

The ideal science teacher: a small-scale study on how science teachers see themselves in the classroom

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ABSTRACT

In educational philosophy and theory there are long debates on the ideal teacher. Some prioritize the cognitive aims of teaching (e.g. providing knowledge, developing critical thinking, etc.), others the social and emotional aims (e.g. disciplining, giving motivations, building relationships with students, etc.), while others yet suggest that all the above should be pursued by any single teacher. Within this debate, there is little talk about science teacher in particular. Are they supposed to worry about whether students just “learned their physics”? Common sense, reinforced by educational policy today, indeed often sees them as mere transmitters of scientific information. But this may not be how they see themselves. This paper will report on a small-scale study that shows that science teachers themselves recognize a multi-dimensional role of their teaching and try to accommodate different educational aims within the science-class.

KEYWORDS

Teaching goals, science teachers, ideal teacher, philosophy of education

RÉSUMÉ

Dans la philosophie et la théorie de l'éducation, il y a de débats longs sur la question de l'éducateur idéal. Certains mettent l'accent sur l'importance des objectifs cognitifs de l'enseignement (par exemple, fournir des connaissances et développer une pensée critique, etc.), d'autres sur les objectifs sociaux et émotionnels (par exemple, discipliner et motiver les élèves ainsi que de développer des relations avec eux, etc.) et d'autres soutiennent que tous les précédents devraient être poursuivis par n'importe quel éducateur. Dans ce débat, on parle peu de l'enseignant des sciences. Doivent ils s'inquiéter si les élèves ont simplement « appris leur physique » ? En effet, l'opinion dominante, renforcée par la politique éducative d'aujourd'hui, les considère souvent comme des simples transmetteurs des informations scientifiques. Cependant ce n'est pas celle la manière qu'ils se voient. Cet article présentera une étude à petite échelle montrant que les enseignants des sciences se reconnaissent d'avoir un rôle multidimensionnel en ce qui concerne leur enseignement, tentant de concilier des différents objectifs éducatifs au sein de la classe scientifique.

MOTS-CLÉS

Objectifs d'enseignement, enseignants des sciences, éducateur idéal, philosophie de l'éducation

INTRODUCTION

Philosophers of education have long been debating on the educational goals an ideal teacher should prioritize. From Plato's *Symposium* and Rousseau's *Emile* (1762), to Noddings (1995), Zevin (2010) and Griffiths (2014), pretty much any philosopher of education has entered this debate; and the discourse is still on: one of the goals of education is to pass on important pieces of knowledge; thus a teacher is supposed to familiarize students with the sciences, the humanities and the arts, or whatever we consider remarkable and important for our culture (Carr, 2005; Peters, 1972; Zevin, 2010). Yet, teachers are not just to inform students about the arts or the sciences; they are also expected to inspire enthusiasm, even love for learning (Locke, 1712; Rousseau, 1762). Moreover, they should pursue the cultivation of their students' many different skills, such as critical thinking, creativity, problem solving, argumentation, emotional intelligence, as well as a moral compass. In fact, the teacher is often expected to act as a moral paradigm, cultivating the character of their students (Griffiths, 2014; Noddings, 1995; Rousseau, 1762). Furthermore, teachers are often expected to promote their students' discipline; after all, a dominant figure in the classroom would prepare students for the workplace, where they will have to follow rules, procedures and chains of command (Lloyd, 1979; Zevin, 2010).

On top of that, teachers are expected to explore and develop different teaching strategies in order to accomplish any of the above educational goals (Zevin, 2010); thus, they would have to be competent educational researchers (Dewey, 1998; Heck & Goodlad, 1984). Besides, cultivating their own teaching skills and talents is key to their own professional development and their career as teachers (Carr, 2005).

