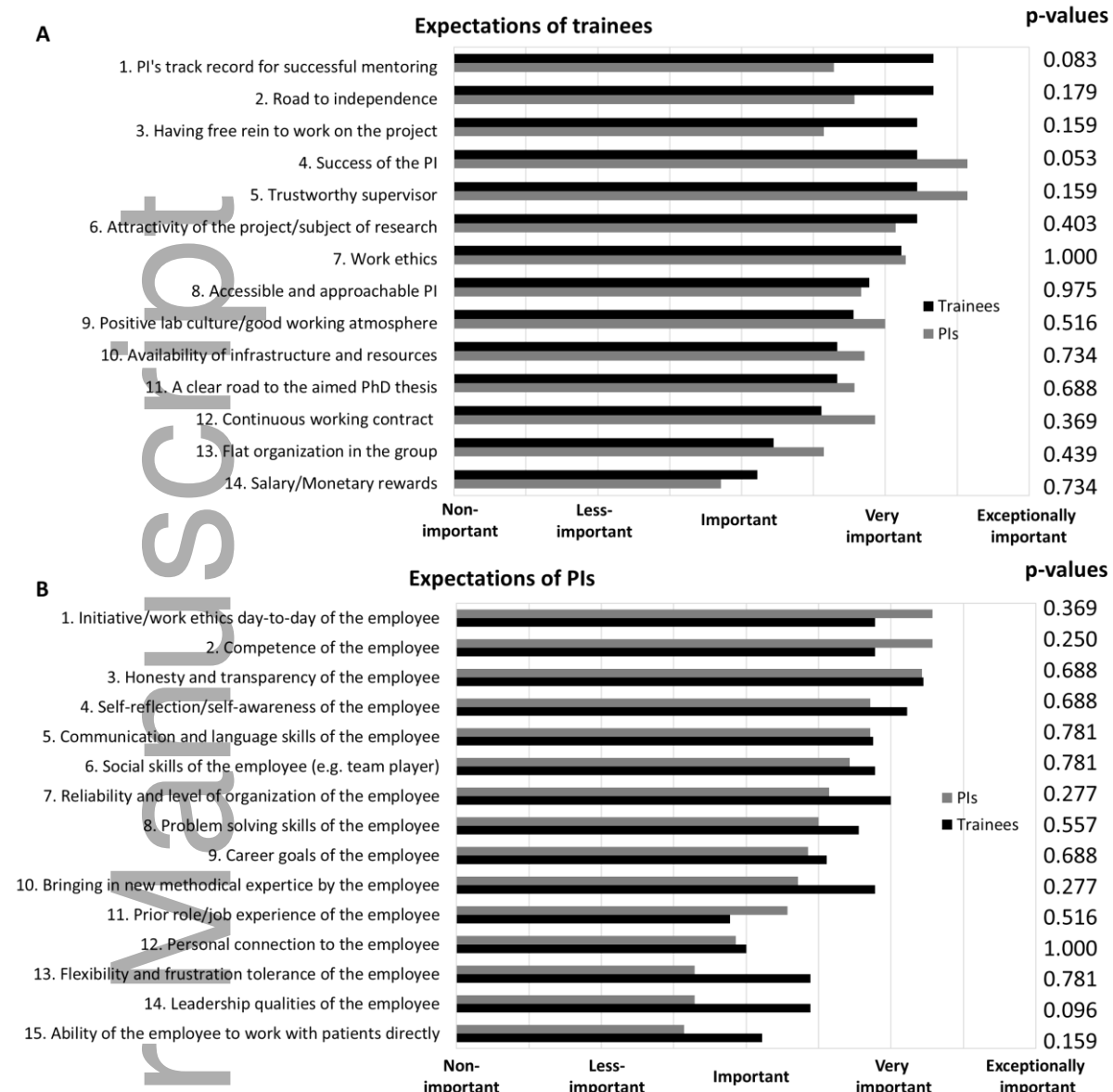


Figure 2. Outcome of the online survey – (A) Expectations of trainees (postdocs and PhD candidates) towards their future PI. (B) Expectations of PIs towards their future trainees. 23 Masterclass attendees (14 PIs and 3 PhD candidates/6 postdocs) rated a sum of twenty-nine predefined statements of important expectations from non-important to exceptionally important. Results are the numeric average of the given answers as for the calculation responses were converted to numbers, using the following scale “non-important”=1, “less-important”=2, “important”=3, “very important”=4 and “exceptionally important”=5. p-values calculated using Mann-Whitney-U-test indicate group accordance between trainees and PIs, where p-values of 1 or 0 reflect absolute agreement or non-agreement, respectively.

Discussion

This pilot study designed to investigate the expectations of principal investigators and trainees highlights the potential discrepancy of expectations between these two parties. The mentor-mentee relationship between the PI and the trainee is undoubtedly a unique relationship and goes beyond a pure working alliance. A positive relationship has a long-lasting influence on the mentee and sets the course for a successful academic career. For the PI, a motivated and passionate mentee represents a valuable partner in the rewarding scientific process.

For the mentee, the success of the PI is of utmost importance, whether attributed to successful trainee mentoring or scientific work. Hence, PIs should keep in mind that beside their scientific accomplishments, also their track record and reputation for successful mentoring is an appealing factor for trainees. Furthermore, young scientists seeking an academic career are aware of the competitive environment and greatly appreciate a mentor who articulates a clear road to independence at the same time that provides personalized guidance to the trainee.

