Kunnskapssenter for utdanning
Universitetet i Stavanger

Appendix / appendix

Recruiting and retaining teachers in kindergartens and schools - a knowledge base

Recruiting and retaining teachers in ECEC and schools – a ÿsystematicÿreview of rese

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Preface

This knowledge base is the result of a project awarded to Høgskulen på Vestlandet (HVL). In talks between HVL and the Knowledge Center for Education (KSU), it was decided that HVL should part -finance the work on a knowledge base together with KSU.

KSU contacted a research group at the University of Durham that has previously been concerned with similar issues, and entered into a collaboration with them regarding the international part of the study. The research group leader, Beng Huat See, is a co-author of this report, while her research team of three people has had important contributions throughout the process. At KSU, there are also two people in addition to the first author who have contributed information to the knowledge base.

We thank HVL for contacting us and co-financing the assignment. We hope that the research basis presented here can be useful in further work on developing policy and practice to recruit and retain teachers in kindergartens and schools in Norway, and that the knowledge base can also contribute to the development of the necessary research.

Stavanger, 30 June 2022

Elaine Munthe

Center manager, Knowledge center for education

Contents

1. Teaching as a career choice

RESEARCH OBJECTIVE: To understand why some people choose teaching as a career and why some do not.

RESEARCH QUESTIONS:

What are students' perceptions of teaching?

What are the important factors determining students' choice of teaching as a career?

This review synthesises international evidence of some of the strongest empirical work on the main factors which explain why some people choose to go into teaching and others do not. The perception of teaching as a favourable career compared to other professions is important, and the literature often suggests that this is a reason why fewer people choose teaching as a career. For example, in countries with chronic shortages teachers' salaries are often perceived as much lower compared to similar professions (Defeo et al. 2016; Strunk & Zeehandelaar2011), and the demand of the role (such as workload) and worklife balance is unmanageable (Garcia & Weiss 2019; Sibieta 2018; Worth & Van den Brande 2019).

METHODS

Search strategy

To ensure that the search was comprehensive and picked up as many relevant literature as possible, we conducted three searches using slightly different search terms. These are applied to known sociological, educational and psychological databases/search engines (EBSCOHost, ProQuest Dis sertations and Theses, Google and Google Scholar). EBSCOHost includes databases such as ERIC, PsycInfo and British Education Index. We also followed up on known studies from our previous work and also from references in the studies identified in the search:

Search 1

((“student* choice of teaching as a career”) OR (“undergraduate* choice of teaching as a career”) AND (factors) AND (“initial teacher education”) OR (“initial teacher training”)) AND (strategies or initiatives or schemes or policies))

The first search uncovered 126 records that were potentially relevant

Search 2

A second search using these key terms found 645 potentially relevant studies. Of these, 241 were duplicates and removed.

((“teaching as a career”) AND (student* or undergraduate* or “university students”) AND (choice or decision))

records = 404 imported 241 (duplicates removed)

Search 3 Google scholar

A search of Google Scholar obtained 2,86,000 hits. We viewed the first 650 and stopped after the next 5 pages or 50 articles found no relevant reports. Of the 650, 101 were found to be relevant to the topic.

Screening

These studies were then exported to EPPI-Reviewer for screening. A number of records were not relevant but contained some of the keywords (i.e., not about choice of teaching as a career). To remove these, the title and abstract were screened and removed if they were clearly not relevant to the topic. Duplicated results were highlighted using the EPPI-reviewer duplicate function; these were checked and duplicates deleted.

The next stage involved screening the full reports using a pre-defined inclusion and exclusion crite ria (see below). This full-text screening involved skim-reading the study, and any studies thought not to meet the inclusion criteria were removed and the reason logged in EPPI-reviewer. As the screening was done by three reviewers, a sample of five were independently screened first and then compared to see if we agreed on the inclusion/exclusion decision.

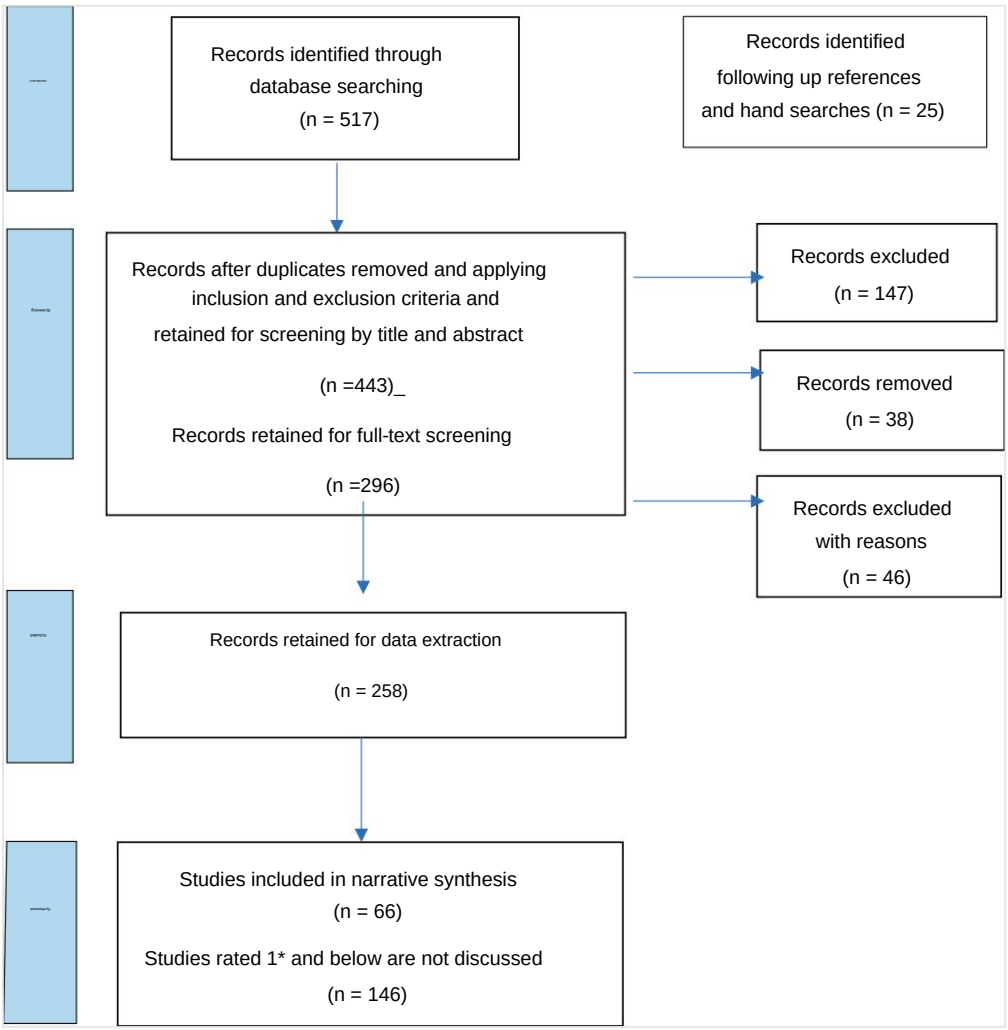

Figure 1.1: Flow chart showing number of studies at each stage of the review.

Inclusion criteria

Studies are included if they were:

- Empirical
- About school teaching
- About teaching in mainstream schools
- About attracting men and ethnic minorities into teaching
- Focused on choice or motivations or influencing factors relating to teaching as a profession
- About perceptions of teaching

Exclusion criteria

Studies were excluded if they were:

- Only about individuals' perceptions of teaching as a career
- Studies about attracting people to non-core subjects or subjects not traditionally consid ered as hard-to-staff
- Studies on characteristics of individuals who choose teaching as a career rather than rea sons for choice of teaching as a career
- Focused on outcomes that are not about teaching as a career, e.g. maybe about teaching competency or investment in teaching
- Not about classroom teachers (e.g. if they were about headteachers, teaching assistants or administrative staff)
- About teachers in higher education
- Not empirical, i.e., not research
- Publications from practitioners reflecting on their views (e.g., opinion pieces)
- Not reported or published in English
- Published prior to 1990 (with the exception of well-known pieces that have been widely cited or pieces that have considered relevant issues not mentioned in other studiess)

We did not restrict our search to any regions in the world, but in this Appendix and for the current report we have omitted research from regions in Asia, South East Asia and Africa as the school systems and conditions may differ more from northern European school systems. We have limited our search to those post 1990 as factors influencing peoples' choice of career or more specifically teaching as a profession may have changed over the last three decades. Nevertheless, we retained

some pre-1990 studies if they were seminal pieces or if the research was of a very high quality, which is rare of studies on this topic.

Data extraction

Key information from each of the included studies was extracted and summarised using EPPI-Reviewer. The following screening template was used for each study:

- Country
- Main topic or research questions
- Design
- Research method for data collection
- Sample
- Response rate/attrition
- Results
- Security of findings

Quality assessment

Part of the process of data extraction is also to assess the strength or credibility of the evidence based on the kind of research used. This was assessed using the 'Gorard Sieve' (Gorard, 2017) based on five criteria: the design, scale of study, scale of missing data, quality of data obtained and other threats to validity (Table 1). How the "sieve" works is that each study is awarded a star ranging from 0 (no weight can be placed on the study) to 4* (the most robust that could be expected in reality). This is an indication of how secure the findings are. These criteria are a judgement of the quality of evidence, which refers to the security of the findings and not necessarily the quality of the research. To ensure inter-rater reliability, four members of the team reviewed and rated a sample of papers.

Team members met to discuss each piece to come to a consensus. This is to ensure consistency of rating across studies. During the synthesis stage the team leader revisited some of these pieces if there are any doubts about the scoring based on the information extracted.

Table 1.1: Criteria for judging the quality of research evidence

Design	Scale	Dropout	Outcomes	Other threats	Rating
Fair design for comparison (e.g. RCT)	Large number of cases per comparison group	Minimal attrition with no evidence that it affects the outcomes	Standardised pre-specified independent outcome	No evidence of diffusion or other threat	4*
Balanced comparison (e.g. Regression Discontinuity, Difference-in Difference)	Medium number of cases per comparison group	Some initial imbalance or attrition	Pre-specified outcome, not standardised or not independent	Indication of diffusion or other threat, unintended variation in delivery	3*
Matched comparison (e.g. propensity score matching)	Small number of cases per comparison group	Initial imbalance or moderate attrition	Not pre specified, but valid outcome	Evidence of experimenter effect, diffusion or variation in delivery	2*
Comparison with poor or no equivalence (e.g. comparing volunteers with non-volunteers)	Very small number of cases per comparison group	Substantial imbalance or high attrition	Outcomes with issues of validity and appropriateness	Strong indication of diffusion or poorly specified approach	1*
No report of comparator	A trivial scale of study (or N unclear)	Attrition not reported or too high for comparison	Too many outcomes, weak measures or poor reliability	No consideration of threats to validity	0*

Synthesising the evidence

To facilitate the synthesis, the studies were initially sorted by outcomes according to whether they were about motivations or perceptions of teaching. Under each outcome, we classified the studies by regions. We also looked at those studies that examined the outcomes by phase of education, gender and ethnicity. This helps us understand what encourages or discourages certain groups of people into teaching so that targeted approaches can be used to recruit shortage teachers.

Motivations

Motivations for becoming a teacher are often grouped into three categories: intrinsic, altruistic and extrinsic:

- Intrinsic motivations include factors such as a love of teaching, personal aspiration, job satisfaction and subject interest.
- Altruistic motivations are those which relate to teaching as a socially important and worth while profession. They include reasons such as wanting to contribute to society and the community, and wanting to work with and help children and young adults.
- Extrinsic factors are external factors which are not inherent to the job itself, such as salary, status, job security, working conditions and job flexibility or transferability.

However, there are some other influential factors which often sit outside of the above categori sations: teaching-ability related beliefs, prior teaching and learning experiences, the influence of others (such as family and friends) and the impact of socio-cultural factors. Some researchers categorise these as separate motivations whereas other researchers locate them within one of the three main categories. For example, the influence of others is often noted as an extrinsic motivation, but this is a very different type of extrinsic motivation when compared to salary or job security, for example.

The broad categorisation of motivations for choosing teaching have been criticised by Richardson and Watt (2006) as each categorisation does not have a precise definition, resulting in inconsistent conceptualisation of terms. For example, a desire to work with children has been categorised in some studies as an intrinsic motivation whereas in others, it has been classified as an altruistic motivation.

Given that categorisations are broad across the literature, it is important to ensure that within this systematic review there is a clear understanding of the different factors that may influence people to choose teaching. To ensure consistency in the labelling of factors across studies, we have classi fied the influencing factors under five broad categories (Table 2):

Table 1.2: Broad classification of motivating factors

Factor	Example items
Social contribution	Teaching will allow me to benefit the socially disadvantaged Teachers make a worthwhile social contribution
Work with children	I want a job that involves working with children/adolescents I like working with children/adolescents
Innate interest in teaching	I have good teaching skills I like teaching Share knowledge with others Interest in subject
Positive school experience	I have had inspirational teachers I have had positive learning experiences

Factor	Example items
Economic/financial benefits, e.g. Job security, salaries and job status or prestige	Teaching will be a secure job Teaching will provide a reliable income
Social influence (e.g. influence of friends, family and teachers)	My friends think I should become a teacher People I've worked with think I should become a teacher
Family friendly	Teaching hours will fit with the responsibilities of having a family School holidays will fit in with family commitments
Fallback	I was not accepted into my first-choice career I was unsure of what career I wanted
Job transferability	Teaching may give me the chance to work abroad A teaching job will allow me to choose where I wish to live

Perceptions

Perceptions of teaching have been categorised in different ways. Our research grouped perceptions into four groups under two broad two themes of task demand and task return, based on the litera rules:

Table 1.3: Classification of perceptions of teaching

		Example items
Task demand	Expertise	Do you think teachers need highly specialised knowledge? Do you think teaching requires high levels of expert knowledge?
	Difficulty	Do you think teaching is emotionally demanding? Do you think teachers have a heavy workload?
Task return	Social status	Do you believe teaching is a well-respected career? Do you believe teaching is perceived as a high-status occupation?
	Salary	Do you think teachers earn a good salary? Do you think teaching is well paid?

RESULTS

The studies included in the current review cover a group of countries consisting of the USA, Europe, Australia & New Zealand.

The review focuses on the results from studies rated at least 2*. The lower evidence studies, while they do not inform the evidence, can provide context and additional information. Some of these will also be discussed if there add anything interesting to the narrative. Table 1.4 is a summary of the number of studies awarded for each security rating.

1.1 What motivates people in different countries to go into teaching?

Table 1.4: Quality rating of studies on motivation to teach (n = 48)

	Studies	Country	Sample
3 *	Elfers, Plecki, St. Jon & Wedel (2008)	US	Undergraduates
	Giersch (2016)	US	Undergraduates
	Gorard, Ventistia, Morris & See (2021)	England	Undergraduates
	He and Rossmiller (2004)	US	In-service (including former teachers)
	Kyriacou, Coulthard, Hultgren & Stephens (2002a)	Norway	Undergraduates
	Mangieri (1984)	US	Secondary students
	See (2004)	UK	Undergraduates
	Allen (2000)	US	Undergraduates
	Argentine (2013)	Italy	In-service
2*	Bergey & Ranellucci (2021)	US	Pre-service
	Christensen, Davies, Harris, Hanks & Bowles (2019) US		Secondary students
	Christensen 2020	US	Secondary students
	Cornelius (2019)	Italy	Pre-service
	Fokkens-Bruinsma & Canrinus (2012)	The Netherlands	Pre-service
	Giersch (2021)	US	Undergraduates/pre-service
	Glutsch & König (2019)	Germany	Pre-service
	Gratacós, López-Gómez, Nocito & Sastre (2017)	Spain	Pre-service
	Heinz (2015)	International (23)	Pre-service
	Heinz, Keane & Foley (2017)	Republic of Ireland	Pre-service
	Harms & Knobloch (2015)	US	Pre-service
	Hogan, Reid & Furbish	New Zealand	Pre-service
	Howes and Goodman-Delahunty (2015)	Australia	In-service
	Hunter (1998)	US	Secondary students
	Ivanec (2020)	Croatia	Pre-service
	James & Chopin (2997)	England and Wales	Secondary students
	Johnston, McKeown & McEwen (1999a)	Northern Ireland	Pre-service
	Johnston, McKeown & McEwen (1999b)	Northern Ireland	Secondary students

Studies	Country	Sample
Keck Frei, Berweger & Bieri Buschor (2017)	Switzerland	Secondary students/ undergraduates
Lin, Shi, Wang, Zhan and Hui (2012)	US	Pre-service
Lohbeck & Frenzel (2021)	Germany	Pre-service
Moran, Kilpatrick, Abbott, Dallat & McClune (2001)	Northern Ireland	Pre-service
Moreau (2015)	England / France	In-service
Watt & Richardson (2007)	Australia	Pre-service
Nano, Kallçiu & Mita (2019	Albania	Pre-service
Ponnock, Torsney & Lombardi (2018)	US	Pre-service / in-service
Classes, Granger & Bardach (2021)	UK	Undergraduates
Schaffner & Jepsen (1999)	US	Secondary students
Sclan (1993)	US	In-service
Show (1985)	US	Undergraduates
Show (1991)	US	Undergraduates
Wagner & Immanuel-Noy (2014)	Australia	Pre-service
Watt & Richardson (2008)	Australia	Pre-service
Watt, Richardson, Klussman, Kunter, Beyer, Trautwein & Baumert (2012)	Australia/US/ Germany/Norway	Pre-service
Weiss, Syring, Keller-Schneider, Hellsten & Kiel (2018) Germany/ Sweden/ Switzerland/ Romania		Pre-service
Whannel & Allen (2014)	Australia	Pre-service
Williams & Forgasz (2009)	Australia	Pre-service
Wolf, Auerswald, Seinsche, Saul & Klocke (2021)	Germany	Pre-service
People (1994)	US	Secondary students
Wood (2001)	US	In-service
Yu (2011)	US	Pre-service
Zounhia, Chatoupis, Amoutzas & Hatziharistos (2006) Greece		Pre-service

Given the large number of studies rated 2* and above, this section will first discuss the 3* studies and then the 2* studies by different sample groups: secondary students, undergraduates, pre-service teachers and in-service teachers. A summary for each is provided within each subsection and a final summary synthesising the evidence from all will be presented at the end. A disproportionately large number of studies were conducted in the US (18/47 of those rated 2* and above). Of these five were rated 3*. The 3* studies are large-scale and include a comparison group, that is, those who have not considered teaching. This is important because without considering the group that are not interested in teaching, the importance of salaries and professional advancement in any policy to attract teachers would be missed. Studies that only asked teachers, thus ignorin

not interested in teaching, invariably emphasised the importance of altruistic and intrinsic factors (e.g. desire to work with children and to contribute to society). Hence, policies that are based on such evidence are not likely to be effective as they will be “preaching to the converted” so to speak. Unfortunately, a large number of studies in this area tended to be based on the views of those who are either training to be teachers, or who have indicated interest in teaching.

Secondary school students

Among the studies that looked at secondary school students’ interest in school teaching as a career, less than 20% of students indicated that they would consider teaching as a career. Hunter’s (1998) survey of 510 (no response rate reported) high school students in North Carolina, US found that under 20% responded that they would likely consider teaching or will teach. 60% of respondents said that they were unlikely to teach, with 20% responding that they would not consider teaching at all. In another survey of 262 high school students in Virginia, US (response rate of 70%) only 13% of students indicated that their career plans were in the field of education, with school teaching being their field of choice (Judge 2004). Of these 26.5% indicated that they would prefer to teach Kindergarten to 5th grade, and none would want to teach pre-kindergarten. In Christensen et al.’s (2019) survey of 264 high school students in the US, only 22% said they would consider teaching, and only 4% felt that teaching was the best career for them.

With regards to what would encourage school students to take up teaching as a career, the common factors among the medium quality studies (2* and above) are interest in the subject, perceived abil ity in teaching, job satisfaction and a desire to work with children. **Christensen (2019)** found that self-efficacy, the belief in one’s ability was the strongest predictor of who would consider teac Encouragement from family and friends were also strong predictors. Gender and academic success also predict which student would choose teaching. Females and those who believed they were average students were more likely to want a teaching career. **Mangieri’s (1984)** study of over 4,000 students found that student’s innate interest in the subject and their perceived knowledge and skill in a subject area were a motivating factor in their decision to be teachers. *Desire to work with children/ young people* is also an important factor. However, prestige (or status), recognition and working conditions were not important to those who were interested in teaching, but were regarded as very important to those not interested in teaching. There is also a gender difference with males more likely (56%) to consider working conditions as very important than females (28%). Therefore, policies to attract more men into teaching should emphasise those factors that are considered very important to them. This was a large study involving over 4,000 (response rate 87%) high school students across six states in the US. This study was rated 3* because of its scale and the inclusion of a comparison group.

Male students in Switzerland also reported that their perceived ability was an important factor in their decision **(Keck et al. 2017).** However, regression analysis suggests that key motivating factors were *interest in working with children and young people,* the importance of having free time for other things and having relevant experience working with children. These are factors that influence male students’ decision. Having free time for other things and having prior professional experience working with children/young people increases their likelihood of taking up teacher education studies by 8.9 times. Other international studies (Brookhart & Freemann 1992; Fokkens-Bruinsma & Can rinus 2012; Watt & Richardson 2008; Thomson, Turner & Nietfeld 2012; Woolfolk Hoy 2008) also reported similar results. Having teachers amongst family members had no influence on students’ decision to train as a teacher. But those who moved into teacher education after high school are most likely to be interested in maths/natural sciences. For this group, male role models, such as teachers, fathers play an important role in supporting their career decision. An important

that the majority of male student teachers made their decision while in school. Similar findings were found among German students (Faulstich-Wieland, Niehaus & Scholand 2010) and undergraduates in England (Gorard et al. 2021). Opportunity for professional advancement was not considered an important factor for those who decided to train. But for those who did not want to be teachers, professional advancement, status and financial security are important in their choice of career. This study was rated 2* because of the low response rate in the follow-up and the small sample (612 men in the first survey and only 226 in the follow-up). Christensen's (2019) study also indicated that participants found it important to be encouraged by family and others to consider teaching, so the social influence factor appears to be influential.

Another study conducted in the US among students of colour **(Wong 1994),** which included 646 7th and 8th grade students from eight California schools revealed that *school experience is an important factor,* particularly for male students. The study found that those with negative perceptions of the school/classroom environment were less inclined to express interest in teaching while those who felt a belonging to the school were more likely to consider teaching as a career choice. It was also found that Asian students had a more *positive perception of the school/ classroom environment* than African-American and Hispanic students. European-American students were no more likely to consider teaching as a career choice than any other cultural group.ÿLike Keck et al., Wong's regression analysis results also indicate that *desire to teach and work with children/ young people* were key determining factors influencing students' interest in teaching. Those who expressed interest in teaching have a positive perception of teachers' salaries although they are not motivated by money. They also have a positive school experience and feel that teachers are respected by students. Family is also another factor. These students believe that their families want them to be teachers. The study was rated 2* because of the lack of clarity in the sampling strategy and response rate.

In the survey conducted by **Johnston et al. (1999b)** involving 1,036 sixth form students in North ern Ireland, four most influential factors in students' choice of primary teaching were (in order of importance): *working with children, perception of job satisfaction, contribution to society and imparting knowledge.* These are largely altruistic and intrinsic motivation. Extrinsic factors, such as, job security, salary, status and promotion prospects were deemed less important. There are some differences between gender, with females more likely to place greater importance on working with children, while male students were more likely to emphasise the importance of salary. Although this was a large survey, there was no report of how participants were selected and the respo Analysis was made between boys and girls, but no comparison was made between those who chose to teach and those who did not, so it was not possible to say what motivates students to go into teaching and what puts them off. Hence, it was rated 2*.

A much older study in England and Wales compared the motivation and perceptions of 1859 sixth form school students **(James & Chopin 1997).** Of these 207 were 'definitely' committed to a career in teaching, 312 rated themselves as 'possible' teachers, and 1340 were certain they would not be entering teaching profession. Prospective teachers were more likely to rate contribution to soci ety (social utility) as important in their career choice and less concerned about salary and status. They were also more likely to have teaching experience, e.g. in youth clubs and voluntary work. To them, teaching was seen as secure, working hours were attractive and they had the opportunity to influence future generation. Although they did not think that the salary was attractive and were aware of the mental stress and problems with discipline associated with teaching, these were not deterrents. Unfortunately, the views of those not intending to be teachers were not sought, so we do not know what might deter others from a teaching career. Sixth form students found mass media, public libraries and school career advisors of little use. They wanted more direct experience to know what it is actually like. Work experience was highly valued. The study did not report the response

rate (hence 2*) as the plan was to trace a random sample of 1,800 students through completion of A-level to induction.

Cross-sectional studies have shown that students' perception of their own ability to teach is an important factor influencing their decision to teach. **Schaffner & Jepsen (1999)** tested the impact of the social-cognitive career theory (the belief that a person is more likely to choose an activity which he or she feels competent in) on high school students' choice of teaching as a career, that is, whether students' self-efficacy affect their career choice. The study recruited 243 high school students participating in an ethnic minority teacher recruitment programme. The sample included African Americans, Hispanics and American Indians. Students were given an instrument that meas ured their teaching self-efficacy beliefs, outcome expectations, interest in teaching as a career, teaching values and their intention to be a teacher. The results of the path analysis showed a link between self-efficacy and interest in teaching, and interests in teaching in turn influences career choice. However, strong belief in teaching values (e.g. teaching contributes to society, teachers make a difference to children's lives) are negatively correlated with students' intention to be This contradicts the findings of most cross-sectional studies. It is possible that the programme raises student's perception of the value of teaching, but did not alter their commitment to teaching. This is the only study in this review that actually examines the direction of the relationship between in tention to teach and students' perception of teaching. **The findings demonstrate that recruitment interventions and policies that highlight the social or utility value of teaching may not be work in changing students' behaviour.** The study was rated 2* because of the small, non-randomised sample and the lack of clarity regarding the total number of students that took part in the teacher recruitment programme, so it was not possible to calculate the response rate. The use of chi-square and significant test for a non-random sample is also flawed.

In summary, although teaching is considered a career option by secondary students in western countries, it is clearly not their first choice career. The stronger studies in terms of research de sign suggest that the most common factor influencing secondary students' choice of teaching as a career are desire to work with children. Perception of job satisfaction, desire to contribute to society and positive experience of school and students' perceived innate ability and interest in the subject are other factors. **Highlighting the social utility value of teaching may work in persuading those already interested in teaching to be teachers, but may be less effective in altering the career choice of those who have no intention to b**

Undergraduates

Among the studies that examined the motivation of undergraduates to choose teaching as a profession, around half of undergraduates acknowledged that they have considered teaching at some point. In one of the largest studies in England involving around 4,500 undergraduates across a broad range of subject disciplines and universities, over 59% of the students said that they had considered teaching as a career **(Gorard et al. 2021).** Of these, 20% had serious intention to become a teacher. The figures are similar in Norway **(Kyriacou et al 2002a)** where 55% of the 84 first year undergraduates surveyed indicated that they had considered being a teacher, with 14% indicating that they had seriously considered teaching. An earlier study by See (2004) involving 1,845 under graduates and teacher trainees in Wales and South-west England found that 64% of respondents had thought of being a teacher. Of these 30% indicated they had firm intentions to be teachers. The figures in See's 2004 study are slightly higher because they included teacher trainees as well. Elfers et al. (2008) survey of 718 undergraduates across all year groups in Washington, US, reported the lowest number of students willing to consider a career in teaching: 40%, with on

considering it. This study, however, only focussed on students on maths, science, computer science and engineering degrees, which are notoriously hard to recruit in teaching. Undergraduates on these courses are traditionally on a career trajectory that is not teaching oriented, which may explain the low interest among this group in teaching. In England and elsewhere, it is the case that females are slightly more likely to indicate an interest in teaching than male students. For example, **Gorard et al. (2021)** showed that female undergraduates were more likely to have considered teaching (62% vs 55%) than males, and they were also much more likely to want to be a teacher (24% vs 14%). All ethnic groups in their study show similar levels of interest in teaching, with White students the most interested in general, while South Asian origin students the most likely to turn that into consideration into an intent. Black and mixed ethnic origin students expressed the least interest in teaching.

A number of studies explored factors which influence career choice in general. Ten studies examined undergraduates' motivations for choosing teaching as a career. In a survey of 84 Norwegian under graduates in one university **(Kyriacou et al. 2002a),** almost all students (98%) looked for jobs that are enjoyable, with a pleasant working environment and friendly colleagues. All this underscores the importance of a positive culture and ethos of the working environment. But only 9% of respond ents think that teaching is definitely enjoyable, 27% strongly think that teaching offers a pleasant working environment. Undergraduates in England also considered job satisfaction and enjoyment as very important in what they look for in a career **(Gorard et al. 2021).** Across the whole sample, job satisfaction, pay, job security, career prospects and an opportunity to develop new skills, and interest in their subject of study were the most influential factors affecting career choices. These are generally labelled as extrinsic factors in most research in this area. Interestingly, Norwegian students **(Kyriacou et al. 2002a)** were more concerned about the earnings over the length of their career than the starting salary. Kyriacou et al. reckoned that this may be specific to Norway due to the culture and values where choosing a career primarily because it is highly paid, or would accord high status and prestige would be played down. However, we do not think that this is unique of Norway. We believe that most previous research that only surveyed those in teaching or preparing to be teachers are less likely to rate these extrinsic factors highly since those who choose to be teachers tend to be motivated by intrinsic reasons. This again highlights the importance of including the views of those who had no intention to be teachers.

Kyriacou et al. (2002a), Elfer et al. (2008) See (2004) and Gorard et al. (2021) are among the few studies in this review that compared the motivation of three groups of people: those who had not considered teaching, those who had considered teaching but not interested in teaching and those who were seriously considering teaching. When the views of those who have considered teaching are compared with those who did not want to teach, the results are different. For example, under graduates in Norway who indicated no interest in teaching tended to rate extrinsic factors salary, promotion prospect highly in their career choice **(Kyriacou et al. 2002a).** Similarly, **See (2004)** also found that non teachers were more likely to value factors like salary, promotion opportunities, job status and good working conditions.

Gorard et al. (2021) also found that for those already applying or intending to teach, extrinsic fac tors such as salary, career status and progression were less important; instead, they were reporting more intrinsic drivers such as wanting to give back to society and sharing knowledge of their subject with prior good experience of schooling, and academic interest as drivers. Crucially, though, for the group who considered but rejected the idea of teaching, extrinsic motivators such as *pay and career status/ opportunities* were more important. They also found that prospective teachers were more likely to have lower tariff points on entry to university and were more likely to enter university with a vocational qualification (e.g. a BTEC). They were also less likely to be from families with professional

backgrounds and more likely to expect second class degrees (2:1 or 2:2) rather than firsts at the end of their studies (see also Allen 2000). Perhaps this is why studies that examined the motivation of teachers or intending teachers might downplay the importance of these extrinsic motivators and emphasise altruistic ones. Financial incentives like bursaries and scholarships are attractive only to those who are already interested in teaching, but not those who have never considered teaching. To attract those who might have considered teaching, policies would need to focus on job satisfaction, job status, career prospects and interest in subject rather than financial incentives alone. Awareness of these potential differences is important for developing policy and targeting resources towards those who could be attracted to the profession. In their regression analysis, the factor that most strongly predicts those who are likely to consider teaching or not are those things related to student's university career, such as, their subject choice, year of study and entry qualifica tion. The kind of courses that students take at university is closely related to their career intention, suggesting that many have already made a decision prior to entry to university. This suggests that most students would have made a decision to teach or not by the time they have entered univer Those who are on professional vocational courses, e.g. law, architecture, dentistry and medicine would have already decided their career trajectory before university and would never consider teaching. Among those who had considered teaching, the factors that most predict who would go into teaching or not are students' career motivations.