In philosophy of education there are valid arguments prioritizing any of the above educational goals, each of which implies a different role for the teacher. Some even argue that any teacher pursues all the above goals all the time, whether they intent so or not (Gasparatou, 2016, 2018; Zevin, 2010). Philosophy is full of theoretical arguments and prescriptions about how one should act. But on some occasions, it might be important to take into account how the actual agents think they should act as well. Experimental philosophy is an emerging new branch that roughly suggests that philosophy should be informed by laypeople's opinions on philosophical questions (Gasparatou, 2010a, 2010b; Knobe & Nichols, 2008). So, when entering the debate about an ideal teacher, it would be helpful to know how teachers would like to view themselves. Using the methodological suggestions of experimental philosophy then, we decided to ask teachers from different backgrounds how they view themselves in the classroom. The goal of our study was to explore *what teachers think their role should be inside the classroom*; that is, *what type of educational goals do they feel they should prioritize when they teach*. It is worth noticing that, when philosophers of education talk about the ideal teacher, they rarely discriminate among teachers teaching different subjects. Part of the aim in this study was to see if teachers report having similar ideas about the goals they wish to pursue, independently of the subject(s) they teach. Here however, we will only report on the results of science teachers. We will however, briefly comment on whether their views are similar to those teaching other subjects.

Science education today has a highly dominant place in the curriculum. Educational policy priorities science education in order to promote scientific literacy; most professions today need some type of scientific or technological expertise; and most everyday decisions, from what to eat to whether to vaccinate ourselves, rely on scientific literacy also. Aiming at scientific literacy makes it evident that science education's goals are primarily cognitive; science classes are supposed to promote scientific knowledge and cognitive skills. So, whereas, the arts and the humanities make a case for themselves that they also cultivate character, morality, emotional intelligence and democracy, on top of academic literacy (Newman, 1982/1873; Nussbaum, 1997, 2010), no such argument is usually made for science education. Science education may as well just teach science. After all, science is so highly appreciated, that no secondary educational goal is

needed to support it. In this paper, we would like to explore whether science teachers agree with this idea. The aim of this paper then, is to explore *what science teachers think of the ideal teacher; what educational goals think an ideal science teacher should prioritize?*

Previous Research

As far as we know, there are very few studies exploring normative questions about the ideal teacher. The most relevant studies focused on how preservice teachers or students perceive a good teacher (Minor, Onwuegbuzie, Witcher & James, 2002; Weinstein, 1990). According to Minor et al. (2002), preservice teachers think that good teacher has to follow a student-centered teaching, effectively manage the classroom, exhibit moral values, but also enthusiasm for the act of teaching, be a good acquaintance of the subject, and finally transmit the image of a professional person. Similar views have been expressed by students (Weinstein, 1990): students think that a good teacher must have understanding towards students, provide the appropriate motivations, have patience, ability to give comprehensible explanations, creativity, organization, humor, responding to pupils' needs, etc. Moreover, Kelly, Dorf, Pratt and Hohmann (2014) compared teachers' portrayals in England and Denmark. It seems that in England teachers tend to have distant, rigorous and guiding attitude, while in Denmark teachers tend to have a positive, calm and supportive attitude. Crosby (2000) suggests that in higher education, teachers may see themselves employing many different roles, e.g. mentor, learning facilitator, study leader, etc.

Other studies explore the impact or the causes of different teaching types. Palermo et al. (2007) study the positive impact of close educational relationships between pre-school teachers and students for their admission in higher education institutions. Ben-Peretz, Mendelson & Kron (2003) explored how teachers act depending on their students' performance level: in classrooms with low performance students, teachers expressed more protective feelings towards students, while teachers with higher performance students chose to prioritize knowledge.

When it comes to science education, most studies explore the learning outcomes of different teaching interventions (Abd-El-Khalick, Bell & Lederman, 1998; Goodrum, Rennie & Hackling, 2001; Lederman & Abel, 2014). Focusing on the learning outcomes however, in a way strengthens the stereotype that a science teacher should strictly prioritize informing students about their subject matter and facilitating some key cognitive skills that are necessary for scientific work. But is this how science teachers see themselves too? Aiming to explore *how a science teacher views the ideal teacher*, we formulated the following research questions (RQs):

- RQ1. What do science teachers think the goals of their teaching should be?
- RQ2. Do they think they should prioritize some specific educational goal or do they feel that they ought to pursue many different goals simultaneously?

