

Teacher training effects; whether they exist, how to measure them and what improves them.



CONTENTS

How do we measure teacher training effectiveness?

- Grade Tracking
- The Evaluation Triad

What helps or hinders training?

- Hours
- Culture
- Subject (of teacher's degree & being taught)
- Student factors

What interventions & techniques improve teacher training?

- Location-based self-efficacy
- Differentiated Instruction
- Mentoring and consistent feedback

INTRODUCTION

Investigating the effects of teacher training is a multi-faceted issue in which you have to consider the methodological limitations of using certain outcome measures, mediating factors in training efficacy and ways to boost teacher training. A number of ways other than tracking students' grades have been identified as outcome measures of a training effect, particularly triangulated feedback. While some studies have shown teacher training to have no effect, others show it can improve grades when it is content-focused and intensive. Teacher training currently is limited in its scope of professional development. It may fail to take into account the location in which a teacher begins their career, the amount of hours they require to explore and polish new teaching techniques, and possibly fails to allow them access to current research and mentoring that could help them become far more effective teachers.

HOW TO MEASURE THE EFFECT OF TEACHER TRAINING

No matter how old you are everybody always remembers at least two teachers throughout their lifetime. There are the teachers who made the biggest positive impact in your life and the teachers you wish you had never gotten stuck with. Figuring out a correct formula that maximizes a student's chances of finding the former and weeding out the teachers who can't seem to connect with students the right way is currently one of the most widely researched topics in the field of education. Though volumes upon volumes of research can be found on the topic, one probably has a better chance of finding the Holy Grail than finding that one perfect method of measuring a teacher's effectiveness. The fact of the matter is that there is no single perfect method for evaluating this because each method has its uses as well as its downsides. However, since there is no single perfect method we can still combine complementary methods so that each covers where the others may falter. In this paper, we will analyse results found from several research trials evaluating various methods and propose a system of measurement that includes tracking a teacher's overall grade relationship with their

students, as well as incorporate reviews from three different sources. Through this system of grade-tracking and including evaluations from student, peers, and the teachers themselves we believe it is possible to give a more holistic view of the complex matter of accurately measuring a teacher's effectiveness. Only once we know how to measure this can we tell if it training boosts a teacher's effectiveness.

One method of measuring effectiveness has been to strictly measure grade and exam outputs over the course of a few years. Programs like the 'No Child Left Behind' policy that is slowly being phased out of US public schools have adopted this type of method. Though it seems like a good idea on paper to base effectiveness on concrete data, there are many aspects that require consideration when it comes to truly measuring a teacher's effectiveness in the classroom. A teacher's educational background, the training they have received, their style of delivery and motivation factor into play when it comes to how they will impact students. Additionally, there are various external characteristics that make the task of isolation that much more difficult, such as, the varying degree of ability that each student possesses, the influence of their peers, whether or not the students had a choice in selecting their teacher (Primary/Secondary schooling vs. University), and other atmospheric characteristics surrounding the school and classroom. The other methods covered later in this paper will aim to touch on as much of these factors as possible

since grade tracking in itself cannot. Grade tracking should never be the sole point of evaluation when it comes to measurements of effectiveness but it should still remain an essential part of the process.



The Harris and Sass Grade-Tracking Experiment

The model we endorse for most accurately correlating what average grade and exam marks students will make with a given teacher is one tested by Harris and Sass (2011). The testing for this model was conducted throughout public schools of all levels (except university) in the state of Florida and was one of the first multidistrict models of its time. The public school databases in Florida allowed the experimenters to have access to the transcripts of teachers as well as their exam scores to see how these may correlate to the numbers that would be observed. The database was also organized in a way that allowed for the tracking of each student with their classroom assignment, allowing the experimenters to see how each student progressed with each teacher. The experimenters took the data from the years 1999-2000 and 2004-2005 and used this time-lapsed information to get a view of each teacher's average ability to output sufficient grades. We will call this the teachers GOA (grade output average).

While not every schooling system will have a database as detailed as this, an argument can be made for more systems to allow for this. Because of the room tracking system, the experimenters were able to see not only the GOA of the teachers for their given classes each year, but they were also able to see how each student did in the following years after. This data allowed them to see if a student was already performing well or not when they first encountered a teacher, whether or not that changed the following years, and allowed for the correlation of how a teachers GOA can affect the best and worst students. This experiment was basically a way of using concrete numbers and room tracking to see if a teacher was effective or if outside factors like student ability were the causes for grade output.

Why Use a Triad?