These findings also resonate with **Kyriacou et al.'s (2002a)** findings that those who have considered teaching were more likely to want to be teachers if teaching offers them the things they look for in their career. For example, among those who are undecided, they need to be more convinced that teaching is a job they will find enjoyable, with a pleasant working environment, colleagues that they can get along with, a job where they can use their university subject and a career that provides intellectual challenge. This suggests that perhaps a deterrent to teaching is that it is not perceived as enjoyable, or have a nice working environment. The students who reported that they could be encouraged to consider teaching as a career rated measures like more resources, better teaching materials and better teaching conditions as important in encouraging them into teaching. These factors could be potential deterrent to people who might have chosen teaching as a career. Similar observations were noted in Elfer et al.'s (2008) study. They found that those interested in teaching were more concerned about the quality of materials, supplies and technology in school than those not considering teaching (61% vs 36%). Therefore, previous research that focused only on those who are already in teaching or planning to teach, and research that only asked about individuals' motivation to teach may be missing the crucial points.

Several studies have suggested that those who have lower academic ability and personality types are more likely to choose teaching as a career (e.g. Gorard et al 2021); See 2004; Vance & Schlechty, 1982). Potential teachers are more likely to enter university with lower entry tariff, expect lower degree results and with non-academic or vocational qualifications. To test whether students' academic self-concept and their social abilities (self-confidence, popularity and leadership ability) influences their career choice, **Tusin (1991)** used data from a longitudinal survey of 10,326 first year university students, but included only female students from one university and those who had selected a teaching career. The results show that students' initial low academic self-concept had a negative indirect effect on their choice of primary teaching, but not for secondary teachers. Initial social self-concept, on the other hand, had a significant positive indirect effect on students' choice of secondary teaching, but not for primary teachers. The study also found that primary school teachers tended to have lower secondary school academic achievement, were from families with lower socioeconomic status, and were more likely to be white than black. They were also more likely to attend less prestigious universities. For secondary teachers, subject choice at university was the

best predictor of a teaching career. This finding is consistent with that of Gorard et al. (2021, see above). This is a quasi-experimental study using two instrumental variables in the modelling.

In an earlier study, **Tusin (1985)** looked at whether college had an effect on undergraduate women's choice of school teaching as a career. The study collected data on 2,730 non-minority women from 74 four-year colleges and universities. Background and pre-college characteristics, college charac teristics and institutional environment dimensions as well as college experience were measured The study found that pre-college influences were best predictors of women's choice of teaching. Women from more prestigious/selective and highly competitive institutions were less likely to want to be school teachers. Tusin concluded that the type of college influences women's career decision. Perhaps this suggests that undergraduates have already made their decision to teach by the time they reach university, as indicated in other studies (e.g. Cornali 2019, Faulstich-Wieland, Niehaus & Scholand 2010, Gorard et al. 2021, Keck et al. 2017).

Allen's (2002) longitudinal study comparing characteristics of teachers and non-teachers in their senior year at college, during their postgraduate year and after their graduate study found that non-teachers had higher academic outcomes (higher SAT scores and GPAs), their parents had higher levels of education and more prestigious occupations. Logistic regression analyses suggest that these background factors were important in people's decision in career choice These factors could predict with 80% accuracy who are likely to be teachers and who are not. The significant predictors that distinguished those who became teachers from those who chose non-teaching professions ("non-teachers") within this population were SAT performance, the attainment of a masters degree, the father's education attainment level, and ethnicity, specifically being either African American or Hispanic/Latino. This concurs, to some extent, with Tusin's and Gorard et al.'s study (see above). However, Gorard et al. included subject major at university as well. Like Allen, they also found that student's university career, such as their year of study, entry qualification and expected degree classification were predictors of who are likely to consider teaching or not. Crucially, their analysis showed that subject choice at university is an important predictor. Those who chose generic subjects related to sports, languages and English are most likely to consider becoming a teacher, while those in more clearly occupationally-related areas such as medicine, law and architecture are least likely.

Thinking specifically about teaching as a possible career choice, **Gorard et al. (2021)** found that the biggest reported attractors for all respondents was the long holidays and the social contribution factor (desire to share knowledge and to give something back to society). Comparing those who have considered, intend to be teachers and those who have not considered teaching, potential teachers are more likely to report being motivated by having a chance to share their knowledge and give something back compared to their peers. **See's (2004)** study also found that the chance to share knowledge was important to those interested in teaching compared to those who were not. See (2004) also found that job satisfaction, length of holidays and the chance to continue interest in own subject were all influential for those who indicated they wanted to pursue teaching. **Kyriacou et al. (2002a)** found that for the pro-teaching group, emphasis was also placed on using their university subject, intellectual challenge, family friendly and working with children. The notion of subject knowledge – whether that be sharing their subject or using their subject – is important in all three studies suggesting that this is an important motivator for undergraduates considering teaching.

Elfer et al. (2008) noted that students who were seriously considering teaching were more attract ed to a starting salary that is comparable to that in STEM profession than students who were not interested in teaching (71% vs 48%). There is also a gender difference with men being more likely to be motivated by financial factors, such as loan forgiveness than women. Nearly half of students (44 percent) indicate that opportunities for advancement and leadership beyond the classroom would

definitely encourage them to consider teaching. Over half of students of colour responded that they were definitely encouraged by such incentives compared to White non-Hispanic students (41%). Among those who were seriously considering teaching as a career, *positive school experience,* in particular the positive experience they had with their school teacher, is an important influence on their decision to consider a career in teaching. Among those who did not want a teaching career, the biggest deterrent is the relatively *low salary* Gorard et al. (2021). Elfers et al. (2008) also found *teachers' salary a deterrent.* It has to be noted that Elfer's study was among STEM subject students who are more likely to command higher salaries outside teaching.

Almost all the studies so far are cross-sectional analysis involving questionnaire survey to identify the factors that most likely attract people into teaching based on participants' self report. This re view has found few experimental studies that put to test which of the motivating factors identified in cross-sectional studies will encourage people to be teachers. **Giersch (2016)** used a survey of 238 undergraduates in a North Carolina university who do not plan to study education or enter teaching. The researcher developed a list of 10 reasons to teach. These reasons were divided into two cate gories: one list emphasise 'social utility values'. These are often classified as 'altruistic motivations', such as chance to contribute to society, opportunity to make an impact on children's lives. The other list contains items that emphasise 'personal utility values'. These include factors like portability of teacher qualification and family-friendly work schedule, which are classified as 'intrinsic motivations' in other studies. Participants were then randomly assigned to either 'personal utility' values, 'social utility' values or no treatment. Participants were then asked how appealing teaching was to them The results showed that students receiving the 'personal utility' treatment were more likely to find teaching appealing (66%) or very appealing (21%) than those exposed to the social utility treat ment (58%). Control group (those not assigned to any treatment) were least likely to find teaching appealing (46%). Logistic regression analysis indicated that subjects receiving either the social or personal utility were 2.3 times more likely to find teaching appealing than the control group. The findings suggest exposure to personal and social utility values of teaching potentially can increase college students' interest in the profession (for both men and women).

In a more recent experiment **Giersch (2021)** tested 10-motivating factors (taken from Watt & Richard's 2007 FIT-choice questionnaire instrument) on 597 non-education major students in one university in North Carolina who were not studying or planning to teach. Students were then randomly assigned to three treatment groups (one group exposed to intrinsic rewards, one to ex trinsic rewards or personal utility and the third group to altruistic rewards or social utility, and one control group with no treatment. They were then asked how likely they were to choose teaching as a career. The results show that the likelihood of choosing teaching as a career increased for all students exposed to the three treatments, but not for the control group. This suggests that all these factors (intrinsic, extrinsic and altruistic) were influential, but intrinsic rewards were more important to non-educators, followed by altruism (social utility) and lastly extrinsic rewards. There was a small gender difference, with men more lightly to be attracted to teaching for extrinsic reasons. As with Gorard et al.'s (2021) study, Griersch also found that students with lower academic achievement were more responsive to the three treatment or motivators. The results differ slightly when study subjects were teachers or aspiring teachers, who tend to rank altruism more important than the other factors. This underscores the need to include those who are not in teaching but might other wise be attracted to it. Policies aimed to increase recruitment into teaching, therefore, should aim to attract those who have considered teaching, but have decided against it. A common and serious methodological flaw in research on this topic is the exclusion of non-teachers, resulting in mislead ing results, and ineffective policies. This was rated 2* because of lack of clarity about the potential sample and non-response/attrition.

To test the findings observed in a number of studies, which suggests that people who have con sidered teaching are more likely to want to be teachers if they perceive teaching as offering them the things they look for in their career (e.g. Gorard et al. 2021; Kyriacou et al. 2002a). **Klassen et al. (2021)** conducted a psychological experiment using theories of person-vocation fit among 111 un dergraduates studying STEM-base subjects in England. **Several psychological studies have shown** strong association between person-vocation fit and job satisfaction, commitment, and retention (e.g. Vogel & Feldman 2009). **Uggerslev, Fassina, and Kraichy's (2012)** meta-analysis showed that the strongest predictor of attraction to a career is the individual' perceived fit, suggesting that perceived fit plays a key role in individual's career decision-making. Combining Realistic Job Previews (where respondents are presented with a realistic portrayal of the job/teaching) with person-vo cation fit feedback, the study is able to measure the perceived match between participants' own attributes (how to respond to real life classroom scenarios) and the attributes required for a teaching career as determined by experienced teachers. This not only gives participants feedback on their suitability for teacher, but also avoids them from selecting themselves out of teaching based on some misunderstood pre-conceived idea that they may not be suitable to be a teacher. While the results did not show an association between participant's own attributes (e.g. skills, knowledge and abilities) and those required of teachers, their scenario scores (how they would respond to the scenarios) predicted whether they were more likely to explore a teaching career. Interviews with a subset of participants suggest that the exercise enables participants to reflect on their ability and increase interest in teaching.

In summary, it would appear that teaching is a career option that undergraduates in western countries may be willing to consider. But they are more likely to consider teaching if they perceive teaching as a job that offers them what they look for in a career. For example, under graduates in western democracies rate enjoyment and positive work environment as important in their choice of career. Job satisfaction, pay and career prospects are also important consid erations. Those who are considering teaching are more likely to want to be teachers if they perceive teaching as enjoyable with a positive work environment and offers job satisfaction. However, when comparisons are made between those who indicated an interest in teaching and those who are not, the former are more likely to emphasise the intrinsic and altruistic values of teaching, such as the chance to share knowledge, interest in own subject, job satisfaction and the desire to give something back to society or working with children. Those not interested in teaching, on the other hand, tend to stress the importance of extrinsic factors like pay and career status. Therefore, studies that include only those who are in teaching or preparing to teach would highlight the importance of intrinsic factors and downplay the extrinsic ones. The evidence from the stronger studies with suitable comparisons indicate that the major deter rents to teaching might be the perceived negative working environment (quality of resources, workload), lack of enjoyment, pay and status of the profession. To attract those who might otherwise have considered teaching, policies would need to focus on job satisfaction, job sta tus, career prospects and working conditions rather than the intrinsic factors. Motivations also differ by gender and subject groups. Men and those taking STEM subjects tend to emphasise the importance of extrinsic factors. Therefore, policies to attract males and shortage subjects might do well to emphasise extrinsic value of teaching, e.g. pay, job status and job satisfaction.

A few studies have also noted that background characteristics of students are important predic tors of who are likely to choose teaching as a career. Female students were more likely to have considered teaching than males, and much more likely to intend to become a teacher. While White students the most interested in teaching, South Asian origin students are the most likely to turn that consideration into a serious intent. Black and mixed ethnic origin students are the

least interested in teaching. Prospective teachers have lower entry qualifications, more likely to have a vocational (BTEC or combination of BTEC and academic qualification), from less educated and less prestigious occupational backgrounds and study more generic subjects at university, which do not have clear career trajectory. Student background characteristics, prior experiences and course choices are not malleable in the short-term, and so these differences do not help much in deciding how to attractÿmoreÿpeople into teaching. The kind of courses that students take is closely related to their career intention, suggesting that many have already made a deci sion prior to entry to university. To increase the number of teachers in some shortage subjects, like maths and science, might require an approach that targets students before they make their subject choice at university.

Motivation of pre-service and in-service

teachers This section looks at the factors reported by those how have already made a serious decision to teach in influencing their career choice. The majority of studies (n =31) in this review is based on pre-service teacher's (n =25) and practising teachers' (n = 6) self-reported reasons for going into teaching. Such studies will require respondents to recall their decisions *ex post facto,* which often involves retrospective justification. For this reason, all studies apart from Han & Rossmiller's (2004) study are rated 2* and below. The body of work in this category is particularly weak in evidence and most have serious flaws in their methodology.

Han & Rossmiller (2004) analysed data from the National Longitudinal Study of High School Class and five follow-up surveys to establish whether factors like students' background (family educational and occupational background) their educational attainment, academic major, teach ers' salary, work experience, cognitive abilities and individual attributes are associated with their career choice. Respondents were tracked over time to see who went into teaching and who stayed. The samples were divided into three groups: non-teaching career choosers (those who completed teacher education but did not go into teaching); teaching career choosers currently teaching and former teachers. This is the only 3* study in the category because of the large sample, with actual data on retention and individual's choice of teaching (rather than reported intention to teach). A total of 1,038 students with complete data was included in the analysis (response rate 84%). **The study revealed that men were more concerned with the salary differentials that exist between teaching and other employment opportunities.** Salary differentials, on the other hand, were not an important deterrent for women. The authors reckoned that it was not the salary per se, but the lower economic status of teachers compared to other professions. This supports the findings of other studies that practicing teachers and those who indicated interest in teaching are more likely to be motivated by intrinsic value of teaching. Most teachers also say they do not go into teaching for the money. Job satisfaction was an important factor in people's decision to stay in teaching. The more satisfied teachers were with teaching, the less likely they were to leave teaching.

Consistent with other studies (Allen 2000, Gorard et al. 2021, See 2000 and Tusin 1999), Han & Rossmiller also found that teachers were more likely to be from lower background. There is also a gender difference in the pattern. Men with an academic major in mathematics or the sciences were more likely to enter teaching compared to women. For women, those with high SAT scores in secondary school were less likely to want to be teachers. The findings of this study add to those of other studies.

Argentin (2013) made use of data of 3,369 teachers in Italy collected in a national survey using stratified random sampling. The focus of their study was to look at differences in motivations of men and women in their choice of teaching. In general, men and women were similarly motivated

by altruistic and intrinsic factors: the most important motivations are working with children, social contribution and subject interest. However, compared to women, **men were less motivated by intrinsic/altruistic values of teaching.** They **were more attracted by the benefits related to teaching,** for example, the working schedule of teaching seems a relevant benefit attracting male teachers. The analysis suggests that this could be because men are more likely to have a second job in the labour market while teaching, a phenomenon which is less common among female teachers. Good working hours is more compatible with an extra job for male teachers. Stability of job is anoth er motivating factor for men. Men were also more likely to say they choose teaching **as a fallback option** due to lack of alternative opportunities or ended up in teaching by chance. This is probably because of their major subject at university – less demand outside teaching, and is especially so for primary school male teachers.

Below we report studies that use FIT-Choice Likert-scale self-report questionnaire to identify key motivating factors among pre-service and in-service teachers. Such research invariably suggests that **intrinsic and altruistic** reasons were the mostly commonly cited reasons for teachers' and potential teachers choice of teaching as a career, the only difference is in the order of importance. This perhaps reflects the weaknesses in the kinds of analysis employed in these studies. The use of 5- or 7-point Likert-scale instrument, and treating these as continuous variables is one limitation. It is very common among these studies to use the means of the scores for categorical variables. Few also used regression analysis to control for certain factors to determine key influencing factors. As a result, we see that most studies report all the factors as important with little distinctions among the factors. Many small-scale studies also use factor analysis scores as the means of the factor. Hence, we will simply summarise the findings of the studies and report what the authors identify as important motivators. Because of the weakness in the research design, one has to treat these findings with caution.

Intrinsic motivation includes interest in subject, innate interest in teaching and perceived abilities (or natural attributes) and interest in working with children.

Interest in subject is highlighted in a number of studies as an important influencing factor (e.g. Heinz et al. 2017, Glutsch & Kongig 2019, Moreau's 2015 and Zounia et al. 2006.) Subject interest was also an important, but not the most influential factor, in a number of other studies, including Nano et al. (2019) and Ponnock et al. (2018).

Glutsch & Kongig (2019) surveyed 386 first year teacher trainees in one university in Germany who studied different subject combinations. The focus of the study was on subject interest to see if students of different subject domains differ in their motivations. Pre-service teachers rated 'subject interest' as the most important motivator. This is similar to Watt, Richardson & Morris' (2017) study in Australia. The next strongest motivating factor was 'social motivation', followed by wanting to 'work with children'. Latent path analyses revealed that students from different subject domains differ slightly in their motivations. More importantly, students who value their studied subjects' importance highly also show higher intrinsic, social-altruistic, and pedagogical motivations.

Heinz (2013) also used Watt & Richardson's (2007) 7-point Likert-scale FIT-Choice questionnaire to measure the importance of different motivational factors in the Irish context. The study surveyed 781 successful applicants to secondary teacher trainees at four departments in one university in Ireland. Only 344 responded. The scores for each factor or item were averaged to indicate its level of importance. Among the 12 factors identified, respondents perceived intrinsic motivation as most influential. This includes 'interest in subject', 'enjoyment of teaching', 'desire to share knowledge. The next highest scoring factors with an average of above 5 points were 'perceived ability', 'previous

teaching experience' and other altruistic or social utility reasons, such as contributing to society, wanting to shape the future and desire to work with children. Few prospective teachers admitted to choosing teaching as a fallback career and for extrinsic reasons. Participants were particularly concerned about the stress, status, long hours, pay, relationships with parents, relationships with colleagues and discipline. However, these are not necessarily deterring factors. Since no compar isons were made with other professions, it is not possible to say if these concerns are specific of teaching. The high level of non-response suggests self-selected and biased sample. The analysis are simple frequency counts with no comparisons with student teachers who might not have intended to teach or comparisons with other professions. The motivating factors identified may also apply to other professions – therefore difficult to conclude that these are the factors that would necessarily attract people into teaching. It is possible that those who plan to be teachers would rate intrinsic and altruistic reasons highly, rather than that such factors motivate people to go into teaching. It is important to be clear about the direction of causation.

Heinz et al. (2017) further developed their research to demonstrate whether teacher trainee's career choice may be influenced by economic situations by comparing the socio-demographic back ground and motivational of profiles of two cohorts of secondary initial teacher trainees (n = 427, no report of response rate) using data from 2006 and 2013. A number of changes in pre-service teachers' motivations were observed. The study highlights that the most influential factors regard ing career choice in 2013 was **interest in teaching their subject** followed by intrinsic career value, perceived ability. However, compared to earlier cohort, those in 2013 were more likely to say they chose teaching as a **'fallback career',** 'time for family and other 'social utility reasons. It is important to note that the second survey was conducted during the recession and a period of austerity. This may have influenced teachers' motivation to teach and their perceptions of teaching. For example, in the second survey men rated "working with children" and 'time with family" more highly than women. Heinz argued that the **economic recession in Ireland at the time could have changed traditional norms,** and more common for fathers (who have lost their jobs) to care for children. What is interesting is that extrinsic factors did not feature more highly. Although they rated teacher salary as low, they perceived teaching as a high status job. As Han & Rossmiller (2004) have pointed out, it is not the salary as such, but the perceived low status of teaching in the US that is putting people off. Also of note is that Ireland, unlike many other countries in Europe, does not traditionally have a shortage of teachers. In fact, there is often an oversupply of teachers in Ireland. One possibility is that in Ireland teaching is regarded as a respectable and h

Zounhia et al. (2006) investigated the motivation of 564 final year physical education teachers in Greece also using a 5-point Likert-scale FIT-Choice questionnaire. Most important reasons (as meas ured by frequency of means) were love of PE (wanting to stay in touch with PE), like working and teaching children and to keep fit. Extrinsic reasons, like pay, job security, long holidays and flexible time-tabling were not rated highly.

Moreau (2015) also indicated similar findings, but only among French teachers for whom subject interest is a key motivator, while their English counterparts highlighted the importance of working with children, as well as the wider remit of teaching. The importance **of subject interest** in France was further highlighted by evidence of resistance to teaching another subject in secondary school with this viewed as a deterring factor to becoming a teacher. To the French teachers, their subject expertise is core to professional identities, but working with children was described as a deterrent to becoming a teacher. The findings show that the national context remains relevant to teacher's identities and motivation to teach. Another interesting observation is that in countries like England, Australia and the US, education policies have sought to 'remasculinise' teaching, whereas in France there was less of a 'feminine' construction of teaching. On the contrary, secondary school teaching

was described as an opportunity for upward social mobility for some men from working-class back grounds, none of them reporting resistance from their families This study was based on indepth interviews with 60 teachers in English and French secondary schools.

Innate interest in teaching and other intrinsic factors (desire to work with children and young people)

While subject interest is an important motivator in some studies, others suggest that key motiva tors among pre-service teachers are other innate motivation, such as innate love for teaching and perceived abilities in teaching (e.g. Ponnock et al. 2018, Gratacós et al. 2017 and Ivanec 2020, Watt et al. 2012). These are often referred to broadly as 'intrinsic motivation'.

Ponnock et al. (2018) used the short version of the FIT-Choice instrument to examine the changes in reported motivation of four group of teachers: pre-service, early, mid and late-career teachers. The study revealed that motivation of teachers changed over the teacher's career lifetime, with motivation was generally highest in pre-service and early childhood teachers and lowest in early career teachers with no significant differences between mid- and late-career teachers. The find ing has important implications for teacher retention, especially early career teachers. The survey included 558 pre-service and in-service teachers. What is striking is that across all teacher groups, is that innate interest in teaching appears to be the key motivation factor, with 'interest in teach ing' consistently rated as the strongest influencing factor. Subject interest, social contribution (or altruistic reasons, such as wanting to make a difference, improving social disadvantage and working with children) and perceived talent in teaching were other highly rated factors. This suggests that teachers were more likely to report these as important, but it does not mean that these are the factors that would encourage people to go into teaching. It is likely that people who are predisposed to teaching anyway would rate these as important, while those who rate these factors as important may not necessarily want to be teachers. Other occupations, such as medicine and social work also offer these same attractions. This is a flaw in the design in almost all research in this area.

In a survey of 851 primary and pre-primary pre-service teachers in Madrid, Spain **(Gratacós et al. 2017),** respondents indicated that it was their interest in working with children and shaping the fu ture of children that were the strongest motivators to be teachers. Experience in prior teaching and learning activities (e.g. positive school experience) and perception of ability also had some influence on motivation to teach, but the direction of causation cannot be established. We cannot be sure if it is interest in teaching that led to participation in prior teaching activities, or the other way around. Spanish primary school teachers perceived teaching as a low status and low paid profession, so it is clear that they were not motivated by pay or status. There is also a gender difference in motivation, with women being more likely to be motivated by Intrinsic and altruistic reasons as well as perceived ability, while men were more motivated by extrinsic factors. Men were also more likely to go into teaching as a fallback career. Women's motivation was more vocational, whereas men saw teaching as a pragmatic choice. This was rated 2* because sampling strategy was unclear with no report of response rate, and no comparison with non-teachers or with other profession.

Similar findings were also reported in Croatia (Ivanec 2020), Australia, USA, Germany and Norway (Watt et al. 2012). **Ivanec (2020)** used the FIT-Choice questionnaire to examine the motivation of 423 pre-service teachers in Croatia. Prospective classroom teachers in Croatia also reported mostly motivated by the intrinsic factors (desire to work with others and perceived teaching ability) and social or altruistic reasons (such as contribution to society). **Watt et al. (2012)** surveyed pre-service teachers in Australia (n = 1,438), USA (n = 511), Germany (n = 201) and Norway (n = 131) across a range of subject domains and phase of education. The results showed close similarities in terms of motivation to teach. Across the four samples, the top motivators were intrinsic factors (like teaching/

interest in teaching, perceived teaching abilities), desire to make a social contribution, working with children and positive prior teaching and learning experiences. In terms of job satisfaction, all teachers in the 4 samples are highly satisfied with their choice of teaching as a career. Extrinsic factors like job security, time for family were rated consistently lower across the four settings. Watt et al. acknowledged that their findings were unable to show the direction of causation, and recommended that future research could focus on individuals who have decided against teaching as a career, or have not thought to consider teaching as a career choice, to gain insights into how certain under-represented groups could be attracted to teaching.

However, the desire to want to work with children is a strong motivator for primary or early years teachers than secondary teachers. For example, in **Johnston et al.'s (1999a)** of 334 primary school teachers in Northern Ireland, both male and female respondents cited desire to work with children; perceived job satisfaction; contribution to society; imparting knowledge as important motivators. It is interesting to note that in N Ireland where there is no reported national shortage of teachers, teaching is viewed highly as valuable to society, and is accorded **the highest status in local com munity compared to other occupations.**

Other studies also identified teachers' and potential teachers' ***perceived abilities*** as an important factor. For example, in a study of 151 pre-service teachers (89 at the beginning of their training and 62 at the end of their training) in the Netherlands **(Fokkens-Bruinsma & Canrinus 2012),** the most influential motivational factor for Dutch pre-service teachers was 'teaching ability'. Unlike other studies, prior teaching and learning experiences, and enhance social equity were the least important. Potential teachers in the Netherlands also did not consider salary and status as important in their decision, but they were overall very satisfied with their choice. While the study compared the responses of those at the beginning and end of their training, the results are meaningless. As an example, multivariate analysis showed that preservice teachers at the end of their teacher edu cation were more motivated by social influences compared to preservice teachers at the beginning of their teacher education even though we know that this factor was the least important for both groups. It also does not make sense that participants' at the end of their training suddenly thought that these social influences were more important to them than at the beginning The difference is likely to be a difference in the two cohorts rather than their year of training. This was rated 1* for the very low response rate of around 50%, but we discuss it here as it represents the views of potential teachers in another cultural context.

Across the general sample of pre-service teachers in Australia preparing for secondary, primary and early childhood teaching **(Watt et al.'s 2012** and **Watt & Richardson's 2007, 2008),** the highest rated motivations for choosing teaching included perceived teaching abilities, the intrinsic value of teaching, the desire to make a social contribution, shape the future, and work with children/adoles cents. These themes are repeated in so many studies across countries. One reason could be that they all use some versions of Watt & Richardson's FIT-Choice instrument and averaging the mean scores, and almost all were focused on those already in teaching or training to teach.

Williams & Forgasz's (2009) survey of 375 career changers in Australia revealed that career chang ers' motivations were largely intrinsic. 81.8% chose 'necessary attributes' (or perceived ability to teach) as a reason for choosing teaching, followed by believing that teaching would give them high job satisfaction (81.6%). Both of these can be linked to the innate interest in teaching factor which encompasses perceptions of ability to teach as well as interest/belief in liking teaching.

Other studies also noted intrinsic career value factor as an important motivator, although not rated as the most important (Lin et al., 2012; Watt et al, 2012 (German sample); Watt & Richardson, 2006).

Nano et al. (2019) found that the highest rated motivator was ‘wanting a job in which I can feel proud of myself’ which links to the intrinsic career value factor.

Klassen et al. (2011) compared pre-service teachers’ motivation across cultures. The study includ ed 93 Canadian and 107 Omani pre-service teachers. Using a structured qualitative approach (a 10-statement test), the results showed that pre-service teachers in Canada and Oman both reported high levels of intrinsic motivation for choosing teaching as a career. Perceived ability to teach and personal utility reasons also influenced teachers in the two countries in their choice of teaching. But pre-service teachers in Canada were significantly more likely to say they are motivated by intrinsic and altruistic reasons, e.g. working with children and adolescents than Omani teachers. Omani teachers, on the other hand, were more likely to indicate teaching as a fallback career perhaps because of high uncertainty avoidance and teaching offers greater job security. They were also more motivated by sociocultural influences than Canadian participants. Klassen et al. speculated that the higher levels of power distance in Oman could explain lower attraction in working with children. Canadian participants were also more likely to report being motivated by social utility value than did Omani participants. This is perhaps because Omani participants believe that the role guiding students’ futures belong to the family and not exclusively to teachers. The evidence, however, is weak because it is largely based on the self-selected and self-reported narrative from a small volunteer sample.

Altruistic or social utility of teaching

Teachers and potential teachers also cited altruistic reasons for their decision to be teachers. Includ ed in this factor are teachers’ desire to shape the future of the next generation (Heinz et al 2017; Lin et al’s 2012, Yu’s (2011), desire to work with children (Johnston et al. 1999a., Nano et al. 2019; Watt and Richardson (2007) and Watt et al. 2012, Moran et al 2001).

Lin et al (2012) compared the motivations of 257 US and 542 Chinese preservice teachers. Although participants in both countries cited social utility reasons or altruistic factors (e.g. make social contri bution’ and ‘shape the future of children/adolescents) in motivating them to enter teaching, there were some differences. US pre-service teachers rated motivations from social utility values (making social contribution, shaping the future of young people/children, working with children teaching abilities, prior teaching and learning experiences and other intrinsic factors as important. The top motivating factors for Chinese students were job security, making social contribution, shaping the future of children and prior teaching/learning experiences. Desire to work with children was not rat ed highly among Chinese students. Job security is important to Chinese teachers, but less important to American teachers.

The only experimental study conducted among pre-service teachers **(Yu 2011)** examines what factors influenced pre-service teachers in an urban district in the US to choose teaching as a career. The study also tests whether exposure to a short-term field experience in a teacher education pro gramme can change their initial motivation to teach, and their intention to teach in urban schools. The intervention is a two-week immersion programme where pre-service teachers work in local schools. They are offered professional development activities, mentoring and interact with parents, teachers and district administrators. Participants were selected (not randomised) to treatment and control based on voluntary participation. Pre-post survey using FIT-Choice scale to collect data about their motivation to teach and their intention to teach in urban or non-urban schools. Total number of participants was 433 (203 treatment, response rate 41%; 230 control, response rate 19%). The highest ranking factor was ‘satisfaction with choice’, although it is unclear why this is a motivating factor. The strongest influencing factors were altruistic or social utility reasons (‘wanting to shape the future of children’, making social contribution) and intrinsic factors (working with children, conÿ

fidence in teaching ability and prior teaching and learning experiences). Unfortunately, the study did not compare experimental and control groups in their intention to teach. Instead, they compared groups with different motivational levels. The results showed that motivation factors were correlat ed with intention to teach. Perceived ability to teach in urban settings had the strongest relationship with intention to teach in urban settings. Personal utility value and social influence are not strongly correlated with per-service teachers‘ intention to teach in urban settings. This was rated 2* because of the very low response rate and the self-selected non-randomisation of treatment/control groups.