PIs expect their trainees to possess established values and virtues when they apply for a position, virtues that are critical to success. Interestingly, the discrepancy in expectations might be best explained by noting that trainees focused on *outcomes* of success while PIs focused on the necessary attributes leading to those outcomes (e.g. the *process* of success). Trainees should be willing to be hardworking, honest, and self-reflective, eager to contribute new insights in their field, leaving no doubt of their integrity and honesty. In return, PIs are lenient with their mentees, if features such as frustration tolerance as well as leadership qualities are not perfectly formed right from the beginning of the training. In a way, this relationship might be seen as the first “collaboration” of the mentee, which to be rewarding and long-lasting, needs to be beneficial to both sides.

We acknowledge that this study is limited by representing a small subset of physician-scientists and/or researchers in clinical departments, which might affect its generalization to other areas of investigation. Thus, future studies are required to provide further insight into the mentor-mentee relationship and respective expectations which might lead to new approaches and strategies. Collectively, our findings should encourage PIs and trainees to carefully explore their reciprocal expectations before embarking on the mentor-mentee relationship, thus enabling a solid base for a future scientific cooperation that is mutually beneficial.

Epilogue

The EASL-AASLD Masterclass Experience

Lastly, we would like to emphasize that the inaugural EASL-AASLD Masterclass in 2017 (Figure 3) was a unique educational event for young investigators to learn from and informally interact with leaders in the field of hepatology. This two-day program at Chateau de Guermantes, in the Parisian countryside, provided a casual atmosphere to hold academic lectures, interactive sessions and individual meetings while enjoying French gastronomy and hospitality.

Taken altogether, this workshop was a great setting for comparing and contrasting the European and American health care, research funding and training systems, for effective networking and for developing lifelong collaborations and friendships, which is illustrated in this piece. We strongly encourage young investigators interested in basic, translation and clinical liver research to apply and attend this unique opportunity!

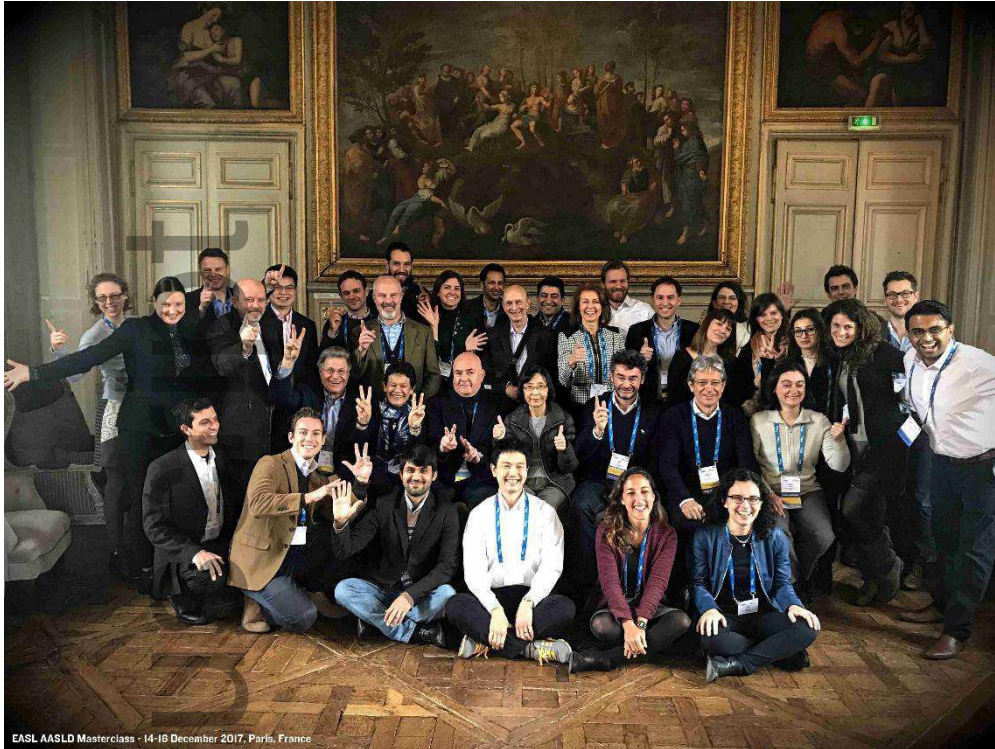


Figure 3: Inaugural 2017 EASL-AASLD Masterclass group photograph® (Copyright EASL Geneva, Switzerland).

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References

1. Brown DG. Expectations of M. [cited 2018 Feb 4]; Available from: https://www.eng.auburn.edu/~clemept/expectations_brown.pdf
2. Career Laboratory: The Changing Expectations of Employers and Employees [Internet]. [cited 2018 Feb 4]; Available from: <https://careerlaboratory.blogspot.de/2015/02/the-changing-expectations-of-employers.html>
3. Hitchcock P, Mathur A, Bennett J, Cameron P, Chow C, Clifford P, et al. The future of graduate and postdoctoral training in the biosciences. *Elife*. 2017;6:1–7.
4. Singer M. The evolution of postdocs. *Science* (80-.). 2004;306:232.
5. Luckhaupt SE, Chin MH, Mangione CM, Phillips RS, Bell D, Leonard AC, et al. Mentorship in academic general internal medicine: Results of a survey of mentors. *J. Gen. Intern. Med.* 2005;20:1014–1018.
6. de Ridder J, Abeel T, Michaut M, Satagopam VP, Gehlenborg N. Don't Wear Your New Shoes (Yet): Taking the Right Steps to Become a Successful Principal Investigator. *PLoS Comput. Biol.* 2013;9.

7. Bell A, Treleven L. Looking for Professor Right: Mentee selection of mentors in a formal mentoring program. *High. Educ.* 2011;61:545–561.

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