Even though Harris and Sass's method of grade tracking may seem like a slightly more improved method of basing teacher effectiveness off grades, it still lacks a holistic picture of what truly occurs in the classroom when it comes to how students and teachers relate. It attempts to boil down numerous, complex, professional and personal relationships to numbers on a spreadsheet. To further assess the other side of teacher effectiveness that goes beyond the numbers, we propose a triad method of evaluation that should be included alongside a method of grade tracking. The triad is proposed because each method has its own strengths as well as its own biases that can be evened out by the others. By incorporating different methods of student evaluations, peer evaluations, and self-evaluations we can take three different pictures of what may occur in any given classroom and use the biases from each picture to see where things match up and where there are discrepancies (Berk, 2005).

Student Evaluation

One of the most popular methods of evaluation is the use of student evaluations. At one point it was documented that up to 88% of universities use this method (Berk, 2005; Seldin, 1999) and it still proves to be an essential method to this day, as it should. A teacher's effectiveness will always be judged on how their students do so it is only logical to gauge how they feel about their instructor. Student evaluations give an idea of where they felt a teacher helped the most and where they were lacking. That being said, student reviews are also somewhat notorious amongst faculty due to the high likelihood of bias that comes with these types of reviews (Berk, 2005; Nasser & Fresko, 2002).

Naturally, a student who did not do well in the class will most likely give a negative review whether or not it was due to their own ability or the teacher's. Students who did well in a class may be a little less biased. For example, if the student received a good mark due their own ability they may be able to speak objectively on some aspect of the

teacher's method that they feel could have been improved. However, if the mark was due more to the teacher's ability than their own there could then be a high likelihood of bias in favor of the teacher. Still, the ability to gauge between the extreme positives and negatives of student reviews can help give an idea of how students generally view the teacher making this an essential part of the evaluation process.

Peer Evaluation

To counterweight the biases that may come to light through student evaluations, the next suggested aspect of the evaluation triad is the method of peer review. This method allows for the examination of the technical parts of the practice that students would not be aware of and cannot be observed through a grade spreadsheet. Additionally, it is a commonly used technique in many higher-order scholarly pursuits;

“If teaching performance is to be recognized and rewarded as scholarship, it should be subjected to the same rigorous peer review process to which a research manuscript is subjected prior to being published in a referred journal.”(Berk, 2005; Webb & McEnery, 1995).

The peer review process in itself can be split into two major aspects, the reviewing of course documents and the reviewing of actual teaching style.

Another teacher, preferably one with experience or who is well-regarded, would be the most qualified to review another teacher's course documents since they could compare how they prepare such documents and can pick out what has and has not worked in the past. The documents that would be reviewed would be along the lines of syllabi, instructional plans, assigned texts, homework, handout, projects, and tests. The second aspect of the peer review process would be some method of observing the teacher teach a few classes in the most natural way possible. The first way to do this would be to physically sit in on a session so that a peer could review the teacher's displayed content

knowledge, delivery, style of teaching, the learning activities they present, as well as just gauge the overall atmosphere of the classroom. However, this method can experience slight validity problems since both, the teacher and the students, would be aware that they are being observed.

The second and more recent approach to this is the use of a video recording. This method has the potential to yield the most authentic observations since there is no pressure being presented by an outsider physically observing a session, but it can still run into some validity as well as privacy issues. Validity can become compromised if the teacher and/or students are notified that they will be recorded at a specific time. If they are not notified this may run into some privacy issues. If this method is to be utilized it is suggested that it is used in conjunction with a policy that suggests that sessions could be recorded at any given time so that authenticity can remain intact. Video reviewing in this method should either be watched by one peer at a time or a group.

Self-Evaluation

The last evaluation method that should be included in the triad is the use of self-evaluations. This method is not well-known for being used as a sole source of evaluation but compliments other ones relatively well. Used as part of an evaluation triad it should help gauge how aware a teacher is to both student and peer perception when it comes to judgement of their abilities. Although this method may be the most susceptible to bias, research has tended to show that

“Superior teachers provide more accurate self-ratings than mediocre or putrid teachers” (Berk, 2005; Centra, 1973; Sorey, 1968).

Common forms of using this method may come in the form of “brag sheets” that allow the teacher to describe their style, their scholarship, experience, training, and give some sample activities. The self-evaluation can also be done in the form of a prepared

portfolio, either physically or digitally. This could include individual documents containing information that could be found in the brag sheet, and could even include a video that the teacher feels best displays their style in the classroom.