A number of studies also found that the chance to shape the future of the next generation was important, although not the most influential motivating factor (e.g. Glutsch & König 2019, Gratacós, et al. 2017, Moran et al 2001, Nano et al, 2019, Wagner & Immanuel-Noy, 2014, Watt and Richardson 2007 and Watt et al. 2012, Williams & Forgasz, 2009), although Moran et al.’s definition of the factor also included aspects of social contribution, which incorporated intellectual fulfilment. Bergey & Ranellucci’s (2021) study found that pre-service teachers tend to be drawn to teaching for social utility values, which included items relating to the social contribution factor.

Extrinsic motivators

There was some evidence that ‘extrinsic’ reasons may also be important although for only some groups. **Harms & Knobloch’s (2015)** survey of 29 graduates certified to teach agriculture in secondary schools found that career choice was related to intrinsic and extrinsic motivation, but pre-service teachers who chose to teach in formal education were more likely to indicate strong intrinsic motivation, whereas those who chose to teach in non-formal education were more strongly motivated by extrinsic factors (defined as salary and benefits, balance between career and personal time, and opportunities for advancement/personal growth).

Cornali’s (2019) study of 335 (84% response rate) primary and pre-primary pre-service teachers in Italy also suggests that decision to teach was made quite early on. Over eighty percent of the respondents indicated that they have always wanted to teach even at an early age. The three mo tivations to teach (intrinsic, extrinsic and altruistic motives) explained only 50% of the variance, suggesting that perhaps their early interest in teaching was the main motivator. When asked to retrospectively recall what influenced them to go into teaching, the top influencing factor was for extrinsic reasons, such as ‘job security’; ‘good working hours’; long holidays, ‘lack of better prospects’ and family friendly. Altruistic reasons, such as ‘transmitting values’; ‘improving society’; ‘forming patterns of reasoning’ were ranked second followed by intrinsic reasons (‘meeting children’s needs’; ‘transmitting knowledge’; ‘working with young people’. This is in contrast to research in countries with comparable social and economic development. One important difference is that, unlike some countries in Europe, Italy has no shortage of teachers in early education. If fact, there is an over supply of early years teachers in Italy. Early years’ teaching is, therefore, a competitive job. There are also key differences in the characteristics of the group of participants compared to those in other research. First, all the respondents were females, majority came from middle class families with high parental educational and professional background. Hence, they are likely to rank family friendly, good working hours and long holidays as an attraction. With regards to motivation to teach early primary and primary education, these were largely decommitted motives, such as ‘more job opportunities’; ‘easier training programme’; ‘subjects taught are easier’ and committed motives, such as ‘greater relational gratification in working with children’; ‘person belief in the importance of the first years of education’; ‘more stimulating teaching’

A smaller and much weaker study involving only five pre-service teachers who are PhD holders training to teach maths and science in secondary schools in Australia **(Whannel and Allen 2014)**

also reported extrinsic reasons as highly influential. The findings from the interviews concluded that financial security and family considers as well as the opportunities for further research were strong motivations in student teachers' decisions. It should be noted that the participants were academic researchers prior to their transition to teaching, and found that their research contract was fixed term contingent on grant funding, which did not offer them financial and job security. This is not representative of conventional pre-service teachers.

Extrinsic reasons, such as job security may become more important during economic recession when unemployment rate is high. Teaching can offer job security. **Hogan (2017)** surveyed the career motivation of 161 (response rate 12%) Early Childhood Education teachers in New Zealand who were enrolled on a Certificate of Education route and Bachelor of Education route (undergraduate degree programme). The majority of students were female (94%). For both groups, the perceived good job market in teaching (perhaps offering job security) was a strong influencing factor although pre-degree students were slightly more likely than degree students to report this as important. It is worth mentioning that the students were from the 2013 and 2014 cohorts – a period of global recession. This may have explained why job security was important to them. Although the authors suggested a cultural influence, this was not borne out in the survey results. Focus group interviews hint at this with reference to Pacific Islanders' desire to be with their children. This probably reflects the fact that majority of the participants were females.

Heinz (2017, see above) also noted how the economic recession in in Ireland in 2013 has changed the role of men as fathers. Job security and wanting to spend time with family, became important for men (who have lost their jobs). They were also more likely to indicate teaching as a "fallback career".

Teachers, prospective teachers and students who indicated an interest in teaching were least likely to admit teaching as a "fallback career".

Role models

While the influence of family and friends was also not considered important in individuals' decision to be teachers, a few studies have indicated that for men and those specialising in maths and nat ural sciences, male role models, such as teachers, fathers play an important role in supporting their career decision. Wood's (2001) study of male African-Americans found that factors for choosing teaching as a career highlighted the necessity to provide role models.

In summary, across western countries in Europe, US and Australia, the highest rated motivations for choosing teaching among pre-service teachers preparing for secondary, primary and early childhood teaching were perceived teaching abilities, the intrinsic value of teaching (innate interest in teaching: share knowledge, ability in teaching and subject interest), altruistic reasons (the desire to make a social contribution, shape the future, and work with children/ adolescents. Positive prior experience in teaching and learning (i.e. positive school experience, work experience) was also important in a number of countries. Most studies identified 3 main sources of motivation: Intrinsic, extrinsic and altruistic. These themes are repeated in almost all studies across countries. This is not surprising as the majority of studies used some versions of Watt & Richardson's FIT-Choice instrument, which conveniently classes teacher's motivation into these three groups. Analysis of data is often simple frequency counts averaging the mean scores of each factor, and almost all were focused on those already in teaching or training to teach. However, these findings should be interpreted with caution as the research design em ployed in these studies cannot establish the direction of causation. For example, we cannot be

sure if it is interest in teaching that led to participation in prior teaching activities, or the other way around. Also, it is possible that those who chose teaching were more likely to rate these factors as important, rather than that these factors attracted people into teaching in the first place. It would be unwise to base policy recommendations on the evidence of such studies. There is some strong evidence that for those who want to be teachers, the majority would have already made their decision by the time they enter university (Cornali 2019, Faulstich-Wieland, Niehaus & Scholand 2010, Gorard et al. 2021, Keck et al. 2017). This influences their choice of major subject at university, which in turn, drives their career trajectory.

An interesting finding is that in N Ireland where teaching is a popular career choice, it is viewed highly on value to society, and is accorded highest status in local community compared to other occupations. As shown in a number of studies, it is not the salary of teaching per se, but the perception of the profession and the status it is accorded that matters. The evidence, albeit weak, also suggests that men and STEM subject teachers are more sensitive to salary differen tials than women and other academic subject teachers. While money may not be the primary factor in people's decision to go into teaching, it may be a major factor in their decision to leave.

While practising and prospective teachers may report being first attracted to teaching for intrinsic and altruistic reasons, research has shown that extrinsic factors like pay, workload, leadership support and working environment do influence teachers' decision to leave (cf Review 2).

The influence of family, friends and teachers have consistently been found not to be an impor tant influence on teachers' and prospective teachers' decision to go into teaching. However, a small number of studies have suggested that for males and those in maths and science, male role models can play an important role in their career decision.

1.2 How is teaching perceived by people in different countries?

Table 1.5: Quality rating of studies on perception of teaching in the USA, Europe, Australia & NewÿZealand

	Studies	Country	Sample
3*	Bergey & Ranellucci (2021)	**US**	Pre-service
	Christensen (2021)	**US**	Secondary students
	Elfers, Plecki, St. Jon & Wedel (2008)	**US**	Undergraduates
	Gorard, Ventistia, Morris & See (2021)	England	Undergraduates
	Heinz, Keane & Foley (2017)	Republic of Ireland	Pre-service
	Kyriacou, Coulthard, Hultgren & Stephens (2002)	Norway	Undergraduates
	See (2004)	UK	Undergraduates
	Christensen, Davies, Harris, Hanks & Bowles (2019) US		Secondary students
	Cornelius (2019)	Italy	Pre-service

	Studies	Country	Sample
	Fokkens-Bruinsma & Canrinus (2012)	The Netherlands	Pre-service
2*	Giersch (2021)	US	Undergraduates
	Gratacós, López-Gómez, Nocito & Sastre (2017)	Spain	Pre-service
	Ivanec (2020)	Croatia	Pre-service
	Johnston, McKeown & McEwen (1999a)	Northern Ireland	Pre-service
	Johnston, McKeown & McEwen (1999b)	Northern Ireland	Secondary students
	Lin, Shi, Wang, Zhan and Hui (2012)	US	Pre-service
	Moreau (2015)	England / France	In-service
	Watt & Richardson (2007)	Australia	Pre-service
	Watt & Richardson (2008)	Australia	Pre-service
	Watt et al. (2012)	Australia/US/ Germany/Norway	Pre-service
	Yu (2011)	US	Pre-service

This section will begin by looking at the results of Christensen (2021) which is the only studied rated 3* which looked at perceptions on secondary students. It will then explore the results from those rated 2*.

Secondary school students

Christensen's (2021) study of secondary school students in the US found that, in general, students' perceptions of the teaching profession were somewhat ambivalent. Just over half agreed that people support teachers, but only a third felt teachers were well respected in the community. Most did not think that teachers were well paid, although salary was important in their career decision. Few agreed that teachers' working conditions were good, but to many work conditions were important in their decision to be teachers.

Secondary school students in Northern Ireland perceived primary teaching as a highly regarded profession **(Johnston et al. 1999b)** as it is seen a kind of moral service to society, and it is also men tally stimulating and likely to offer a high degree of job satisfaction although primary teaching is seen as lacking in status and salary. This is a fairly large study that includes the views of 1,036 sixth formers from 12 different schools. However, there were gender differences. Boys were more likely than females to see primary teaching as a well-paid job, but more likely than females to experience negative reaction from peers about choosing primary teaching as a career. Teaching is seen as a female-dominated profession, and the male teenage culture sees teaching as inherently unfash ionable. The boys indicated that a desire to enter primary teaching could evoke derision from their school peers, hence they were more likely to favour secondary teaching.

In summary, it would appear that secondary students think that teaching is a demanding career but there are mixed views regarding task return. Students appear to think that teaching is not a high status profession, but their views on salary are varied with some viewing teaching as well-paid and others believing teaching is poorly paid.

Undergraduates

Among undergraduates in the US surveyed in **Elfers et al.'s (2008)** study, the perception is that teaching does not offer the important things they look for in a career, such as job security, intel lectual challenge and financial benefits (high earnings over the length of a career, good promotion prospects and a good starting salary) they deemed important in their choice of career. However, those who indicated interest in teaching are aware that teaching does not offer good promotion prospects or high salary, suggesting that they want to be teachers not for financial or extrinsic motivation.

The majority of US undergraduates in **Giersch's (2021)** survey also did not think teaching is a well paid job. They perceive teaching as offering altruistic, intrinsic, and extrinsic rewards (other than pay). Aspiring teachers were more likely to perceive teaching as a well-paid job than their peers who have no interest in teaching.

Norwegian undergraduates viewed teaching as 'a job that is enjoyable' (Kyriacou **et al.2002),** but like their US peers (Elfers et al. 2008), they did not think that teaching offers them intellectual chal lenge Only 35% were sure that teaching was intellectually challenging while 61% thought it could be. Norwegian undergraduates and American undergraduates likewise thought teachers' salary was low and that teaching did not offer high earning over length of career. However, American and Norwegian undergraduates perceived teaching as a respected profession.

Undergraduates in UK who expressed firm intention to teach were more likely to perceive teaching as rewarding than those who had no intention to teach **(See 2004).** Those with firm intention to teach have a more positive perception of teaching. They were more likely to perceive teaching as offering job security, good career prospects and promotion opportunities. They were also more likely to agree that teaching offers the intellectual stimulation they looked for in a job.

A more recent study of undergraduates in England **(Gorard et al. 2021)** found that undergraduates, regardless of whether they were interested in teaching or not held similar views about the working hours, workload, and working conditions in school. These factors are often reported in relation to teacher dropout, but at this stage they are not a concern for teachers, or even for those not intend ing to be teachers. Despite some of the literature and media suggesting otherwise, undergraduates in England generally did not hold the view that teaching is a fallback career for those unable to do anything else, or one especially suited for women. Consistent with studies in the US and Norway, undergraduates in England also did not consider teacher salaries to be high enough.

In summary, undergraduates viewed teaching as a job that does not necessarily meet important values they hold for their career. There is some agreement that teaching is a well-respected job, although it is not generally viewed as a profession that pays well, or intellectually challenging. However, those who intend to be teachers tend to have a more positive perception of teaching. While factors, such as teacher salaries, working hours, job security, workload, poor discipline, long holidays, working with young people, good teachers, academic interest, being female women, school experience, high status, give something back, and intellectual stimulation have been considered in the majority of studies as important influencing factors, they are not relevant to undergraduates' choice of teaching as a career

Pre-service teachers and in-service teachers

Bergey & Ranellucci (2021) surveyed 630 pre-service teachers from across all phases of schooling in a large urban university in the US. They identified four distinct motivation profiles and, although there were some differences, they found that, across the profiles, students tended to view teaching as demanding (i.e. heavy workload) and with modest returns in terms of social status, salary, and morale.

Pre-service teachers in N Ireland also rated task demand highly, with task return also rated modestly, meaning that they perceive teaching as requiring high expertise and hard work, but moderate salary and status **(Heinz et al. 2017).** Student teachers' perception also varied with their socio-economic background. Those from lower social class groups rated the social status of teaching more highly than did those from higher socioeconomic groups. Heinz speculated that being a teacher for lower social class groups indicates upward social mobility as teaching is considered a middle class profes sion.

Pre-service teachers across a number of European countries also rated teaching as high in task demand, for example, Fokkens-Bruinsma & Canrinus (2012), Switzerland; Gratacos et al. (2017), Spain; Ivanec (2020), Croatia; Lin et al. (2012), US; Watt & Richardson (2007, 2008), Australia; According to Watt et al. (2012), Australia, US, Germany and Norway; and You, (2011), US.

Italian pre-service teachers were generally very positive about the teaching profession (Cornali 2019). They perceived teaching as 'stimulating', 'exciting', 'engaging' and 'rewarding. Cornali (2019) highlighted that these descriptions appear to have significant emotional connotations.

In summary it would appear that pre-service teachers across western countries see teaching as high in demand (heavy workload) and requiring special expertise and training. But they are realistic in their perception of teaching as not highly paid or accord high status. Despite this, they are highly satisfied with their career choice. This is in contrast to those in Asian and East Asian countries, where teaching is not often their first choice career. They are more likely to choose teaching because of parental influence or public policy or because their grades were not good enough to gain entry into other degree programmes.

2. Recruitment and retention of teachers: What does the evidence say are the most promising strategies?

Research objective: To identify effective strategies in recruiting and retaining teachers in general, male teachers, teachers in shortage subjects, ethnic minority teachers and teachers in primary and early years education specifically.

Research questions:

1. What approaches show promise in recruiting and retaining teachers in general?
2. What approaches show promise in recruiting and retaining male teachers, early years and primary school teachers and teachers in shortage subjects and minority ethnic teachers?

This new review extends a previous review (See et al. 2020), which evaluates interventions aimed at recruiting and retaining teachers in high need areas and subjects. The search therefore is limited to articles from 2015 onwards. For this new review we are looking also at interventions or factors that might support the recruitment and retention of specific groups of teachers, such as those of short age subjects, ethnic minority groups and male early years teachers. The previous review considers only studies that evaluate interventions/programmes and initiatives using some kind of a causal design, i.e., experimental and quasi-experimental designs. For this current review, we also consid ered correlational, observational and case studies. Such studies are invariably based on participants' self-report of their perceptions, e.g., perception of school leadership support and their desire to stay or leave teaching. These studies, are therefore, rated low in terms of the strength of evidence as actual retention data is not collected. However, we include them because they add to the narrative on why some teachers think about leaving even though they do not add to the evidence.

Search strategy

A list of relevant keywords relevant to the research questions were developed to identify strategies that support recruitment and retention of teachers. The keywords are:

teacher supply OR teacher demand OR teacher retention OR teacher shortage OR teacher recruitment OR teacher mobility OR teacher turnover

AND

initiative OR incentive* OR policy/scheme

AND

experiment* OR randomised control* trial OR regression discontinuity OR difference in differ ence OR time series OR longitudinal OR review OR meta-analys*

AND

impact OR effect OR evaluation

As a test of sensitivity these keywords were first applied on known sociological, psychological and educational databases to see if they picked up known literature from our previous reviews. Applying these search terms to the following databases revealed 2,179 records.

ERIC	1,463
WHAT PsycInfo	444
Education Abstracts (H.W. Wilson)	263
OpenDissertations	175
British Education Index	63
APA PsycArticles	8

Previous review

We have included the search terms and the search engines used in the previous review in the table below. The search terms were adjusted according to the idiosyncracies of these search engines. To ensure that the search was comprehensive and included unpublished work and other grey literature, we also included a search of Google, Google Scholar and ProQuest dissertations/ theses. As the purpose of the review was to identify approaches that show evidence of impact only studies that employ a causal design were included. Therefore, the key words also included any causal term (or a synonym) or any research design that would be appropriate for testing a causal model, such as experiments, quasi-experiments, regression discontinuity and difference-in-difference. Any material published or unpublished that mentioned these key words would be included. The scoping review and previous reviews of literature suggest that there were few robust experimental evaluations of policy initiatives or approaches that aim to improve recruitment and retention of cla
Therefore, we included any empirical study including those using surveys or cross-sectional and observational designs. These studies will of course have a lower security or quality assessment ratings. No date limiter was also applied. This was to allow the search to be as broad as possible. This review picked up 6,690 records in the first trawl. Of these 545 were retained as relevant from skimming titles and abstracts.

Table 2.1: Keywords used in the previous review (See et.al. 2020)

Database	Syntax used	No of hits
EbscoHost	The following search terms with the following limiters were used: teacher supply OR teacher demand OR teacher retention OR teacher shortage OR teacher recruitment AND initiativeÿOR incentive* OR policy/scheme (TX All Text) AND experiment OR quasi-experiment OR randomised control* trial RCT OR regression discontinuity OR difference in difference OR time series OR longitudinal OR systematic review OR review OR meta analys* AND impact OR evaluation OR effect	113 Only 12 were deemed relevant upon screening of the titles and abstracts
ERIC ProQuest	The following search terms were used: teacher supply OR teacher demand OR teacher retention OR teacher shortage OR teacher recruitment (Anywhere) AND initiativeÿOR incentive* OR policy OR scheme (Anywhere) AND experiment OR quasi-experiment OR randomised control* trial RCT OR regression discontinuity OR difference in difference OR time series OR longitudinal OR systematic review OR review OR meta-analys* (Anywhere) AND impact OR evaluation OR effect (Anywhere) The search yielded 921 records. 31 studies and reports were deemed relevant.ÿ	921 31 were deemed relevant based on titles and abstracts
JSTOR	The search in JSTOR was adjusted many times to get the most reasonable number of search hits. The following syntax was used: teacher retention OR teacher shortage OR teacher recruitment (All fields) AND Experiment* OR quasi-experiment OR regression discontinuity OR difference in difference OR time series OR longitudinal OR review (Abstract) AND impact OR effect (All fields)ÿ	The search yielded 2,153 hits. Eight studies were deemed relevant upon initial screening of title and abstract.

Database	Syntax used	No of hits
PsycINFO	The following search terms were used: teacher supply OR teacher demand OR teacher retention OR teacher shortage OR teacher recruitment AND initiativeÿOR incentive* OR policy/scheme AND experiment OR quasi-experiment OR randomised control* trial RCT OR regression discontinuity OR difference in difference OR time series OR longitudinal OR systematic review OR review OR meta analys* AND impact OR evaluation OR effect The following databases were chosen: • OpenDissertations • British Education Index • Education Abstracts (H.W. Wilson) • Educational Administration Abstracts • PsycARTICLES • PsycINFOÿ	The search yielded 165 records. After removing duplicates 6 records were deemed relevant upon screening of titles and abstracts
Web of Science	The following search terms were used: teacher supply OR teacher demand OR teacher retention OR teacher shortage OR teacher recruitment AND initiativeÿOR incentive* OR policy/scheme AND experiment OR quasi-experiment OR randomised control* trial RCT OR regression discontinuity OR difference in difference OR time series OR longitudinal OR systematic review OR review OR meta analys* AND impact OR evaluation OR effect ÿ	The search yielded 56 hits. Most were duplicates from the other databases, except for one (Schiffrer, Turley and Heard (2017)
ProQuest Dissertations & Theses Globalÿ	The following search terms were used: teacher supply OR teacher demand OR teacher retention OR teacher shortage OR teacher recruitment AND initiativeÿOR incentive* OR policy/scheme AND experiment OR quasi-experiment OR randomised control* trial RCT OR regression discontinuity OR difference in difference OR time series OR longitudinal OR systematic review OR review OR meta analys* AND impact OR evaluation OR effect ÿ	The search yielded 828 results 41 were kept as being relevant

Database	Syntax used	No of hits
International Bibliography of the Social Sciences (IBSS)	teacher supply OR teacher demand OR teacher retention OR teacher shortage OR teacher recruitment AND initiativeÿOR incentive* OR policy/scheme AND experiment OR quasi-experiment OR randomised control* trial RCT OR regression discontinuity OR difference in difference OR time series OR longitudinal OR systematic review OR review OR meta analys* AND impact OR evaluation OR effect ÿ	The search yielded 595 hits. Duplicates found in other databases were removed. Kept 22ÿ
Sage Journals	"teacher supply" OR "teacher demand" OR "teacher retention" OR "teacher shortage" OR "teacher recruitment" AND initiative OR incentive* OR policy OR scheme AND experiment OR quasi-experiment OR "randomised control* trial RCT" OR "regression discontinuity" OR "difference in difference" OR "time series" OR longitudinal OR "systematic review" OR review OR meta analys* AND impact OR evaluation OR effect ÿ	The search yielded 1814 hits. Duplicates from other databases were removed. Kept 25
Academic OneFileÿ		4 records were found in Academic OneFile
Applied Social Sciences Index & Abstracts (HESSE)	An advanced search was conducted in ASSIA, but yielded no relevant records, so a basic search using phrases like "improving teacher preparation recruitment and retention" and "incentives to retain teachers" was also run. However, no relevant study was found in this database. A great number of studies were found of relevance to teacher retention in special education.ÿ	
British Education Index -- Ebscohost		One study was found that was not a duplicate Gaikhorst, Beishuizen, Zijlstra & Wolman, (2015
British Education Index A search in British Education Index resulted in only 36 hits although the search limiters were modified many times. The records that were found to be relevant were the same as the ones found in ERIC – Ebscohost.ÿ		36 hits Only two new ones were found in this database (Gu 2014; Price & Weatherby 2018)
Science Direct		4 records were found

Database	Syntax used	No of hits
Taylor and Francis		6 records were found
Other databases searched **Wiley Online Library** **Springer Link** **Scopus** **First Searchÿ**	These databases did not contain new relevant studies that have not already been covered in the other data bases.	
Random search using Google Scholar with different combinations of search terms		18 studies were found in the Google Scholar search
Hand search using Google following up on known pieces		17 studies were found

Both the current review and the previous reviews followed the same protocol. When the keywords were entered into the respective databases/search engines, the studies were sorted by relevance using the filter function. We eyeballed the records and removed the obvious duplicates and those that were clearly not relevant from the titles and abstracts. When the next 10 pages showed no relevant materials, the search is stopped. The rest were then imported to EPPI-Reviewer or EndNote (as with the previous review) for screening.

Screening

The screening process involved a series of steps. The first stage of the screening was to remove the duplicates. The research reports were then screened for relevance by title and abstract first and then removing those that were not relevant to the review questions. This process removed the majority of the studies. This was conducted by two reviewers who were constantly in consultation with each other to see if they agree on the decision.

Because the search involved multiple databases, there were many duplicates. As we intentionally kept the search broad so as not to miss out potentially relevant materials, it invariably picked up a large number of irrelevant materials. Many of these contained some of the keywords, but were not relevant. To remove these, we eyeballed the entries looking at the title and abstracts and removed those that were clearly not relevant to the topic. We then screened for duplicates. Some studies were presented in different forms, or for different audiences, e.g., as a working paper or a report as well as journal articles (e.g., Clotfelter et al. 2007 in the Journal of Public of Economics and Clotfelter et al. 2008 in the Journal of Public Economics; Feng and Sass 2015 as a working paper and in 2018 as a journal article in Journal of Policy Analysis & Management). These were treated as one study. For example, Dee et al's evaluation of the IMPACT programme was produced as a working paper for the National Bureau of Economic Research, then as a full report and as a journal article in the Journal of Policy Analysis and Management (Dee & Wyckoff 2015 and Adnot Dee & Wyckoff 2017). Fulbeck also reported on the ProComp programme in two papers with the earlier paper reporting on teacher retention within school (Fulbeck 2011), and the later paper focussing on mobility (Fulbeck 2014).

Ingersoll wrote several research pieces, often presenting similar materials but for different outlets. For example, he presented his research on the impact of mentoring and induction in two different outlets, one as a report for the Education Commission and one as a journal article for the Review of Educational Research. In all these cases we read the journal article and make reference to the full report, if necessary.

In the next stage of screening the full reports were skim-read by one researcher. Any studies thought not to meet the inclusion criteria were then reviewed by other members of the research team for consensus. Four members of the team independently reviewed 10 randomly selected reports to agree on their inclusion or exclusion. The full texts of the included studies were then screened by applying pre-defined inclusion and exclusion criteria as presented below.

Exclusion and Inclusion

Studies were included if they met the following criteria:

- Empirical
- About activities aimed at attracting people into teaching or about retaining teachers in teaching
- Specifically about recruitment and retention of classroom teachers
- About incentives/initiatives/policies or schemes or factors influencing teacher recruitment and retention
- About mainstream teachers in state-funded/government schools
- Had measurable outcomes (either retention or recruitment)
- Relate to mainstream education (i.e. not special education)

Studies were excluded if they were:

- Not primary research
- Not published or reported in English
- Not actually a report of research at all
- Simply descriptions of programmes or initiatives with no evaluation
- Not about strategies/approaches or factors relating recruitment or retention of teachers
- Studies that had no tangible or measurable outcomes (e.g. teachers' attitude or beliefs or perceptions)
- Ethnographic studies and narrative case studies

- Opinion pieces, guidance briefs or manuals on how to attract and retain teachers
- Anecdotal accounts from schools about successful strategies
- Studies about outcomes that were not related to teacher recruitment or retention (e.g. student achievement)
- Studies about school leaders, school administrators or teaching assistants
- Studies about teachers in fields outside school contexts, e.g. medical students, nursing, agriculture teachers.

In the initial stage, we included all studies that were about strategies employed in attracting and retaining teachers and potential teachers. There were a substantial number of studies that were surveys conducted to collect ideas about the best way or most effective ways to attract and retain teachers. Where these were deemed relevant, they were included, but given lower ratings in terms of strength of evidence as they were based on perceptions and speculations of outcomes, rather than actual outcomes. These studies were used to provide some background context on the situa tion. Unlike the previous review, this new review also included prior reviews.

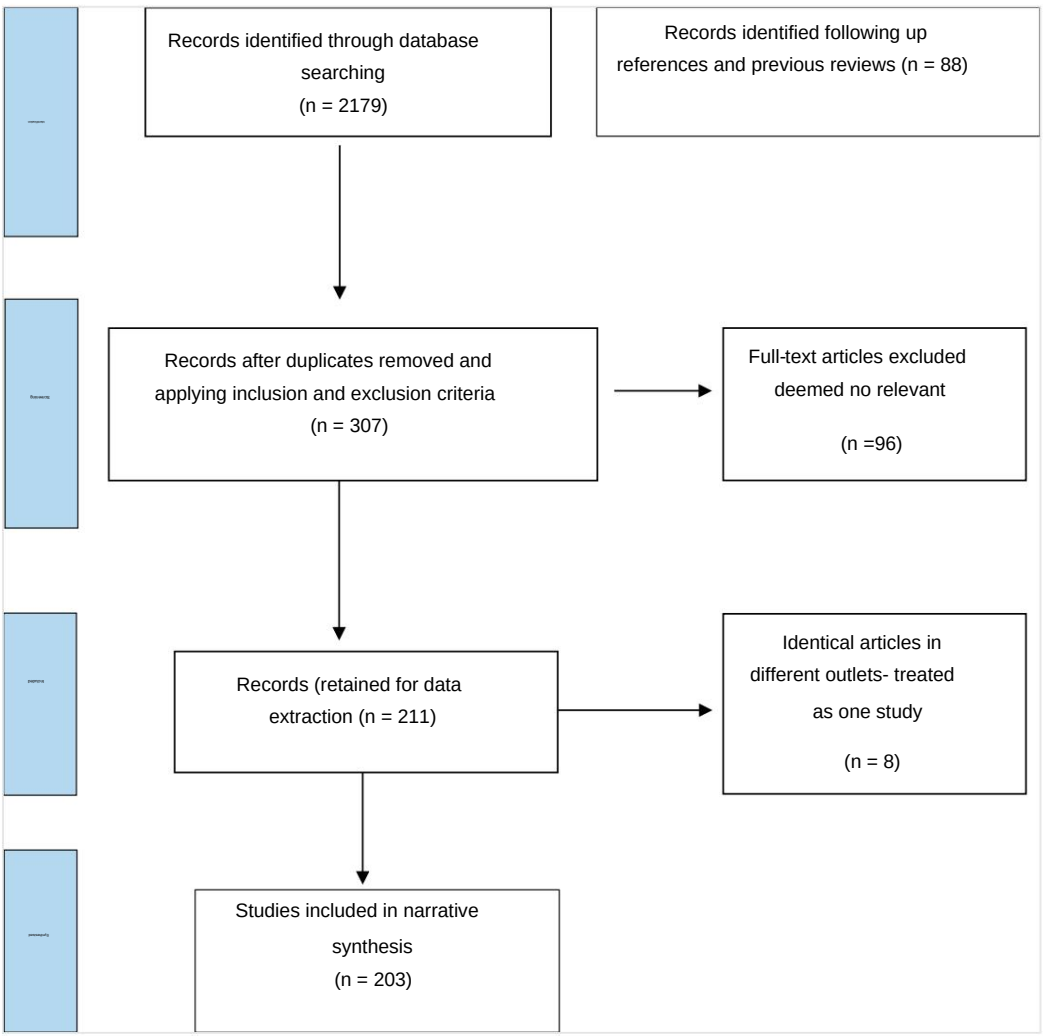

Figure 2.1: Flow chart showing number of studies at each stage of the review.