METHOD

Research Tool

This papers reports on a small-scale survey. We formulated a five-point likert scale questionnaire. Here we are going to report on the first part of the questionnaire, asking what kinds of goals the ideal teacher should pursue. Each item of the questionnaire was an exemplar proposition describing a certain educational goal, following the philosophical discussions summarized in Zevin's book *Teaching on a Tightrope: The Diverse Roles of a Great Teacher* (2010). Participants had to choose whether they (1) "totally disagree", (2) "probably disagree", (3) "are not sure if they disagree or agree", (4) "probably agree", or (5)

“fully agree” with each exemplar proposition. Items’ sequence was randomized. Participation was anonymous; participants had to give some information about themselves, namely, their gender, age, years of service; they also had to report whether they work in a private or a public school, in primary or secondary education and whether they teach: (a) humanities and social sciences, (b) arts / physical education or (c) natural sciences & ICT. The questionnaire was designed through the Google Forms app and distributed electronically via e-mail to in-service/acting teachers.

Participants

The study was performed from May to June 2017. A total of 117 teachers participated; however here we will report on 26 science and ICT teachers. The 26 participants were working either in public (23/26) or private (3/26) schools; they were 25-57 years old and had been working in primary (3/26) and secondary (23/26) education for less (5/23) or more (18/26) than 10 years. 18/26 were male, and 8/26 female; all had a BA degree, 13/26 had a MA and 1/26 had a PhD.

Analyzing the data

Each question was individually analyzed depending on the frequency that participants agree/disagree with the question; SPSS IBM Statistics software was used.

RESULTS

In the sections below you can see the questions, each suggesting an educational goal, and the frequency of the participants answers agreeing or disagreeing with each item.

Q1: I believe my teaching should help students acquire basic pieces of knowledge about the subject(s) that I teach.

This item presents the teacher as a knowledge delivery person; the primary goal of their teaching is to help students learn the subject they teach. The majority of the participants 17 (65.4%), “strongly agree” with this item, 8 (30.8%) of the participants “probably agree”, while 1 participant (3.8%) is “not sure if agrees/disagrees”. No one of the participants claims that they “disagree” with the above item (Figure 1).

Q2: I believe my teaching should help students advance their thinking skills.

This item presents the teacher as a thinking coach; the primary goal of their teaching is to help students practice thinking. 6 (23.1%) of the participants claim they “probably agree” with this item, while 20 participants (76.9%) “strongly agree”. No one of the participants claims they “disagree” or is uncertain (Figure 2).

Q3: I believe my teaching should inspire students’ interest in the subject(s) that I teach.

This item presents the teacher as an inspiration facilitator; the primary goal of their teaching is to help students love learning. 15 (57.7%) of the participants “strongly agree” with this item, while the remaining 11 (42.3%) claims that they “probably agree”. No one of the participants claims they “disagree” or is uncertain (Figure 3).

Q4: I believe my teaching should contributes in students' overall flourishing.

This item presents the teacher as a second parent or a *pedagogue*; the primary goal of their teaching is to help students’ intellectual, but also social, moral and emotional flourishing. The vast majority of the participants (19/26 or 73.1%) “strongly agree” with this item, while the

remaining 7 (26.9%) “probably agree”. No one of the participants disagrees or is uncertain (Figure 4).

Q5: I believe I should inspire discipline into classroom.

This item presents the teacher as a discipline facilitator; the primary goal of their teaching is to help students learn to follow rules, be patient and delay gratification. Participants had many different opinions on that: 1 of them (3.8%) claims they probably disagree with the above proposal, while 7 (26.9%) are uncertain. On the other hand, 10 (38.5%) of participants “probably agree”, while the remaining 8 (30.8%) “strongly agree” (Figure 5).

Q6: I believe I should give an interactive teaching performance in the classroom every day.