Every method that has been mentioned, with the exception of self-evaluation, has at some point been used as the only way of measuring a teacher's effectiveness. However, each method has been shown to have its shortcomings and biases. In order to counteract these downsides, we believe that the best way to truly measure effectiveness is by using a combination of them all so that their positives can make up for their negatives. For anyone measuring teacher effectiveness, strong attention should be paid to the grades that are put out and a method similar to the one found in Harris and Sass's experiment should be used as a way to track teacher ability versus student ability. To complement the concrete data, a triad of evaluations should be used to present a picture of what a typical class session would be like with the given teacher. Student evaluations give an idea of how students perceive the teacher's abilities, peer reviews give a more technical view of the teacher's abilities, and the self-evaluations make us aware of how the teacher perceives their own abilities as well as how they believe the other two sources perceive them. All of these methods together should provide a holistic measure of a teacher's effectiveness.

MEDIATING FACTORS IN TRAINING

When we think of what makes a good teacher, attendance at prestigious university, achieving an education or masters degree, and lots of experience come to mind. As it turns out, all of these factors failed to correlate with reading and math scores of 4th through 8th graders in Florida. Recent calls for an independent oversight in the structuring of teacher training in the UK may be missing the point if teacher training has no effect on student grades. Teacher training, although technically can include pre-employment training such as a degree in education, is mainly in the form of

on-the-job training. This training involves professional development programs in which teachers allocate a certain amount of hours annually to learn about their taught subject, learn about the process of learning itself and how to transform this knowledge into practice in the classroom for the benefit of students.

The Magic Number?

A simple explanation for the finding that training is not effective would be to say teachers haven't been given enough of it. While training exists at most schools in one form or another and is a legal requirement in some countries, hours allocated to training vary. In the US, over half of teachers complete less than eight hours of annual professional development programming. This is a disappointing figure when we consider the fact that training must exceed 14 hours per year in order to significantly improve student learning. When training is increased to 49 hours per year, student scores on standardized test are boosted by 21 percentile points. Clearly, doing the bare minimum benefits no one; moderate increases in the hours spent training cannot improve math or reading achievements. In a study evaluating the effectiveness of an intensive (>100 hours annually) science teacher training program, the number of hours spent on training predicted student achievements. Interestingly what also predicted student achievements was the beliefs of science teachers regarding their teaching; which will be discussed upon in a later section.

Teacher training does not exist in a vacuum

The approach taken to training will inevitably be influenced by the culture we live in. This influences tradition, beliefs and practices within schools. A qualitative comparison of a number of schools' teacher training found their practices to be reflective of the culture in which they existed. In a Us school, the uniformity of federal guidelines meant

training opportunities were limited to external conferences centred around policy guidelines and informal training was absent due to restrictions;

“we don’t have any time (...) Interaction is scarce.”

In a Russian school, working within a culture of prestige and tradition, training was organised in a top-down manner from the vice-principal. A Lithuanian school, operating within a socio-political culture which celebrated independence, took a more democratic and relaxed approach to teacher training where teachers would exchange ideas informally;



“Teachers in our school are never late to their classes because they need to come and discuss events of the day with their colleague over a cup of coffee.”

The authors concluded that a culture which encourages collaborative learning between teachers is one in which informal teacher learning thrives. However, the objective comparison of informal versus formal teacher training was not covered in this study.

Subject being taught/what teacher studied

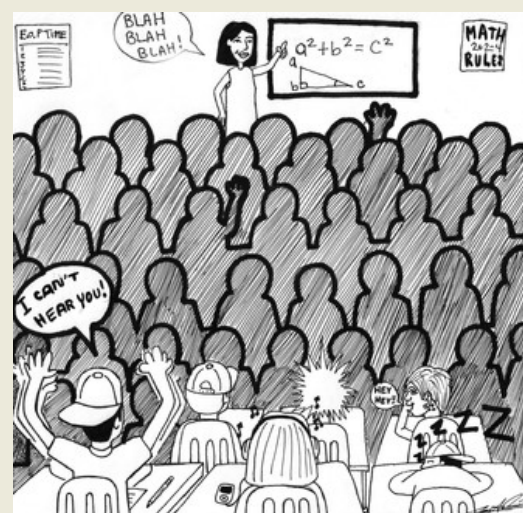
Proponents of teacher training may find solace in the fact that there is one exception to the rule that training does not affect student outcomes; math teachers. Training which focuses on the content of high school math has produced a larger effect on student

outcomes than completing an education degree. Coupled with the finding that working towards a certificate from the National Board of Professional Teaching Standards in the US only improves the effectiveness of elementary school math teachers, it becomes apparent that this subject is one in which teacher training could be most effectively applied. When we think of teacher training we envision a seminar in which teachers discuss theories of learning and how they can be applied to the classroom. This does, in fact, form part of most professional development programs for teachers, yet it is less important than content-based training when it comes to mathematics exam scores.