Our search has identified 307 studies relevant to teacher recruitment and retention, including 88 from our existing database (Figure 2.1). Ninety-six were excluded when it was clear they did not meet the inclusion criteria, retaining a total of 211 for data extraction. For example, Garcia (2020) was excluded because it was a policy agenda rather than an evaluation of the policy, Koch (2015) was about the research experience of men in early childhood education. This gives a total of 211 relevant studies related to teacher retention. Of these 8 were similar studies reported by some of the same authors but in different outlets. These were treated as one study.

Because some studies reported more than one outcome, the total number of studies in the tables may not correspond with the actual number of studies identified in the review. For example, Boyd et al, 2012 reported outcome for teacher accountability and the alternative certification pathway, and Zhang (2006), which investigates the effect of school and organisational characteristic reported the impact of school climate, teacher compensation and professional development opportunities. A number of studies reported outcomes for both recruitment and retention.

The included studies were then prepared for data extraction. Screening for full text and data extrac tion were performed simultaneously. A coding sheet was developed for screening by full text. Key information about research aims, research design, target population, sample size, kind of strategies (e.g. monetary incentives, professional development, alternative routes and working condition/ac countability), and outcomes (e.g. recruitment or retention). Four reviewers independently reviewed a random sample of research reports. The lead reviewer than compared the extraction of the team members to ensure that the codes were consistently applied across reviewers.

Quality assessment

Key information extraction from each of the studies assists with the synthesis and in making judge ments about the credibility or trustworthiness of the findings. This information is then filtered through a “sieve” developed by Gorard (Gorard, See & Siddiqui 2017) using five criteria (summarised in Table 1.1).

Based on these criteria, we award each study a star ranging from 0 (no weight can be placed on the study) to 4* (the most robust that could be expected in reality). These criteria are a judgement of the quality of evidence, which refers to the security of the findings and not necessarily the quality of the research. To ensure inter-rater reliability, four members of the team reviewed and rated a sample of papers. Team members were in constant consultations with each other throughout the process to ensure consistency.

Synthesis

The research reports were first sorted by outcomes according to whether they were about recruit ment or retention or both. Next, we classified the strategies or approached used for each outcome under broad categories, such as, use of monetary incentives, professional development/mentoring/ induction, alternative certification and working conditions.

Approaches with the most highly rated studies showing positive effects are considered the most promising. Likewise, approaches rated highly (i.e., 2* and above) showing negative or no effects are considered least promising given the existing evidence. All outcomes, whether positive or negative are considered. It is worth mentioning that approaches with no evidence of impact does not mean that they are not effective, but rather that the existing evidence is such that its effectiveness cannot be determined or is inconclusive.

2.1 Recruitment

Use of monetary incentives in attracting teachers

Differential compensation in terms of higher salaries and bonuses have been used in many countries to attract teachers to teach in areas and subjects which are traditionally difficult to recruit. Several large-scale studies using administrative panel data have been conducted in the US to evaluate the impact of such policies. This review found a number of such studies. These are invariably of higher quality because of the large representative data based on official statistics of actual number of teachers recruited and retained. These also often used experimental or quasi-experimental designs with suitable comparison groups or before and after comparisons.

A total of 40 studies relating to the use of monetary incentives as an intervention to attract people into teaching were included in the review. The overall results are mixed. Ten of the higher quality studies that meet our minimum criteria for a causal claim (i.e. 2* and above) showed that the use of monetary incentives can increase the supply of teachers. Six reported mixed results, while four showed no effects. But the strongest studies (3*) suggest that monetary inducements are promis ing, but often with conditions attached.

Table 2.2: Monetary incentives and teacher recruitment (n = 40)

Strength of evidence	Positive (nÿ=ÿ16)	Unclear or mixed (nÿ=ÿ13)	Negative or neutral (nÿ=ÿ11)	
3*	• Cowan & Goldhaber 2018 • Hough & Loeb 2013 • See et al. 2020			3
2*	• Atteberry & Lacour 2020 • Defeo, Hirshberg & Hill 2018 • Proud 2011 • Glazerman et al 2013 • Jacobson 1988 • Steele, Murnane & Willett 2010 • Zarkin 1985	• Dolan, Matcalfe & Navarro Martinez 2012 • Fulbeck & Richards 2015 • Gjefsen 2020 • Henry, Bastian & Smith 2012 • See et al. 2020 • Sims 2018 • Sisouphanthong et al. 2020	• Good & Sass 2018 • Gorard et al. 2021 • Leaver et al. 2021 • Rosen 2013	18
1*	• Bobronnikov et al 2013 • Gordon & Vegas 2004	• Hopefully • Fitzgerald 1986 • Goldhaber, Destler & Player 2010 • Kelly 2004 • Rothstein 2015	• Guarino et al. 2006 • Fowler 2003 • Kane 2010	10
0	• Morrell & Saloman 2017 • Petty et al. 2012 • Ware 2018 • Warren 2008	• Whitfield 2021	• Liu 2010 • Liu et al. 2004 • Protik et al. 2015 • Sykora 2010	9

The stronger studies provide some evidence that offering higher salary or bonuses to compensate for the relatively unattractive working conditions in low-performing or challenging schools with high proportion of low-income and ethnic minority students (e.g. Hough & Loeb 2013; Cowan & Goldhaber 2018; Glazerman et al, 2013; Defeo et al. 2018). But these have conditions attached in that recip ients have to agree to teach in these hard-to-staff schools (HTSS). It is not clear if the effects are sustained once the incentives are withdrawn or if the teachers no longer become eligible.

Hough & Loeb (2013) found that offering teachers a higher salary and a bonus increased the proportion of new teachers hired from 49% to 54%. There was also an increase in the proportion of shortage subject teachers in hard-to-staff areas from 27% to 37%. The scheme that was im plemented in the San Francisco School District awards shortage subject teachers and teachers in schools with a high proportion of poor and ethnic minority students with a salary uplift of between $500 and $6,300 and a $2,000 bonus. But teachers have to agree to teach in these hard-to-staff schools (HTSS). Using a difference-in-difference approach, the authors compared the recruitment and retention of 1,611 eligible teachers in different school districts before and after the introduction of the policy.

In another study **Cowan & Goldhaber (2018)** evaluated a similar salary and bonus incentive scheme in Washington, known as the Washington's Challenging School Bonus (CSB). Because bonus eligibility was based on the share of students eligible for free- or reduced-price lunch (FRL) programs in the school, the authors employed a regression discontinuity design (RDD) to compare teacher staffing on both sides of the eligibility thresholds. RDD is as close one can get to an RCT as it ignores variation in outcomes that may be associated with factors correlated with school poverty but not caused by the program itself. They also found that the incentives resulted in an increase in the proportion of newly hired teachers by about 38%. Compared to schools that just missed out on the eligibility, the bonus policy increased the proportion of certified teachers in bonus-eligibility schools by 42%. Similar to the scheme in San Francisco, teachers are eligible for the awards only if they agree to teach in high poverty schools.

A randomised controlled study **(Glazerman et al. (2013)** where teachers were first matched on char acteristics and then randomly assigned to receive a bonus incentive or not found that the incentive increased the number of vacancies filled (88% were filled compared to 44% the year before, and 71% in the comparison group). They also found that teachers recruited were more than twice as likely to have National Board Certification. The Talent Transfer Incentive offers a $20,000 bonus to high performing teachers paid in instalments over a two-year period. Teachers who were already teaching in low-performing schools received aÿ$10,000 retention stipend if they remained in the school over the two-year period. The participants included 85 teacher pairs across 114 elementary and middle schools.

Steele et al. (2010) also found positive effects of conditional monetary incentive. The policy initi ative in California, known as the Governor's Teaching Fellowship (GTF), offers teachers a $20,000 scholarship on condition that they teach in a low-performing school for four years. The result was that there were twice as many teachers enrolled during the years when the scheme was introduced than before and after. And 28% more teachers taught in low performing schools than before. Money seemed to be an attractor. As with the Talent Transfer Initiative (Glazerman et al. 2013), they found a substantial increase in the likelihood of targeted teachers working in such schools.

Another evaluation of the conditional monetary incentive scheme in the US also suggests that the scheme was effective in attracting high performing graduates into teaching, but only in high performing schools with lower proportion of disadvantaged children, and in high performing classes

The scheme evaluated is the North Carolina Teaching Scheme (NCT) designed to recruit high per forming graduates into teaching and prepare them for leadership roles. The scheme awards fellows with $6,500 a year for 4 years to train as a teacher in ad a NC university. If recipients do not fulfil the 4-year commitment, they have to repay the loan with 10% interest. To estimate the impact of the scheme, **Henry, Bastian and Smith (2012)** compared the recruitment and retention of the NTC fellows with other in-state prepared teachers.

Falch's (2011) study found that higher salaries in Norwegian public schools also increased recruit ment of teachers. Using a difference-in-difference approach, Falch made use of a natural experiment where teachers in schools with high vacancies were given a wage premium to compare the recruit ment rate of teachers before and after the wage premium was introduced. Comparisons were also made with schools with persistent teacher shortages outside the three counties, which were not eligible for the wage premium. The results showed that the recruitment rate was higher in treatment schools than non-treatment schools. A 10% increase in wage boosts recruitment by about 30%. The wage premium appeared to be more effective in attracting young female teachers into teaching than older male teachers.

Higher salaries were also offered to attract teachers in Alaska to teach in rural schools. **Defeo et al. (2018)** analysed data from twelve Alaskan school communities in three districts to determine the minimum salary needed to attract highly qualified teachers in rural communities in Alaska, and how much more is needed to get teachers to teach in difficult-to-staff schools. They found that higher wage differentials were needed to compensate for factors that might make a community or school more or less attractive, with remote rural communities having higher differentials.

In an alternative analysis, **Jacobson, S. L. (1988)** analysed data from the Personnel Master Files (PMF) for school years 1974/75, 1978/79, 1982/83, and 1984/ to compare the mean salaries of teachers with different levels of experience in each of the 699 school districts. Using these salary figures Jacobson calculated the salary ratios of mid-career teachers (mid-career salary/entry level salary) and senior teachers (senior salary/entry level salary). These salary ratios describe the salary distribution practices in the district. Values greater than 0.05 suggests that districts were increasing novice teachers' salary faster than salaries for more experienced teachers. Values less than -0.05 suggests that districts were increasing the pay of veteran teachers faster than for new career teachers. Salaries between -0.05 and 0.05 indicates that the rate of salary increase was the same for all teachers. These are then used to determine the relative attractiveness of the district's salaries for early entry, mid-career and senior teachers over the ten- year period. Changes in the district salary rankings are then correlated with teacher recruitment and retention through a series of paired comparisons. The findings revealed that when districts improved their entry-level salary ranking, they improved their ability to recruit highly educated candidates, while districts that experienced a decline in their entry-ranking typically experienced a marked drop in their ability recruit candidates with advanced training. In summary, the findings suggest that the manner in which a district distrib uted its salary increments among staff had an important bearing on the subsequent attractiveness of its salary offerings, vis-a-vis salary offerings of neighbouring districts, and that changes in the relative attractiveness of district salary offerings. Paying new teachers more improve r

Zarkin (1985) developed an economic model to test how responsive the "reserve pool" of teachers is to the teacher salary at the time in a longitudinal time-series analysis. The reserve pool of teachers in one year was estimated as the average proportion of certified teachers to the total certified over the 20-year period, multiplied by the total number meeting the minimum certification requirements in that year. They estimated that a 20% increase in wages could induce a 14% increase in the supply

of secondary school teachers, and that secondary teachers were more responsive than primary teachers to increase in salaries.

Other studies suggest that while monetary incentives may be effective in increasing supply of teach ers in some schools or areas, there are caveats. For example, **Dolan, Metcalfe & Navarro-Martinez (2012)** suggested (indirectly) that monetary incentives may be effective only in attracting those already intending to teach, not those who would not have considered teaching anyway This was an experiment analysing data of 1,496 undergraduates in England to test whether financial incentives would attract high ability students into teaching. Instead of asking student directly whether they would be motivated by financial incentives, participants were presented with a hypothetical task for which they were rewarded for effort. They were also offered an initial up-front payment or “endowment” conditional on their subject and predicted degree classification. This was to mimic the incentives offered for initial teacher training (ITT) bursaries in England where students were offered differentiated bursaries for different degree subjects and degree class with high priority subjects attracting higher bursaries. Those intending to be teachers were more likely to give greater importance to bursaries. The effect was stronger for women who were more likely to want to be primary school teachers than secondary. Those in the third year of study were also less likely to express intention to teach. This study was based on hypotheticals and on participants’ expression of intention to become a teacher, which weakens its validity.

Another study, also conducted in England, examined the effect of salary supplements on the re cruitment and retention of maths and science teachers (shortage subjects). **Sims (2018)** analysed data from the annual School Workforce Census and the Teacher Pension Records data. The results suggest that a 5% increase in salary supplement in 2010 for new science and maths teachers in the first five years of their career increased the supply of maths and science teachers, but this was largely through improving retention of those already in the profession. The higher pay does not incentivize more people to train in each cohort.

Gjefsen (2020) assessed a benefit programme in Norway aimed at attracting highly qualified teach ers to disadvantaged primary and secondary schools. The main element of the programme was a 5% wage increase. Using a difference-in-differences approach, the study analysed the changes in the characteristics of newly hired teachers in terms of educational background and academic achieve ment compared to a matched group (using propensity score matching). As with Sim’s analysis, the study also found that a 5% wage rise increases the probability of hiring teachers with a master’s degrees by about 7 percentage points. However, it did not increase the probability of hiring teachers with a teaching degree or better academic achievement.

Fulbeck and Richards’ (2015) evaluation of the Denver’s Professional Compensation for Teachers Program (ProComp) also showed that the incentive was successful in attracting teachers to high growth and high performing schools, but less successful in getting teachers into schools with a high proportion of low-income pupils or hard-to-staff schools. Financial incentives also did not encourage teachers to move out of the area they were currently in. ProComp is a performance-based financial incentive, which awards individual teachers for meeting student performance targets, some are awarded schoolwide, and to teachers who taught at hard-to-staff schools serving low-income population, high performing schools and schools that make the most progress in maths and readin Annual payouts average 12% of base pay among full-time teachers. **Attebury & Lacour (2020)** also evaluated the ProComp programme using a comparative time-series analysis to compare the recruit ment and retention of public school teachers before and after ProComp relative to other districts over a 16-year period (from 2001/02 to 2016/17). The results showed that more effective teachers were recruited to public schools in Denver during the ProComp period compared to comparable districts.

See et al.'s (2020) systematic review of international evidence which synthesises the strongest evidence there was on a range of interventions and policies to recruit and retain teachers, concluded that the overall result is that targeted monetary incentives are the most promising approach in encouraging people into teaching, but they are mostly effective only in enticing those who have a pre-existing desire to teach and when the school context is appealing. Extra salary may be warranted in high-demand subjects (e.g. STEM) and in disadvantaged and low-performing schools. This review, unlike most previous reviews, is rated 3* as all the studies included have been carefully screened and filtered by strength of evidence. The conclusion is based on the evidence of the strongest studies

Some weaker studies based on interviews with a small subset of the original recipients of bonus incentives offer some explanations for the lack of effects of such inducements in attracting teachers. For example, a longitudinal study **(Liu et al. 2004)** tracing the original recipients of the Massachusetts Signing Bonus Program (MSBP) revealed that the bonus money had little influence on recipient's decisions to enter teaching. Far more important was the alternate certification program created to implement the policy. Liu et al. (2004) also found that although the incentive was intended to attract those who would otherwise not considered teaching, many of the bonus recipients had previously considered teaching and had taken steps to enter the profession. In other words, the bonus incentive only attracted those who were already considering teaching. Although they were to teach in high need schools, most did not. Only 45% in the first cohort did and only 36%in the 4th and final cohorts did.

Other medium rated studies (2*) found that financial incentives alone do not work (Bueno & Sass 2018; Gorard et al. 2021; Leaver 2021; Rosen, 2013). **Bueno and Sass's (2018)** evaluation of the monetary compensation scheme in Georgia, US found that increasing maths and science teachers' pay to make it equal to that of a teacher with six years of experience did not increase the number of maths or science teachers nor did it encourage people to switch to maths or science. The authors an alysed data from the state-level longitudinal database, Georgia's Academic and Workforce Analysis and Research Data System (GA•AWARDS) from 2006/7 to 2014/15. The data includes information about whether a teacher is eligible for the salary supplement. A difference-in-differences model was used to estimate the impact of the differential pay programme on the likelihood of becoming a teacher by comparing the difference between graduates with majors in maths and science and other education majors in the change before and after the programme period.

Similarly, **Gorard et al.'s (2021)** cross-sectional analysis comparing three groups of 4,469 under graduates in England (those that never considered teaching, those who have considered teaching but rejected it, and those with firm intention to teach) found that pay was not an important factor in determining undergraduates' decision to teach or not. The authors used logistic regression analysis entering the predictors in stages with demographic background factors (e.g. sex, ethnicity, parental occupational and educational background) and prior qualifications in the first step, then factors re lating to their university, such as their expected degree classification and university subject choice, what they looked for in a career, and their perceptions of teaching. The factors that make the biggest discriminator in predicting who are likely to intend to teach are those related to the university years. Adding these factors improves the accuracy of prediction of who are likely to want to be teachers by five percentage points. Net of these factors, knowing students' perceptions of teaching as a career does not help much in predicting if they intend to teach or not. The role of financial incentives makes absolutely no difference in students' intention to teach. As explained before, financial incentives are important to those who are already considering teaching, but do not make a difference in their decision to teach or not. These findings concur with those of Dolan, Metcalfe & Navarro-Mart

Rosen (2012) analysed data from the School and Staffing Survey from 1999/2000 to 2007/08 which contained data from 106,930 public school teachers in 6,540 public school districts to compare

teachers in districts that offered incentives with matched teachers in other districts that do not offer incentives. The results also showed that the incentives were most attractive only to those who were already interested in becoming teachers. There is no clear evidence that the incentives improved recruitment of shortage subject teachers nor the quality of teachers recruited. To create a natural ex periment in which assignment to treatment or control conditions is not driven by something external to the model, the author used an instrumental variable approach where teacher union membership was the variable used to select comparison teachers. The two unions were the American Federation of Teachers (AFT) and the National Education Association (NEA). Both unions support single pay salary, but NEA explicitly does not support additional pay. However, this does not overcome the problem that districts that did and did not offer such incentives may have other differences that could influence teacher recruitment and retention. For this reason, the study was rated 3* and r

Most of the studies so far have looked at the attraction of monetary incentives in high-income coun tries. **Leaver et al. (2021)** examined the impact of pay for performance on upper primary teachers in Rwanda and found that, contrary to popular beliefs, money was not an attractor in low-income countries. The study found no effect on recruitment of more skilled workers based on distribution of teacher skills between schools. Monetary incentives also did not encourage teachers to stay in teaching despite the condition that they remain in teaching the following year. The study design is described in more detail in the Retention section.

Sisouphanthong et al. (2020) conducted a thought experiment to test if the offer of financial incentives would compensate for teaching conditions in rural areas of Cambodia and Laos. Teacher trainees were asked hypothetical questions where they were presented with a randomised variety of scenarios/conditions. This allowed the researchers to analyse the separate effects of different conditions on salary expectations. Teacher trainees expressed an unwillingness to accept hardship teaching positions (e.g. in rural areas without hospitals, modern infrastructure like electricity and water, and transportation), unless there were substantial increases in the salary offered (around two to three times the normal salary). The finding suggests that monetary incentives w when the prospective teaching positions are intrinsically less appealing. As Goldhaber, Destler & Player (2012) found in their study, teachers are willing to work for less in more attractive working conditions.

One weaker study **(Rothstein 2015)** suggests that bonus incentives may only be effective in high performing schools. But offering tenure contract with sharp increases in salaries is effective in attracting all types of teachers but has little effect on the relative number of high and low ability teachers. Although the tenure contract with higher salary increase is more effective it shortens the career of the weakest teachers by 80%. The majority of these would be teachers who left voluntar ily because of the knowledge that their chances of tenureship are lower than expected.

In summary, money is an attractor, but it is effective only in motivating those who are already predisposed to teaching. There is no evidence that offering monetary incentives for shortage subjects would encourage more people to teach these subjects, nor did it encourage people to switch to teach these subjects. Although higher salaries (e.g. a 5% increase) may increase the probability of hiring teachers with higher qualification, it does not necessarily increase the number of qualified teachers or higher performing teachers. Paying teachers for performance works in attracting teachers to high performing schools, but it is not successful in getting teach ers to teach in low-performing challenging schools in hard-to-staff areas with a high proportion of low-income pupils.

Non-monetary interventions

Alternative recruitment strategies

One commonly used non-monetary intervention to get more people into teaching is alternative pathways into teaching and recruitment. The idea is to make it easy for those who are interested in teaching, but would otherwise find it hard to get certification through the conventional universi ty-based routes. This often involves getting people trained while teaching or enabling those who are already involved in classroom teaching (e.g. classroom assistants) to obtain certification on the job. In the UK there is the Teach First in England programme, School Direct and School Centred Initial Teacher Training, Troops to Teachers and Return to Teaching scheme. Similar programmes in the US include the Teach for America programme, the Teacher Residency Programmes and Peace Corps Alternative Program.

Many studies have been conducted to evaluate the effectivenesss of different teacher prepara tion routes, but most are focused on their impact on student performance. There are few robust evaluations of their impact on teacher supply. Traditional teacher-preparation programmes often emphasised pre-service training on the assumption that a rich and substantial set of courses and practical experiences will give teachers the requisite skills and knowledge needed in the classroom. Alternative programs, on the other hand, often seek to reduce barriers to entry, enabling teachers of varying backgrounds to enter the classroom more quickly (Hess, Rotherham, & Walsh, 2004), and often emphasised on-the-job training.

Fourteen studies looked at the impact of alternative strategies for recruiting teachers. The majority, and mostly medium quality studies suggest that such alternative methods of getting teachers into teaching have the impact of increasing the number of teachers.

Table 2.3: Alternative recruitment strategies teacher recruitment (n = 14)

Strength of evidence	Positive	Unclear or mixed	Negative or neutral	
3*				
2*	• Boyd et al. 2012 • Latham & Vogt 2007 • Papay et al. 2012 • See et al. 2020			
1*	• Clewell & Villegas 2001 • Guarino et al. 2006 • Harrell & Harris 2006 • Scott et al. 2006 • Shen 1997 • Zumwalt et al. 2017		• Dwinal 2012	
0	• Burstein et al. 2009	• Ware 2018 • Whipp & Geronime 2017		

One often cited review is the one by **Guarino et al. (2006).** This review examined the individual and school characteristics linked to teacher recruitment and retention and concluded that alternative preparation programmes increased the recruitment of diverse older teachers. However, there are a

number of limitations with this review. First, the review included only studies in the United States that were published by the end of 2004 and used data that reached 1990 or later. The authors considered only published and peer-reviewed research reports. Although the authors applied four quality criteria based on sample, measurement procedures, model specification and interpretation to these studies, these were used to determine whether studies would be included in the review or not, rather than the strength of evidence or trustworthiness of the findings. For example, they did not consider the design, scale nor threats to validity (e.g. conflict of interest, attrition and diffusion. They did not assess the weight of the evidence that should be allocated to the findings in relation to each intervention. In addition, Guarino et al. placed the Massachusett's Signing Bonus Programme under alternative programme, but we classified this programme as a monetary programme as the primary motivation is the bonus incentive. The small selection of studies reflects the lack of rigorous evaluations of alternative credentialing programs.

See et al.'s (2020) comprehensive review suggests that alternative routes into teaching had a posi tive impact on recruitment of maths teachers, but this was supported by a single moderately-robust study. Hence the 2* rating even though this was more rigorous review than Guarino et al.'s because of the careful filtering of studies with weak design, and weighting each study by the strength of the evidence.

Boyd et al. (2012) compared the recruitment and retention of Math Immersion teachers (MI), an alternative teacher preparation programme in New York City, with New York City mathematics teachers who began their careers through other pathways. MI was designed to fill vacancies as uncertified teachers were not allowed to teach. The study found the Maths Immersion programme was successful in attracting highly qualified teachers to teach in some of the most challenging schools. The number of such teachers increased from 2003 to 2008 at a faster rate than those who were prepared through the traditional college (CR), Teaching Fellowships (TF) and Teach for America (TFA) routes. Maths Immersion teachers also had better academic qualifications than traditionally prepared peers, but weaker qualifications than TFA teachers. The study found little variations between pathways but substantial variation within each pathway with regards to required coursework, suggesting that those who chose certain pathways are self-selected or differed in terms of attitude, motivation and other unobservable characteristics. Although this study is large based on large administrative data drawn from the New York City Department of Education, the New York State Education Department, and the College Board databases, we have to bear in mind that MI teachers and those on the traditional routes were not randomly assigned, so there may be differences between groups. For example, they are substantially more likely to be male, Black, and Hispanic, and perform better on most measures of academic ability, including the math and verbal SAT exams, although they perform slightly worse on the Content Specialty Test in Mathematics (CST Math) and the secondary pedagogy exam (ATS Secondary).

In their study, **Latham & Vogt (2007)** compared the recruitment and retention rates of teachers who completed teacher preparation in a Professional Development School (PDS) and traditional university-trained teachers. PDS contains specific elements including: field placement, onsite under graduate coursework that allows for more time and more total immersion in the school environment; professional development opportunities for teachers through work with university faculty members and improving teacher preservice preparation. This is a longitudinal study using previously collected data to examine the effects of PDS. The sample included 506 primary education graduates prepared in PDS and 559 traditionally prepared graduates as comparison group. Data was analysed using a time-series analysis from 1996 to 2003. The results suggest that PDS-prepared students and col lege graduates were more likely to enter the profession compared to community college trans PDS teachers were more successful in being recruited compared to traditionally prepared students.

Odds of PDS graduate employed were 40% higher whereas the odds for the non-PDS prepared were 37% lower.

Papay et al.'s (2012) evaluation of the Boston Teacher Residency (BTR) programme showed that while the programme had been successful in recruiting teachers to shortage subjects, there was no effect on student outcome in the first few years. The proportion of new maths and science teachers hired in Boston public schools that came through BTR increased over the years. By 2009–2010, 62% of Boston's new math teachers and 42% of new science teachers came through the BTR program, which provided 34% of the total pool of new teachers hired by Boston Public Schools that year. But we do not know what proportion it was in 2004/05, so there is no way of calculating what the increase would be as a result of BTR. The BTR programme is based on the medical residency model. The residency year is heavily invested on classroom practice where teachers work alongside a men tor in the school for a year. In addition, they have to complete a coursework which leads to Teacher Licence and a Master's degree before certified to work in Boston public schools. BTR graduates teach specifically in Boston and are committed to teach in Boston for 3 years after their residency year. Residents also receive a small stipend during their training year ($10,000 or 25% of the Boston teachers' salary). After residency, they can be employed as classroom teachers, but they are not guaranteed a teaching position in schools or district.

Harrell, P. E. and M. Harris (2006) compared the recruitment of teachers via an online post-bac calaureate programme with traditional programmes. The online programme was designed for teachers of grades 8–12 and includes a traditional baccalaureate programme and a master's degree programme for secondary teachers with a semester of practical teaching. It offers greater flexibility while increasing access and affordability. The aim of the programme was to attract career changers, minority candidates and those in shortage subject areas and hard-to-staff schools. Candidates need to demonstrate content mastery by passing the Texas content examination and meet the minimum grade point requirements. The analysis was based on data taken from 632 students (191 online students; 441 traditional programme students) during the 2002/03 and 2003/04 academic The results indicate that the online programme was more successful than the traditional programme in recruiting males (49% for online vs 32% for traditional or ES = 0.2) and ethnic minorities (32% vs 22% or ES = 0.19). It was also more successful in recruiting career changers (recruits came from telecommunications, engineering, construction, sales, finance services and the ministry) and shortage subject teachers. 37% of online programme candidates were enrolled to teach maths and science compared to only 24% of the traditional programme candidates who were enrolled in these subjects (ES = 0.2).

Shen (1997) compared the impact on recruitment and retention of minority teachers and maths & science teachers in urban areas between traditionally and alternatively certified (AC) teachers in state-funded schools. The analysis was based on a nationally representative sample of public school teachers (N = 14,721), taken from the Schools and Staffing Survey 1993/1994, a national survey conducted by the National Center for Education Statistics. The study found that while alternative certification was successful in increasing the number of maths and science teachers in urban schools as well as the number of minority teachers, it was less successful in recruiting teachers with good academic qualifications. AC tended to be the route taken by new graduates to avoid the traditional teacher training programme which has higher entry qualifications. AC teachers were less likely to have a master's degree, but they were more likely to have degree qualifications in maths and science than TC teachers. AC teachers were younger and less likely to report wanting to stay till r In other words, they have little impact on retention.

Clewell & Villegas (2001) summarises a six-year evaluation of the Pathways to Teaching Careers programme. The programme consists of 4 strands, each strand targets a different population (e.g. racial/ethnic minority teachers). This paper is about the two strands that aimed at recruiting the paraprofessionals and noncertified teachers (the most comprehensive of the 4 strands), and the Peace Corps Fellows. The paraprofessional and noncertified programmes involve identifying parapro fessionals and noncertified staff already working in the schools and offer them scholarships as well as other support services to help them obtain qualified teacher status. Upon completion participants are committed to continue teaching in the schools for a specified period. The Peace Corps Fellowship identifies and supports potential teachers from returning Peace Corps volunteers (similar to the Troops to Teachers programmes in England). Fellows are placed in schools on a full-time contract and paid a salary where they work towards a teaching qualification. The evaluation showed that completion rate of Pathways teachers was higher than traditionally certified teachers (75% vs 60% A high proportion (84%) of Pathways graduates ended up teaching in targeted school districts (hard to-staff schools), but since this figure was not compared with the national average or with previous years, it is not clear if this was an improvement or not, and if so, whether this improvement was the result of the programme. Follow-up survey showed that retention rates among Pathways teachers three years after completion are higher than the national 3-year average (81% vs 71%). Overall Paraprofessionals appear to be the most successful of all the teachers in the Pathways programme.

Scott et al. (2006) evaluates The Texas Math and Science Scholars Programme (MASS), which is a multi-component programme to streamline certification and support preservice teachers through scholarships and tuition remission. It provides early field experiences and quality mentoring in local classrooms guided by a mentor teacher. Mentor teachers provide not only classroom learning but also convey enthusiasm and value of teaching. Students are offered tuition fee waivers for the first two certification courses. They can then apply for a scholarship where they are committed to teaching maths or science for 2 years. The evaluation is a simple one-group longitudinal design comparing recruitment and retention over time. The results suggest an increase in the numbers of mathematics and science majors pursuing teaching careers. In the first year 37 prospective teachers were recruited, 69 were enrolled in the second year with 41 retained (60%), and 80 in the 3rd year with 69 indicating that they would continue on to do the teacher certification course. In the 4th year 100 students were enrolled with 80% indicating that they would remain on the course. The design of the study, however, does not make it possible to attribute the increase in the number of students enrolled on the teacher certification course solely to the MASS programme. Additionally, given the multiple-feature of the programme it is difficult to determine which aspect of the programme or indeed the combination of the programme that is driving the impact.

