Interviews

"You have to bend the rules"

Interview with Sebastian Seiffert on education

Sebastian Seiffert[1] is professor for physical chemistry of polymers at Johannes Gutenberg University Mainz. He studied at TU Clausthal from 1999–2004 and completed his dissertation in 2007. After a post-doctoral stay at Harvard from 2009–2010, he headed a junior research group at Helmholtz-Zentrum Berlin from 2011–2014. From 2014–2016 he was associate professor for supramolecular polymer materials at FU Berlin. Since 2016 he holds the former chair for physical chemistry of polymers at JGU Mainz.

Sebastian Seiffert developed a keen interest in academic education, teaching and learning already during his time at the TU Clausthal, being a member of the student council. During his stay at Harvard he came into contact with Prof. Eric Mazur and learned about his philosphy of peer instruction[2] which inspired him to further engage with the subject of good teaching. Since then, he has been perpetually questioning the long-established form of frontal lecturing and has been reaching out to make a difference.

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[2] https://mazur.harvard.edu/presentations/peer_instructions

JUnQ: What comes to your mind when thinking about the slogan "Never change a running system"?

Sebastian Seiffert: Did you ever ask yourself what the point of the QWERTY layout of keyboards is? It is a relict from the time of mechanical typewriters. The QWERTY layout ensured that there was less interlocking of letter stamps, as it actually prevents typing too fast by using a purposely ineffective arrangement of keys. With the onset of computers, it would have been logical to overcome that so-far purposely ineffective system and to replace it with a better one. But the concern of non-acceptance by customers, who might be unwilling to adapt to a new system, kept the inefficient QWERTY arrangement in use. In the academic business, especially in its educational branch, we actually follow the same pattern of missing chances for revolutionary improvement quite often.

JUnQ: What was your most frustrating experience regarding this principle?

Sebastian Seiffert: When I was trying a new method for interactive teaching in my class for the first time, I was very eager to implement for the quote that “education is not the filling of a pail, but the lighting of a fire”. However, I received reluctant responses from students. I mean, imagine a crowd of students who you try to motivate by confronting them with a new way of teaching, but who are so stuck in old ways of conceiving teaching content that the spark just didn’t light the fire. I felt like a fool that day.

JUnQ: Why do you think it is so difficult to make a change in education, especially at university level?

Sebastian Seiffert: There are two elements. One in general is administration. In the academic educational business, there is an external set of rules that dictates exactly how

much time you have to spend on teaching, how much time students ought to spend on conceiving it, and even how they have to spend it. Hence, there is not much space for creative approaches if you have to follow this rigid set of rules. The other element is a distinguishing feature to my subject, chemistry. The field of chemistry is, compared to other scientific fields, dominated by conservative views, which also applies to the educational part. In times where flexible and interdisciplinary research is becoming ever more important, this is an unfortunate attitude in my opinion. As a result, I believe that if you want to implement new ways of teaching, you have to try to circumvent or bend the rules, and on top convince your peers frequently.

JUnQ: If there were no boundaries what should teaching look like?

Sebastian Seiffert: Let me answer that with a quote from Eric Mazur that is my general guideline: "Good teaching is to help students learn". We have to create a system which accounts for that. We must motivate our students to learn perpetually and not only excessively before an exam. We also have to create an environment where this continuity is not a surplus of workload but well balanced. How do we get there? Here's a first practical idea: if we implement small five-to-ten minute quick tests at the beginning of every lecture, then the students will have an incentive to dedicate themselves to the content of a lecture beforehand at home. But there has to be enough time for them to do this without overwhelming them with assignments. Ideally, that way, students establish a basic understanding at home and the lecture would let them acquire a more detailed insight later on. This format can also be supported fantastically by using e-learning tools. In that context, make yourself clear that the way we still mostly teach today, the frontal lecture, originates from the 15th century, when books weren't available in mass, so that a privileged person had to read out content to a recipient group. It was the name patron of our university, Johannes Gutenberg, who made books available in mass, which we refer to as the 2nd media revolution. These days, we already experience the 4th media revolution—but apparently, this has not yet reached the academic educational system.

JUnQ: This is remarkable, indeed. But let's get back to your suggestion. Having to write a small exam every week in every course sure creates pressure. How would you avoid this?

Sebastian Seiffert: Let's say if you score less than 50% on average in these quick tests, the only penalty should be that you are not able to score a perfect A or 1.0 in the final exam. That would take away most of the pressure but still ensures an incentive for the motivated students. But also giving the students exact information on where to find the required knowledge via reading assignments helps to lower the barriers for students. A wonderful way is to provide a well written lecture script plus a another supporting medium, like an audio podcast or tutorial videos. That way, we can accomplish continuity and reduce exhaustion caused by bulimic learning at the end of the term.