What these few results suggest to us is that teaching to teach is not so effective but teaching what to teach may be. Keep in mind though, that untrained teachers who hold a degree in a science subject are as likely to improve math performance as trained teachers. Could it be that the pairing of the undergraduate degree to the teachers taught subject is just as effective at influencing teacher effectiveness than any training could be? The importance of relevant experience in the subject being taught was reflected in the finding that 8th grade teachers with math or science degrees only improved student results in these specific subjects, and not English or history. This indicates that simply having a degree does not qualify people to teach, and teacher training may be less effective than identifying teachers with competence and relevant knowledge of their taught subject.

Achievement level of student

Analysis of teacher to class assignment in US schools revealed low-achieving students are assigned to lower quality teachers (with less experience and from less competitive colleges) at elementary, middle and high school levels. This would have alarming implications if teacher training does in fact have a substantial impact on



low-achieving students. However, it has been found that low achieving students do not benefit from teacher-training as much as they do from smaller class sizes.

IMPROVEMENTS & INTERVENTIONS IN A TEACHER'S ROLE

Chingos & Peterson (2011) suggest evidence that teachers may experience changes in efficacy throughout their career. From a student teacher's initial experiential learning curve upwards, as they transition from being in a full-time training program to actually teaching or tutoring classes themselves, to when they plateau out as full-time teachers, and most worrying in the timeline, the gradual degradation of efficacy as their teaching style and methods become either outdated or they stop developing professionally. Why should it be this way and what difficulties can a teacher face that will affect their ability to teach? There are a number of ways teachers can be helped, and there a number of methods that could be instituted throughout the career of a teacher to ensure they develop fully and then maintain as much of their ability as possible.

Teachers who believe they can teach will of course teach better. This concept is called self-efficacy and has been shown to be valid in relation to a teacher performance.

Bandura was the first to suggest that self-efficacy plays a role in how effective a teacher may be, and his supporters have shown that it can be correlated with student performance and the teacher's commitment to teaching. It also helps the teacher gain the motivation to learn new methods and strategies in teaching, work harder with students who may be struggling, and avoid removing a struggling child from class by referring them to special educational needs departments.

By boosting teachers self-efficacy, it may help them become a more effective or inclusive teacher.

Location-Based Self-Efficacy



Key Paper 1: [Knoblauch & Chase \(2015\)](#)

It has been suggested that student teachers entering schools in different areas can have a lowered self-efficacy, based upon their preconceptions of what they will encounter within the school. Based upon Knoblauch & Chase (2015), urban schools are perceived as having a highly diverse student population, along with corresponding societal and cultural issues (gangs, disregard for authority). In addition, they are seen as poorly equipped due to the higher demands on educational spending within a city authority area.

At the opposite end, rural schools are perceived as having less money due to the wider dispersion of schools and lower rate of educational spending for these schools. While

class sizes are generally smaller, there is less opportunity for professional development and less support for disabled or learning impaired students, meaning teachers can feel more isolated and perceive a rural school as requiring more self-reliance in tackling problem children. Suburban schools by comparison are seen as closest to the ideal, with high levels of funding, adequate support and good opportunities for professional development.

This means that student teachers have more reasons to negatively attribute their performance and Knoblauch and Chase (2015) show that, while they qualitatively may not express it, self-efficacy suffers more in rural and urban locations, particularly in student teachers, and teacher turnover is highest in urban areas, followed by rural. Suburban locations seem to be the best in all of these measures, and self-efficacy is highest there, possibly as a result. To decrease the teacher dropout rate, and ensure that student teachers achieve their peak efficacy rate, training and mentoring programmes within urban and rural environments could look to increase the self-efficacy of student teachers, giving them added support as they build resilience to the different issues the schools may have. Interventions could be built around the following ideas expanded upon in the following sections.

Some teachers, like Mr Kadir in this [video](#), **show this self-efficacy and confidence in their teaching style regardless of location.**

Differentiated Instruction & Professional Development

Key Paper 2: [Dixon et al. \(2014\)](#)

It must be noted that classes are highly fluid over time in many of the factors that can influence how a teacher instructs the class. Such factors can include class size, subject material, number and nature of problem



individuals within the class, ability level/distribution within the class, and curriculum changes. This creates a situation for any teacher that they must either develop and adapt to stabilise their efficacy through the use of differentiated instruction.