Zumwalt et al.'s (2017) evaluation of the New Jersey alternative route to teaching initiative also reported positive effects on recruitment, but not the quality of teachers. This study compares the preparation and retention of 315 primary and secondary English and maths teachers who were trained through the New Jersey college-based education programme (CB) and those via the New Jersey Alternate route (AR) programme. Teachers were surveyed in their 6th year of teaching. AR increases the number of rural and urban teachers and also the diversity of teachers. However, the alternative route has not shown to be effective in retaining maths teachers compared to the tradi tional college-based route. As the full paper was not available, there is no access to the data and the analysis. The three-yearÿretentionÿrates were highest for elementary and CB mathÿteachersÿand lowest for AR mathÿteachers.

A cross-sectional study compared two alternative certification programmes (Teacher Immersion/ iZone and Project Inspire) with the traditional recruiting methods using a survey administered to 212 teachers in a low-performing cluster of schools **(Ware 2018).** There was no report of response

rates. Teacher immersion/iZone included a two-day paid immersion experience in which prospective teachers could engage with a variety of stakeholders in the low-performing schools and teach a mini-lesson to students, while learning about the urban community. Teachers needed to have qualifications and experience to show they could be successful in the target context. In return, they could qualify for financial awards and professional development support when starting a teaching job in the low-performing schools. In addition, there were bonuses of $5,000–10,000 available based on signing a teaching contract at low-performing schools and on student achievement gains. The Project Inspire Teacher Residency program was aimed at STEM teachers who would work with a chosen university to earn a tuition-free MA, while teaching in the low-performing schools for 4 years. They also receive a living stipend during their 4-year residency in the low-performing schools. Both routes included mentoring, induction and professional development. The study examined the factors that influenced teachers' decisions to take up teaching and staying on in low performing schools in an urban school district.

Compared to their counterparts, iZone teachers were more likely to report that enjoyment of urban lifestyle and the school's recruiting programme as important factors influencing their decision to teach in urban schools. Traditionally recruited teachers, on the other hand, found recruitment mate rials and resources not important in influencing their decisions. In terms of retention strategies, tra ditionally recruited teachers found the urban lifestyle less influential as a retention strategy. iZone recruited teachers found high quality professional development opportunities and opportunities to travel for professional growth to be an effective retention strategy. Project Inspire recruited teach ers, on the other hand, found state/district funded bonuses for all teachers working in high-priority public schools to be an effective retention strategy. The findings do not provide clear evidence about how effective alternative programmes are compared to traditional routes. However, the study did suggest that other factors salary, benefits, and other aspects of the job offer, or not having other job offers, were the main recruitment factors, along with a challenging position and proximity to family. Younger teachers in the Teacher Immersion/iZone programme were influenced to take up jobs in the target low-performing schools because they were attracted by the urban lifestyle, but older teachers were not influenced by the same factors.

One weaker study evaluated the Mississippi-Arkansas Delta's Teach for America (TFA) programme aimed at improving rural southern teacher supply **(Dwinal 2012).** Teacher shortages in the Delta was chronic because of the high poverty, geographical isolation and racial segregation in the re gion. Teach for America (TFA) is a teacher training programme (similar to England's Teach First) that recruits potential school leaders from university graduates and professionals, who have the best chance of success in school through an intensive selection process. These recruits are committed to teach for at least 2 years in state schools. TFA targets schools in hard-to-staff school districts. The study surveyed 94 district superintendents (response rate 20%); 542 principals (response rate 13%). Although the administrative data showed a 600% increase in TFA teachers in the region, providing between a quarter to a half of the area's new teacher labour supply each year from 2008 to 2010, Dwinal found that the programme was unable to increase recruitment in the area suffi ciently to reduce its vacancy rates. And this was because TFA imposed a limit on the number of its corp members in each district. Once this limit is reached the additional teachers are funneled to other areas. Another limitation was the lack of provision to train local teachers. This means that the schools are continually reliant on TFA to supply them with teachers.

A number of studies have suggested that teachers are more likely to express interest in teaching in schools where they have previous experiences. There is a strong link between teachers previous learning environment and their commitment to teach in certain types of schools (e.g. Andrews, 2009; Frankenberg et al., 2010; Irizarry & Donaldson, 2012; Ronfeldt, Reininger, & Kwok, 2013;

Taylor & Frankenberg, 2009). Taylor and Frankenberg (2009), for example, found that White student teachers without previous urban experiences or without a background in teaching prior to the teacher education program tended to have lower retention or commitment in teaching in an urban school by the end of the first year of training. In a study of three cohorts of 2,029 teachers who completed training with Teach for America, Irizarry & Donaldson (2012) found that Latina/o teachers were twice as likely as White teachers to express a preference for teaching in schools and communities like those where they grew up.

One alternative certification route, known as “Grow Your Own” is based on this assumption. Earlier work by Haberman (1996) found that successful urban teachers tended to have life experiences in urban neighbourhoods and schools. These studies tended to be weak on evidence because of the small sample, poor response rate or lack of comparators. **Whipp & Geronime (2017)** analysed the experiences of 72 graduates from an urban teacher education programme to see whether certain previous experiences were associated with expected recruitment at urban schools. New teachers who had attended, volunteered, and/or student-taught in poor, urban schools were much more likely to plan to teach in such schools. In turn, those with such commitment were much more likely to actually take up a job in poor urban schools. It is not clear from the report which of these experiences in urban schools are required components of the “grow-your-own” approach, and which are option There were a number of methodological limitations with this study. First sample size was small, re sponse rate was low and the sample was self-selected. Of the 250 student teachers who graduated during that time period, 95 (38%) volunteered to participate, and of these data from only 72 were analysed, giving a response rated on 29%.

Burstein et al. (2009) examined the effectiveness of the 1-year Accelerated Collaborative Teacher preparation programme (or ACT). ACT is a full-time credential program designed for post-graduates to train elementary, secondary, and special education teachers for urban schools. The programme focuses on the diverse needs of urban school learners, and trainees complete field work during the day and coursework in the late afternoon and evening. Demographic and survey data were gathered from 6 years of program graduates to monitor their completion, placement and retention rates. The data indicates that the programme recruited 554 candidates over 6 years, with 94% completing it. Under half (43%) were hired in the urban school district where they were trained. Of these 74% of graduates stayed in teaching after 5 years. However, because there was no before and after programme comparison and no comparison with national average, it is not possible to say if the programme was more effective compared to other accreditation. Any change in numbers of recruits could be due to a myriad of factors, such as changing economic situation (e.g. economic depression), changing pupil population or increased funding for schools. This study was therefore rated 0* for evidence.

While the stronger studies suggest that alternative routes to teaching can potentially improve the recruitment of teachers in HTSS and shortage subjects and also the supply of minority teachers, none of these could establish causation. These alternative routes are so varied and most also involved a combination of financial incentives, induction and mentoring as well as field experiences, it is difficult to say which of these components are key to its success.

Early support and professional development (mentoring and induction)

Teacher induction programmes are widely used as non-monetary interventions, mainly to support early career teachers to promote retention. They are not specifically aimed at recruiting teachers.

However, this review found three studies that looked at whether the offer of such support would encourage people to take up teaching, especially in hard-to-staff schools.

Table 2.4: Early support and professional development and teacher recruitment (n = 3)

Strength of evidence	Positive	Unclear or mixed	Negative or neutral	
3*				
2*		• You 2012		1
1*	• Kane 2010			1
0			• Wood 2008	1

The highest rated study is 2* (You 20212). This study shows that induction and mentoring had no clear effect on teacher recruitment. Taking advantage of the variation of the timing of mandatory induction legislation across school districts in the US, **You (2012)** compared the number of new hires before and after using a time-series difference-in-differences method. The study analysed data from the New York City administrative data combined with the SASS survey (1999–2001, 2003–2005, and 2007–2009) and the TFS. The data shows that there is little change in the number of new teachers recruited in the period 2004 to 2006 (when mentoring/induction programme was introduced). From 2007 onwards recruitment fell. There was also shift in the demographics of teachers during the induction period, suggesting that the induction programme maybe more effective for certain groups of teachers. For example, there were more Hispanic new teachers, while the number of White new teachers decreased, but the other demographics remained fairly constant. There was an increase in the number of new teachers with a Master's degree while those with just a Bachelor's decreased (but was still the majority) and there were also more new STEM teachers. Recruitment to suburban school increased, while that for rural schools decreased. More of the new teachers were serving a higher proportion of minority students. The induction period also saw an increase in recruitment at large schools while recruitment in small schools fell. The analysis used to estimate recruitment did not control or account for other confounding factors, e.g. economic and political changes that could have influenced the number of teachers going into teaching.

The other study was based on a survey of 278 teachers using a teacher recruitment questionnaire to compare recruitment strategies in rural and metropolitan areas **(Kane 2010).** A range of strategies was suggested to teachers (e.g. monetary incentives, alternative routes, marketing materials, re cruiting events and collegial networking). The questionnaire asked teachers which of the strategies they considered important. Financial incentives and marketing materials were not considered impor tant in new teachers' decisions to teach in rural or metropolitan areas. Mentoring programmes were deemed most important for both rural and metropolitan teachers, while alternative certification and partnership with neighbouring schools were least important for both rural and met teachers. Among these constructs, district mentoring programmes were deemed most important for both rural and metropolitan teachers. The evidence is rated low in quality as it is essentially based on teachers' self-report and intention.

Although Wood (2008) evaluated the Rodel initiative, the main focus of which was retention and training of new teachers in high poverty/high minority (Hispanic) schools, the study did not specifically address the issue of recruitment and retention. The Rodel initiative was a mentoring programme to provide training and support for new teachers in high poverty schools in Arizona. The rate of student teachers that have finished and have contracts to teach in high-poverty schools is

96%, but we do not know what this is compared with. The project seeks students' perceptions of the programme and the factors influencing their perceptions of job retention. Data was collected through a survey questionnaire to 247 participants. 148 responded (response rate of 60%). The analysis compared responses of the mentors (Rodel Exemplary Teachers) and mentees (Rodel Grad uates). Without a counterfactual, it is not possible to say if the Rodel initiative did change student teachers' likelihood of staying on in teaching or if it resulted in better retention compared to the regular support received.

There is little evidence so far that accessibility to mentoring, induction and professional de velopment is attracting people into teaching. The stronger study (You 2012) shows a negative correlation between the introduction of the programme and teacher recruitment. The other two weaker studies were based on participants' perceptions of whether mentoring and induction support were important to them. So far there is no evaluation of the impact of the offer of professional support on teacher recruitment.

Other factors

We also looked at whether other factors, such as teachers' working conditions, school accountability systems, marketing and advertising and other non-financial incentives (e.g. accessibility to teaching resources) have been effective in recruiting teachers.

A number of studies have also suggested that working conditions matter in attracting teachers, especially to hard-to-staff or high need schools. These studies are generally of a lower weight in evidence because of the self-report nature of the research designs (e.g. surveys and interviews) with no comparators. **Sisouphanthong et al. (2020)** presented fictional scenarios, which considered a number of school, community, and student factors and their relationship to WTA (willingness to accept a teaching position). The study found that trainees required more salary to teach ethnic mi nority students or larger class sizes. On the other hand, trainees were willing to accept lower salaries if the teaching positions offered perks, such as further study and training opportunities, choice of school, lodging, or use of a motorbike. At the same time trainees also required higher salaries to move into non-teaching jobs, displaying a preference for the teaching profession. In other words, if the working conditions are favourable, monetary inducements are not necessary.

Kelly (2004) conducted a survey presenting a list of financial and non-financial factors that contrib ute to teacher recruitment and retention. Over 80% of the respondents indicated that tuition fee reimbursement was the most influential for them. They would be attracted to move if offered this incentive. Another financial benefits that would encourage them to apply to move is 100% health insurance premium. Non-financial incentives include accessibility to supplies and materials readily, positive learning environment, additional planning time, and a low student/ teacher ratio of eighteen to one or less. Respondents viewed all non-financial incentives in the form of support and practices as positive incentives. The study found that districts that infuse both financial and non-financial incentives had positive effects on recruitment and retention of teachers.

Kane (2010) surveyed 128 newly hired teachers within three years of teaching in rural and metro politan school districts in Kansas, US, to compare their perceptions of teacher recruitment practices with regards to the use of financial incentives, marketing materials and recruiting events, and col legial networking and alternative teaching options. While financial incentives were not considered important in new teachers' decisions to teach in rural or metropolitan areas, competitive salary and

competitive benefits were deemed most important to them. Teachers did not think marketing and advertising were important factors in their decision to teach. But teachers indicated that school visits, website information and virtual tours were the most important marketing materials.

While the Robert Noyce scholarship scheme (discussed in more detail in the Retention section) had little impact on retention of teachers in high need schools, the scholarship provided some relief for student teachers, who reported that the financial support meant that they did not have to work part-time while completing their teacher training **(Whitfield 2021).** They also reported less stress. This could have had an impact on teacher recruitment and opportunities for further education.

See et al.'s (2020) review of international research on teacher recruitment and retention provides some evidence (although not strong) that adding more accountability requirements had a negative impact on numbers of teachers recruited. For example, **Kraft et al. (2020)** compared the supply of teachers (measured by the number of licences granted) across different states. As states introduced high stakes teacher evaluation reforms at different times, the authors were able to compare the outcomes seven or more years prior (pre-reform) to a reform and three or more years after a reform (post-reform). They found that high-stakes evaluation reforms reduced the number of licenses granted in a state by 2.69 per 10,000 18-to-65-year-olds. The reforms also made it difficult for hard-to-staff schools to fill vacant positions. Consistent with See et al.'s review, **Guarino et al.'s (2006)** review also concluded that testing requirements for candidates had a negative impact on recruitment, and possibly selecting against ethnic minorities. **Stecher et al.'s (2018)** evaluation of the multi-million dollar teacher evaluation project suggests that the programme did not increase the recruitment of more effective teachers over time than before. However, there was a decline in the retention of ineffective teachers in most sites.

See and Gorard (2020) time-series analysis of government data and documentary analysis of teacher recruitment and retention in England suggests that government policies could also artifi cially limit the number of teachers that can be trained. For example, to raise the quality of teachers, the government has made admissions to teacher training more difficult with the introduction of the mandatory Numeracy and Literacy Skills test (although this is no longer mandatory). Candidates were allowed three re-sits and had to wait two years before they could take the test again. Some postgraduate trainees also need to take a Subject Knowledge Enhancement course (SKE) before commencing training. But places available for SKE are announced later in the recruitment cycle. This means that ITT providers are unable to make firm offers to these people before the end of the cycle (Universities UK 2014). Research in the US (Podolsky et al. 2016; Levin and Quinn 2003) found that late hiring had a detrimental effect on candidates' decisions to accept job offers. By the time offers are made these qualified candidates may have accepted job offers or training positions elsewhere. There were also caps on the number of trainees training providers can recruit. All these have the effect of restricting number of teachers that can be recruited.

In terms of recruitment of male teachers, **Warren's (2008)** study of factors influencing the recruitment and retention of male teachers suggests that have male role models growing up, opportunities to coach sport could make teaching appealing to men. On the other hand, society's gendered expectations, perceived low salaries and discipline issues were seen as things that might make teaching a less popular career choice for men. Interview data revealed several themes around teaching-experiences that could be especially relevant to men: feeling disrespected and underap preciated, not valuing the shorter job hours, and fearing accusations of impropriety. This study was rated 0* because of the lack of comparators, e.g. with other professions, the self-report nature of the questionnaire (e.g. tendency to provide socially desirable answers (since the questionnaire was administered and collected by school personnel) and the low response rate. The interviews

conducted with only four teachers, and the questions were often leading. The author admits that participants had difficulty answering some questions, indicating that the protocol needed further refinement.

In summary, accountability systems, such as testing, teacher evaluations have a negative impact on teacher supply by selecting out ineffective teachers, but they do not necessarily improve the overall quality of the teaching pool. The evidence in this area is not strong. Robust evaluations in this area is challenging as demonstrated by the Gates Foundation study.

2.2 Retention

Strategies to promote retention largely fall under the following:

- Monetary incentives (e.g., the use of performance-pay incentives, salary compensation, bursaries and scholarships)
- Mentoring, induction and professional development
- Alternative routes into teaching
- Leadership support and general working environment
- Accountability

We discuss each of these strategies, the strength of the evidence and the results (effects) for teach ers in general. We then identify those that are relevant to the special groups (male primary teachers, shortage subject teachers and minority ethnic teachers to see if there are particular strategies that work best in retaining these teachers. Where studies are reported in more than one outlets by the same authors although maybe in different order, we report as one study and select the one that is most complete. Because of the large number of studies, only those rated 2* and above are discussed in detail.

Evidence on the use of monetary incentives for retention

Of the 203 studies, on teacher retention, 55 concern the use of some form of monetary induce ments. The stronger studies (rated 2*/3*) using experimental/quasi-experimental design or large scale longitudinal administrative data with good controls for confounding factors suggest mixed results.

Table 2.5: Monetary incentives and teacher retention (n = 55)

Strength of evidence	Positive outcome (nÿ=ÿ12)	Unclear outcome/Mixed (nÿ=ÿ31)	Negative or neutral outcome (nÿ=ÿ12)
3*		• Berlinski & Ramos 2020 • Gilpin 2011 • Hill & Jones 2020 • Ryu & Jinnai 2021	• Fryer 2011 (RCT)
2*	• Good & Sass 2018 • Henry, Bastian & Adrienne 2012 • Sims & Benhenda 2022 • You 2012	• Booker & Glazerman 2009 • Choi 2015 • Dee & Wyckoff 2013 (Adnot, Dee & Wyckoff 2017) • Defeo, Hirschberg & Hill 2018 • Falch 2010, 2011, 2017 • Feng & Sass 2015, 2018 • Fitzgerald 1986 • Fulbeck 2011, 2014 • Glazerman & Seifullah 2012 • Glazerman et al. 2013 • Hahs-Vaughn & Scherff 2008 • Hendricks 2014 • Jacobson 1988 • Jones 2013 • Koedel & Xiang 2017 • Murnane & Olsen 1990 • Rosen 2013 • Shifrer, Turley & Heard 2017 • Smith 2014 • Springer et al. 2010a • Springer, Swain & Rodriquez 2016 • Van den Borre 2021	• Attebury & Lacour 2020 • Clotfelter et al. 2007, 2008 • Hough & Loeb 2013 • Leaver et al. 2021 • Steele et al. 2009, 2010
1*	• Barnett & Hudgens 2014 • Bond 2001 • Rothstein 2015 • Springer & Taylor 2016 • Stinebrickner 1998 • Zhang 2006	• Achinstein, Distributors & Speiglman 2004 • Hancock 2008 • Strong 2005	• Colson & Satterfield 2018 • Fowler 2003 • Goldhaber, Destler & Player 2010 • Wells 2011
0*	•Bridges et al. 2011 • Coates 2009 • Scott et al. 2006	• Bobronnikov et al. 2013	• Sykora 2010 • Whitfield 2021

Performance pay incentives

The most robust study using randomised control design (Fryer 2011) shows that financial incentives have no effect on retention. **Fryer** evaluated a teacher performance pay incentive where partici pating schools were given a lump sum on $3000 either for a subset of teachers with the highest

value-added or for a group of teachers. 396 high-need public elementary, middle, and high schools took part. Of these schools, 233 were randomly assigned to the intervention group and 163 to the comparison group. Effects of the bonus program were estimated by comparing the outcomes in schools that were offered participation in the program--even if they ultimately declined to par ticipate--with the outcomes in schools that were not offered the opportunity to participate using intention-to-treat analysis. The study found that the teacher performance bonus had no effect on teacher retention. Overall (K-8) teachers were 0.1% more likely to stay in NYC school district, less likely to stay in the same school and took 0.5% more absences. The author suggested that such incentives did not have the impact it did compared to developing countries either because the incentives were not large enough or the incentive scheme was too complex. Although it was a cluster RCT, some schools declined participation and to make up the number schools on the waiting-list were included. 15% of those randomized did not participate. This has reduced the strength of the evidence somewhat.

The other 3* rated studies using robust quasi-experimental designs, e.g., regression discontinuity (Berlinski & Ramos 2020; Hill & Jones 2020; Ryu & Jinnai 2021) found mixed effects. **Berlinski & Ramos (2020)** evaluated a merit pay incentive that rewards excellence in teaching in Chile. Teachers who are qualified for the incentive receive a 6% annual wage increase for up to 10 years and an award that publicly recognizes their excellence. This study uses a regression discontinuity design to identify the causal effect of the incentive. The incentive did not improve retention in the profes sion, but increases mobility of talented teachers across schools. The study follows a large sample of over 12,000 teachers over five years using administrative data on actual attrition and retention (as opposed to expression of intention).

Hill & Jones (2020) also found negative impact of performance pay on teacher retention (defined as teacher staying on in the same school). The study conducted in North Carolina compared retention rates of teachers in school districts that had performance pay before and after the incentive was introduced using a difference-in-difference approach to analyse data from 4,930 public high school teachers who were observed over a two-and-a-half year period. Teachers were paid a bonus of $12,000 a year based on their student performance. The authors also reported a gender effect with male teachers more likely to stay than female teachers in schools that offer the incentive.

In another evaluation of performance pay incentive, **Ryu & Jinnai (2021)** also reported mixed re sults. The study evaluates the group-based incentive scheme for teachers in North Carolina where all teachers in a school could receive a maximum bonus of $1,500 per person a year based on the average student achievement/growth within the school. The results show that a positive associ ation between bonus incentive and retention, but the “effects” of the group-based performance pay depend on the base salary and experience/qualifications of the individual teachers. Teachers with higher salaries who received group-based bonuses are more likely to leave than teachers with lower salaries to leave. A 1% increase in salary increases the likelihood of turnover by 1%. If teachers’ salaries are related to their qualifications and experience, the results suggest that the group-based incentive increases the turnover of overqualified and underqualified teachers. The relationship between monetary incentives and teacher turnover is, therefore, U-shaped rather than linear. Although highly qualified teachers are more likely to leave probably because they feel that they should get a higher bonus than less qualified teachers, and also because they believe they could find better options outside teaching, there was a reduction in moving across schools for those receiving the bonus. This is a large study, which analysed panel data of individual teachers in North Carolina over six years.

Springer et al. (2010a) also evaluated a similar performance pay incentive scheme, known as D.A.T.E. (District Awards for Teaching Excellence) 10 years earlier although it is not clear if this was the same incentive programme described by Ryu & Jinnai as they did not refer to the scheme by name. They also reported a U-shaped relationship between receipt of the incentive and teacher turnover. Among teachers who did not receive the award, the probability of turnover increased over the period while it fell sharply among teachers who received the award. However, for district-wide plans, awards greater than $100 were associated with a significant decrease in the probability of teacher turnover but awards in excess of $1,500, and $2,500 were not. Teacher turnover increased for districts with relatively small proposed maximum awards, and decreased as the proposed max imum award amount increased, until the maximum award exceeded roughly $6,000. This is a 2* study because comparing teachers who were eligible for D.A.T.E. with those who were ineligible is not a fair comparison as the factors that exclude them for eligibility may be relevant to teacher turnover. However, looking at the size of the award maybe a better comparison.

Springer, Swain & Rodriquez's (2016) evaluation of the US$5,000 retention bonus program for effective teachers in Tennessee's Priority Schools (high poverty, high minority schools) showed mixed results. The bonus incentive did not increase the retention of Level 5 (Diploma in Education & Training) teachers, but increased the retention of teachers in tested subjects and grades. This was a quasi-experimental study using a regression discontinuity design exploiting the sharp cutoff in a teacher's overall evaluation rating that determines eligibility for the retention bonus in participat ing schools. Nationally administrative data supplemented by county-level economic data and data from the TVAAS and Tennessee's online teacher evaluation platform, CODE (contains value-added estimates for teachers) were utilised for the analysis. The sample included all teachers working in Priority Schools in Tennessee during the 2012– 2013 school year. Of the 82 eligible schools 56 of them employing 2,005 teachers elected to participate.

Shifrer, Turley & Heard (2017) looked at whether actual receipt and amount of performance pay award in an urban school district as opposed to eligibility made a difference to teachers' decision to leave or stay. They also reported a U-shaped pattern where incentive awards beyond a certain amount had no effect on retention. Using the difference between a large and a small award as the cut-off threshold, they conducted a regression discontinuity analysis (a natural experiment), using census data of 12,000 teachers although they focused only on 3,363 teachers. Teachers in the top quartile of value-added scores were rewarded with a large award and teachers with a value-added score in the second quartile a small award. They analysed the amount of award rather than eligibility. Their analysis showed that likelihood of retention was slightly higher for teachers who received a small award rather than no award. However, this study found that teachers who received a large award were less likely than teachers who received a small award to be retained in the district. Per haps teachers in receipt of a large award are high performing teachers who can easily find better paid jobs elsewhere.

Another performance incentive scheme in the US is IMPACT, a teacher evaluation system where teachers are assigned a performance score based on classroom observations, student achievement, and their contributions to the school. Based on this score, teachers are rated: Highly Effective, Ef fective, Minimally Effective, or Ineffective. Highly Effective teachers receive sizeable increases in compensation, Minimally Effective teachers are scheduled for dismissal if they do not improve within a year, and Ineffective teachers are immediately dismissed. **Dee & Wyckoff (2013)** used a regression discontinuity design to compare the retention of 4000 low-performing teachers whose ratings placed them near the threshold that implied a strong dismissal threat. The study also compared outcomes among c. 2000 teachers who had IMPACT scores just above and just below the threshold between Effective and Highly Effective. **The** results show that the incentive had a positive

on retaining high-performing teachers but not low-performing teachers, which is a good thing. This study was rated 2* because no information was given about attrition and baseline equivalence. Therefore, it is difficult to attribute any effects on retention to the intervention alone as differences in retention could be related to teacher characteristics at baseline. This study is also reported in **Adnot, Dee & Wyckoff (2017).**

Booker & Glazerman (2009) examined the Missouri Career Ladder (CL) Program, aimed at helping small, rural districts retain teachers by offering opportunities for teachers to earn extra pay for extra work. The monetary incentive is also based on teacher performance. Under the programme teachers must agree to spend a certain amount of time outside their contracted hours on certain responsibilities, which must be academic in nature and contribute to improving the programme or services to students, or on professional development. Teachers are observed and evaluated and they move up the career ladder in 3 stages. For each stage teachers receive more supplementary pay up to £1,500 for Stage 1, £3000 for Stage 2 and £5000 for Stage 3. The study compared the retention rates of CL teachers in CL districts with similar teachers in non-CL districts. Leavers are defined as teachers who move to a different school district or are no longer on the Missouri emplo This means that unobserved determinants of teacher mobility may not be accounted for. To address this, the researchers used statistical controls for measured variables and instrumental variables for unmeasured factors and propensity score matching. The results show the incentive had no effect on retention within district, but positive effect on mid-career teachers. These teachers are half as likely to move compared to their nonCL peers. The incentive also had a big effect on the retention younger teachers in the profession, but not in the district. The study is rated 2* because while it is able to control for observable factors between districts that opted for the CL programme and those that did not, it is unable to control for unobservables. The programme also allows teachers autonomy to design their work plan. It is therefore difficult to say if it is the monetary incentive or the greater autonomy that drives the effect.

Glazerman & Seifullah (2012) evaluated the Chicago Teacher Advancement Program (TAP), a teacher development and compensation programme. Under this programme, teachers were given performance incentives and the opportunity to assume leadership roles. As the programme was staggered across all schools, schools that were randomly assigned to implement later served as the comparison group. Teacher retention was measured by comparing the retention of a matched sample of 2,600 teachers in Chicago TAP and conventional public schools. This, thus, reduced the strength of evidence to 2* because although schools were matched on pre-programme measures, such as school size, teacher retention, student achievement, ethnic composition and poverty level and truancy rates, it is possible that there were other differences between the two types of schools that were not accounted for. These differences could have influenced teacher retention rates. The study reported mixed results with positive effect on the first cohort of teachers, but not subsequent cohorts. Although there was some evidence that the programme was effective in retaining less ex perienced teachers, there was no consistent pattern. Also, because of the multi-component nature of the intervention, it is hard to attribute any effect solely on the monetary incentive alone.

The Minnesota Quality Compensation program (or Q Comp) is another performance-based incen tive which pays teachers based on their performance, measured in terms of student achievement, leadership, professional knowledge and skills, and instructional behaviour. Using a difference-in-dif ference-in-difference design, **Choi (2015)** compared the retention rates of teachers before imple mentation and during implementation as well as with non-Q Comp schools. Retention is taken to be the school-level retention. The results were mixed. Overall, Q Comp reduced school-level turnover, but the effects were only seen in the 5th year. No effects were observed in the first 4 years. As with the Chicago TAP programme (Glazerman & Seifullah 2012), Q Comp was effective in retaining expeÿ

rienced teachers, but only after 5 years. There analyses were not clearly explained, and a number of assumptions were made, for example, that the characteristics of the schools associated with the salary schedules did not change over the 5 years. Any effect in the 5th year could potentially be due to characteristics of the schools rather than the incentive. Hence, the study was rated 2* for strength of evidence.

Jones (2013), also rated 2*, used an instrumental variable approach to estimate teacher turnover and work effort under performance pay incentives for maths and English teachers employing na tionally representative datasets. Teachers in performance pay districts earned a salary that was $2,825 less than their counterparts in non-performance pay districts and the performance pay may be used to compensate for the difference. Data from TFS (Teacher Follow Up Survey), showed that performance pay was not considered as the most important reason for teachers' decision to leave. Because the sample consisted of only 64 teachers, caution is urged in interpreting this result. Since the performance pay incentives are rewarded at the school level, this finding may also suggest that other teachers are free-riding on the efforts of Math and English teachers. The study suggests that although there is some evidence on retention it is not clear. The author cautioned against gener alising performance pay incentive as implementation can vary between districts. Performance pay is more effective in reducing turnover when it is implemented on a school level than on an individ ual level. Male teachers also respond more positively than female teachers to performance pay. In states, such as Florida, which restricts state performance pay funding to individual teachers, teacher turnover increased.

Some may argue that performance pay may not be so effective in high-income countries where money is not a major concern. A study conducted in six districts in Rwanda **(Leaver et al. 2021)** found that despite the condition to remain in teaching the following year, receipt of higher pay did not encourage teachers to stay on in teaching. This was an RCT where applicants for teaching jobs were assigned to either advertised fixed wage contract (FW) or advertised performance for pay (P4P) contract depending on the labour market in which they resided. All recruits received a signing bonus to minimise demoralisation due to randomisation outcome. In addition, all new recruits were offered an end-of-year retention bonus of FRw80,000 on top of their school-randomized P4P or FW contract. This was to mitigate against disappointment where individuals who applied under one contract were offered another contract. The findings show that teachers working under P4P were no more likely to quit during the two years of the study than teachers working under F

In summary, performance pay does not work in retaining teachers. The stronger study, in terms of research design, suggest mixed results, e.g., for some groups only, or up to a certain amount beyond which the incentive loses it effect.