This item presents the teacher as a performer; the goal of their teaching is to keep students engaged. 6 participants (23%) claims that “strongly disagree” and “probably disagree”, 10 (19.2%) claim they are not sure whether agree or disagree. The majority of 15 (38.6%) declare that they “strongly agree”, while 5 (19.2%) say that they “probably agree” (Figure 6).

Q7: I believe I should systematically take action in order to advance my professional development.

This item presents the teacher as a professional; their goal is to advance their skills and their carrier. 2 participants (3.8%) claim that they “strongly disagree” or “probably disagree” with this item. The majority of 13 participants (50.1%) “probably agree”, while 8 (30.8%) of participants “strongly agree”. A small number of 3 (11.5%) is “not sure whether agrees or disagrees” (Figure 7).

Q8: I believe as a teacher I should systematically test the effectiveness of new teaching methods.

This item presents the teacher as an educational researcher; their goal is to perform educational research inside their own classroom so they can advance their teaching methods. 15 of participants “probably agree” (57.7%), while 6 (23.1%) “strongly agree”. A small number of 2 (7.7%) “probably disagree”, while 3 of them (11.5%) are uncertain (Figure 8).

Concluding then, regarding RQ1, about *what science teachers think the goals of their teaching should be*, it seems that ideally they would like their teaching to perform all major goals that philosophers have identified as primary educational goals. 25/26 participants claim they probably or fully agree with all the first 4 items (Q1-4) of the questionnaire, while just one claims they are not sure. The vast majority of science teachers then, believe their teaching should (Q1) facilitate students’ knowledge on their subject, (Q2) their thinking skills, (Q3) their love of learning, and (Q4) their overall flourishing. Minor disagreements appear on whether they should also advance (Q5) students’ discipline, and on whether they should worry about (Q6) their own teaching strategies, (Q7) professionalism and (Q8) educational research (Q8).

Regarding RQ2, about *whether they think they should prioritize some specific educational goal*, most of them seem to feel that they ought to pursue many different goals simultaneously. The majority of participants believe they ought to fully pursue at least 4 different goals (Q1-Q4), while most of them would want to pursue all 8 educational goals with their teaching. Among the many goals, (Q6) advancing interactive teaching strategies, (Q8) and engaging in educational research seem to be the two goals that some science teachers do not consider as important as the rest.

DISCUSSION

The results of this study clearly show that participants see themselves as having a very complex task. Most participants see the ideal teacher as one performing all major educational goals. Giving details on the other results of this study is beyond the scope of this paper; but it might be useful for discussion purposes to suggest that the 26 science teachers seem to reflect all our 117 participants' views. All teachers participating this study share similar views on what goals they would like to pursue.

One should keep in mind that these are just preliminary results of a very small scale study. But even so, results show that the teachers that participated this study claim to have very high expectations from themselves. And one could draw many interesting conclusions out of these results. On one hand, participants seem to confirm philosophers' claiming that any distinction among the different goals or aspects of teaching is unattainable when you are inside a real classroom (Zevin, 2010; Gasparatou, 2018). On the other hand, science education researchers proposing new teaching approaches every now and then, don't seem to take into account the multi-dimensional expectations science teachers impose on themselves. So, while researchers seem to prioritize the intellectual and cognitive results of any teaching approach, they provide no useful advice for any science teacher who has other goals in their agenda.

Having such a multiplicity of goals in mind, also explains why participants claim they are not satisfied with their own education. It seems that science teachers in Greece would welcome more educational courses during their studies, courses that could up to a point prepare them for the multi-dimensional goals they would like to pursue. Last but not least, our results could explain why teachers in general might be prone to frustration by their job (Zevin, 2010); any single teacher who wishes to facilitate intellectual, cognitive, critical, social, moral, emotional skills to their students, while pursuing their own professional and academic development, is probably on the road to disappointment. For, while it is indeed very hard to distinguish among the above goals when you are teaching, it is also very hard for any single person, in any single teaching act, to succeed in all the above goals in any single classroom filled with many different students, each of which have their own agendas in mind.

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