Some teachers prefer to teach similar lessons with clear outlines and formats. However, it is postulated in Dixon et al. (2014) that this may be due to the teacher not having as complete an understanding as could be possible, along with not having techniques to vary their teaching methods and ideas. The study discusses the different ways in which a student may gain understanding of a concept, where some may understand at the knowledge/comprehension/abstract level, while some may find it easier to learn in terms of application or analysis and others yet may find it easier to learn in an evaluate and create cycle. Teachers who only teach with one method implicitly expect students to modify and adapt their learning strategies to meet, which may be a difficult task for some.

Teachers who learn and continually adapt their teaching style to the particular class, subject or even mood of the students during the day may find that teaching efficacy rises as they find students more responsive to certain techniques and propositions. Dixon et al. found that teachers who spent more time in professional development, expanding their technique base and rehearsing and feeding back on these techniques had a higher rate of both self-efficacy and actual efficacy when returned to teaching a real group of students.

Programmes of extensive professional development could be expanded throughout a teacher's career, encompassing not just teaching new skills, but allowing teachers a friendly atmosphere in which to practice and become confident in the material. In Chingos & Peterson (2011), it is shown that teacher efficacy begins to degrade after a number of years in the role, and this could be attributed to a lack of continuing development and restructuring of their teaching style to keep their lesson plans

concurrent with the curriculum, and to ensure that they have the most tools and methods to engage with the wide dispersal of student learning methods, regardless of which theory of learning styles the teacher may subscribe to.

Some schools are already attempting to encompass these concepts by giving their teachers the time and professional development they want and allowing ideas to cross between subjects and individuals. To give an example; [Forest Lake School](#),

Differentiated instruction

Mentoring and consistent feedback

Key Paper 3: [Gareis & Grant \(2014\)](#)

Shown in the previous video, the Forest Lake School also made use of the headteacher giving consistently structured feedback to her teachers without allowing it to become a formally tracked and monitored system. Feedback can be a crucial part of a teachers learning and maintenance of their efficacy throughout their career. Student teachers entering a realistic teaching environment are often placed within a regular teacher's classroom and afforded periodical opportunities to teach the entire class, gaining valuable insight from both the teaching experience and from feedback given by the permanent teacher. Self-efficacy is boosted from having consistent feedback from a mentor or particular person who becomes acquainted with the teachers emerging styles and issues, and in parallel, the teacher gains insight into effective teaching from the feedback.

Gareis & Grant (2014) showed evidence to suggest this by comparing efficacy and self-efficacy measures before and after mentoring. One group of participating student teachers were mentored by regular teachers and a second group were mentored by in a structure programme by clinical teaching experts from a local university. It was shown that while efficacy increased regardless of which mentor group the student teacher was in, the teaching experts with formalised feedback and a structured approach gave the

biggest boost on both self-efficacy and actual assessed efficacy. This study suggested that formalised teacher training programmes, that made use of the expertise found in research and senior teaching staff alongside existing staff, rather than just the current teachers at the school, could help student teachers to fully develop. It may also be beneficial to have an alternative to a mentoring relationship, such as the one shown in the video of a feedback mechanism for continual improvement that can facilitate identification of teaching issues in fully qualified teachers.

CONCLUSION

In this introduction to the subject of teacher training, we hope to have shown the difficulties in first measuring teacher efficacy, in that there is difficulty deciding which measure should be used . From there, it has become apparent that there are factors that influence or hinder a teacher's training and can limit the potential training a teacher can have, including cultural influences on approaches to teaching, subject they teach, and hours they spend in professional development. Finally, we discussed certain ways to improve teacher efficacy and continual training throughout their career, looking at the start of the career in how the location of their first school can affect their confidence in their abilities. After they have become established in their roles, it's important to maintain professional development and keep expanding the teachers abilities in the classroom. And finally, identifying issues and possible improvements through consistent feedback (and mentoring in the early stages of teaching) that can help sustain the teachers efficacy.

References

Berk, R. A. (2005). Survey of 12 strategies to measure teaching effectiveness.

International Journal of Teaching and Learning in Higher Education, 17(1), 48-62.

Main article that examined 12 different strategies of evaluating teachers. There are three major ones that stand out which is what the triad method is based around. The rest of them seem to be supplementary to the big three. Citations that are put alongside this are sources that Berk cites within his paper.