JUnQ: You said that conservative views are sometimes a boundary for progress in education, can you elaborate on that?

Sebastian Seiffert: A key word to understanding this is the term "confirmation bias". For academic teachers, it is very enticing to come to the conclusion that the way they were educated themselves is good because it made them what they arem, brilliant researchers and teachers of course. So, questioning the way one was educated appears to be counter-intuitive. And therefore, it is generally difficult to change something. That is also the reason why these discussions tend to get emotional very fast, which makes it even more difficult to progress. A way to circumvent this would be by providing positive incentives like rewarding good attempts and courage in applying new methods in teaching. In addition, I would promote more projects like inverted classroom formats wherever applicable. In my opinion and experience, the best way to realize whether you understood something or not is by explaining it to someone else. So, why not use this exact tool in academic education?—flip the classroom and let students teach each other as often as possible, using written, audio and video teaching materials at home beforehand! Let me repeat: "Good teaching is to help students learn".

JUnQ: Do you have examples on how you have been utilizing these ideas?

Sebastian Seiffert: I like to implement slides in my lectures where I ask a conceptual question, and the students should vote for one out of a couple of answers. If the result suggests that a good share of students got it right, we proceed with the lecture, but if the result suggests that only a minority was able to transfer the knowledge or understand the principle, I will ask them to discuss with their peers for some minutes. Almost every time, a second vote then turns out fine. This method is not invented by me—it is Eric Mazur's "peer instruction" approach, that has been proven to actually work and improve the learning outcome measurably. On top, during the "Corona semester", I provided podcasts plus written scripts in order to provide two channels of knowledge transfer. This was more work for me, but the students appreciated the flexibilty and the way they were able to process the content. But again, I am limited by regulations than supported in being inventive with new ways on how to get the knowledge across.

JUnQ: If it is so difficult from within one could argue that change needs to be induced from the outside.

Sebastian Seiffert: Well no, that is again not as easy. If progress is the aim, the first cogwheels that should turn should be the ones inside the heads of people that are op-

posing it. Change can only be achieved if enough people believe in it. It cannot be enforced. Take the Corona pandemic as an example. The governmental rules to attenuate the spreading of SARS-CoV2 in spring 2020 were the most severe cuts on individual liberty in the whole history of our republic. But they were carried by the public based on agreement and acceptance. That changed in summer 2020, when shocking pictures of overwhelmed Italian and Spanish hospitals were already forgotten, and the protective means lost public support.

JUnQ: That is an interesting statement especially regarding politics. Do you think this is also the cause for the slow action with respect to climate change?

Sebastian Seiffert: I think there are also other elements. If you look on a political level, the questions are big and vague. Like how do we respond to climate change? There are probably a thousand different answers, which are all correct but none of them could solve the general question by itself. The scientific answer is clear: we must de-carbonize our world economy by the middle of this century. The way of achieving this, however, is a matter of massive debate. It must of course be politically enforced in the end, but this must rest on a solid level of general acceptance in public.

JUnQ: Do you think this makes it difficult for scientists to participate in these processes?

Sebastian Seiffert: Yes, because scientists are trained to raise and answer specific questions one by one. And to proceed by continuous erratum. They are not used to give generally applicable, persistent statements for very complicated questions.

JUnQ: Thinking of climate change or the current corona crisis, is it fear that drives this clinging on the good old days?

Sebastian Seiffert: Most certainly, but not solely. As already mentioned, the confirmation bias also plays a big role here. Many people who have established a comfortable way of living (with a large CO_2 footprint) have indeed earned that by persistent hard work (and by the luck of being born in the first world in the first place), and so they feel that they deserve that way of life. And people who did not suffer from the Corona virus or had no cases in their personal social environment think that everything is fine and do not see a reason for the measures against the virus anymore. In a way, this mixes with the fear that measures imposed on us that affect our daily lives take something away from us without evident benefit. It is hard to grasp climate change or to see an immediate benefit for the environment as an exchange for depriving yourself from something you are used to.

JUnQ: What is your way of dealing with this principle or encountering people who are guided by it?

Sebastian Seiffert: Persistence and esteem. Like in my "peer instruction" games in lectures, I know that the scientific truth will eventually prevail. Even skeptics will eventually see that countries with reasonable means of prevention will do better in the pandemic than others. And they will see that further business as usual will lead to persistent periods of $40+°\mathrm{C}$ in central Europe. I just hope that it won't be too late for action then.

JUnQ: What would be your message to all students regarding this subject ?

Sebastian Seiffert: Confucius said "If you make a mistake and do not correct it, this is a second mistake". I apologize to students that me and my parent's generation made a terrible mistake and didn't get the scientific message yet. Dear students, please help us out here. We need you; we need your enthusiasm, your tenacity, and your optimism that everything can be improved.

JUnQ: Thank you very much for the interview!

— Kevin Machel