Wage differentials

Other studies have looked specifically at whether higher salaries would encourage retention. To determine whether it was the purported unattractive salary of teachers that prompted teachers to leave the profession, **Gilpin (2011)** followed the careers of 5,000 public school teachers in U.S. between over 5 years, and compared the wage differentials between teaching and non-teaching occupations of teachers who left for other occupations. The result suggests that wage differentials only matter for inexperienced teachers with less than six years of experience. Compared to wages, what matter most to both experienced and inexperienced teachers is the working environment. To overcome selection bias, i.e., unobservable characteristics that potentially cause spurious correla tion between the decision to exit teaching and wages, the authors controlled those unobserva

that are correlated between wages and the teachers' propensities to exit teaching. This is not ideal, so the strength of evidence is reduced to 3*.

Hough & Loeb (2013) used a difference-in-difference approach to compare the recruitment and re tention of 1,611 applicants in the San Francisco Unified School District which awards higher salaries/ bonuses to teachers teaching shortage subjects and in schools with a high proportion of poor and ethnic minority students with teachers in different school districts before and after the introduction of the policy. These teachers were also given a retention bonus if they stayed on after four years and more after the eight years. The results showed an increase in the proportion of shortage subject teachers in hard-to-staff areas from 27% to 37%. There was also an increase in the proportion of new hires in the targeted group (those that received the incentives) from 49% to 54%. However, there was no difference in the retention rates of targeted and non-targeted teachers. Over 90% of teachers stayed on in the district and over 85% stayed in their school, in both groups. This com parison is difficult because of the economic downturn in 2008 when unemployment was high. Such retention bonus might be more effective in a more competitive labour market.

Smith (2014) used multiple regression analysis to estimate the relative effect of a range of factors (student, teacher and organisational characteristics) on K-12 teacher retention in Texas, US. The study found that across all districts higher salaries were associated with only marginal increase in retention. The results are rather mixed. In urban areas, large class sizes are associated with lower retention whereas in suburban areas, it was pupil funding and classroom resources that mattered. Surprisingly, having more economically disadvantaged students in urban districts was associated with higher teacher retention. The factors influencing retention also varied across districts. In some districts, having a higher proportion of administrators lowered retention. Having more non-White teachers increased retention in urban districts, but not in rural districts. In general, schools with more experienced teachers, higher pupil population, fewer male teachers and better academic performance had better retention. All this suggests that it is not salaries per se, but the working conditions of the school that mattered in keeping teachers in the school. But few of these factors can be easily manipulated to increase retention. While the findings are interesting, the evidence is not strong as it is a correlational study, and there is no information on how retention data was collected or measured. Hence, it is rated only 2*.

You (2012) examined the retention and turnover of teachers in the US using multiple cycles of the School and Staffing Survey (SASS)/the Teacher Follow-up Survey (TFS), NYC administrative data. These sources of data are analysed with regression modelling to determine the factors influencing teacher retention and turnover. The results show that a $1,000 increase in first-year new teachers' school- related annual earnings was related to 1% greater retention of new teachers, but $1000 greater outside/non-school income was related to 0.5% less retention. This suggests that a higher pay is necessary to keep teachers in school and in teaching, and higher pay in jobs outside teaching can increase the likelihood of teachers leaving.

Hendricks (2014), analysed the effect of raising teachers' pay to a level that would compensate for the higher salary they might receive in other occupations to see if it would attract a larger pool of higher quality teachers. The sample contained 165 districts and 55,440 district-by-year-by-experi ence observations of turnover rates, but only data for 2,640 district-by-year-by-experience obser vations were analysed. Using difference-in-difference-in-difference-in-difference (4-difference) regression design, the study compared turnover rates of teachers across experience in districts that increase or decrease pay of teachers with different years of experience and comparing this difference-in-difference in other districts that did not impose such changes in pay. Using current salary schedules the researcher estimated the future pay of teachers and the actual future pay

that teachers will receive if they stayed in the district. Turnover is defined as the percentage of teachers who stayed in the same district in two years, and so does not distinguish between those who leave for another district and those who leave the profession. The results showed that teachers' pay is negatively correlated with teacher turnover, and higher salary is effective in only keeping less experienced teachers. Higher salary makes no difference to the retention of more experienced teachers. Paying shortage subject teachers higher salaries also did not encourage them to stay. The results showed that an overall pay increase for all teachers had a better impact. Because the study compared districts which award teachers for years of experience with districts that do not, this means that comparisons are not made with similar teachers. Districts differ in terms of labour and market outcomes. Districts that award pay increases by years of experience may already be experiencing high attrition of more senior teachers. Hence, the study is not rated higher than 2*.

Bueno & Sass (2018) also found that differential pay did not increase the number of maths or sci ence teachers nor did it encourage people to switch to maths or science. The study assessed the im pact of the Georgia's bonus system (a monetary compensation) on the recruitment and retention of maths and science teachers. The bonus system increased the pay of new math and science teachers to make it equal to that of a teacher with six years of experience. A difference-in-differences model was used to estimate the impact of the differential pay programme on the likelihood of becoming a teacher by comparing the difference between graduates with majors in maths and science and other education majors in the change before and after the programme period.

Sims & Benhenda (2022) evaluates a similar policy, known as the Retention Payment (RP), which was introduced in England in 2019/2020. The policy offers maths and physics teachers a wage uplift of 8% (equivalent to £2000 per year) for eligible teachers. These are teachers with a degree or teaching qualification in maths or physics and who teach maths or physics in a state school in one of the 42 targeted local authorities (these are areas with high levels of disadvantage). This excludes all teachers in London. Because the policy was introduced at a time when the Teacher Student Loan Reimbursement (TSLR) scheme was in operation, the authors excluded the 25 local authorities where TSLT operate. TSLR is a scheme where teachers' student loans (loans for their undergraduate degree) are fully reimbursed. At the same time there was another policy in place, the Phased Maths Bursary (PMB) policy, where maths teachers in receipt of the bursary are paid in instalments in their third and fifth year of teaching. To avoid contamination of the effect from this policy, the authors excluded all PMB eligible cohorts. Analysis was performed on five trainee cohorts that qualified between 2014/15 and 2018/19 (N = 2,111) using data was taken from the School Workforce Census (SWC). Teachers who were in the SWC data in 2018 but not in 2019/20 would be assumed to have left state teaching. A triple-difference approach was used to compare retention of eligible teachers when the policy was introduced relative to changes in retention among teachers in eligible subjects but in ineligible areas and teachers who are in eligible areas but in ineligible subjec This makes it possible to assess what would have happened in the absence of the RP incentive. Across the three comparisons, the results indicate that that eligibility for RP reduced the likelihood of attrition by 23%. The results echo those of Feng & Sass (2018) and Bueno & Sass 2018). However, unlike previous work, the policy was new and no long-term effect could be ascertained. There is, therefore, no way of knowing if the reduction in attrition is maintained when the teachers are no longer eligible for the incentive payment.

Murnane & Olsen's (1990), on the other hand, suggest that a uniform salary scale may not work in retaining teachers in fields such as chemistry and physics that are in demand in business and industry. The study is based on a longitudinal dataset that provides information on the career his tories of 13,890 North Carolina teachers. Regression models were developed using a number of key explanatory variables to predict the length of stay in teaching. Results of the analysis showed

that higher salaries have an important impact on length of stay in teaching. A $1,000 increase in each step of the salary scale (measured in 1987 US Dollars) is associated with an increase in median duration of two to three years for a teacher starting her career in 1970. They concluded that for financial compensation to be effective it has to be large enough to cover the differential salary that they would get if they had not gone into teaching.

One reason for this conflicting result could be the size of the compensation. **Defeo, Hirshberg & Hill (2018)** analysed data from twelve Alaskan school communities in three districts to determine the minimum salary needed to attract and retain highly qualified teachers in rural communities in Alaska, and how much more is needed to get teachers to teach in difficult-to-staff schools. They estimated that the differential to compensate for factors that might make a community or school more or less attractive ranged from 0.85 to 2.01, with remote rural communities having higher dif ferentials. The differentials include costs of living among other working and living conditions that affect teachers' staying or leaving communities. Higher salaries are therefore needed to attract more qualified teachers where the characteristics of the school and their salary predict less than the national standard. So it might be the case that to attract maths and science graduates (who would command higher salaries elsewhere), the salary differential would have to be big enough to compensate for the difference they would otherwise get. It has to be mentioned that the amount of the bonus is determined by the salary differences on the state salary schedule, not a teacher's actual salary, and some districts are already paying pay teachers more than what is stipulated in the state salary schedule. This suggests that even with the compensatory bonus teachers' salaries could be the same or even below what they are already getting. **Boyd et al. (2003)** estimated that an addition $5,790 would be needed to induce teachers to teach in a classroom with a 50% increase in the proportion of minority students but only an additional $706 to induce them to teach in a classroom with a 50 percentage point increase in the proportion of FRL-eligible students.

Hahs-Vaughn & Scherff (2008), used the 1999–2000 Schools and Staffing Survey (SASS) and the Teacher Follow-Up Survey to examine the individual and school characteristics associated with retention. They suggested that salary was the only factor with a statistically significant positive correlation with beginning English language and language arts teacher's odds of leaving, but only for those earning under $20,000. They were over 8 times more likely to leave the profession than to staying on. This is a weaker study (2*), because of the correlational design, which compares the retention rates of teachers with high and low salary. The analysis can only tell us that the correlation, but not the direction of causation. Such designs cannot control for unobservable factors. Also the use of significance test is inappropriate for non-random sample. But the large administrative sample and the use of actual retention/attrition figures provide some robust evidence.

Falch (2010, 2011, 2017) also took advantage of a natural experiment to estimate the causal effect of wage changes on teachers' turnover decisions. The study used data from 1993–94 to 2002–03 when wages were set centrally, and schools with a high degree of teacher vacancies got a wage premium of about 10 percent during the period. These are known as experimental schools. The experiment exploits that several schools switched status during the empirical period in accordance with their level of vacancies. To estimate the wage-effect on likelihood of quitting, Falch used a difference-in-difference approach to compare the quit rate when the wage premium was introduced with the quit rate when the wage premium was removed. The study found that the wage premium reduces the probability of voluntary quits, but only in the short term since the intervention was short-term and teachers only received the premium for only a limited time period. Overall, there is no impact of retention for younger teachers, and female teachers are less responsive to wage increases than older and male teachers. Rated 2*

A recent study analysed the retention decision of early career lower secondary teachers from 31 countries using data from TALIS 2018 **(Van den Borre et al. 2021).** Again, the effect of salary on retention is not clear-cut. The analysis shows that teachers' salary was positively correlated with their reported intention to stay in teaching, but only if they perceived it as adequate. This is rated 2* because of the correlational design and the self-report of intention to stay, rather than actual reten tion. Teachers who expressed desire to leave do not always leave. Previous research suggests that on average, the intention to leave or stay in the profession is a good predictor for the actual decision (Cho & Lewis, 2012; Gersten et al., 2001). The very large and diverse sample of 11 613 early-career teachers in 3998 schools across 31 countries adds to the warrant for the MLM/ regression analysis, but response rate was only 62% and not all factors were considered in the analyses.

Jacobson (1988) analysed the effect of distribution of salary increments among staff and the sub sequent attractiveness of its salary offerings, vis-a-vis the relative attractiveness of neighbouring districts' salary offerings on teacher recruitment and retention. The relative attractiveness of the district's salaries is determined by the rank-ordering of each district's mean entry- level, mid-career and senior salary, and the difference in salary rankings over the 10-year period from 1974 to 1984. The relationships between changes in district salary rankings and teacher recruitment and reten tion were then examined through zero-order and partial correlations, and through series of paired comparisons. The results showed positive correlation between teacher retention and changes in rankings for all mid-career teachers except males in rural districts. Paired comparisons indicated that the relative attractiveness of salaries paid to mid-career teachers were effective in retaining teachers in wealthier urban region. On the other hand, highest retention rates in poorer, rural region were found in districts whose regional salary rankings had remained relatively unchanged. This was rated 2* because of the correlational design, which is unable to control for other confounding factors such as the economic and political differences in the districts.

In summary, higher wages for shortage subject teachers or teachers in hard-to-staff areas also showed mixed results, e.g., they are effective for inexperienced teachers, or those earning under a certain amount, effective for shortage subjects, but only if the incentive is perceived as adequate, or only in the short term. It also varies across districts. There is also tentative evidence that higher wages work in retaining teachers in wealthier regions, but not in high poverty areas. There is no consistent pattern.

Conditional pay incentives

Several studies in the US that evaluated the impact of conditional monetary incentives suggest a positive impact on retention, but only when the incentives are available. Once the incentives are withdrawn, retention retained to pre-incentive period, suggesting no long-term effect.

For example, **Clotfelter et al. (2007, 2008)** evaluated the North Carolina bonus incentive scheme aimed at keeping qualified teachers teaching targeted subjects in high poverty schools or academi cally challenging schools. The scheme was in the form of an annual bonus of $1,800. Teachers were eligible only if they taught in an eligible school, and they continued to receive the bonus as long as they stayed in the same school and teach the same subjects. Using a difference-in-difference-in-dif ference approach, the authors compared hazard rates before and after the implementation of the bonus programme; eligible and ineligible teachers in the same schools; and teachers across eligible schools and those in schools that have narrowly missed out based. The third difference-in-difference is a hybrid of a randomized experiment and a regression discontinuity design. Experimental schools were those with over 80% percent of students in a school who eligible for subsidi

over 50% of pupils who failed maths (algebra) and science (biology) across the 4 years (2 years prior to the programme and the first 2 years of the programme). Control schools were those which were near the threshold of eligibility and hence missed out on the bonus. The results showed that teachers receiving bonus were 15% less likely to leave at the end of the school year compared to other teachers in the same school. Including the school fixed effects in the regression the effect was negative. Overall, the results suggest that the bonus incentive did not reduce turnover rates. However, it is not clear whether this is because the $1,800 bonus is not large enough or is it a flaw in the design and implementation of the program because not all teachers who were eligible actually received the bonus. Survey responses from principals and teachers indicated that and the $1800 bonus alone is not enough to retain teachers. They suggested that administrative support, improving school conditions and facilitating professional development may be better options.

Steele et al. (2010) evaluated the Governor's Teaching Fellowship (GTF) scheme, involving a $20,000 incentive to attract and retain new teachers to low-performing schools for four years. Teachers had to repay $5,000 for each year that they did not meet the commitment. An instrumental variable design was used, based on 718 GTF teachers, excluding those who could not be tracked, were missing data, or not enrolled at recognised institutions. GTF recipients were not randomly selected, and so may have had a predisposition to teach in low-performing schools. Twice as many teachers were enrolled during GTF as in the years before and after, and 28% more taught in low performing schools. It seemed that money was an attractor. However, there was no effect on reten tion rates (75% over four years) between recipient and non-recipients, despite the penalty clause.

One well-known conditional incentive scheme that has been championed by the former US Presi dent Barack Obama as a model for teacher compensation reform is the Denver ProComp incentive programme. This scheme includes a combination 10 financial incentives and is targeted at retaining teachers in high deprivation areas. To receive salary increases and/or annual incentives, teachers had to satisfy a number of conditions, such as agreeing to teach in a hard-to-staff (HTS) schools or HTS subjects and work at a high-achieving school. Using interrupted time-series regression and differ ence-in-difference regression model, **Fulbeck (2011)** compared the retention rates of teachers before and after ProComp and the change in retention rate from year to year. Teacher retention is measured as the percentage of teachers retained from one year to the next. Analysis for all schools show that average retention rate after ProComp rose. But the increase in retention is more likely a function of the increase in the number of new teachers and HTS. Retention is also higher in high-poverty schools where teachers are eligible to receive financial incentive to stay. Time-series, however, shows that average retention rate among ProComp schools did not increase until two years after full implemen tation, and this coincided with the economic recession in 2008, the year when HTS incentive came in. In 2008/09 there was also a change in the contract, which stipulates that teachers must work in a HTS school for at least a day in the month to be eligible for the HTS incentive. However, **Attebury & Lacour's (2020) evaluation,** using a comparative time-series analysis that compares the recruitment and retention of public school teachers before and after ProComp relative to other districts over a 16 year period, showed that retention over the period had declined as i

Despite the positive effects, the findings are inconclusive as the models did not take into account other factors, such as selection bias, that is, factors that may drive ProComp participation, the in troduction of the HTS incentive and *Teach for America,* that happened at around the same time, all these have potential to bias the estimates. So it is difficult to tell whether ProComp is effective or not. Other studies found that incentives from $1800 to $5000 had no effects on teacher incentives (Clotfelter, Glennie, Ladd, & Vigdor, 2008; Steele, Murnane & Willett, 2009), suggesting that teach ers do not respond to financial incentives (Milanowski et al., 2009). What these studies show is that it is not the incentives alone, but the conditions attached to them that had an effect on retention.

In a later paper, **Fulbeck (2014)** analysed the effect of ProComp on teacher mobility in high poverty areas. Using multinomial hierarchical regression modelling the author estimated the risk of teach ers moving within district and moving out of the district. The results show that although ProComp reduces the odds of teachers leaving the district, it does not reduce their risk of moving out of school within the district. ProComp is also found to be not effective in high poverty schools. In other words, ProComp does not compensate for poor working conditions, school leadership and climate. This is consistent with the findings of other studies (e.g. Clotfelter et al. 2008; Steele et al. 2009; Milanowski 2009). This study was rated 2* because ProComp and non-ProCom teachers were not randomly allocated, so it is possible that there could be systematic differences between teachers and between those who taught in high-poverty schools and low-poverty schools. For example, ProComp teachers had to satisfy a number of conditions and agree to teach in HTS schools or HTS subjects and work in high achieving schools. Those who left could be lower-performing teachers who are likely to leave due to unsatisfactory evaluation.

Feng & Sass (2015, 2018) evaluated the effects of the Florida Critical Shortage Programme, which is aimed at increasing the recruitment and retention of shortage subject teachers (e.g., special education, maths and science teachers). One component of the programme was a £10,000 loan to help beginning teachers pay off their student loan on condition that they stayed to teach shortage subjects. A second component was a one-off retention bonus for teachers teaching certain subjects and grade levels on condition that they continue to teach the shortage subject the following year and have had favourable performance appraisal. This is a natural quasi-experiment study that uses difference-in-difference and instrumental variable approaches, the to compare the probability of attrition and recruitment of eligible and non-eligible teachers for each shortage subject. The effect of loan forgiveness was estimated by comparing changes in retention of eligible teachers when a subject is designated as a shortage subject with those of non-eligible teachers over time. But this was for retention in Florida but not in the school they are currently teaching. It is unable to test the effect of retaining teachers in the school they are currently teaching. This means that in practice there may be a lot of movement in and out of schools that are not captured in the analysis. Loan forgiveness was found to encourage retention of beginning teachers in teaching, but only when the payments were substantial (US$2,500). The effect disappeared when the funding was reduced. However, the com parison is with non-eligible teachers, and it is not clear if teachers have to apply for the incentive. If so, then those who have the intention to stay on and thus benefit from the incentive will be more likely to apply for it whereas those who have no intention of staying on will not apply since the condition is that they agree to stay and teach shortage subjects. Hence, this study was rated 2*.

Glazerman al. examined the impact of bonus $20,000 highest performing teachers for agreeing, which **et (2013)** offered Talent Transfer Initiative on teacher recruitment and retention

The incentive paid in instalments over a two-year period. Teachers who teach in schools which received lower-performing year were $10,000 participants included 154 teachers in the matched schools. The two-year school characteristics and randomised

to not, or across pairs changed their personnel between randomisation and the start year, the longer equivalent the beginning of the study. Both of the school

two at groups were filled, compared 44% the before. The results that while the vacancies no assigned to the scheme, 88% were in the comparison Retention after group. year was and 60% after (compared 51%) had a positive impact on teacher retention during the payment once stopped.

Fitzgerald's (1986) evaluation of priority location stipend also showed that the impact on retention was short-lived. The Priority Location Stipend is a monetary incentive programme to get teachers to work in high priority areas. Only after the first year of implementation was the differential retention rate significant. No differences were found in the following years. Survey of staff who left indicated that while they were appreciative of the incentives, they did not think the stipend was high enough. Their main concerns were the working conditions, discipline in school, management support and admin/teacher relations. Control teachers also indicated that they would be happy to work in the high priority areas if student discipline, working conditions and admin/teacher relations were im proved. Response rate to the survey was low, so the results can only reflect the views of those who responded. A lower evidence study **(Rothstein 2015)** also suggest that a bonus incentive has to be large enough to be effective in order to compensate for the threat of dismissal.

Rosen (2013) also evaluated whether districts that offer incentives had better recruitment and retention of teachers, in particular shortage subject field teachers, than comparable districts that do not offer incentives. It found no clear evidence that districts offering incentives had higher teacher retention, at least after the first year. The study utilised an Instrumental Variables Difference-in-Dif ferences model using data from the School and Staffing Survey from 1999/2000 to 2007/08 which contained data from 106,930 public school teachers in 6,540 public school districts. Because some districts were more likely to provide incentives, comparing districts that did and did not offer such incentives was likely to conflate the effects of such incentives with the effects of other characteris tics of the districts that may have an influence on teacher recruitment and retention, Rosen created a comparison group that is similar to the treatment group to indicate what would have happened in the districts that offered the incentives had they not have the incentives using an instrumental variable approach. But this does not overcome the problem that district that offer and did not offer incentives may have other difference that could influence recruitment and re

In summary, the effect of conditional incentives on teacher retention is also mixed. The stronger studies suggest either no effects, or effective only for teachers in low-poverty schools. In some instances, the incentive may encourage retention within school districts but not across schools, so there may still be a lot of movement in and out of schools. Other studies also suggest that although the incentives may encourage teachers to stay in high priority areas, the effect is only short term.

There is some suggestion it is not the financial incentives, but the conditions attached to them that had an effect on retention, and that monetary inducements alone cannot compensate for the poor working conditions, school leadership and school climate.

Other financial benefits

Another type of financial inducement is pension enhancement to encourage teachers to stay until their retirement. **Koedel & Xiang (2017)** examined one such scheme used in St Louis, Mississippi. The researchers used a six-year administrative panel data from the Missouri Department of Ele mentary and Secondary Education (DESE) covering the school years 1994–95 through 1999–2000 for the empirical analysis. Using a difference-in-difference model they compared the likelihood of eligible teachers (i.e., those retiring after June 1999) with those not eligible. The pension formula was implemented retroactively so that individuals who retired under the enhanced rules had the higher rate applied to all service years. This resulted in a 60% increase in pension wealth for the

eligible teachers. Enhanced pension is effective only in delaying the retirement of teachers who are a year close to retirement, but no retention effects were detected for other groups.

Evidence on mentoring/induction/professional development and teacher retention

One of the factors identified in previous studies as contributing to the early attrition of new teachers is the inadequate support and preparation (e.g., Darling-Hammond 2000; Ingersoll & May 2011; Achinstein, Ogawa & Speiglman (2004). As part of the strategy to help retain teachers many coun tries are turning to providing quality induction and mentoring programmes for new teachers and professional development for regular teachers in school. The idea is to help new teachers transition into classroom teaching and develop new skills among experience teachers. In England the govern ment has introduced the new Early Career Framework (ECF), the aim of which is to provide beginning teachers with early professional support, access to high quality professional training materials and curricula and mentoring.

While there is a large body of research that examined the “impact” of induction and mentoring on teacher retention, most are limited to single-group causal comparative analysis, correlating teachers’ participation in these programmes with their self-reported intention to stay in teaching (Jenkins 2012). Totterdale et al.’s (2008) systematic review of the role of mentors found no conclusive evi dence that mentoring supports the retention of early career teacher. Almost all the studies in the review were correlational (i.e., not causal in design). The report highlighted the need for more robust and reliable research in this area. Given the often complex or multi-faceted nature of induction mentoring programmes, it can sometimes be difficult to understand which of the mechanisms or ‘ingredients’ within them are likely to drive any impact on retention.

Table 2.6: Mentoring/induction/professional development or support and teacher retention (n = 72)

Strength of evidence	Positive (n = 31)	Mixed or unclear (n = 16)	Negative or neutral outcome (n =25)
3*			• Ault 2017 • Glazerman et al. 2010 • Helms-Lorenz et al. 2016
2*	• Donaldson & Johnson 2010 • Fuller 2003 • Gold 1987 • Latham & Vogt 2007 • Ronfeldt & McQueen 2017 • Scott 2008 • Speidel 2005 • Van Overschelde et al. 2017	• Allen & Sims 2017 • DeAngelis, Wall & Che (2013) • De Jong & Campoli 2018 • Glazerman & Seifullah 2012 • Ingersoll & Smith 2004 (also Smith & Ingersoll 2004) • Ingersoll & Strong 2011 • Weisbender 1989 • You 2012	• Hahs-Vaughn 2008

Strength of evidence	Positive (n = 31)	Mixed or unclear (n = 16)	Negative or neutral outcome (n =25)
1*	• Astrology 2013 • Anthony 2009 • Barnett & Hudgens 2014 • Cohen 2005 • Eberhard 2000 • Elmore 2003 • Grant 2003 • Helfeldt et al. 2015 • Henke, Chen & Geis 2000 • Kelley 2004 • Lindsay et al. 2021 • Lyons 2007 • McBride 2012 • Odell & Ferraro 1992 • Quartz 2003 • Spuhler & Zetler (1993,1994, 1995) • Zhang 2006	• Bemis 1999 • Cheng & Brown 1992 • Chou 2011 (also Hallam et al 2012) • Counts 2012 • Lawrason 2008 • Parker et al. 2009 • Strong 2005	• Beattie 2013 • Bowman 2007 • Croft 2015 • Gaikhorst et al. 2015 • Halcomb 2007 • Hancock 2008 • Hopkins 1996 • Humphrey et al. 2018 • Jones 2004 • Mordan 2012 • Reynolds et al. 2002 (also Reynolds & Wang 2005 • Robertson-Phillips 2010 • Van Zandt Allen 2013 • Wiggins 2010
0*	•Bridges et al. 2011 • Cheasty 2011 • Clamp (2011) • Harris-McIntyre 2014 • McGlamery & Edick 2004 • Wood 2008	• Cartisano 2010	• Alotto-Joseph 2014 • Ayorwoth 2008 • Benson-Jaja 2010 • Gilham 2008 • Hope 2001 • Portis-Woodson 2014 • Randall 2009

This new review found studies which considered the link between mentoring, induction and teacher development and teacher retention. Thirty of these reported positive effects on retention, and 26 found no effect. The strongest studies rated 3* using randomised controlled designs showed that mentoring and induction had no clear effect on the retention of teachers.

The largest study **(Glazerman et al. 2010)** involving 1,009 teachers in 418 schools found that the extra induction support for treatment teachers had no impact on teacher retention rates after each of the three years of follow-up. There was no impact on teacher retention within school, district or teaching profession for both one-year and two-year programmes over the first four years of the teachers' careers. This was a 3-year comprehensive teacher induction programme in Princeton, New Jersey (US) where schools were randomised within district by lottery to receive comprehensive in duction services or not. The mentoring programme consisted of a year-long curriculum for beginning teachers. Mentors also arranged opportunities for mentees to observe experienced teachers. In the second year monthly Teaching and Learning Communities were held where mentors and mentees met for peer support and to discuss aspects of classroom instruction. In the second year, beginning teachers also received between 35 and 42 hours of professional development.

The two smaller studies (Ault 2017) and Helms-Lorenz et al. (2016) found small positive but non-sig nificant results. **Helms-Lorenz et al. (2016)** evaluated an induction programme for beginning teachers in the Netherlands. The aim of the programme was to reduce teacher workload, provide professional development and support effective teaching classroom behaviour. 71 schools with 338 beginning secondary education teachers were randomly allocated to receive the induction arrangements or a business-as-usual control group. Because schools routinely provide beginning teachers extra support, control teachers also received some induction albeit only for a maximum of one year. Experimental teachers, on the other hand, followed the programme for 3 years under controlled condition arranged by the schools. Both groups were similar in background characteristics. The study showed no clear effect on teacher retention. The results showed that 14% of the control group and 12% of the experimental group had left (ES = +0.076) three years after the programme. Importantly, the study found that it was the lack of certification and the low teaching skills that most explained teachers leaving the profession.

An evaluation of a mentoring programme in Alaska **(Ault 2017),** also using a randomised controlled design reported a small, but non statistically significant effects (ES – + 0.16). The study was con ducted over four years where 556 early career teachers (ECTs) were randomly assigned to the Alaska Statewide Mentor Project (ASMP)ÿor Business-as-Usual groups. ASMP is a professional development initiative that supplies highly trained mentors to ECTs. Although retention of treatment group ECTs in their third year of teaching was higher than that of control group ECTs (80.5% compared to 76.6%), the study did not control for other factors that may have contributed to the higher retention The study also did not report attrition, so there is no way of knowing whether the missing cases may be skewed the results.

The majority of the 2* studies using weaker designs suggest that professional development and in duction/mentoring programmes may improve retention of teachers. However, it has to be mentioned that the majority of these studies did not have equivalent comparison groups. For these reasons, the evidence from these studies is considered weaker, rated 2* and below.

Scott (2008), for example, compared the retention rates of career education teachers who par ticipated in the Missouri Career Education Mentoring programme (CEM) with non-Career Education teachers and Career Education teachers who did not participate in the programme. Retention refers to teachers who returned to teaching the following year. Total number of students for the two cohorts is 226.The findings revealed that retention rates for the two cohorts of CEM programme participants are higher than non-Career Education teachers (served as baseline) and Career Educa tion teachers who did not participate in CEM. This is a weaker study as the comparison groups were not equal nor randomly allocated. Those who opted not to take part in the programme are likely to be different to those who volunteered.

A longitudinal, retrospective study using discrete-time survival analysis of three cohorts of Teach for America teachers compared the retention rates of Career Education teachers with and without mentoring **(Donaldson & Johnson 2010).** The retention rates for the 2-year CE mentoring teachers was around 95%/97%. Compared with career education teachers with no mentoring, retention rate was 63% (a difference of 32%). For both cohorts, the results are similar. The study also found that teachers who have more challenging assignments, e.g. split grades, multiple subjects, out of field subjects are more at risk of leaving than single grade, single subject or in-field assignments. In-field science teachers are also at higher risk of resigning than non-science out-of-field teachers

Gold (1987) evaluated the New York City Retired-Teachers-as-Mentors Program by comparing mentees with a comparison group of non-mentored teachers. Mentors were assigned to schools in

the districts with the highest attrition rate among new teachers. Comparisons were made between teachers who were mentored and those who were not. The results showed that in the schools with the mentoring system, three of the 160 mentored teachers (1.9%) and 4 of the 113 non-mentored teachers (3.5%) left the system. The author concluded that the programme lowered attrition rate of mentored teachers compared to non-mentored teachers. This study was rated 2* because of the small number in each comparison group and the fact although principals were asked to assign mentors at random, it was not clear how this was done. In some cases teachers rejected the offer of a mentor. Assignment was therefore no longer random.