Bressoux, P., Kramarz, F., & Prost, C. (2008) Teachers' Training, Class Size and Students' Outcomes: Learning from Administrative Forecasting Mistakes. *Economic Journal*, 119, 536, 540-561.

Thanks to the variation in France's teacher recruitment, an experimental method was possible. This study measured effectiveness of experienced teachers against trained and untrained new teachers. It produced a number of interesting results; studying science at university is as likely to boost effectiveness as training science teachers, content focused-training improves math test scores and smaller class sizes are more beneficial to low achieving students than teacher training.

Chingos, M.M., & Peterson, P.E. (2011) It's easier to pick a good teacher than to train one: Familiar and new results on the correlates of teacher effectiveness. *Economics of Education Review*, 30, 449-465.

Good longitudinal study of multiple forms of training (alongside other factors) & their effect on grades. Has the benefit of using grades from the same students across eight years instead of comparing between control and experimental groups. Also, produced counter-intuitive results suggesting training doesn't affect grades.

Dixon, F. A., Yssel, N., McConnell, J. M., & Hardin, T. (2014). Differentiated instruction, professional development, and teacher efficacy. *Journal for the Education of the Gifted*, 0162353214529042. Quantitative study investigating how differentiated instruction, correlated to professional development hours, can affect teacher efficacy. Has a mass of literature and theoretical implications for teaching styles.

Douglas, N. Harris, Tim R. Sass. (2008) Teacher training, teacher quality and student achievement. *Journal of Public Economics*. 95 798-812.

Measures both pre-service and in-service factor effects on student achievements. Findings show no support for pre-service education training but does show support for content focused training and experience of the teacher.

Gareis, C. R., & Grant, L. W. (2014). The efficacy of training cooperating teachers. *Teaching and Teacher Education*, 39, 77-88. Study showing differences in teacher self-efficacy and efficacy with good stringent measures, based upon what type of mentoring they received, either from a regular experienced teacher or from a specialist in teaching research.

Goldhaber, D.D., & Brewer, D.J. (1996) Evaluating the Effect of Teacher Degree Level on Educational Performance. 197-210

Found that specificity of undergraduate degree mattered; science and math undergraduates made the best science and math teachers but did not improve English or History scores. Has implications for the route teachers take to teaching, perhaps taking any degree then doing an education conversion course leads to differentiated abilities in teachers.

Jacob, B., & Lefgren, L. (2004) The Impact of Teacher Training on Student Achievement: Quasi-Experimental Evidence from School Reform Efforts in Chicago. *Journal of Human Resources* 39, 1, 50-79

Used a regression analysis to show that modestly increasing the hours of in-service (conducted by the school) training had no effect on students' math and reading performance at a high-poverty school.

Jennings, J., & Rentner, D. S. (2006). Ten big effects of the No Child Left Behind Act on public schools. *Phi Delta Kappan*, 88(2), 110.

This article provides some background on the "No Child Left Behind Act" and why its approach is too narrow.

Jurasaitė-Harbison, E., & Rex, L. A. (2010). School cultures as contexts for informal teacher learning. *Teaching and Teacher Education*, 26, 2, 267-277.

Interviews with teachers from schools in different cultural settings and how their approach to training differs. Shows that cultural and political factors can shape training practice, making them more rigid or informal.

Kalogrides, D., Loeb, S., Beteille, T. (2012) Systematic Sorting: Teacher Characteristics and Class Assignments. *Sociology of Education*, 86, 2, 103-123.

Not directly related to teacher training. This study shows that low-achieving students are more likely to be assigned less effective teachers (in experience and training). Could have implications if training produces more gains in low-achieving students but other studies have shown class size to be more influential to the grades of these students.

Knoblauch, D., & Chase, M. A. (2015). Rural, suburban, and urban schools: The impact of school setting on the efficacy beliefs and attributions of student teachers. *Teaching and Teacher Education* , 45 , 104-114.

Comparison of self-efficacy in student teachers, separated by location, with qualitative research attached as a second measure.

Yoon, K. S., Duncan, T., Lee, S. W.-Y., Scarloss, B., & Shapley, K. (2007). Reviewing the evidence on how teacher professional development affects student achievement. *Issues & Answers Report*, REL 2007–No. 033.

Review of studies which have measured both hours spent on teacher training and students' performance on maths and reading tests. Shows that training is not worth investing in if it's not intensive (under 14 hours).

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