An evaluation of a mandatory mentoring system for new teachers in a rural school district in North Carolina **(Anthony, 2009)** reported an increase in teacher retention (defined as the proportion of teachers retuning each year to the school system). Both mentors and mentees were given training. Data on retention was taken from the school system database. The proportion of teachers returning to the school system increased each year from 84% in 2005/6 before the programme to 92% in 2007/8. There was, however, no counterfactual as part of this study, and it is therefore a very weak study for a causal question. Positive results on retention were also reported for a statewide program known as the Texas Beginning Educator Support programme which offers instructional support and mentoring for beginning teachers **(Fuller, 2003).** Although this was a state-wide programme, participation was selective, and it is unclear how selection was organised. Using the state personnel database, the study compared the retention rates of beginning teachers who participated in the scheme with those not participating, from 1999/2000 to 2002/03. The participants had higher retention, but this could be at least partly due to the prior selection process.

In another study, **Latham & Vogt (2007)** compared the retention propensity of 506 elementary education graduates in Illinois who had opted to undertake teacher preparation in a professional development school (PDS) with another group of 559 traditionally prepared graduates matched on demographic characteristics. The authors claimed that those trained in PDSs were more likely to stay in teaching for longer (about ¼ of SD more than those who did not). The PDS group were self-selected and hence are likely to be different to those not in the non-PDS group.

Speidel (2005) evaluated a teacher development programme in the Volusia County Schools District in Florida, known as STARTS (Skills, Tips, and Routines for Teacher Success), designed for teachers of ‘Exceptional Students’ (ESE) i.e., students with special needs. The study utilized data on the employment histories of 771 new special needs teachers for school years 1998/99 to 2003/2004 to compare the retention of 349 teachers who participated in STARTS with 422 who did not. The study reported that teachers who participated in the programme were more likely to return to the school system the following year. However, there were no controls for differences between the two groups of teachers. There were other variables that might have been in play with respect to teach er retention that were not accounted for. Although some of the ESE teachers returned to Volusia County Schools for a second year, they did not return to ESE. The study was only able to look at the short-term retention rates. It is not clear if the programme had a longer-term effect.

Drawing on data from 55 training institutions in the state as well as five-year employment data on all teaching staff, **Van Overschelde et al. (2017)** compared the retention rates of the Texas Teacher Preparation Programme (TPP) teachers with for-profit and non-profit alternative certification grad uates and the state average. TPP aims to prepare preservice teachers for school includes mentoring (working with practising teachers) and professional development. The results reveal that preservice teachers under this programme had a higher retention rate (85%) after five years than the state’s average retention rate (71%). Retention of TPP teachers was also higher than for- profit ACPs (69%) and non-profit ACPs (62%). Compared to CREATE public institutions, the retention rate for the Texas

State University program was also marginally higher (79%). This was rated only 2*because the groups compared were not equal, and the data presented was quite limited.

McBride (2012) used three sets of administrative data including the SASS, the TFS and the Begin ning Teacher Longitudinal Study (BTLS) that included a sample 1,992 to examine the correlation between teachers' participation in mentoring and induction and their likelihood to remain in teaching the following year. The reported 'meaningful associations' between induction and mentoring var iables, and likelihood of teacher remaining in teaching for the following year. Regular, supportive communication with a principal or other administrator (leader) were also positively related to teachers' likelihood to stay in teaching. This is also rated as a weaker study as the teachers being compared were not equal, and the regression analysis cannot account for unobserved differences between the groups being compared.

Ronfeldt & McQueen (2017) also drew on the SASS, TFS and BTLS data to investigate whether different kinds of induction support predict teacher turnover among first-year teachers. To mitigate against unobserved factors, the authors compared teachers to demographically similar teachers who had experienced different support (using propensity score matching to find teachers with similar characteristics). Propensity scores of 1,600 teachers receiving extensive induction (i.e. 4 to 6 induction supports) were matched with 1,130 teachers not receiving extensive induction (i.e. 0 to 3 types of support). Unlike previous studies that focused on only one cohort, this study looked at three recent cohorts of teachers. In total there were 13,000 across the 3 waves. Of these only 2,340 were first year teachers that could be linked to both teacher and school characteristics. The authors correlated the level of induction support with teacher outcomes (leaving school and leaving profession).

Multilevel regression models were used to estimate the likelihood of teachers leaving schools in their second year. The results showed that positive correlation between the greater the number of combined induction supports and teachers likelihood to stay in school or teaching in their second year and across 5 years. Receiving extensive induction supports reduced migration by 5% compared with not receiving extensive induction supports. Of all the induction supports, supportive commu nication with school leadership had the biggest impact, reducing the odds by 55% to 67%. Every additional induction support is associated with an average decrease in the odds of leaving teaching by between 18% and 22%. The more and extensive induction support, the less likely are teachers to leave school and teaching. One major limitation of this study is that the measure of induction is based on teacher self-report and this is prone to reporting biases. For example, teachers may not interpret communicative support consistently. There is also a possibility of selection bias.

Seven other 2* studies showed mixed effects. **Allen and Sims (2017)** evaluated the STEM Learning Network professional development programme in England, which as intended to improve beginning teachers' subject, pedagogical and career knowledge, confidence and motivation. They used reten tion data of teachers from England's Department for Education (DfE) School Workforce Census. This was matched with the National STEM Learning Network to identify teachers who participated in the programme. The authors used propensity score matching, to match participants with non-par ticipants by known characteristics. To control for unobserved differences, comparisons were made between those who participated in 2010 with those who participated later. The authors argued that these individuals were therefore more likely to be similar in terms of motivation and career plans. Further analyses were also made comparing science departments in schools before and after the treatment. The study suggests that taking part in National STEM Learning Network professional development is associated with an increase in retention in the profession as a whole. The odds that a participant stays in the profession one year after completing these courses was around 160%

higher than for similar non-participants, and the positive association is sustained two years later for recently qualified teachers. Using the more rigorous double-difference and triple-difference models that takes into account factors that are not included in the demographic and background measures, the positive association is maintained. However, while participation in the professional development courses improves retention in the career, it had no impact on retention within the schools that teachers were working in at the time of participation.

DeAngelis, Wall & Che (2013) utilized a survey and administrative data to examine the effects of preservice preparation and early career support on new teachers' career intentions. Teacher reten tion was collected via a survey on teachers' intention to stay in teaching. The survey was distributed to 2,221 teachers who completed the four-year undergraduate degree and were employed in state schools with a response rate of 52%. These teachers were asked about their career intentions the following year, which was then correlated with whether they had a mentor, whether the mentor was of the same subject they were teaching, and their perceptions of the quality/helpfulness of their mentor. The study concluded that it is the quality of support rather than the availability of a mentor that is associated with teachers' decision to leave the profession or change districts. Having a mentor of the same subject has a positive influence on teachers' decision to stay in the district compared to not having a mentor, but it has no influence on teachers' decision to leave teaching altogether or move within district. Having a more comprehensive mentoring and induction support significantly decreased the odds of new teachers changing districts and leaving the profession after the first year. After the second year, perceptions of preservice program quality were significantly related to their odds of leaving teaching, but not to their odds of moving within or across districts. The results are therefore mixed. While having a mentor may influence teachers' decision to stay in teaching, it did not affect their decision to move schools. The evidence for this study is much weaker because retention was based on teachers' self-report off intention.

Similarly, **Ingersoll & Smith (2004)** found that it was not just having mentors, but having same-sub ject mentors that mattered. Having mentors from different subject areas had no influence on beginning teachers' decision to leave. This was a large correlational study using a nationally rep resentative sample study compared the retention of beginning teachers who reported that they received mentoring support or not. They results showed a positive correlation between participation in induction/mentoring programmes and likelihood of teachers leaving or moving school. The study analysed data from the School Staffing Survey (SASS) and the Teacher Follow-up Survey (TFS) which included a sample of 3235 beginning teachers in their first year of teaching. The survey asked teachers about their participation in any form of induction programme including mentoring, CPD, collaboration with other teachers and support. The multiple kinds of support included in these induction programmes meant that it was not possible to isolate which of these were most ef Although the authors controlled for school and teacher effects, they were unable to control for un observed differences between teachers and schools. Because those who received mentoring and those who did not were not randomly allocated, there may be inherent differences between these two groups. It could be that schools or districts that offer mentoring support are generally more supportive of their teachers, or have better working environment. The results therefore cannot be solely attributed to mentoring alone. Hence it was rated 2*.

Another 2* study also showed mixed outcomes. **Weisbender (1989)** evaluated the California Mentor Teacher Program which was developed to retain experienced teachers and to assist new teachers in the transition into teaching. Highly talented classroom teachers (mentors) were given the incentive to continue teaching and to use their instructional expertise to mentor their peers and new teachers (mentees). The study included 336 mentors and 638 of their mentees in 240 schools and 46 retirees in the Priority Staffing Program. Personnel records and questionnaires over a 5-year period were

collected to assess the length of time each cohort stayed in the district. Comparisons were made between mentors and a matched group of non-mentors as well as mentees and non-mentees. Results varied from cohort to cohort. There was no effect on retention for the first cohort, with non-mentees being more likely to stay within the school district compared to mentees. With the subsequent cohorts, mentees were more likely to stay compared to non-mentees. On the other hand, mentors were also more likely to leave over the 5-year period than non-mentors. Although comparison mentors were matched, the selection of highly effective teachers suggest that the two groups may not be equal. As Shifrer et al. (2017) noted, it may be the case the high performing teachers can find jobs more easily and are therefore more mobile.

Glazerman & Seifullah's (2012) evaluation of the Chicago Teacher Advancement Program (TAP), a teacher development and compensation programme, also found no consistent effects. The imple mentation of the programme was staggered across all schools with schools randomly assigned to implement sooner or later, creating comparison group for analysis. Teacher retention was measured by comparing the retention of a matched sample of over 2600 teachers in Chicago TAP and conven tional public schools. In this programme teachers and mentors met weekly in their "cluster groups". Teachers were also given performance incentives and had the opportunity to assume leadership roles. The results showed positive effects on school retention only for the first cohort, but the ef fect was not consistent across cohorts. More teachers from the first cohort returned to their same school three years later compared to teachers in non-TAP schools, an impact of nearly 12 percentage points. In other words, teachers in Chicago TAP schools were about 20% more likely than teachers in comparison schools to be in those same schools three years later. For teachers in schools that started the Chicago TAP in later years, the impact was not obvious. There was some evidence of impacts on retention for subgroups of teachers, such as those with less experience, but there was no consistent pattern.

De Jong and Campoli (2018) analysed the observational data from the 2007–2008 Schools and Staffing Survey (SASS) to compare the retention of teachers who have curricular coaches with teachers who did not. Curricular coaching provides new teachers with the techniques to incorporate evidence-based instructional methods in their local context. They found that early career teachers in a school with a curricular coach was less likely to leave the profession (relative risk ratio = ÿ0.52). The effect was stronger for first year teachers, but much less so for second and third year teachers. It is possible that this was the period of economic recession when there is less incentive to change profession. Having a curricular coach, however, did not influence early career teachers' decision to move school.

You (2012) also used data from the School and Staffing Survey (SASS), but for the period 1999–2001, 2003–2005, and 2007–2009 cycles, as well as the Teacher Follow-up Survey (TFS) and the NYC administrative data. The aim of the study was to explore what kinds of induction program influence first-year new teacher's turnover. A number of strategies was used to account for hetero geneity of the treated (induction participants) and untreated groups (non-induction participants). This included regression analysis, propensity score matching (PMS), difference-in-differences and instrumental variable methods. The results show that the effect of induction programmes on teacher retention is unclear. An average induction programme is unlikely to be effective in reducing teacher turnover. Results from OLS regression analysis and PMS show that an average induction programmes and a comprehensive induction program tend to reduce teacher turnover. However, using a differ ence-in-differences approach incorporating instrumental variable, the results show that teacher induction programmes by themselves may not work. Such programmes need to be comprehensive and accompanied by improvements in the attractiveness of the profession in terms of salaries and working conditions. The study also suggests that not all components of induction programmes a

beneficial. For example, participation in seminars or classes for new teachers and having supportive communication are associated with a decrease in the likelihood of both transfer turnover and exit turnover. Having common planning time with teachers in the same subject reduces the likelihood of new teacher transfer turnover, but increases the likelihood of teacher exit turnover. Having extra assistance (e.g., a teacher's aide) is associated with a reduction in turnover, in particular exit turno ver. Reducing new teachers' time-table schedule and preparation time, on the other hand, tends to increase, rather than decrease, turnover. It seems to encourage teachers to transfer schools. Having a mentor also may actually increase new teachers' turnover, especially transfer turnover.

Hahs-Vaughn (2008) analysed the 1999–2000 Schools and Staffing Survey (SASS) and the Teacher Follow-Up Survey (TFS, 2005) to identify individual and school characteristics and mentoring and induction activities that affect beginning English language teachers' attrition, mobility and reten tion. None of the factors were found to be with attrition and moving schools after controlling for teacher and school characteristics. However, the odds of teachers from high-poverty schools leaving are higher, suggesting that it is perhaps the working conditions or environment rather than the presence or absence of induction and mentoring that mattered.

Ingersoll & Strong's review (2011) of mentoring and induction programmes for beginning teachers found that most studies reported a positive impact on teacher commitment and retention, but a large randomized controlled trial of induction found no effects on teacher retention. The review included only studies that have comparisons, but these varied in scale, and some were correlational, and some were RCTs. Studies were not weighted by research design.

Lindsay et al. (2021) surveyed 539 teachers in Michigan, US, to examine the association between teachers' report of availability of support in their local education agency and their likelihood of stay ing on in teaching. Overall, the results showed a positive correlation between four types of support and their probability of staying on in their local education agency (LEA), although the difference is small. These include mentoring, regular support and communication, orientation to the school for new teachers and allowing teachers to set their own goals for evaluation. However, offering support in the form of housing mortgage had a negative effect on teacher retention. This reinforces the earlier findings that financial support alone is not enough. This study is rated 1* because of the very poor response rate (12.2%), thus potentially biasing the results. The analysis is based on reports of absence or presence of support, but not whether actual supports are offered. In many LEAs, there was only one respondent. The correlational design cannot account for differences between LEAs. LEAs where such supports are available may differ from those where supports are not available in terms of unobservable characteristics. They may be wealthier with better performing students. These can influence teachers' perceptions of teaching conditions and their reported propensity to stay.

One study (rated 0*) provided some explanations for the lack of impact of mentoring on teacher retention in a primary school. The study involved a small number of mentors (n = 17) and mentees (n =35) who participated in a mentoring programme from 2006/07 to 2008/09. Data collected from questionnaire survey, face-to-face interviews and focus groups. The study provided no evidence that the mentoring programme had been effective in retaining teachers, but suggested that for mentor ing to be effective the needs of teachers have to be met. Support from administration, school leaders are colleagues are also important. Lesson modelling, lesson observation of experienced teachers and opportunities for professional growth were identified as beneficial components of the mentoring programme. Crucially, this study suggested that for mentoring programme to be successful, mentors have to be trained and matched to grade level and subject areas. Respondents also indicated that release time for mentors and mentees to meet weekly is also useful to s

In summary, there is no clear evidence that induction, mentoring and professional development of teachers by themselves can induce teachers to stay in teaching or in the school they were teaching. The amount of support and whether mentors are same subject or same grade teach ers do matter. The medium quality studies show a positive correlation between mentoring/ induction and teacher retention, but analyses tended to compare non-randomised groups of teachers that have mentoring/induction with teachers that do not. Results of randomised controlled studies and quasi-experimental studies (e.g. Glazerman et al. 2010; Ault 2017; Helms-Lorenz 2016; You 2012) show no significant effects on teacher retention. It is possible that correlational studies did not fully adjust for omitted or unobserved variables. It may also be possible that there is selection bias. If this is the case, then the relationship between induction and retention may not actually exist or may not actually be causal.

Impact of alternative strategies for recruiting teachers on teacher retention

There is a proliferation of alternative certification programmes and alternative strategies to recruit ing teachers in recent years, largely to address the shortage of teachers in some specialist subjects or geographical areas. However, most are focused on their impact on student performance (e.g. Greenwald, Hedges, & Laine, 1996; Rivkin, 2007). These studies typically assess the relationship be tween certain attributes and qualifications of teachers and teacher performance (usually measured using students' performance as a proxy). The results have been mixed. There has been less research on the effects of teacher preparation on teacher retention

Table 2.7: Alternative recruitment strategies and teacher retention (n = 32)

Strength of evidence	Positive (n = 7)	Mixed or unclear (n =9)	Null or negative (n = 16)
3*			
2*	• Papay et al. 2012	• Harris-McIntyre 2015 • Silva et al. (2014, 2015)	• Boyd et al. 2012 • Hopper 2018 • Morris 2002 • Ogundimu 2014 • Tai, Liun & Fan 2006 • Finger 2004
1*	• Clewell & Villegas 2001 • Fleener 1998	• Cowman 2004 • Goldhaber & Cowan 2014 • Hansen et al. 2016 • Ingersoll, Merrill & May 2014 • Kelly & Northrop 2015 • Lyons 2007 • Zavala 2002	• Achinstein, Ogawa & Speiglman 2004 • Bratlinger et al. 2020 • Chapman 2005 • Goodwin et al.2019 • Hardie 2008 • Strong 2005 • Zhang & Zeller 2016 • Zumwalt et al. 2017
0*	Burstein et al. 2009 Eberhard et al. 2000 Murphy 2004 Quartz 2003		Randall 2009 Ware 2018

Thirty-two studies investigated the relationship between alternative certification and teacher preparation and teacher retention. Nine of these were rated medium quality (2*) in terms of strength of evidence. No studies were rated 3* and above largely because almost all the studies were correlational in design, and were thus unable to control for unobserved confounders. Of these, six suggests that teachers on alternative preparation routes were less likely to stay on in teaching. Only one medium quality study (Papay et al. 2012) reported positive effect. Alternative routes to teacher certification are so varied that it is hard to say work works and what does not. It is also the case that some alternative certification also includes components of mentoring and induction (e.g. Harris-McIntyre 2014), so it is not often clear whether it is the alternative pathways or the mentoring and induction that are key drivers.

The Boston Teacher Residency Program (BTR), for example, is a practice-based teacher preparation programme where teachers work alongside a mentor in the school for a year before being certified to work in Boston public schools. BTR is modelled on the medical residency concept. Using administra tive data from Boston Public Schools. **Papay et al. (2012)** compared the recruitment and retention of BTR teachers with other new teachers in Boston public schools by following seven cohorts of teachers from 2004/05 to 2010/11. They found that graduates of the Boston Teacher Residency Programme were less likely to leave teaching in the first year (12%) than other new Boston public school teachers (27%). By the fifth year, retention rates among BTR teachers were still higher than other public school teachers in Boston (49% vs 25%). They were more likely to stay until their fifth year, and did not leave suddenly after their third year when their commitment However, it has to be mentioned that BTR teachers were committed to teach in Boston for three years after their residency year or pay a penalty equivalent to the programme tuition fees of up toÿ$10,000. The study compared BTR and non-BTR teachers in the same district but the groups were not matched, so the results could be more of a reflection of the kind of people who opted to be trained via the BTR route than the programme itself. Also, BTR candidates were pre-screened and selected for their potential success, and they also received a stipend or salary and were committed to teaching for three years. These teachers may be differently motivate compared to other public school teachers. Therefore, the findings have to be interpreted with caution.

Two medium quality studies show mixed results. **Silva et al. (2014, 2015)** looked at a teacher res idency programme (TRP), also known as the Teaching Quality Partnership Grants Program, which is an alternative teacher certification programme for those with a bachelor’s degree. The teacher residency programme works in partnership with local school districts and universities where pro spective teachers complete a coursework with supervised fieldwork experience teaching in a school for at least a year (known as the period of residency). It recruits highly qualified individuals, either recent graduates or mid-career professionals to teach in high-need schools under the guidance of an experienced teacher. In exchange for teaching full-time in the high need school for a minimum of 3 years, TRP residents receive a living stipend or salary. In an update (Silva, McKie & Gleason 2015), the authors tracked the first cohort of residents from their first to their third year of teaching using administrative data to compare the retention rates of TRP and non-TRP students, as well as reten tion rates of experienced and less experienced compared to their non-TRP peers. The data shows that there is no difference in the retention rates of TRP and non-TRP teachers within district (89% and 87% respectively) and within schools (77% for TRP and 79% for non-TRP). However, for novice teachers, the programme was more successful in keeping them within district but not within schools. Teachers who move schools were more likely to move to higher performing schools with a smaller proportion of black children. Although the authors controlled for school characteristics, individuals who opted for TRP may be different to those who did not in terms of motivation. These confounding factors were not accounted for. This was, therefore, rated 2*.

Harris-McIntyre (2014) compared the retention outcomes of lateral and non-lateral novice teach ers. Lateral teachers are trained on the job and certified while training. Non-lateral teachers are traditionally trained teachers. The school district in North Carolina initiated a program entitled Mission Possible, an initiative which offered incentives to teachers in hard to staff schools (HTSS) and schools in difficult to reach areas. The author used a causal-comparative ex-post facto design to compare the outcomes of lateral and non-lateral novice teachers using data from archived records taken from the human resources office. The results show no evidence that on-the-job training has been effective in retaining teachers in the district. However, non lateral or traditionally trained teachers were over twice more likely to stay in teaching in the first and second year, but no differ ence in the 3rd year. The evidence for this is not strong as the two groups of teachers were not the equal so comparing their retention and attrition rates is not a fair comparison. The teachers were neither randomised nor matched by background characteristics. Lateral teachers were self-selected, and were also offered incentive to teach in HTSS. The design is unable to control for unobservable differences between the groups.

The majority of the medium quality studies present no evidence that teachers trained via alternative routes are not more likely to stay in teaching. **Boyd et al. (2012)** compared the retention rates of Math Immersion (MI) teachers in New York City with mathematics teachers who were trained via other pathways. The Maths Immersion programme is an alternative teacher preparation programme introduced to address the shortage of certified maths teachers with maths qualifications. Teacher attrition was determined using teacher data from the New York City State Department, which were matched with their personal files though unique teacher identifiers. Teachers who returned to the same school the following academic year are identified as stayers, if they returned to another school, they are defined as movers and if their records show that they have retired, exited or were on leave and not returning for more than one year, they are defined as leavers. Although the programme was successful in attracting highly qualified teachers to teach in high need areas, it was not effective in keeping them in the school or in teaching. MI teachers were more likely to leave teaching in NYC than their traditionally trained peers but less so than TFA (Teach for America) teachers. They were also more likely than traditionally prepared teachers to transfer or leave their school. TFA teachers were more likely leave teaching after 4 years but less likely to leave their schools.

Morris (2002) compared three alternate routes to teaching: traditional approved programme, alternative programme and special alternative programme. The study analysed data from the Mis sissippi Department of Education (MDE) for the year 1995 to 2000 on 1,895 teachers, looking at the 5-year retention rates of teachers in the three routes as well as by subjects and gender. The analysis showed no evidence that alternative routes were more effective in retaining teachers compared to traditional route. Retention rate. The five-year retention rate of traditionally prepared teachers was 63% compared to 44% for teachers trained via standard alternative routes, and 53% for those trained via special alternate route. The approved traditional program was also more effective in retaining female teachers (66%) and male teachers (52%) compared to alternate program route (47%). Retention of Black male teachers was similar for both approved and alternate routes (45% vs 43%). Although approved programme is more effective in retaining White teachers (64%), there is no difference in the retention of White male teachers by routes. For Black females, there is also no difference by routes, but there is a slightly higher retention via the approved route. There is also no difference between routes in the retention of teachers by subjects.

This study was rated 2* because the number in the different comparison subgroups varies widely. Also, the analysis did not account for other factors to rule out confounders. E.g., younger people, or non-ethnic minority teachers may be more likely to be certified via the traditional approved routes.

Those who chose alternate pathways may be different in some ways that could explain their reten tion status. They are more likely to be older, married with young children.

In another longitudinal study, **Ogundimu (2014)** analysed a large administrative dataset using discrete-time survival analysis modelling to compare the retention patterns of cohorts of teachers from traditional and non-traditional training sources over a six-year period. The analysis revealed no difference in retention patterns in the two groups. Survival rate for both groups is 80% in the first year, 54% at the end of 2nd year, and after 5 years 60% of traditional and 62% of non-traditional teachers stayed on in teaching. It is not clear why traditional programme teachers made up under 20% of teachers in any year. However, it seems the year of entry into teaching, individual age, sex, ethnicity, subject taught, and school level are important predictors of retention.

Tai, Liu used the nationally representative School and Staffing **& Fan (2006)** Survey data (SASS) and the Teacher Follow-up Survey (TFS) the traditionally certi to compare fied teachers (regular, **programme**) ... alternative certified teachers ... standard or part certificates of a 5th year through

or or or

The sample included 900 regular math/science teachers, but 92 of from of information these ... deleted ... the sample ... because ... teachers ... were

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the school (stayers), transfer ... another school ... (movers) ... logistic regression ... analysis.

ers) was math and science teachers were The

alternatively certified marginally more likely to move

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The ... predictors of teachers' decision ... job satisfaction, the number of years ... leave

or move school were school ... teaching ... those with than 3 years of

more more is only for evaluation is needed if the effect term to The data

is sustained. sample year after SASS and actual data on Longer

This correlational study, and of hence rated 2* because the large was a

retention.

Vinger (2004) also used a longitudinal retrospective design to compare the retention rates of teachers certified through a traditional university-based certification programme (TCP) and those certified through an alternative certification programme (ACP). The author analysed data from the Texas state education agencies of teachers who began teaching in 1994–95 in South Texas over five years to see if the rates of retention or leaving the profession were correlated with the routes of certification. The results indicated that retention rates were similar for both TCP and ACP teachers in the early years, but in the fifth year retention of TCP teachers was higher than that of ACP teachers.

However, ACP teachers were more likely than TCP teachers to move into other school roles. It is not clear what the implication of this might be. This study was rated 2* because while all former teachers who could be contacted were included, only a sample of active teachers who could be contacted were included. Selection bias is likely, given that those teachers who were not able to be reached or who did not respond may be quite different to those who responded. Those entering the two certification routes would likely be different to start with. In addition, the self-report survey data may suffer from social desirability bias.

The low evidence studies (rated 1*) are also mixed, with seven reporting positive results and eight suggesting no or negative results. Only three indicated positive effects.

Clewell & Villegas (2001) evaluated alternative pathways to teaching which involve offering nonprofessional and noncertified teachers already teaching working in schools scholarships to help obtain qualified teacher status and helping Peace Corps volunteers to train as teachers. The pro gramme also offered support services. The Peace Corps Fellowship identifies and supports potential teachers from returning Peace Corps volunteers (similar to the Troops to Teachers programme in England). Fellows are placed in schools on a full-time contract and paid a salary where they work towards a teaching qualification. This was a six-year study which was largely based on self-report, with a high level of missing data. Only 44% reported where they were teaching initially, and only 31% after three years. Pathway teachers reported higher completion rates than traditionally cer tified teachers (75% to 60%). A high proportion (84%) ended up teaching in hard-to-staff schools and had better retention rates over three years compared to the national average (81% But it has to be mentioned that some of these teachers were already working in the school, and chose to gain certification while working there. These are self-selected individuals. This is a weaker study because of the low response rate and the self-declared status of teaching. Of the 2,593 pro gramme participants, only 1,141 responded to the survey about where they teach and only 812 were followed 3 or more years after graduation. It is not clear what happened to the others. The data is quite unclear about who were included in the survey, the attrition rate or the scale of the missing cases. From the tables presented it would appear that less than half of the programme participants responded to the survey. As with the Boston Teacher Residency programme, the programme also requires teachers to agree to continue teaching in the schools they were trained in for a specified period.

Fleener (1998) compared the attrition rates of elementary teachers trained under the traditional university-based teacher preparation programme and those trained through field-based programme in Texas, US. The results showed that CPDT trained teachers had higher retention rates than those trained through university campus-based programs for all strata of ethnicity, gender, and university site (attrition was 2.1% for CPDT, campus-based 6.7%). Data was collected on 1,959 graduates from teacher preparation programs from three universities who were among the first in the state of Texas to receive grants for the development of the CPDT field-based programs. 755 of the original sample were excluded because of incomplete academic performance test scores and those who had not been employed as teachers in Texas public schools after graduation. Of these. 45% (871) were trained through CPDT and 56% (1088) were trained through the university campus-based programme. Subgroup analysis comparing attrition rates by gender, ethnicity, and academic per formance were also conducted. This is given a lower rating because teachers who opted for field based programme and the traditional university-based programme may be different in terms of their motivation to train, their commitment. Alternative trained teachers tended to be mature students or career changers. Additionally, a large number who did not end up in state-funded teaching were excluded. This may have already excluded those who would be likely to leave teaching anyway – only that they left early.

As with Fleener's study, **Zavala (2002)** also found that teachers trained via a field-based programme (CPDT) were more likely to stay in teaching than beginning teachers trained via an alternative certi fication programme (ACP). The study compared teachers trained through ACP and CPDT within one university in Texas using data taken from the Teacher Master File for the 2000–2001school year for teacher retention. The university was chosen because it offered the two teacher preparation programmes. Sample included 1,188 teachers who had completed the programme and had passed the professional development exam over the three years from 1997 to 1999. Of these 784 were CPDT and 404 were ACP teachers. The results showed that twice as many (16.1%) teachers trained through ACP left teaching than those trained through CPDT (8.7%). Put another way, CPDT teachers were 0.5 times less likely to leave teaching. ACP secondary teachers were 1.3 times more likely to

leave than CDPT teachers. This study was rated 1* because there was no pure control group, so it is difficult to say what the retention rate would be like compared to the traditional route. There was also a disproportionate number of teachers in the two groups. There could be a selection bias as those who chose CDPT are likely to be different in terms of motivation and other characteristics to those who chose the ACP route.

In summary, there is no evidence that alternative routes to qualification are effective ways to retain teachers in school or teaching. The majority of the stronger studies (rated 2*) suggest no or unclear effects on retention. Only one 2* study (Papay et al. 2012) indicates positive effect on retention in teaching, but the programme requires trainees to commit to three years after their training or incur a penalty. All the studies that we found on alternative certification are correlational in design, comparing alternatively certified teachers with traditionally certified teachers or with other alternative pathways. Those who chose alternative pathways are likely to be different in motivation from those on the university-based traditional pathway. It is also the case that these alternative pathways offer other services, such as monetary incentives, induction and mentoring. It is therefore not possible to say for certain if alternative preparation works or not. There is no one-size fits all programme. Whether alternative certification is more effective than traditional university/college routes depends on the kinds of programmes pro vided. Study results differ also depending on what programmes are being compared. Generally, the programmes are more successful in keeping new teachers within the district or in teaching but not within the school. Job satisfaction and working conditions may have stronger effect on teachers staying in the school. Some programmes may be effective only in keeping teachers for the first few years. But this may be because the programmes involve a tie-in where recruits are committed to teach in the district for a number of years after graduation. Others also involve a stipend or living expenses for teaching in high-need areas. There is no evidence that teachers trained through alternative pathways to teaching are more likely than the traditionally univer sity-trained teachers to stay in the long term.

Working conditions and teacher retention

Teachers' working conditions include workload, leadership support, length of working week, degree of autonomy and school resources. Pupil characteristics and location of the school also contribute to teachers' working conditions, e.g., proportion of children eligible for free/reduced lunch, proportion of low attaining children or children with special needs. Schools located in rural or remote areas can also be challenging. This section looks at studies that have considered teachers' working conditions as a factor in teacher attrition.

Since the first round of TALIS in 2008, there have been several studies that analysed the rich data from the survey (e.g. Peter Sellen 2016; Fackler and Malmberg 2016; Duyar et al. 2013; Sims 2017). These correlational studies assume that working conditions are related to job satisfaction, and job satisfaction is related to teacher turnover. The assumption is that if teachers are not satisfied with their job or if they express a desire to leave, they are more likely to leave the profession. These are often used as indicators of teacher turnover. In reality, intention is often not the same as actual ac tion. More people consider leaving than actually left (Lynch et al. 2016; Worth 2015). These studies also assume that improving the working conditions and pay of teachers can help improve teacher recruitment and retention.

Table 2.8: Working conditions (including leadership support, autonomy, shorter work week) (n = 34)

Strength of evidence	Positive (n = 25)	Mixed or unclear (nÿ=ÿ4)	Null or negative (nÿ=ÿ5)
3*			
2*	• Boyd et al. 2011 • Ingersoll, Merrill & May 2016 • Jacob et al. 2015 • Johnson, Kraft & Papay 2012 • Ladd 2011 • Sims 2017 (Sims & Jerrim 2020) • Stuit & Smith 2010 • Torres 2016	• Shirrell 2014	• Cohen 2005 • Maiden, Crowson & Byerly 2020
1*	• Good & Sass 2018 • Campoli 2017 • Clotfelter et al. 2007, 2008 • Defeo, Hirshberg & Hill 2018 • Fitzgerald 1986 • Fulbeck 2014 • Glazerman et al. 2010 • Goldhaber, Destler & Player 2010 • Grissom 2019 • Hancock 2008 • Hasegawa 2011 • Perrone 2019 • Perryman & Calvert 2019 • Pyhältö 2015 • Zhang 2006	• Grant 2020 • Ingersoll & May 2012 • Puppet-Acevedo 2009	
0*	• Dupriez, Delvaux & Lothaire 2016 • Hughes 2012		• Hawks 2016 • Kuhn 2018 • Morris 2006

Almost all the studies in this section are correlational and based on teachers' perception of workload. The large majority show that teachers' working environment is a strong predictor of their decision to leave teaching or school. These studies also show strong links between school leadership, adminis trative support and teachers' decision to leave. The evidence is mostly weak mainly because of the weaker design. The correlational studies linking teachers' self- reports of school working conditions to measures of their own satisfaction and career decisions are likely to be due to reporting bias and not true working conditions because teachers who are negative about school working conditions are likely to be less satisfied. Similarly, those who are less satisfied are likely to portray a negative working environment. Because teachers are not randomly assigned to schools, it is not possible to separate the causal effect of working conditions and teacher turnover. For this reason, all such correlational studies are rated medium quality at best. The stronger studies are those that used longitudinal data to link teachers' perceptions of working conditions with their actua Only one randomised control study was found **(Jacob et al. 2015)** but this was rated 2* because of the high non-response as teachers refused to be randomised.

Stuit and Smith (2010) compared the turnover rates (attrition and mobility) of teachers in charter schools with those in traditional public schools and the extent to which these turnover rates are related to organisational conditions and contextual factor. Data was taken from the National Center for Education Statistics (NCES) 2003–04 Schools and Staffing Survey (SASS) and the Teacher Fol low-Up Survey (TFS). They found an association between teachers working hours and the likelihood of turnover across school types. Teachers who worked more than 60 hours a week are 1.6 times more likely to leave teaching compared with teachers who worked fewer than 60 hours a week after controlling for teacher characteristics, school characteristics, and organizational conditions.

Analysis in England, based upon the international TALIS dataset, also highlights the importance of good leadership. **Sims (2017)** and Sims & Jerrim (2020) found that better school leadership is associated with higher job satisfaction for teachers and a reduction in the odds that they would want to leave their school. The study analysed data of over 50,000 teachers from 34 different countries. Among the 8 factors measuring working conditions, school leadership was found to have the strong est association with job satisfaction and desire to move school A one SD increase in the quality of school leadership is associated with a 64% reduction in the likelihood of teachers' intention to leave. Workload as measured by the number of hours worked and frequency of marking and feedback was not related to job satisfaction, but teachers' assessment of whether their workload is manageable is. The study also found that it was not the amount of workload, but teachers' perception of whether it is manageable or not that influenced job satisfaction.

The following studies also used longitudinal administrative data, but the low response rate or miss ing data rendered them a lower rating. **Ingersoll & May (2012)** analysed ***data from*** 5,189 math or science ***teachers in the 2003–04 Schools and Staffing Survey and 662 in the 2004–05 Teacher Follow-Up Survey.*** Comparisons were with qualified teachers only. The study shows that working conditions do not have the similar effects on all teachers. For example, for maths teachers, the degree of individual classroom autonomy was the strongest predictor of retention and mobility. ***Net of other factors such as salaries, schools with less classroom autonomy lose math teachers at a far higher rate than other teachers. In contrast, for science teachers, it was salary that mattered more than classroom autonomy. Organisational factors were also strongly correlat ed with maths teachers' turnover, but less so for science teachers.*** Including all organisational factors, school poverty and rural schools became insignificant – suggesting that worse organizational conditions account for a large part of the higher turnover in poor and urban schools. Interestingly, Ingersoll found that STEM teachers were no more likely to leave teaching than other teachers, nor more likely than other teachers to take non-education jobs, such as in technological fields or to be working for private business or industry. Ingersoll also reported annual reshuffling of STEM teachers from poor to non-poor schools, from high-minority to low-minority schools, and from urban to subur ban schools. Although the study is correlational in design, the large administrative data and follow-up survey based on actual attrition data strengthens the quality of evidence. However, the follow up only comprises 13% of the or

A later study by **Ingersoll, Merrill & May (2016)** considered the impact of working conditions (including quality of leadership, support provided to teachers, amount of school resources, ac countability and degree of autonomy teachers have in the classroom). They analysed data from the 2003–2004 Schools and Staffing Survey and the 2004–2005 Teacher Follow-up Survey, conducted two and three years after the introduction of the No Child Left Behind Act. Controlling for teacher and school characteristics, the study found strong evidence that teachers in schools with reported higher levels of leadership support, and greater classroom autonomy had lower turnover. Of all the working conditions, teacher autonomy was particularly influential in mitigating the negative effects of accountability sanctions.

Bueno & Sass (2018) also found that the salary compensation only had a short-term effect on the retention of teachers. Using a triple difference model of attrition comparing teachers who were eligible with those who were not they found that the rate of attrition was lower for bonus recipients especially in the first five years compared to non-recipients, but no difference after 5 years when teachers stopped receiving the bonus. Working and living conditions, lack of community engage ments were reported to be important factors in teachers' decision to stay or leave.

In another study, **Goldhaber, Destler & Player (2010)** compared working conditions in private and public schools using hedonic models to estimate how much money is needed to compensate teach ers for working in less attractive schools. Data was taken from the 1999–2000 School and Staffing Survey, the 2000 Common Core of Data (CCD), and the 2000 Census that collect information on 56,354 teachers in 5465 public schools and 10,760 teachers in 3558 private schools about teacher compensation, school demographics, and working conditions from teachers, principals, and district personnel. The study estimated that private schools paid teachers more for working in schools with high proportion of poor and minority children, but teachers said they were willing to be paid less to work in less challenging schools with better working conditions.

Related to the school working environment is principal leadership. A number of studies have illus trated that it is not the workload or perception of workload, but the support from the administration that is an important influence on teachers' decision to stay or leave. For example, **Torres (2016)** reported a positive association between teachers' perception of workload and their decision to leave, but workload becomes unimportant if they perceive that they have the support of the ad ministration or principal. This is a correlational study that uses survey data from one large Charter Management Organisation (CMO) for the period 2010–2011. CMOs are educational organisations that operate Charter schools in the US. In this study, workload is measured using on a 6-point Likert scale. Logistic regression analysis is conducted to determine the odds of teachers leaving compared against the dichotomous variables (e.g. workload is manageable/unmanageable). The study reported that teachers' perceptions of workload are significantly associated with their decision to leave their school. Teachers who rated workload as unmanageable are 3.7 times more times more likely to leave the school. 30% of teachers who rated their workload unmanageable (14% of all respondents) left at the end of the year while only 1 in 10 leaving who did not rate their workload unmanageable left. There is no difference in terms of teachers' experience. Newer teachers were not more or less likely than more experienced teachers to leave because of workload. However, when other organ isational conditions, e.g. perceptions of principal support and communication were factored in the analysis, workload was no longer associated with turnover. This suggests that it may not be the actual workload, but school leader's support and principal leadership that are determining factors. In other words, teachers who cite workload as heavy may be more likely to stay as long as they perceive working conditions as favourable. It may also be that teachers' perception of workload influenced by what their perception of principal support. School discipline is the only organisational factor that is associated with teacher turnover. Relationships found between turnover and school or organization al characteristics could be a result of other unobserved factors not included

The strongest study using a randomised controlled design explores the impact of the Balanced Leadership programme (BLPD) on principal leadership, instructional climate and turnover **(Jacob et al. 2015).** The study included 126 schools where half were randomly assigned to treatment group in which the principals participated in the BLPD program, and half to a business-as-usual control group. Pre-post- surveys (on a 6-point Likert scale) was administered 3 years apart to measure impact. The results show a positive impact on retention with principals and teachers in treatment schools significantly more likely to remain in the same school over 3 years than staff in the control schools. Despite the strong design, the study was rated 2* because it was not clear what the turnover rates

were for the control schools. Moreover, there was a high attrition of 28% from randomisation as schools refused to participate or did not submit baseline survey. This is a common problem with such studies, which is why almost all studies on this issue are correlational and post-hoc or retrospective.

Boyd et al. (2011) explored the relationship between school contextual factors and teacher reten tion decisions in New York City. This is a large-scale longitudinal study based on a survey of 4,360 first year teachers (70% response rate) and a follow-up survey (n = 1,587; response rate 72%) asking teachers about their teaching experiences and factors that might make them consider leaving and a second follow-up survey of teachers who left teaching in New York City (n =368; response rate 61%). Responses were then matched with the administrative data from the New York State Education Department, which included information on student and school characteristics, and teacher demographic background. The study separated the effects of teacher characteristics from school characteristics. They found that teachers' perception of the school administration has by far the greatest influence on teacher retention decisions. This effect of administration is consistent with that for the full sample of teachers and those who have recently left teaching.

Ladd (2011) used a large longitudinal administrative data from North Carolina to examine the rela tionship between teachers' perceptions of their working conditions and their intended and actual departures from schools. Controlling for school characteristics, such as ethnic composition of the school, the results show that school leadership is the strongest predictor of teacher mobility. *Ceteris Paribus,* teachers were more likely to leave schools with poor leadership than those with strong lead ership. However, working conditions were less predictive of actual turnover rates than intended rates.

Johnson, Kraft and Papay (2012) combined a statewide survey of school working conditions (MassTeLLS) with demographic and student achievement data from Massachusetts. The survey included a sample of 25,135 teachers representing 61% of all K-12 teachers in Massachusetts. Controlling for school and student characteristics, teachers working in schools with a positive work context are more satisfied and more likely to say the plan to stay in the schools. They found that it was not the general working condition, such as clean and well-maintained and well resourced school, but the social conditions which form part of these—such as the principal's leadership, school culture and relationships with colleagues—which mattered most to teachers.

The other studies are weaker largely because they were based on teachers' perceptions of what they thought, rather than actual effect of working conditions. **Grissom & Bartenan (2019)** ana lyzed administrative data from Tennessee, including all public education personnel in the state from 2011–2012 to 2016–2017 to estimate the effect of principal leadership (measured using the Tennessee Instructional Leadership Standards) on likelihood of teacher retention. On average more effective principals experience lower teacher turnover rates. Effective principals are also more likely to retain effective teachers than less effective teachers. The poor response rate of teachers who were invited to participate in the survey (ranging from 25% ton 40%) and the high proportion of missing cases reduces the credibility of the evidence. 21% of principals had complete leadership module data from only 1 teacher and 3% had data from only 5 respondents. The noise introduced by these small samples are likely to attenuate the association between leadership effectiveness and teacher turnover. The results, therefore, should be interpreted with caution.

Another study looked at the impact of administrative support on retention of music teachers. **Han cock & Scherff (2008)** used a sequential logistic regression to analyse data from the 1999–2000 SASS survey of 1,931 music teachers in K-12 public and private schools. The analysis included pre dictors, such as age, phase of teaching, ECA hours, administrative support and salary to estimate the risk of teacher migration and attrition. A positive association was found between administrative

support and teacher retention for English language teachers. The more supported English teachers felt, the less likely they were to be considered a high risk for attrition than those receiving less sup port. For music teachers, young, female, minority and secondary teachers were more likely to leave. Controlling for all other factors, parent and administrative support were importing in reducing the risk of attrition. Although the study is based on large administrative data, the evidence is not strong as it is based on self-report of intention to stay or leave.

Fitzgerald (1986), for example, compared schools that received the high priority location stipend with similar schools not receiving the stipend. High priority schools were those with a high propor tion of students receiving free/reduced lunches. Athough the stipends reduced teacher vacancies in treatment schools, survey of staff who left indicated that while they were appreciative of the incentives, their main concerns were the working conditions, discipline in school, management support and admin/teacher relations. Control teachers also indicated that they would be happy to work in high priority areas if student discipline, working conditions and admin/teacher relations were improved. Response rate to the survey was low, so the results can only reflect the views of those who responded.

Glazerman et al. (2010) found that a comprehensive induction and mentoring programme had no im pact on teacher retention. But in the survey conducted as part of this randomised controlled trial, over a quarter (28%) of treatment teachers and 25% of control teachers cited working conditions and principal leadership (20% treatment and 22% for control teachers) as reasons for leaving schools.

Defeo, Hirshberg & Hill (2018) estimated that teachers working in less attractive community or school will need to be paid more to compensate for the less attractive working conditions. This study demonstrates that financial incentives may be necessary to attract teachers, but they are not enough to retain them. Working and living conditions, lack of community engagements are important factors in teachers' decision to stay or leave. Correlation analysis shows that teachers who left rural districts were significantly more likely to be dissatisfied or very dissatisfied with job-related aspects of their work, including parent and community relationships or school and district administration or community characteristics such as entertainment, housing, or relationships/friendships.

Clotfelter et al (2007, 2008) evaluated a bonus incentive scheme aimed at keeping teachers in high poverty and academically challenging schools where working conditions are far from ideal. Overall, the results suggest that the bonus incentive did not reduce turnover rates, and it was not clear whether it was because the $1,800 bonus is not large enough or whether the implementation of the programme was flawed as not all teachers who were eligible actually received the bonus. However, survey responses from principals and teachers suggested that the $1800 incentive alone was not enough. To keep teachers in challenging schools would require better administrative support, better school conditions and opportunities for professional development.

Fulbeck's (2014) evaluation of the ProComp financial incentive also suggests that although the incentive help keep teachers within the district, it did not stop teachers from moving schools. As in Ingersoll's study, Fulbeck also found a lot a movement out of schools in the district, particularly from high- to low-poverty schools, suggesting that financial incentives alone cannot compensate for poor working conditions, school leadership and climate.

Using a questionnaire administered to 1,230 eligible participants (with a response rate of only 29%), **Hasegawa (2011)** showed that organizational commitment and job satisfaction significantly con tributed to predicting novice teachers' intention to stay.ÿThe model explained 57% of the variance, suggesting that under half of the explanatory factors were not accounted for. Those who reported

wanting to move to another school, family reasons, working conditions and lack administrative support were cited as top reasons. Pay, promotion opportunities and better working conditions were given as reasons for teachers wanting the leave the profession.

The rest of the 1* study also suggest that school climate is strongly associated with early career teachers' (ECT) burnout and subsequent turnover. **Perrone, Player & Youngs (2019),** for example, investigated the career intentions of 184 early career teachers from Michigan Indiana. Linear re gression analyses show that positive administrative climate is strongly associated with lower levels of burnout. While administrative climate is not directly associated with turnover, the high levels of burnout (a consequent of low measures of administrative climate) is. These findings provide an explanation for the role of school leadership as top determinant of teacher mobility. Although the small sample and the correlational nature of the study cannot suggest causation since it cannot control for unobserved confounders, it does provide tentative evidence that teacher burnout is an important factor. There are also limitations in the Burnout instrument – using only 4-point Likert scale instead of 7 and treating as a continuous variable rather than categorical variable.

Other studies have suggested that the link between teachers' working conditions and intention to leave is not clear-cut. **Shirrell's (2014)** study, for example, showed that around 10% of student teachers changed their decision about teaching in the same district after they completed their teach ing in school. But the challenging conditions of the school did not predict whether student teachers were more likely to leave or not. The study explores the relationship between school-working con ditions and teacher attrition using survey data from student teachers in a large urban district and a series of ordered logistic regressions. Data from several surveys of more than 1,000 student teachers during the 2008–09 or 2009–10 school years was merged with extensive data on the student demo graphics, achievement, and teacher turnover at the students' teaching schools. Although the author reported that there is some evidence suggesting that worse working conditions in student teaching schools are associated with decreases in the lengths of time student teachers plan to teach during their careers, it is unclear whether student teachers' plans to stay in teaching or not are influenced by the working conditions in the school they taught. This study was rated 2* because turnover was based on respondents' reported intention, and there was no indication of what the student teachers actually ended up doing later on in their career or even whether they enter teaching.

A study in England surveyed over 1,000 current and former teachers to find out what motivated them to join teaching and what made them leave **(Perryman & Calvert 2019).** Respondents were former trainees from one institution in London. The top reasons cited by those who have left and those who intended to leave in the future were workload (83% and 71% respectively). Accounta bility (target driven culture) and lack of administrative support were also among the top 6 reasons given by teachers for leaving teaching. However, teachers in the survey were clear that it was not the workload as such, but lack of support and the accountability culture that was not something they had anticipated when they entered teaching. This has led to many leaving or considering leaving. In other words, it was the nature rather than the quantity of workload, linked to performativity and accountability that was the deal breaker for teachers. This study was rated 1* because of the low response rate (33%), which means that respondents would be self-selected and views would not be representative of the large majority. Also, the evidence is based on teachers post hoc rationalisation, and those that are least happy with the workload would be most likely to respond.

The Department for Education in England also conducted interviews with 80 primary and secondary teachers who have left in the previous two years **(DfE 2018).** The most common reasons cited for leaving were workload, government policy and lack of leadership support. Similar findings were reported in the House of Commons Report **(2017),** which cited unmanageable workload as a key

driver for teachers considering leaving the profession. In the case of England, workload is often attributed to government policy and Ofsted (Office for Standards in Education) inspection. School accountability is perceived to have played an important part in increasing workload. **Lynch et al.'s (2016)** interviews with 21 teachers also cited workload as the key driver for teachers are considering leaving. These studies are awarded 0* rating because of the small sample, which are likely to be subject to some self-selection bias. Nevertheless, they offer some insight into teachers' career decisions and factors influencing those decisions.

There is also some evidence that reducing the working hours or length of working week may not be enough to encourage teachers to stay in teaching or in the schools. A large-scale longitudinal time-series analysis of district data found no evidence a four-day week will improve teacher retention over time, once other relevant predictors are controlled for **(Maiden, Crowson & Byerly 2020).** The compared the retention rates of teachers within and between districts. Regression analysis showed that variations in retention across districts over the five-year observation period indicate that teacher salary and instructional expenditures were significant positive predictors of teacher retention rate while administrative expenditures and proportion of students on free and reduced lunch were signif icant negative predictors of retention rate. They found that when four-day week and teacher salary were added to the regression model, district-level salary significantly moderated (p=.0143) the effect of instructional expenditures on teacher retention rate, but four-day week was not a significant moderation. As in previous studies, Maiden et al. also found that the lack of administrative support is one of the important reasons for teachers leaving the district or the profession

Cohen (2005) analysed data of 3,172 novice teachers from the 1999–2000 Schools and Staffing Survey (SASS) which included data on measures of teacher turnover, teachers' working conditions, teachers' background and professional preparation, and teachers' attitudes about collegial relations. The study compared retention of novice teachers who have the 5 components of induction with those who did not. These components included mentoring, workload reduction, supportive com munication, common planning and professional development. Workload reduction was not found to relate significantly to turnover. Almost all teachers (about 10% to 11%) reported workload reduction. 80% of those who received supportive communication stayed in teaching compared to 74% who left. As with Johnson, Kraft & Papay's study, Cohen also found that schoolwide collegiality (i.e., social relationship with colleagues) is associated with a reduction in teacher turnover. But the results are hard to interpret because of the complex interactions among the 5 components and school characteristics. For example, supportive communication reduces the odds of turnover only in schools with low levels of commitment. In schools with high levels of commitment, the reverse is true, with supportive communication being associated with high probability of turn

Other weaker studies (rated 1* and below) also suggest that working conditions are fundamentally important to keep teachers in schools. In a survey of teachers in high-need areas, the most common reasons cited by teachers who intended to leave were lack of a supportive environment and burnout due to students' needs, while money was not emphasized as a reason they were planning to leave **(Petty et al. 2012).**

Similarly, **Whitfield's (2021)** study of the Robert Noyce scholarship programme in Texas, US, found that the scholarship programme had little impact on retention in high need schools beyond the required period. Some of the reasons cited for not staying on in high-need schools include personal reasons, standardized testing, autonomy, job burnout, and apathetic students as factors that would make them leave or stay in high-need schools. By far, the most frequent reason given for leaving or staying in high-need settings was school context. This includes administrative support, which was frequently cited as an important reason for staying or leaving a high need school. Retention in high

need schools may have been improved simply from the teachers' closer experience with them. The Robert Noyce scholarship programme is a monetary award for STEM teachers with the condition that students either have to teach in a high-need school for one to four years or pay back the funds as an interest-bearing loan. The length of the commitment depends on the number of semesters the student accepted funding.

A weaker study that evaluates the alternative programmes, Immersion/iZone and Project Inspire (Ware 2018) revealed that the most likely retention strategies influencing teachers' decision to remain teaching in low performing schools were strong support from the administrator and building relationships with students. Competitive salaries for teachers was also mentioned by respondents as an effective retention strategy. iZone recruits also thought professional development opportunities were important for retention, while Project Inspire recruits thought bonuses were important. This study was rated 0* because of the lack of comparators in the analysis.

In summary, evidence from the medium quality studies suggests that working conditions that are specific to the schools, e.g., administration support and leadership quality of the school, are important influencing factors in teachers' decision to stay or leave school, but not necessarily the profession. But it is hard to say if working conditions per se are drivers since there are multi ple ways of measuring the working environment of the school or the profession. Nevertheless, there is some strong evidence that leadership or administrative support are important. In general, teachers are willing to work long hours, accept lower pay if the working environment is collegial and supportive. What teacher want is a happy place to work in.

Closely related to working conditions is the accountability culture of the profession, which can have a negative impact on teachers' wellbeing and mental health. Constant changes in government policy on education can also add stress to teaching. In their edited book that looked at research from across nine different countries, Poppleton & Williamson (2004, p. 308) found that in countries that experi enced "government initiated and tightly controlled reform" teachers reported the greatest negative impact on their work lives. A comprehensive review of strategies to recruit and retain teachers (See et al.) concluded that accountability programmes had mixed or neutral/negative effects on teacher retention.

Table 2.9: Accountability (n =7)

Strength of evidence	Positive (n =1)	Mixed or unclear (n = 4) Null or	negative (n =2)
3*			
2*	• Boyd et al 2008	• Clotfelter et al. 2004 • Fuchsman, Sass & Zammarro 2020 • Sallman 2018 • Shirrell 2014	• Ingersoll, Merrill & May 2016
1*			• Robertson-Kraft 2014 • (also Robertson-Kraft & Zhang 2018)
0*			

Ingersoll, Merrill & May' (2016) analysis of the Schools and Staffing Survey and the Teacher Follow up Survey data suggests that accountability has a negative impact on retention, but particularly in low-performing schools and schools that received sanctions for low performance. However, the neg ative effects on teacher turnover can be mitigated if teachers are given greater classroom auto The authors argued that if teachers were to be held accountable for their student performance, they must also be given some control over their classroom instruction.

In another longitudinal study, also using the Schools and Staffing Survey and Teacher Follow-up Survey, **Sallman (2018)** examined the association between the retention of ethnic minority teach ers before and after the implementation of the standards-based accountability (SBA) framework of NCLB. Under NCLB schools are required to set their achievement standards, administer annual assessments upon which schools are identified based on the annual progress made. The quasi-ex perimental study used a difference-in-difference design to compare the retention rates of teachers in states that implemented an accountability framework prior to NCLB with states that had not done so prior to NCBL. The assumption is that No Prior states would experience the biggest impact of NCBL, while Prior States would experience little or no impact given their previous exposure to such policies. States that had no previous exposure to NCBL showed a consistent decline in retention following the implementation of NCBL while retention in Prior states remained the same. The author argued that this was because Prior states were able to implement SBA under NCBL with greater fidelity and so the impact was greater for Black teachers in those states. However, the results for Black teachers are baffling. Black teachers in Prior states experienced a bigger decline in retention following NCBL than Black teachers in No Prior states. Using a DD model this relationship was significant for Hispanic, but not for Black teachers. However, using linear probability model, the relationship between perceptions of classroom autonomy and retention was significant for Black but not for Hispanic teachers.

Shirrell (2014) did a similar analysis to evaluate the impact of accountability under NCLB where schools are held accountable for the performance of ethnic minority subgroups if the number of students in those subgroups exceeded 40. Using the minimum number as the threshold for a regres sion discontinuity analysis, the author compared schools on either side of the threshold before and after NCLB and also teachers of different ethnic subgroups using a difference-in-difference analysis The study found that Black teachers in schools who were held accountable for the performance of Black students were less likely to leave than Black teachers in schools not accountable for the performance of Black students. Accountability, however, had no effect on the attrition for the White subgroup. The author explained that it could be that Black teachers were more likely to be paired with ethnic minority students, and were more motivated to stay on in schools that made an effort to support the achievement of Black students. This perhaps explains the counterintuitive finding in Sallman's study.

Shirrell also compared student teachers' career intentions before and after they began teaching. In terestingly, the results showed that challenging working conditions did not predict student teachers' career decisions, but they did reduce the length of time students said they plan to stay in teaching. In general, there is no evidence that accountability and working conditions have a big impact on ethnic minority primary school teachers' decision to leave or stay in teaching. Where high stakes exams in secondary schools matter, accountability pressures are likely to be bigger.

Fuchsman, Sass & Zammarro (2020) took advantage of a policy change in the testing system in Georgia in 2011 when testing was removed for Grades 1 and 2, and from 2017 onwards when testing was removed for some subjects for Grades 6 and 7. Using a difference-in-difference approach the authors compared changes in the mobility of teachers over time in grades/subjects that discontinu

testing vis-à-vis grades/subjects that are always tested. The study found no impact on teachers' likelihood of leaving teaching or changing schools within a district or moving between districts. How ever, there was a small impact on the retention of early career teachers (those with less than 5 years of experience). The probability of early career teachers in Grades 1 and 2 leaving the profession was reduced from 14% to 13% points and from 14% to 11% points for teachers in Grades 6 and 7.

Boyd et al. (2008) analysed data on all public primary school teachers in New York State from 1994–1995 through 2001–2002 to estimate the effect of the implementation of state-mandated testing in Grade 4 on teacher turnover. Interestingly, the study found that the turnover rate of fourth-grade teachers decreased relative to teachers in other grades since testing began. The au thors speculated that this could be because 4th grade teachers were more likely to be experienced teachers, especially in urban schools and schools with very high or very low achieving students. They were also more likely to be given more resources to help them prepare students for the exam. Further analysis on reallocation of resources was not conducted to confirm if this was the case. The finding of this study, therefore, contradicts popular belief that teachers are leaving tested grades as result of the implementation of high-stakes testing. But it does illustrate that it is not the pressure or the workload associated with testing, but whether necessary support is available.

Robertson-Kraft (2014/2018) also found no evidence that teacher accountability negatively impact on teacher retention. The study evaluated the impact of INVET, a teacher performance man agement programme in Texas. Under this programme teachers' performance are assessed based on classroom observations using a teacher observation framework as well as by progress made by their students. The survey included 2662 teachers (60% response rate) and teachers were asked about their perceptions and experiences of the new performance management system as well as their decision to stay/leave. The study found that turnover rates grew faster in the INVEST pilot schools. It seems that it was the unmanageable amount of paperwork associated with INVEST that contributed to teachers' sense of wanting to leave. Again, this illustrates the point that it is not accountability as such, but the necessary support needed that is the deal breaker.

Clotfelter et al. (2004) analysed the North Carolina's ABCs (where A is for accountability, B for basic skills and C for local control) accountability to see how it impacted on the recruitment and retention of turnover of low-performing primary school teachers. This accountability system had been place since 1996–1997. The authors used a difference-in-differences approach to compare recruitment and retention of two cohorts of teachers before, during and after the programme was introduced. The later cohort (1996–1997) includes teachers in the post-accountability period. If accountability has a deleterious effect on retention, then the decline in retention will be greater for the 1996/07 cohort than for the 1994–95 cohort. The data shows that for both cohorts the number of teachers who remained in their original low-performing in subsequent years fell, but the decline was greater for the 1996/97 cohort. To reduce the chance that the different trends might be the result of other factors rather than the accountability system, the authors normalised the data series using ratio relative to initial year. The results are mixed. After the introduction of the accountability system, teachers in low-performing schools labelled as low performing have increased likelihood of leaving the school (an increase of a quarter over the baseline exit rate). This is true for both new teachers and teachers with 10 years of experience. For experienced teachers in low-performing schools the main statistically significant effect relates to the labelling of the school rather than the accountabili ty system itself. For new teachers, both the accountability system itself and the labelling component have a negative impact.

In summary, there is only tentative evidence that accountability has a negative impact on teacher retention, but the effect is not clear cut. The effect is stronger especially in low perfor mance schools where sanctions or penalties are imposed based on student performance in high stakes assessments and where teachers have little autonomy in the classroom. It affects some ethnic minority groups but not others. Accountability pressures are also less intense for primary school teachers than secondary teachers. Although high stakes assessments and accountability pressures are often cited as reasons for teachers leaving the profession, removing or reducing teacher accountability does not seem to have a clear benefit on retention. Perhaps, as illustrat ed in large-scale longitudinal studies, it is not the accountability, but the leadership support and professional autonomy that are also important to help mitigate against the negative impact, making the pressures more bearable.

Multi-component project to improve teacher effectiveness

In **Stecher et al. (2018)** retention was measured using a teacher survey about their intention. On surveys administered from 2011 to 2015, less than half of teachers in most sites indicated that they would still be working in the same district in 5 years' time. Employment records show that teachers rated effective were more likely than lower-rated teachers to stay in teaching. However, the policy levers did not have the effect of increasing retention as the rate of retention remained the same over the time when the policies were implemented.

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Appendix / appendix

To recruit and retain teachers in kindergartens and schools

– a knowledge base

Recruiting and retaining teachers in ECEC and schools

– a ÿsystematicÿreview of research

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